

Adoption of Social Software for Collaboration

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Abstract

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Adoption of Social Software for Collaboration

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According to some commentary, employees are empowered by simple, flexible and lightweight social software such as blogs and wikis. Using such software, it is claimed they will be able to connect and collaborate beyond boundaries and to benefit organisations in innovation and growth. Extending such claims, commentators also argue that social software challenges existing ways of networking, communicating and collaborating and is likely to cause disruption to some organisations. However, a literature search reveals that it is still unclear for both researchers and practitioners how social software can be exploited for work purposes, and what are the grounds for its adoption. Systematic investigation of the adoption of social software for work collaboration is found to be absent in academic writing.

Organisations continue experimenting on social software, seeking ways to encourage their employees to adopt the tools, and expect to benefit from self-organised, distributed collaboration. This technology adoption is a contingent process. The way members use social software is embedded within the social interaction process, group characteristics, tasks and environments.

Adaptive structuration theory (AST) is adopted for social software-supported collaboration in a way that emphasised its value as a contextual analysis approach. A conceptual framework was developed from the researcher's experiential knowledge, AST and empirical evidence, and then revised with the findings from exploratory studies.

The main theoretical insights induced from empirical evidence are: influence from "meta-users", e.g., supervisors and managers, affects both users' use intention and behaviour. Social structures embedded in social capital can enable or inhibit the adoption of social software. Nevertheless, new social structures do emerge from online conversations. Additionally, the results show that task-technology fit has little relevance to social software adoption.

A case study approach with mixed methods is adopted in this study. Social network analysis and statistical analysis provide complementary support to qualitative analysis. The UK public sector was chosen as the research context. Individuals are knowledge workers in distributed and cross-boundary groups. The asynchronous social software applications studied are blogs and wikis

Declaration

No portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institutes of learning.

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List of Abbreviations

Ajax	Asynchronous JavaScript and XML
API	Application Programming Interface
AST	Adaptive Structuration Theory
CEO	Chief Executive Officer
CMC	Computer-Mediated Communication
CoP	Communities of Practice
CSCL	Computer Supported Collaborative Learning
CSCW	Computer supported cooperative/collaborative work
FtF	Face-to-face
GDSS	Group Decision Support Systems
GSS	Group Support Systems
HICSS	Hawaii International Conference on System Sciences
ICT	Information and Communication Technology
ICTA	Internet Community Text Analyzer
IDeA	Improvement and Development Agency
IM	Instant Messenger
IP	Internet Protocol
IS	Information Systems
ISR	Information Systems Research
JMIS	Journal of Management Information Systems
KM	Knowledge Management
KTC	Knowledge Transfer Chain national project
MISQ	Management Information Systems Quarterly
NoP	Networks of practice
RSS	Really Simple Syndication
SECI	Socialization, Externalization, Combination, and Internalisation
SIM	Social Influence Model
SNA	Social network analysis
SNS	Social networking sites
Socitm	The Society of Information Technology Management
TALK	Transferring Across Local Knowledge
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
TPC	Technology Performance Chain
TRA	Theory of Reasoned Action
TTF	Task-Technology Fit
UTAUT	Unified Theory of Acceptance and Use of Technology

Chapter 1 Introduction

1.1 Research Background

“We are entering the age of new mass collaboration enabled by Web2.0 technology... The new mass collaboration is changing how companies and societies harness knowledge and capability to innovate and create value. This affects just about every sector of society and every aspect of management (p.20).” -Tapscott and Williams (2006), Wikinomics: How Mass Collaboration Changes Everything

Tapscott and Williams' work illustrates the fundamental change in organisations and society with open boundaries, flow of information, and knowledge enabled by the wide use of social technologies.

The emergence of collaboration as a source of innovation is the result of a number of intersecting trends primarily enabled by Internet technology.

Roam working

The advancement in technology redefines the boundary between work and life. Instead of working in the office, now people can work with their devices from anywhere they like. On a blog, Phil Jones of global technology manufacturer, Brother Ltd. UK subsidiary, calls this trend “roam working”. In his words¹,

“Growth in broadband, wireless networks, clouds, 3G and items like netbooks, VoIP and the i-Phone are radically re-defining the space we used to call ‘the office’...Roam workers will present new challenges to businesses as workforces become more and more de-centralised and more scattered. Accessibility to applications in the cloud will be key. Speed and availability of data will be the key component to success.”

The Pew Research Centre conducted a study on American “Networked Workers”, namely, employees who use the Internet or email at their workplace. Networked workers account for 62% of American employed adults. The results show that, overall, 56% of Networked Workers sometimes

¹ Phil Jones' blog <http://jones.tm.mbs.ac.uk/trends/roam-working/>

bring work home and 20% do so every day or almost every day (Madden & Jones 2008).

Globally, Gartner (2007) predicts that by 2011, 46.6 million corporate employees will spend at least one day a week teleworking, and 112 million will work from home at least one day a month. According to Nemertes Research (2007), the number of people working outside the office grows rapidly. In 2005, 57% of organisations said they operated a virtual workplace. By 2006, that number had increased to 83%. These statistics imply that distributed collaboration is becoming the norm for knowledge workers.

Information everywhere

Digital technologies enable information generation and dissemination, which lead to an unimaginably vast amount of digital information in the current world.

The amount of digital information increases tenfold every five years and by 2013, the amount of traffic following over the Internet will reach 667 exabytes (equal to 2^{60} bytes), according to Cisco, a maker of communication devices (Economist 2010). This rapid increase and flow of information is essential for innovation in the knowledge economy (Hatch & Cunliffe 1997).

Denise Gershbein (2009) of frog Design argues that the wide flow of vast information threatens the identity of those individuals and companies who call themselves experts or innovators. She says,

“Today, the question of innovation and achieving it through cross-disciplinary collaboration and knowledge sharing is well beyond deep expertise or broad horizons. We’re beyond the lateral and the longitudinal, beyond the specialist or the generalist.”

“Innovation is achieved after disciplines come together, when their organizing principles, themes, and guiding premises overlay in transparency and there is a resulting exponential accretion of knowledge and possibility.”

Tapscott and Williams (2006) suggest that businesses should blend internal with external experts to capitalise on knowledge and talent wherever it exists in the world. In other words, the ability to integrate and leverage globally-dispersed talent is a key competency for future business. In such an

environment, the traditional hierarchical forms of organising become cumbersome because rapid innovations demand an instant share of information and knowledge. Flatter hierarchies with horizontal communication and decentralised decision-making are preferred (Hatch & Cunliffe 1997).

Transparency

One of the watchwords of the new Internet revolution is transparency. This trend is reflected in other spheres of life, from business and politics to media and entertainment (Cook 2008). To some, this is the basis for collaborative innovation. Tapscott and Williams (2006) observe a shift to “openness” happening in four areas, the first of which is that: rapid scientific and technological advances challenge most managers in existing businesses. The problems they are facing often require cross-disciplinary knowledge and resources across organisations. Secondly, technologies like open systems and open source, such as Linux operating systems and the World Wide Web, propel the movement towards “openness”. Thirdly, the disclosure of pertinent information by corporations, including corporate behaviour, operations, and performance, increases “transparency”, which is essential in a networked economy. Fourthly, economy and society are also open in new ways. Countries and institutions have reduced visible and invisible boundaries by lowering trade barriers, opening up a knowledge repository (e.g. MIT’s OpenCourseWare). Tapscott and Williams (2006) argue that openness, together with peering, sharing and acting globally are four principles for business in this era. They write,

“These four principles ...increasingly define how twenty-first-century corporations compete. This is very different from the hierarchical, closed, secretive, and insular multi-national that dominated the previous century.” “We must collaborate or perish – across borders, cultures, disciplines, and firms, and increasingly with masses of people at one time.” (p.30, p.33)

Net generation

The Net Generation, or generation Y, are people who grow up with Internet technology and are accustomed to using the Internet for collaboration, socialising, file sharing and more (Tapscott & Williams 2006). This is a

community-based generation who are particularly adept at collaborating with others(Gratton 2007).

A study on teens and social media conducted by the Pew Research Centre found that content creation by American teenagers continues to grow, with 64% of online teenagers aged 12 to 17 engaging in at least one type of content creation (Lenhart et al. 2007). In the UK, according to an Omnibus survey, 49% of British youths (8-17 years old) who use the Internet have a page or profile on a social networking site(Omnibus 2007). In 2009, nearly two-thirds of all UK residents were participating in “social computing” , rising to 87% of 18 to 24 year olds (Koehler 2010).

Time Magazine names “You” as Person of the Year for 2006 (Grossman 2006). The reason they give for this is that:

"It's a story about community and collaboration on a scale never seen before. It's about the cosmic compendium of knowledge Wikipedia and the million-channel people's network YouTube and the online metropolis MySpace. It's about the many wresting power from the few and helping one another for nothing and how that will not only change the world, but also change the way the world changes."

The reporter suggests that a revolution is starting, one of which will challenge how we think, organise ourselves, communicate and collaborate with our colleagues.

These four trends are the backdrop for this study. Business writers claim that the employees empowered by social software such as blogs and wikis will benefit organisations in innovation and growth once they adopt new ways of working (e.g. McAfee 2006; Tapscott & Williams 2007). So how are knowledge workers communicating and collaborating in their organisations now?

McAfee (2006) found that most information technologies currently used by knowledge workers fall into two categories, namely, channels such as e-mail and instant messaging, and platforms like intranets and information portals. However, a survey revealed that many knowledge workers are not happy with the channels and platforms available to them. Although all of the respondents used e-mail, 26% of them felt it was overused in their organisations, 21% felt overwhelmed by it, and 15% felt that it actually

diminished their productivity (Davenport 2005). In another survey by Forrester research, only 44% of respondents found it easy to find what they were looking for on their intranet (Morris 2005). Apart from the usability issues, current technologies are not good at capturing knowledge. The channels can only be accessed and searched by people who are in the conversations. Information on the common platform is published by a small number of people and visits to platforms leave no trace (McAfee 2006).

In contrast, social software applications are designed to be easy to use, and provide users with flexibility by imposing minimum structure. Gartner(2010) predicts that “the rigid distinction between e-mail and social networks will erode. E-mail will take on many social attributes...while social networks will develop richer e-mail capabilities” and “by 2014, social networking services will replace e-mail as the primary vehicle for interpersonal communications for 20 percent of business users.” Furthermore, social software can potentially connect multiple stakeholders and facilitate conversations and collaboration among them. Great ideas can come from people inside and outside the company. According to an IBM (2006) survey, employees, business partners and customers are the top three most important sources of innovative ideas

Despite these potential benefits, social software is seen as a disruptive technology because it challenges the existing way of networking, communicating and collaborating (Cook 2008). Although using online social networks like Facebook are becoming the norm in our personal lives (Nielsen 2010b), we are still unclear about how to exploit social software for work purposes. Moreover, technology is only one aspect involved in the collaboration. Management researchers identify a number of barriers to collaboration, including individual values, trust building, knowledge transferring, and constraints from organisational and technological environments (Hansen & Nohria 2004). MIT Professor Erik Brynjolfsson points out “what we need is ‘meta-innovation’ - innovation about ways to innovate. We need innovation not just in the technology but innovation in some of the institutions that manage the collaboration and that manage a global community working on problems (2007, p. 51)”. Similarly, Cook(2008) indicates that most companies have to address cultural, structural and managerial issues before any social software benefits can be realised.

This part explains the background of this research as well as its timely importance. Social software has been experimented widely within both private and public organisations for internal and external communication and collaboration (Barnes & Mattson 2009; Gartner 2010).

1.2 Rationale for the research

1.2.1 Research questions and objectives

As described above, social software has a great potential to support collaboration. These tools are simple, flexible and light-weight. Their network structure is embedded to encourage participation, and users are allowed to generate their own content. Potentially, empowered knowledge workers can use social software tools to express their ideas and learning, converse and socialise with colleagues in different locations, learn and create new knowledge collectively. However, organisations are still learning how to capture the benefits brought by social software (see section 1.4.3 social software at work).

Moreover, when searching for the term “social software” and its synonyms² in key information systems journals, it seems that empirical studies on this topic are still absent. Even when enlarging the search scope, the academic literature mainly addressed the significance of social software at the theoretical level (e.g., Avram 2006; Boulos & Wheeler 2007; Du & Wagner 2006; Luzón 2008; Wagner, C & Bolloju 2005). Individual studies investigated weblog acceptance without linking it to the work context (e.g., Hsu & Lin 2008; Warmbrodt et al. 2008).

This study seeks to answer the question of whether social software can be used to support collaboration, and to understand why and how social software can be used to support collaboration when it takes place.

The following research objectives motivate the study:

- To develop a systematic understanding of social software-supported collaboration by reviewing different theoretical perspectives in the literature and published empirical studies

² Social media, social computing, and Web2.0 are considered as the synonyms of social software in this study.

- To induce theoretical insights from empirical evidence

Three research questions are proposed, as follows:

- RQ1: What motivates actors to adopt social software for collaborative tasks?
- RQ2: What is the role of social software in supporting collaboration?
- RQ3: To what extent can use of social software then affect the nature of collaboration?

This study does not seek to test hypothesis because the phenomena of social software-supported collaboration is new and complex. Social technologies themselves are still evolving (see section 1.4). Also, it is observed that theory on this specific topic is still under development. Thus, this research aims to identify patterns from observations and develop some general theoretical insights (Checkland & Holwell 1998; Van de Ven 2007).

1.2.2 Research scope

This study is interested in social software-supported collaboration. Like any other type of e-collaboration³, social software-supported collaboration consists of four basic elements, namely, task, technology, individuals, and context (Kock 2005). The scope of investigation in each dimension is summarised below.

- Task: collaborative task for knowledge creation
- Technology: asynchronous social software includes blogs and wikis
- Individuals: knowledge workers in distributed and cross-boundary groups
- Context: UK public sector*

The UK's public sector was chosen as the research context for several reasons, the first of which is that exploratory studies have demonstrated that a voluntary context with a single cultural background is more suitable for the

³ According to Kock and Nosek (2005), one of research traditions of e-collaboration is Computer-Supported Cooperative Work (CSCW). Social software is originated from groupware. CSCW is considered as academic term for groupware (see the section "brief history of social software" for more details). Thus, we regard social software-supported collaboration as one type of e-collaboration.

research objective. Availability of access is another reason for selecting the public sector. Local council officers, as knowledge workers, are appropriate subjects for this study. Meanwhile, the TALK project itself and published documents (e.g. SOCITM 2003) suggest that there is a need for UK local authorities to adopt Web2.0 applications to break the boundaries and transfer knowledge.

1.2.3 Research methodology

This research seeks to understand the role of social software in collaboration by investigating the adoption process. The focus of the adoption process is a decision informed by initial literature search in relevant disciplines (section 1.3) and social software (section 1.4).

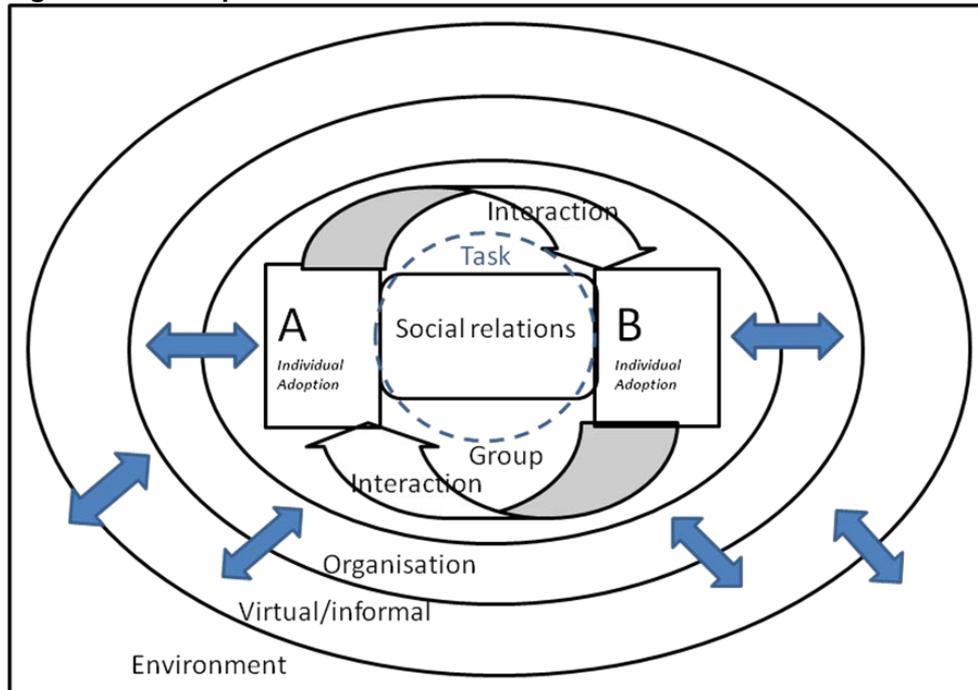
The third research question is thereby further specified as follows:

- RQ3: To what extent can use of social software then affect the nature of collaboration?
 - RQ3 a, b, c, d: How does technology/task/social capital/context enable or constrain the adoption?

According to technology adoption theories, technology, task, social capital and context are the influential factors on the adoption of collaborative technology (DeSanctis & Poole 1994; Zigurs & Buckland 1998). In this study, social software applications are assessed by their functionality and users' perceptions. Tasks are defined by their basic process including communication needs and interdependence among members (McGrath 1984), as well as task complexity. Social capital refers to the structural, relational and cognitive capital. This is emphasized for two reasons. Firstly, in group support systems (GSS) literature, it is reported that members' prior history and group heterogeneity have great effects on technology performance (Fjermestad 1998; Tan et al. 2000). Secondly, social capital is emphasized because of the problem context. Both theoretical and empirical evidences show that knowledge creation is affected by social capital (Hansen 2002; Malhotra, A & Majchrzak 2004; Nahapiet & Ghoshal 1998). "Context" refers to the existing organisational and environmental conditions

include organisational culture and structure, informal networks⁴, as well as the growth of the Internet and social networking sites. Outcomes of social software adoption are assessed using users' satisfaction, which is reported to have positive association with technology benefits (DeLone & McLean 2003). The relationships among these elements are visualised in the conceptual framework below. The conceptual framework is constructed based on the author's own experiential knowledge, prior theory and research (Chapter 2), and exploratory studies (Chapter 3&4).

Figure 1.1 Conceptual framework



To achieve the research objectives, a case study strategy with mixed methods is adopted by this study. A case study approach is suitable for an ill-defined problem context (Yin 2003). Mixed methods aim to address the impact of social software from both social and technological perspectives (Kaplan & Duchon 1988). Social network data, website content, semi-structured interviews and secondary data are collected for investigation of the impact of social software on collaboration. Social network analysis is adopted because it provides insights into interpersonal relationship and is suitable for studying online network (Haythornthwaite et al. 1995). However,

⁴ The conceptual framework was revisited after exploratory studies. Informal network was added as an additional dimension

the priority is given to qualitative methods. Social network analysis and other statistical analysis only provide subsidiary and complementary support.

Although the overall research process is presented in linear form in the Table 1.1, the actual process follows Van de Ven's (2007) Engaged Scholarship research model and is not linear. Engaged scholarship is a general model of implementing mixed methodology, with the purpose of obtaining the different perspectives of key stakeholders. The model is an iterative process of the four activities, namely, a) problem formulation (situate, ground, diagnose and infer the research problem), b) theory building (create, elaborate, and justify a theory by abduction, deduction and induction), c) research design (develop variance or process model to study theory) and d) problem solving (communicate, interpret, and negotiate findings with intended audience). The key to Van de Ven's model is its emphasis on the feedback loop of the researchers' own reflection during the course of the investigation. In the iterative process, alternative adoption theories and models are examined and applied to develop deep understanding of a complex phenomenon.

Table 1.1 Overview of research process

Step 1	Step 2	Step 3	Step 4
Literature review & Exploratory study on student group blogs (8 weeks)	Interviews with local government officers & Literature review on local e-government	Interviews with TALKnet users	Case study on TALKnet (2006-2009)
Study of 20 group weblog used by 115 students; Answering if social software can support collaboration? Quantitative and qualitative analysis of weblog content and interview data	An exploratory study aimed at finding out how social software has been adopted by local councils. Qualitative analysis of interview data	Pilot study with three TALKnet users Qualitative analysis of interview data	Study of TALKnet adopted in local government: social network data on the active TALK wikis (313 users and 47 group spaces) and blogs, interviews, and secondary data are used to answer research questions SNA, quantitative & qualitative analysis on web content and interview data
Results revealed the complexity of Web-supported collaboration and highlight the importance of group process and social influence. The outputs from this study informed theory building, research design	Results helped researcher to understand public sector as the context for social software-supported collaboration. The results helped to further develop research model	Results provided researcher a general overview about how TALKnet has been used. The results helped researcher to refine interview questions.	Results and reflections informed future research

In two case studies (“student group blogs” and TALKnet), a “sequential transformative design” is adopted for implementing mixed methods (Creswell et al. 2003). That is, the study uses an explicit theoretical lens (critical realism), collects quantitative and qualitative data sequentially, and gives the priority to qualitative data in the analysis. Nevertheless, the actual analysis process is iterative, which involves reading and rereading interview transcripts, collecting additional quantitative data, as well as qualitative data via interviews and emails.

The initial literature search revealed that although the Web-supported collaboration involves multiple disciplines. Sociology, information systems (IS) and e-commerce research fields appear to be most relevant. In the following section, an overview of studies on Web/Internet based

collaboration in these three disciplines is provided.

1.3 Relevance of the Web and collaboration in multiple disciplines

1.3.1 Sociology perspective

Sociologists are most concerned about the social implications of the Internet. The Web/Internet is seen as an important research site for sociologists who want to test theories of technology diffusion and media effects (DiMaggio et al. 2001). They are interested in questions like who uses the Internet and why. What organisational and social changes are brought about by using the Internet? DiMaggio (2001) identifies five domains in research on the Web/Internet's implications: the digital divide; community and social capital; political participation; organisations and other economic institutions, and cultural participation and cultural diversity. Among these topics, sociologists' discussions on community are the most relevant to this study.

Sociologists have a long history of studying the community. However, the definition of community has been revised over the years (Wellman 1982). Physical features, such as location, were the initial criteria for defining the boundaries of communities. With the advent of higher technology, people can form communities based on need without considering locations. Thus, the strength and type of relationships among people have become alternative criteria for defining a community (Haythornthwaite & Wellman 1998; Wellman, B. 1997). Another closely relevant research stream is the virtual group or team. Rooted in sociology, the studies of virtual groups or teams focus on the group process, during which actors interact with each other. In essence, an electronic group is a virtual social network (Wellman, B 1997). Therefore, these two streams deliver similar messages to the studies of online collaboration. Firstly, social interaction considerably affects group use of technology (Powell, A et al. 2004). Thus, relationships among members can be used as a potent indicator of a social network (Wellman, B 1997). Secondly, social implications of the Internet are also shaped by economic, legal, and policy decisions when new technology becomes institutionalised. DiMaggio (2001) suggests that researchers include a comprehensive analysis of the constraining factors in an institutional and political-economic environment into the findings on individuals' Internet-use behaviour. Additionally, the Internet is an everyday technology (Wellman &

Haythornthwaite 2002). Internet users and the Internet have been continuously shaping each other, and a movement from Web1.0 to Web2.0 has been witnessed. It is very likely that the evolution of the Internet will continue as different groups seek to mould technologies to their own interests (McGuire & Granovetter 1998 in DiMaggio et al. 2001).

Moreover, research methods used in sociology, such as social network analyses (Haythornthwaite 1998; Haythornthwaite et al. 1995) and digital ethnography (Masten & Plowman 2003; Wesch 2008) offer promising alternatives to study online communities. However, there are a couple of practical issues concerning data collection, one of which is that, in order to gather social network data, researchers have to ask sensitive questions in their surveys, and respondents may be reluctant to provide the true answers (Preece 2000). The other issue is that these methods are time-consuming, since developing a relationship takes time. A longitudinal study with multiple methods has the potential to uncover the patterns in an online community (Schoberth et al. 2003).

1.3.2 Technological perspective

Although technology is placed at the centre of the topic in this perspective, there is a socio-technical spectrum inside the technological perspective.

There are three general theories in information technology research: technology-determined, interaction, and social-determined⁵.

At one end of the spectrum, people with a technology-determined view assume that behaviour is determined externally by the environment or by technology. Studies are usually related to the design and development of Websites. Emphasis has been put on multiple measures, such as usability, navigability, interactivity, and responsiveness (Palmer 2002; Preece 2000). However, some soft aspects, such as sociability, site content and organisational incentives, have been brought into focus by Web developers (Palmer 2002; Preece 2000; Sulin et al. 2001). Nevertheless, the basic assumption on this side is that users are able to notice technological features and realise their design functions. We all know that it is often not the case.

⁵ Detailed accounts about three general theories, as well as a justification about why the interaction theory has been adopted in this study are provided in the Appendix- A summary of theoretical perspectives in IT research.

Anecdotally, “techies” sometimes magnify the difference in technical features across applications. For instance, blog and discussion forum are considered as two separate pieces of technology. Whereas, for users, the difference is limited as they can leave comments on both of them. Also, there is evidence that different social software applications, such as social networking sites, blogs, and micro-blogs are sharing more and more features. For instance, both Facebook and Blogspot have installed micro-blogging features: Facebook enables status updates while Blogspot allows bloggers to follow each other. This trend will inevitably blur the boundaries between these applications. Researchers who want to evaluate social software sites have to both study the functions provided by websites and how users perceive and use those functions. In fact, social interaction and users’ perceptions can provide deep insights into how a piece of technology has performed (Jones, S & Hughes 2001).

At the opposite end of the spectrum, the social-determined theory assumes a person's or a group's behaviour is determined internally. Thus, researchers with such a view tend to focus on users’ attitudes and behaviour. It is important for users to accept new technology. They will only realise technological benefits when they are willing to use these tools. The problem with this extreme view is that IT artefacts are not described, conceptualised or theorised. Hence technology is essentially absent in the studies (Orlikowski & Iacono 2001). An improved version of the social-determined theory is an ensemble view. The "ensemble" view defined by Orlikowski and Iacono (2001) regards technology as being only one element in a package of resources. In line with this view, system use is usually included in the discussion.

However, although system use is one of the most frequently reported measures of IS success (DeLone & McLean 1992, 2003), there is little consistency in the findings of past investigations (Burton-Jones & Straub 2006). The main issue is that system use is very often treated as a proxy for performance impacts in technology-adoption studies. The assumption behind this is that utilisation leads directly to improved performance. However, in IS success studies, although positive association is shown between user satisfaction and system benefits (Iivari 2005), it is hard to determine the correlation between user satisfaction and use. In other words,

it is unclear whether system use predicts user satisfaction or vice versa (DeLone & McLean 2003).

The interaction theory has to be introduced to explain the missing link between technology adoption and performance. Situated in the middle of socio-technical spectrum, the interaction theory assumes that the characteristics of individuals interact with the characteristics of the system. On the group level, different responses to technology may be given by the same group of users in different settings (Markus 2005). Following this perspective, the answer to the question of why there is no straightforward connection between collaborative technology adoption and performance may be that an individual user's perception of new technology change over time (Chiasson & Lovato 2001). This individual possibly conducts a self-directed learning process via communication behaviour (interaction with other users or IS professionals for information exchange about IT) and/or through independent exploration behaviour (information search undertaken independently and spontaneously to achieve a good command of IT) (Barki et al. 2007). The second possible explanation is that same individuals use the same technology differently when they have different tasks in hand. Humans are all creative individuals, and when a task is mismatched with technology, users tend to adapt either the technology or the work process (Barki et al. 2007). However, individual differences in IT ability exists among people (Rogers 2003). Undoubtedly, performance of the same collaborative technology is likely to vary if there is dramatic change in some aspect of group members' background, such as age or IT skills. Another plausible reason for why a link between usage and performance is hard to detect is that a traditional evaluation approach considers users as being stand-alone (Neale et al. 2004). However, in the context of e-collaboration, an individual user not only interacts with the computer system, but also with another user through IT or a meta-user (e.g. supervisor) (Burton-Jones & Straub 2006). Furthermore, technology is often embedded in a large system. Users are indeed social actors. "Most people who use ICT applications utilise multiple applications, in various roles, and as part of their efforts to produce goods and services while interacting with a variety of other people, and often in multiple social contexts" (Lamb & Kling 2003, p. 197). As a social actor, a person's use of technology at work is affected by at least four dimensions: affiliation (i.e., organisational and professional relationships), environments (practices, association, and locations which restrict organisational action),

interactions (information, resources, and media of exchange among members of organisations), and identities (individual and group identities in the organisations) (Lamb & Kling 2003). In short, the unclear connection between technology and performance is caused by five intertwined elements, i.e., individual, group, technology, task, and specific context.

This study adopts an interactive view to explore social software supported collaboration.

1.3.3 E-commerce perspective

E-commerce practitioners locate Web technology in the business context. One result of using the electronic network is the rise of co-creation. The concept of co-creation was first introduced to the business community by Prahalad and Ramaswamy (2000). Although users had already been recognised as a source of product innovation in the 1980s (Von Hippel 1986), user-involved co-creation was not widespread until the emergence of Web2.0 technology. Initially, co-creation describes a trend of products and services jointly created by the business and the customer. It also refers to a movement in e-commerce. This means that the purchase of goods and services is being regarded as part of the customer experience, rather than a simple transaction (Prahalad & Ramaswamy 2000). Later, the definition of co-creation was extended to both business-to-customer (B2C) and business-to-business (B2B) cross-boundary co-creation, spanning various scales and scope. Some misunderstood co-creation as being marketing techniques. Subsequently, social software applications become hugely popular among marketers. However, there is evidence to show that the technology fever is fading (Gartner 2010).

The Promise Corporation recently conducted a systematic review of co-creation evidence, in collaboration with LSE Enterprises. The review considers associated concepts and approaches, including open innovation (e.g. Linux operating system), mass-collaboration (e.g. Wikipedia), mass customisation (e.g. NikeiD), user-generated content (e.g. youtube.com), co-production (e.g. IKEA), and collaborative innovation (e.g. Airbus), and reveals that all of the published cases contain one of three elements: (1) purpose-driven innovation (2) consumer involvement or (3) cross-boundary collaboration (Roser et al. 2009). The report further defines co-creation as

being “an active, creative and social process, based on collaboration between producers and users, that is initiated by the firm to generate value for customers” (Roser et al. 2009, p. 9). On the basis of this definition, crowd-sourcing is excluded from co-creation as it is often a process involving “a one-sided flow of information from customers to companies” (Roser et al. 2009, p. 11). Moreover, the study recognises that co-creation is a knowledge process. For companies, it is the quality of their relationship with customers rather than the frequency of interaction, which will decide “how knowledge is created, shared and transferred” (Roser et al. 2009, p. 10).

Although Promise’s literature review is limited to the customer-company relationship involved in co-creation, co-creation is not just about involving customers. As Tapscott and Williams (2006) indicate in their book, the large-scale collaboration is transforming the way companies and societies harness knowledge and capability to innovate and create value, which affects almost every sector of society and every aspect of management. Along the same lines, Ramaswamy (2009) claims that organisations have to be designed to support interactions among individuals everywhere in the system in order to facilitate value creation. In the article, he says, “becoming a co-creative organisation is impossible without the active involvement of managers at all levels and every employee who interacts with customers – from the call centre operator to the service mechanic, from the sales representative to the logistics manager, from the software engineer to the product developer” (p. 36). In short, organisations need to develop an approach to engage all stakeholders to release the power of co-creativity. These claims present a holistic view and indicate the complexity of co-creation. To some extent, the holistic view also illustrates the strategic significance of this study. Secondly, in the co-creation paradigm, value is a function of experiences for organisations, which is realised through consumers’ interaction with the product and with a community of other users supported by web platforms and offline spaces (Ramaswamy 2009). In other words, the quality of the relationship between consumers and companies, as well as the social bond between members in user communities, should be focused on encouraging knowledge sharing, transfer, and creation.

Review of relevant studies in three disciplines provided empirical and theoretical insights into social software-supported collaboration, which

directed further literature search.

Since social software is an ill-defined concept itself, its history is reviewed and the scope of social software relevant to this study is define.

1.4 Social software

1.4.1 Defining Social software

Technology-wise, web-based social software or Web2.0 Internet technology is not really revolutionary compared to its previous generation (Berners-Lee 2006) even though some have noticed differences between Web1.0 and Web2.0 in scripting and presentation technologies (Cormode & Krishnamurthy 2008). However, many assert that social software potentially transforms our work and lives by challenging the current thinking and disrupting the established ways of doing things (e.g. Cook 2008; Leadbeater 2008; McAfee 2006; Shirky 2008; Tapscott & Williams 2006; Weinberger 2007).

There have been various attempts to define social software (Table 1.2), from a concise definition of “software that supports group interaction” (Clay Shirky) to a more elaborate one, “Social Software can be loosely defined as software which supports, extends, or derives added value from, human social behaviour - message-boards, musical taste-sharing, photo-sharing, instant messaging, mailing lists, social networking (Coates 2005).” Although there is disagreement about the scope of social software, Christopher Allen (2004) of Alacrity Ventures emphasises three basic premises of identifying social software, the first of which is that social software supports group interaction. Secondly, group processes precede the software. Additionally, social software is based on the World Wide Web and does not include standard software packages, such as Lotus Notes and Microsoft calendar system.

Table 1.2 Definitions of Social Software

Definitions	References
“Software that supports group interaction”	Clay Shirky in Allen (2004)
“Social software can be loosely defined as software which supports, extends, or derives added value from human social behaviour’ Farkas specifies social software as a tool that must meet at least two of the three following conditions: 1) it allows people to communicate, collaborate, and build community online; 2) it facilitates syndication; 3) it lets people learn easily from and capitalize on the behaviour or knowledge of others.”	Tom Coates in Farkas (2007)
“Social software is any software that supports group communications. The dynamics of social software are significantly different from traditional interactions. Social software allows emergent behaviour to control the content of the information created.”	(Green & Pearson 2005)
“Web 2.0 is the business revolution in the computer industry caused by the move to the internet as platform, and an attempt to understand the rules for success on that new platform. Chief among those rules is this: Build applications that harness network effects to get better the more people use them.”	(O’Reilly 2006)
The key concepts related to Web2.0 are: individual production and user generated content; harness the power of the crowd; data on an epic scale; architecture of participation; network effects; openness.	(Anderson 2007)
“Social computing describes any type of computing application in which software serves as an intermediary or a focus of a social relation.”	(Schuler 1994)
“Several common characteristics may be observed among social computing platforms that differentiate them from traditional organizational computing and content sharing. All of these are decentralized to varying degrees. They are all dynamic with continual refinement in the content and online activity, as well as refinement in how different units of content are tagged and rated.”	(Parameswaran & Whinston 2007)
“Social computing is computational facilitation of social studies and human social dynamics as well as the design and use of ICT technologies that consider social context.”	(Wang et al. 2007)
“Social computing is a social structure in which technology puts power in communities, not institutions.”	(Charron et al. 2006)
“Social media is best understood as a group of new kinds of online media, which share most or all of the following characteristics: participation, openness, conversation, community, and connectedness. Basic forms of social media include social networks, blogs, wikis, podcasts, forums, content communities, and microblogging.”	(Mayfield, A 2008)

Notes: social media, social computing and Web2.0 are treated as the synonyms to social software.

To clarify its nature and relevant concepts, it is necessary to review the history of social software. To the author’s knowledge, Christopher Allen (2004) was the first person to trace the evolution of social software. Similar accounts are found in Cook’s (2008) book on Enterprise 2.0. The following introduction is mainly extracted from Allen’s article.

1.4.2 Brief history of social software

The history of social software can be traced back to Vannevar Bush's ideas about a hypertext-like device called "memex" in the 1940s, and it has been known by various terms, including Augmentation, Groupware, and CSCW, in the 1960s, 70s, 80s, and 90s.

In 1945, Vannevar Bush wrote a seminal article on the future of computing in "As We May Think", in which he described the device "memex" as "a device in which an individual stores all his books, records, and communications, and which is mechanised so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory." In the same article, Bush(1945) described some of the potential benefits of the memex machine to groups.

"Wholly new forms of encyclopedias will appear, ready-made with a mesh of associative trails running through them, ready to be dropped into the memex and there amplified. The lawyer has at his touch the associated opinions and decisions of his whole experience, and of the experience of friends and authorities. The patent attorney has on call the millions of issued patents, with familiar trails to every point of his client's interest. The physician, puzzled by its patient's reactions, strikes the trail established in studying an earlier similar case, and runs rapidly through analogous case histories, with side references to the classics for the pertinent anatomy and histology. The chemist, struggling with the synthesis of an organic compound, has all the chemical literature before him in his laboratory, with trails following the analogies of compounds, and side trails to their physical and chemical behavior."

In 1958, the Advanced Research Projects Agency (ARPA) was formed and it developed the first successful satellite. In 1962, under the leadership of Dr. J.C.R. Licklider, the ARPA changed its focus and began to offer research grants to universities. His efforts led to the birth of ARPANET, and ultimately, the Internet itself.

Licklider envisioned a time when computers would be able to interact in real time with human beings, thus contributing to their ability to formulate insight and make decisions. Licklider(1960) set out this vision in his paper "Man-Computer Symbiosis".

“Man-computer symbiosis is an expected development in cooperative interaction between men and electronic computers. It will involve very close coupling between the human and the electronic members of the partnership. The main aims are 1) to let computers facilitate formulative thinking as they now facilitate the solution of formulated problems, and 2) to enable men and computers to cooperate in making decisions and controlling complex situations without inflexible dependence on predetermined programs.

In the anticipated symbiotic partnership, men will set the goals, formulate the hypotheses, determine the criteria, and perform the evaluations. Computing machines will do the routinizable work that must be done to prepare the way for insights and decisions in technical and scientific thinking.” (in Cook 2008, p. 26)

Later, Licklider(1968) wrote “The Computer as a Communication Device” with Robert Taylor, predicting that “in a few years, men will be able to communicate more effectively through a machine than face-to-face”. In the article, he first introduced the concept of “on-line interactive communities” and communities of interest:

“In most fields they will consist of geographically separated members, sometimes grouped in small clusters and sometimes working individually. They will be communities not of common location, but of common interest. In each field, the overall community of interest will be large enough to support a comprehensive system of field-oriented programs and data.

In each geographical sector, the total number of users—summed over all the fields of interest—will be large enough to support extensive general-purpose information processing and storage facilities. All of these will be interconnected by telecommunications channels. The whole will constitute a labile network of networks—ever-changing in both content and configuration.

What will go on inside? Eventually, every informational transaction of sufficient consequence to warrant the cost. Each secretary’s typewriter, each data-gathering instrument, conceivably each dictation microphone, will feed into the network.

You will not send a letter or a telegram; you will simply identify the people whose files should be linked to yours and the parts to which they should be linked—and perhaps specify a coefficient of urgency. You will seldom make a telephone call; you will ask the network to link your consoles together.”(in Cook 2008, pp. 26-7)

The above description could easily be applied to today's social networking and collaborative working communities.

Inspired by Vannevar Bush's vision, Douglas Engelbart set up a research lab and created the first successful implementation of the hypertext, oNLine system (NLS). The computer mouse was invented in the same lab, as well as the first on-screen video conference. In October 1962, Douglas Engelbart published "Augmenting Human Intellect: A Conceptual Framework" and set out his design thinking. He said that, in order to design augmentation tools, developers have to "integrate psychology and organisational development with all of these advances in computing technology".

In the 1970s, the focus was on "office automation", which was a term coined by IBM. Some argue that the idea of collaboration was lost in the ideas of process and automation. Nevertheless, one automation tool, the Electronic Information Exchange System (EIES) is widely regarded as being the first major example of collaborative software(Allen 2004). The EIES featured threaded-replies, anonymous messages, and polling, which pioneered many of the concepts of online discussion forums. In 1978, having experienced EIES, Peter and Trudy Johnson-Lenz coined the term "groupware" and defined it as "intentional group processes, plus software to support them".

However, the academic community preferred Computer-Supported Cooperative (or Collaborative) Work, or CSCW, rather than the terms "groupware" and "office automation". An annual CSCW conference is still held by the Association for Computing Machinery. There was a debate about different definitions of the second "c" because the people initially involved with this conference came from two different disciplines: human-computer interaction (HCI) and information systems communities. According to Scott Schopieray(2003), cooperation is focused on the product and collaboration in the process.

The term "groupware" hit the mainstream when Robert Johansen published his best-selling business book of the same name. Allen(2004) thinks it was due to the success of the book that the term 'groupware' was corrupted by marketing:

“Initially the co-opting was done by Lotus Notes, which I personally didn't feel deserved to be called groupware, as it was really more of a multi-user database that could be used to make groupware, but wasn't actually groupware. Then Microsoft further corrupted the term when they released Microsoft Exchange Server and Outlook with calendaring features to compete with Lotus Notes, and called that groupware as well.”

The invention of World Wide Web system in 1989 is regarded as being the most important catalyst of social software (Cook 2008). It was K. Eric Drexler, founder of the Foresight Institute, who is considered to have first used the term in “Hypertext Publishing and the Evolution of Knowledge”, originally published at the Hypertext' 87 conference. Drexler explains why he used the term in a reply to Christopher Allen(2004):

“I used the term 'social software' because I am concerned with communication and collaboration on all scales, including the whole of society. Thus, I see media at the scale of the World Wide Web as forms of social software.”

The first Social Software Summit was held in November 2002, which marked the fact that social software had been accepted as common usage after 15 years. In a reply to Allen (2004), Adlina Levin of Social Text explains her thoughts about the difference between today's social software and the old versions:

“Several years ago, in the depths of the tech recession, there were signs of creative life in weblog and journal communities, conversation discovery with daypop and then technorati, the growth curve of wikipedia, mobile games, photo and playlist sharing. The liveliness was about the communities, and also about the culture of tool mix'n'match bricolage. Many of the attributes of social software — hyperlinks for naming and reference, weblog conversation discovery, standards-based aggregation — build on older forms. But the difference in scale, standardization, simplicity, and social incentives provided by web access turn a difference in degree to a difference in kind.”

In summary, the history of social software shows that many of the characteristics of today's Web2.0 social software are based on older forms suggested and developed by scientists, long before the birth of the Internet. However, the recent convergence of technological, cultural and societal factors has engendered the aspiration and ability of people to use technology to communicate, connect and collaborate with one another on an unprecedented scale. From here onwards, social software refers to Web2.0 social software.

1.4.3 Social software at work

Before Harvard Business School professor Andrew McAfee led public attention to the application of social software in the enterprise (also called Enterprise 2.0), large corporation like Dresdner Kleinwort Wasserstein (DrKW) and IBM⁶ had been experimenting with weblogs and wikis inside their organisations (Fenn & Linden 2005; McAfee 2006).

However, implementing social software in the work context is far more complex than adopting these tools for personal use. Some practitioners point out that enterprise computing includes "legacy environment, innumerable vendors, mismatched data source, stringent regulations and far-flung users" and Enterprise2.0 not only represents new technologies but also brings new development models and delivery methods (M.R. Rangaswami 2006, in Cook 2008).

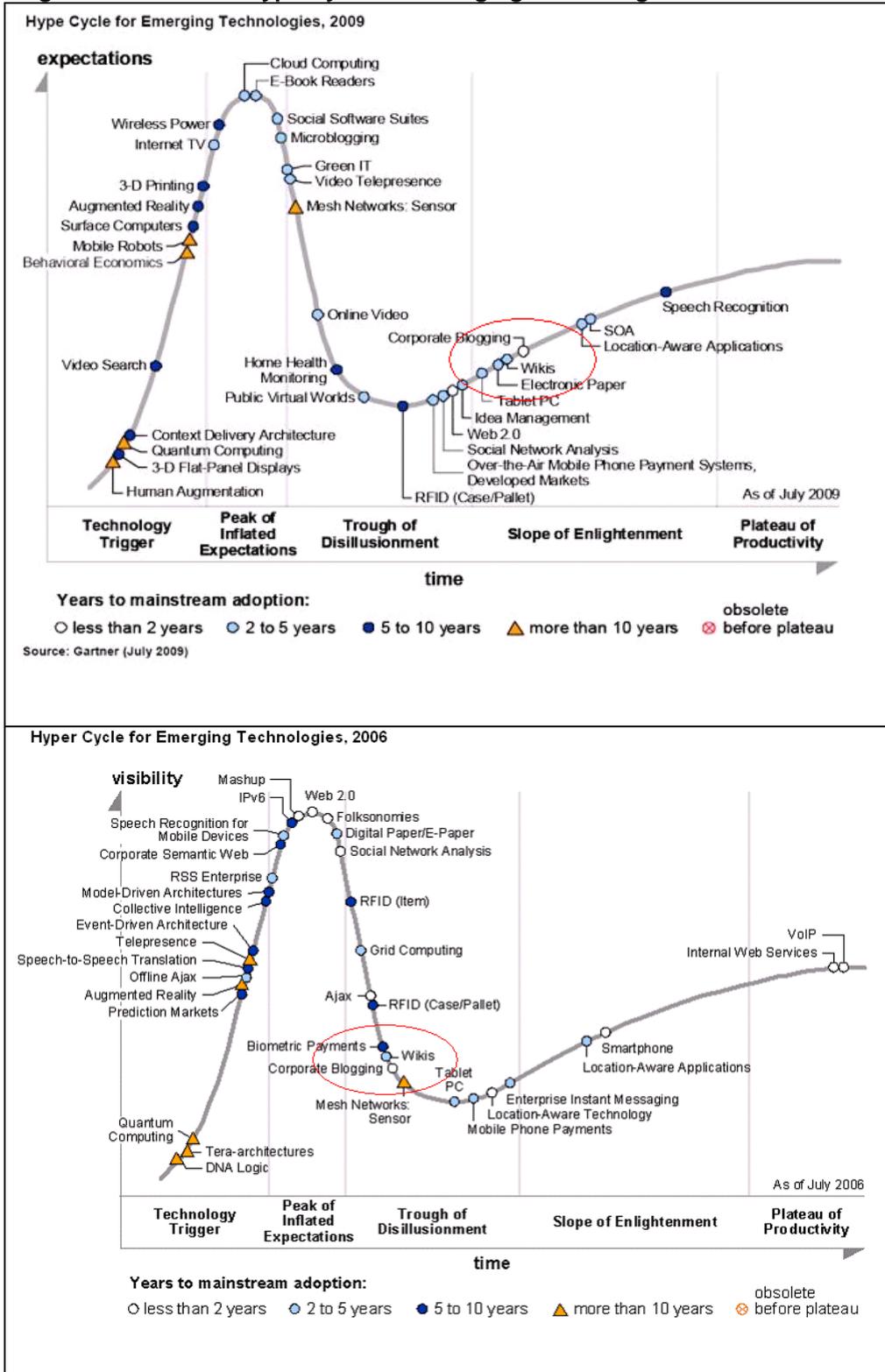
The most evident impact of social software on organisations is its crashing effects on physical and conceptual boundaries. The new social technologies meet employees' need for "informal social communication" (Festinger 1950) and give them power over corporate communication and reputation. Cook(2008) suggests that firms evaluate the match between social software tools and organisations in terms of formality and the level of interaction before implementation. For example, some applications like wikis and social networking sites require a higher degree of formality than weblogs. Organisations may have to review their policies and procedure to provide an appropriate environment for social software adoption.

⁶ Author's own experience

There is debate about the implementation approach. The co-founder of Socialtext, Ross Mayfield (2006), proposes a staged bottom-up adoption strategy, whereas Andrew McAfee (2009) emphasises the importance of top-down support. Writer and blogger, Dave Pollard (2007), suggests a middle-ground approach, empowering “champions” such as current social software users and organisation’s thought leaders, to design and create social software experiments. This adaptable approach is proposed to help organisations to learn and leverage what works for them.

Nevertheless, social software is still at the early stage of adoption. The benefits of these tools are not well understood by businesses. Gartner Research produces annual reports on the adoption of emerging technologies in companies. The researcher extracted and compared the results of 2006 and 2009 reports. The graphs below show that in 2006, social software, such as blogs and wikis, are going “through of disillusionment”. That is, the tools fail to meet expectations and quickly become unfashionable. However, in 2009, both applications are in the “slope of enlightenment”. That means some businesses continue experiment to understand the benefits and practical application of the technology(Gartner 2006, 2009).

Figure 1.2 Gartner's Hype Cycle for Emerging Technologies



1.4.4 Key concepts of social software

Several key concepts of social software are relevant to this research. They are ease-of-use, architecture of participation, and user-generated content. Although these concepts are addressed separately, they are closely linked to each other. It can be argued that easy-to-use social technologies, together with traceable and connected networks, are key drivers to the explosion of user-generated content on the Web, such as YouTube and Flickr.

1.4.4.1 Ease-of-use

The underlying technology of social software is Web technology, which consists of a user-friendly interface and applications, and an open-source and decentralised information structure (Berners-Lee et al. 2006). The ease-of-use characteristic is especially emphasised in Web2.0 in terms of three directions, technological (programming language and presentation technologies applied to support user interaction), structural (user-centred design of layout) and sociological (notions of friends and groups)(Cormode & Krishnamurthy 2008). The use of lightweight programming models for web development, such as Ajax (Asynchronous JavaScript and XML), provides the client side with programmability and allows user interaction. The applications include user comments and “mashups”⁷.

Some people think that social software tools are “extremely easy to use”(Jack Vinson in Avram 2006, p. 2). Ebner et al. (2007) reveal that the “ease of use” characteristic partly contributes to the fact that more and more people choose Web2.0 applications to express their views. On the collective level, Hsu and Lin (2008) tested the relationship between technology acceptance, knowledge sharing and social influence, and perceived ease of use and perceived enjoyment appear to be important reasons for bloggers to share knowledge online. However, in a survey conducted by Mader and Abel (2009), although existing wiki users are generally satisfied with wiki applications, those who are not using wikis reported that wiki platforms are not easy-to-use. This evidence suggests that the “ease-of-use” feature may be subject to individuals’ skills and perceptions. Thus, it is necessary to

⁷ In Web development, a mashup is a Web page or application which uses and combines data, presentation or functionality from two or more sources to create new services (Wikipedia, 2010). For example, internet-accessible data sources can be linked to a map website, such as Google maps, to visualise the locations.

assess the “ease-of-use” of social software applications using both objective and subjective (self-reported) measures.

1.4.4.2 Architecture of participation

“Architecture of participation” refers to the default set of Web applications designed to track users’ digital footprint. The original intention is ‘to aggregate user data and build value as a side-effect of ordinary use of applications’ (O’Reilly 2005). Whether this traceability is a good or bad thing is debatable. However, this kind of technological function helps to record users’ digital footprints and to connect people, and has the potential to develop trust among online users over time (Xiao & Benbasat 2007). A user’s digital footprint can be automatically generated by the Web (e.g., a user’s activity history on Facebook’s wall) or input into the Web by the user (e.g., online profile).

The architecture of participation aims to resolve the conflict between the desires of users’ feedback on Web services, and a low percentage of users “will go to the trouble of adding value to an application via explicit means” (O’Reilly 2005). This characteristic is considered as the essential difference between Web1.0 and Web2.0 (Cormode & Krishnamurthy 2008). On the Web1.0 sites, most users act as consumers of content. In contrast to Web1.0, participants are considered as content creators in Web2.0 and aided by numerous technological tools. However, it is not easy to categorise websites strictly as Web1.0 or Web2.0 because many sites are being in “permanent beta” and add new features gradually overtime. Cormode and Krishnamurthy (2008) suggest assessing websites by a number of features to identify if the design of these sites is user-centred and encourages user interaction. The proposed feature categories are profile details, connectivity, content, and technical (ibid). Additionally, although these new web functions encourage users to interact with each other, participation, as part of collaboration process, is a complex phenomenon. It involves cognitive, affective and social determinants, as well as the user’s level of experience (Bagozzi & Dholakia 2006).

1.4.4.3 User-generated content

On the Internet, the value of using the Internet service to one user is positively affected when another user joins and enlarges the network. Thus, the Internet exhibits “network effects,” or “network externalities” (Katz & Shapiro 1994). In the discussion of social software, the source of network effects is high quality user-generated content by a number of people(Cho, J & Tomkins 2007). The ability to generate one’s own content allows each person to put meaning into the world (Gauntlett 2010; Illich 1973). Content creation on social media sites is about both sharing creative output and participating in conversations stimulated by that content (Lenhart et al. 2007). Network effects from users’ contributions emerge when the associations become “stronger through repetition or intensity” and “the web of connections grows organically as an output of the collective activity of all web users” (O’Reilly 2005).

Linked user-generated content plays an important role in information dissemination and knowledge creation. On one hand, the content on social media sites is dynamic since it is subject to continual refinement. Although information becomes obsolete quickly, the dynamic nature of user-generated content engages readers more than traditional media, and thus, accelerates the dissemination of information(Parameswaran & Whinston 2007). On the other hand, social software applications, such as blogs and wikis support the natural process of conversation, and document the discussion process, which results in databases (Wagner, C & Bolloju 2005). These conversational systems have the potential to bring a positive effect on knowledge sharing and knowledge search (ibid).

Nevertheless, greater individual participation does not lead to greater results on its own. It has to be "matched by a capacity to share and then combine these ideas” (Leadbeater 2008, p. 4). In fact, an epic scale of data and information overload is often reported (Anderson 2007). To create collective intelligence, reviewing user-generated content is no less important than sharing content. There are two ways to ensure the quality of user-generated content: traditional and social media approaches. The traditional way stresses quality control with standardised procedures from top-down by a number of professionals, while social media channels rely on readers’ feedback and evaluation for quality from bottom-up (Parameswaran & Whinston 2007). Examples of both approaches can be found regarding

user-generated content. For instance, in South Korea, reports collected by 40,000 citizen journalists are edited by 50 professionals of the OhmyNews service (Anderson 2007). In the UK, the BBC also uses materials created by citizen journalists. Currently, the traditional media are still undertaking a major review of their content, and the role of the public is mainly about news gathering (Anderson 2007). In contrast, social media approaches entirely rely on the readers. Although the system may be chaotic in the beginning, items with high ratings and positive feedback will be recognised as being reliable sources over time (Parameswaran & Whinston 2007). For example, Global Voices Online (<http://globalvoicesonline.org/>) adopts this approach. However, to ensure information quality in an ocean of contributions, a combination of both top-down editing and bottom-up filtering is more likely to be the solution (Parameswaran & Whinston 2007).

Brown (2004) argues that, in organisations, the forces of transformation brought about by the digital infrastructure are making the periphery more important than mainstream business, since the Web connects nodes and niches and makes it possible for innovative ideas to travel across boundaries. Social software is likely to change our way of networking, communicating and collaborating (Cook 2008). Therefore, a strategy is needed to capitalise on the emergent social software platforms. However, there is likely to be a chasm between the establishment of an electronic social network platform and active participation by a critical number of people (Moore, GA 2002). Andrew McAfee (2006) suggests that, when implementing social software in organisations, managers have to facilitate participation and contribution in the use of these tools.

1.4.5 Social software categories and applications

1.4.5.1 Social software categories

Social software can be categorised by task support, technology features, and synchronicity.

Task support

Different web tools have a different emphasis on use by design. A broader categorisation is provided by (Boyd, S 2006). Social software can be used to

support one or more of three purposes: conversational interaction between individuals and groups, social feedback, and social networks (Table 1.3).

Table 1.3 Social software categories by broad task support

Task support	Descriptions
Conversational interaction between individuals or groups	Include real-time conversations like instant messaging, and “slow time” conversations that occur in collaborative virtual space
Social feedback	Help to build trust and reputation for online interaction, e.g., eBay on a seller’s rating and reputation
Social networks	Many social software applications create a digital layout of a person’s social network and facilitate adding new connections.

Source: (Avram 2006)

Olson and Olson (2003, 2008) suggest that social software applications have the potential to support communication and coordination, to store information, support the formation of social groups or community, and cooperative learning, as well as providing integrated space for broadcasting and collaboration. Table 1.4 shows examples in each category.

Table 1.4 Social software categories by task support

Task Support	Examples
Communication support	Blogs, e.g. Wordpress, BlogSpot online audio or video conference, e.g. Go2Meeting
Coordination support	Group calendar: Google calendar; Awareness: GTalk, Twitter
Information Repository	Wikipedia
Sociality	MySpace, Facebook
Information filtering and recommendation	Amazon.com and douban.com
Cooperative learning	CiteSeer; Delicious
Integrated systems	Youtube, Open Source software community, Collaboratories

Notes: Categories of social software support are based on Olson & Olson (2003, 2008).

Nevertheless, this kind of categorisation seems rather arbitrary. On the one hand, social software applications increasingly appear to be integrated systems. For instance, Google blogger has added certain functions, a presence awareness icon and status update feature have been added to Facebook. Also, users can send public and private messages on Facebook, and although Twitter has a 144 word-limit, it provides almost everything that other social software applications do. On the other hand, completing a task usually involves a combination of collaborative tools.

Technology features

An alternative way to categorise social software is by its features. Munkvold & Zigurs (2005) identify the following features of collaborative tools: audio; video conferencing, presence awareness support, shared graphics editor, document management (categorising/organising/aggregating), annotations, folders, structured discussion (threaded discussion), voting, text chat (synchronous), group memory (log), e-mail (private offline message: asynchronous), file transfer, people finder (online profile), team workplaces (access control). Additionally, the old website feature, the search engine, is a key feature of large-size social networking sites. Special features of social software applications are referring and sharing information (hyperlinks; social bookmarking) and updates notification (via email or RSS)

Markus (2005) challenges the view that it is possible for users only to notice and make sense of features “as designed” (Griffith 1999), arguing that users might also perceive and make sense of features that are not “really” there during the social construction and use of a technology. Moreover, it is possible to assume that only these noticed features are available for user appropriation and/or creations into new features (Markus 2005). Thus, it is impossible to study technical features without asking how important users perceive them to be.

Synchronicity

The third way to categorise social software is to map applications to a time space matrix (Ellis et al. 1991), which defines the tasks and the systems which support them along two dimensions: time and space. Applications for synchronous communication require all participants to be available at the same time, whereas those for asynchronous communication do not have such a requirement.

Table 1.5 Time space matrix

	Same time	Different time
Same place	Synchronous, collocated interaction (e.g., face-to-face meetings; decision room)	Asynchronous collocated interaction (e.g., message left by one person for another to collect later)
Different places	Synchronous distributed interaction (e.g., chats, instant messaging, video conferencing)	Asynchronous distributed interaction (e.g. emails, discussion forums, blogs and wikis, and other social networking sites)

Adapted from Ellis et al., 1991 in Preece (2000, p. 124)

Asynchronous tools are the focus of this study, and the use and limitations of asynchronous tools are summarised from the existing literature.

Asynchronous tools, such as emails and blogs, help users to overcome certain barriers, e.g., time, space, language, disagreements. Asynchronous tools can support an open discussion. However, in order to have an effective conversation, participants are expected to have some knowledge of the topic before the discussion (Preece 2000). Experimental results show that text-based tools are used most effectively when users are familiar with each other (Fjermestad & Hiltz 1998). Unlike synchronous tools, asynchronous tools do not support decision-making in general. They have to be combined with face-to-face meetings. The meetings act as 'social integration tools', which encourage participants to use the tools for discussion (Preece 2000). It is found that synchronous tools help to develop interpersonal relationships, while asynchronous web tools are limited in making initial contact in online communities (Bagozzi & Dholakia 2006; Dholakia et al. 2004; Zack 1993). Nevertheless, an asynchronous website offers a space for building individuals' online identity and keeping group memory when more and more personal profiles and contents are added to the site by users. The process further helps the site to attract new members to a community group, and to develop trust among existing members (Bagozzi & Dholakia 2006).

1.4.5.2 Social software applications

Social software applications relevant to this study include blog, wiki, social bookmark, tag and RSS.

Blog: A blog, or Weblog, is a website containing individual articles or posts which are usually presented in reverse chronological order. Each post is

associated with an URL (i.e., a permalink) which makes it easy to find, even after the post has been relocated. Many blogs encourage comments and trackbacks (comments in the form of a post made on the commenter's blog and linked back to the source post). Wagner and Bolloju (2005) suggest that weblogs are best suited for experts to broadcast their expertise to a large audience, as well as for average people to share their stories or diaries within a small group. Winer summarises the characteristics of weblogs as: personalised, web-based, community-supported (through hyperlinks), and automated (no need to write an HTML code) (Du & Wagner 2006).

Wiki: A wiki is a set of linked Web pages powered by wiki software. It is created incrementally by a group of collaborative users. Wiki content pages resemble regular Web pages. Authors can write their own pages in plain text or with a simplified mark-up language. Wikis are like an online whiteboard which allows multi-users to edit the same document. Users can gradually improve each other's contribution. Wikis provide version management. The software keeps a history of the revision of Web pages and permits the viewing and rollback of earlier versions. These features demonstrate the potential of wikis to be an open source technology for knowledge management (Wagner, C & Bolloju 2005).

Social bookmarking: Social bookmarking is a way to store, organise, share and search bookmarks to web pages using a web service rather than the bookmarks (or favourites) function of a web browser. Most services encourage users to "tag" (see below) each bookmark with words which describe the meaning of the content, which then serve not only as an organisational structure, but also as a way of aggregating bookmarks posted by different people on the same topic.

Tagging: Tagging is the process of assigning user-defined keywords to online content to provide additional contexts and a richer search capability. Depending on the system, tagging can be done by the creator or the viewer of the content. These tags or labels are often used to create aggregated informal classifications (or folksonomies), and as a navigation/discovery method. Tagging is widely used in blogs, wikis and social bookmarking, as well as other forms of social software.

RSS: Really Simple Syndication, or RSS, is a method of publishing frequently- updated web content. Each RSS “feed” is an XML-formatted document containing abstracts or the full text of each item. When combined with an RSS aggregator or feed reading software, subscribers can automatically track a large number of websites without actually visiting the sites.

Weblogs and wikis can be used independently or combined to support online social networks (Avram 2006; Wagner, C & Bolloju 2005). Social software tools such as social bookmarking, RSS feeds, and social tagging are often embedded in weblogs and wikis.

1.5 Outline of the thesis

This thesis is organised as follows:

Chapter 1: describes research background, raises the rationales for the research, and reviews relevant disciplines and social software. Firstly, it addresses the timely importance of this study by describing the emerging trends in the ways of working, knowledge economy, society and future workforce. Secondly, it introduces research questions and objectives, research scope and methodology. Thirdly, it presents initial literature search in three disciplines related to the Web-supported collaboration. Fourthly, it reviews social software concepts, history, and practical applications.

Chapter 2: offers an overview of the topic area and provides a theoretical foundation for this study. Firstly, it critically reviews technology adoption theories and examines their applications in the context of social software-supported collaboration. Secondly, it reviews knowledge management and the role of technology in knowledge creation. Thirdly, it presents a conceptual framework based on the theories and published empirical studies.

Chapter 3: describes research methodology adopted by this study. Firstly, it introduces the development of this study, research objectives and research questions. Secondly, it provides the philosophical foundation and justification for mixed methodology, as well as research design. Thirdly, it introduces case study research strategy and its “fit” with this study. The chapter also

describes the data collection and analysis procedures of the two case studies. Finally, it reviews the validity of this study.

Chapter 4: describes a case study of students' adoption of blogs for group assignments. This exploratory study addresses the question if social software can be used to support collaboration. Firstly, it introduces case background and describes the technical features of the weblog. Secondly, it presents blog content analysis and cross-group analysis. Thirdly, further analysis is developed based on the conceptual framework.

Chapter 5: reviews the background of TALKnet case study. Firstly, it provides an overview of e-Government and the applications of social software in the public sector. Secondly, it describes the status of the UK's local e-Government. The third part provides a detailed account of the TALK project, including TALKnet technical features and its usage.

Chapter 6: reports the findings of the TALKnet case study. In the first part, it presents social network analysis on both individual and organisational levels, as well as content analysis to give an overview of TALKnet adoption. In the second part, it shows a critical analysis of TALKnet adoption for examining the reasons for the limited usage of the website.

Chapter 7: integrates the findings of the two case studies presented in Chapters 4 and 6, and discusses the implications from both technological and social perspectives.

Chapter 8: summarises the research contributions and implications for adoption theory, mixed methodology and for practice, discusses the limitations of the study, and makes recommendations for future work in this field.

Chapter 2 Literature Review

This chapter sets out the boundaries of the study. The objectives of this literature review are to offer an overview of the topic area and to provide a theoretical foundation for the study. The following literature review starts by introducing the technology adoption theory and explaining its relevance to social software. Next, knowledge management and the role of technology in knowledge creation are reviewed. Then, by drawing literature from both disciplines, a conceptual framework is proposed for studying the adoption of social software for collaboration.

2.1 Technology Adoption Theories

Technology is among a number of mediating factors of human behaviour and social change. How certain technological applications are exploited in a specific setting decide their impact, and a number of theories have addressed the issue of technology adoption in an attempt to pinpoint what leads to performance, a number of theories have addressed the issue of technology adoption. The most popular theories are the Theory of Reasoned Action (Fishbein & Ajzen 1975), Diffusion of Innovation (Rogers 2003,1983), Social Influence Model (Fulk et al. 1990; Schmitz & Fulk 1991), Technology Acceptance Model (Davis et al. 1989), Theory of Planned Behaviour (Ajzen 1985, 1991), and Task Technology Fit (Goodhue & Thompson 1995).

Two research streams dominate technology adoption studies: utilisation-focus and fit-focus. The former research stream treats utilisation as the surrogate of performance and employs users' attitudes and beliefs to predict the utilisation of information systems (Davis 1989; Davis et al. 1989; Gefen et al. 2003; Igbaria et al. 1997; Mathieson 1991). The most popular theoretical model in this stream is the Technology Acceptance Model (TAM). The stream of fit-focus research claims that IS have a positive impact on performance only when there is correspondence between their functionality and the task requirements of users (Goodhue 1998; Goodhue & Thompson 1995; Zigurs & Buckland 1998). The representative theory of fit-focus research is the Task Technology Fit (TTF). Numerous studies have been conducted to validate and extend TAM and TTF (e.g. Dennis et al. 2001; Mathieson et al. 2001). Although the TAM and TTF theories identify the

influential factors in the adoption of a new technology, the importance of the constructs vary with the problem context and adoption process. In the following part, TAM and TTF, as well as their extensions are reviewed first to lay the foundation of the discussion.

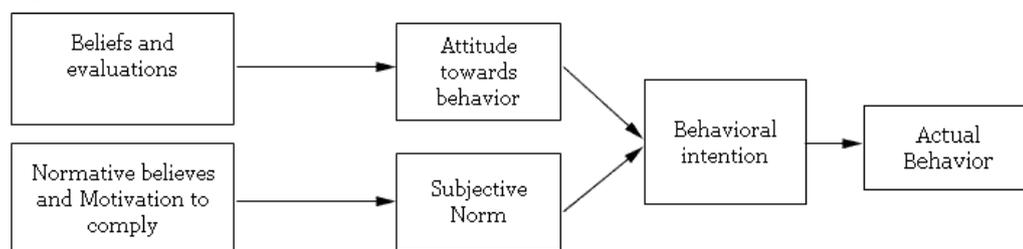
2.1.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) (Adams et al. 1992; Davis et al. 1989) suggests that what leads to the acceptance and actual usage of a new technology are perceived usefulness and perceived ease of use. Perceived usefulness refers to an individual's subjective assessment of the utility offered by the new technology in a specific task-orientated context. Perceived ease of use indicates the cognitive effort required to learn and to utilise the new technology. The key purpose of the TAM is "to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behaviour across a broad range of end-user computing technologies and user populations" (Davis et al. 1989, p. 985).

The TAM is derived from the Theory of Reasoned Action (TRA) (Fishbein & Ajzen 1975, 1980), which assumes a belief-attitude-intention-behaviour relationship. That is, that actual behaviour is determined by an individual's intention, and the intention is shaped by the individual's attitude toward the behaviour and subjective norm.

Attitude is affected by beliefs (perceived consequence of the act) and the evaluation of performance. The subjective norm is influenced by normative beliefs (perceived importance of others' preferences) and the motivation to comply.

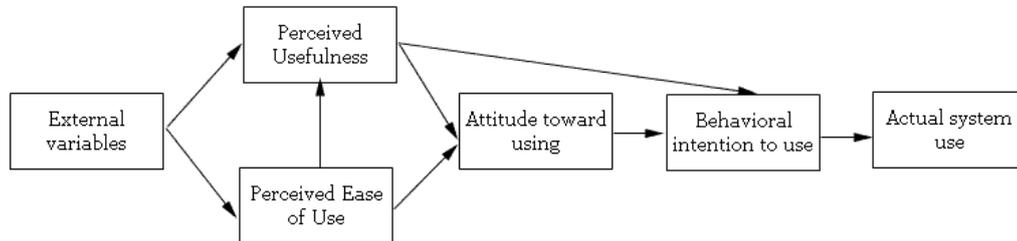
Figure 2. 1 Theory of Reasoned Action



Source: Fishbein and Ajzen 1975 in Davis et al. (1989, p.984)

Based on the TRA, Davis et al. (1989) identify perceived usefulness and perceived ease of use as the two most important drivers of the acceptance of new technology (Davis 1989; Davis et al. 1989).

Figure 2. 2 Technology Acceptance Model

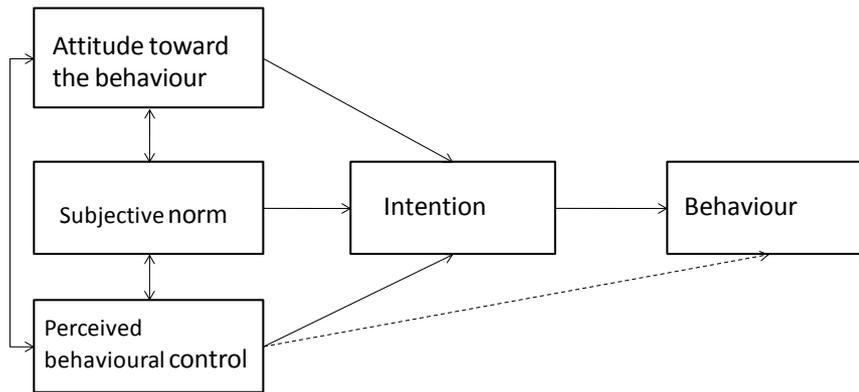


Source: Davis et al. (1989)

The causal link between users' perceptions (perceived ease of use and perceived usefulness) and use intention and usage has been tested and validated by numerous studies (e.g. Gefen et al. 2003; Igbaria et al. 1997; Mathieson 1991; Szajna 1994), some of which suggest that perceived ease of use is an antecedent of perceived usefulness (Gefen et al. 2003; Igbaria et al. 1997).

A number of researches have been conducted to extend the TAM by adding extra determinants. For instance, Taylor and Todd (1995) combine the TAM with the Theory of Planned Behaviour (TPB), which is essentially an extension of the TRA by incorporating a third construct, perceived behavioural control, in addition to attitude and subjective norm. Perceived behavioural control explains situations in which an individual lacks substantial control over the target behaviour (i.e. salient belief of available resources, opportunities, obstacles, impediments) (Ajzen 1985). Taylor and Todd (1995) found that by adding perceived behavioural control to the TAM, the model provided a better explanation of the variance in usage than the original TAM. In another study, Taylor and Todd (1995) offered evidence that perceived usefulness was the strongest predictor of intention for an inexperienced group while experienced users were affected more by perceived behavioural control. Mathieson et al.(2001) also formed an Extended TAM by adding TPB variables, and their study found evidence that an individual's "perceived resources" (perceived personal and organisational resources required to use the technology) influence use intention.

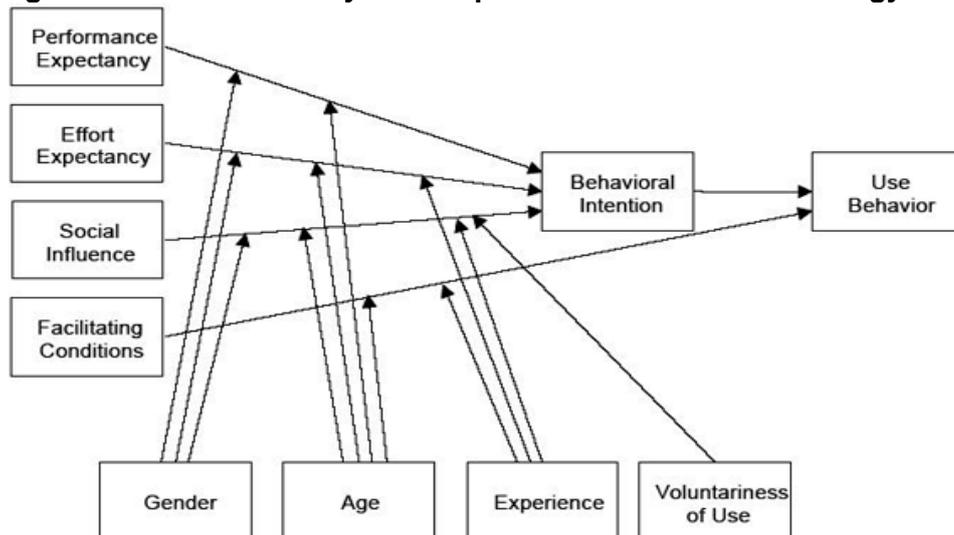
Figure 2. 3 Theory of Planned Behaviour



Source: Ajzen (1991)

Furthermore, Venkatesh and his colleagues elaborate the TAM by examining the formation of users' perceptions of technology. Venkatesh and Davis (2000) propose integrating the original TRA construct, the subjective norm, into the TAM model. The subjective norm is regarded as being a key predictor of behavioural intention. It is a "person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Fishbein & Ajzen 1975). In another study, Venkatesh et al (2002) tested an integrated model of the TAM and the Motivational Model in an employee training environment by the collection and analysis of longitudinal data. The results show that intrinsic motivations, plays an important part in shaping behavioural intention. Through a revision of the eight most popular models among technology acceptance studies, Venkatesh et al. (2003) formulated a Unified Theory of Acceptance and Use of Technology (UTAUT) (Figure2.5). In the model, the influential factors on behavioural intention include the individual's perception of performance expectancy, effort expectancy, social influence, and facilitating condition. These relationships are moderated by gender, age, experience, and voluntariness of use. The integrated model was validated with empirical evidence (ibid). The UTAUT model indicates that social influence is equally important in the acceptance of a new technology.

Figure 2. 4 Unified Theory of Acceptance and Use of Technology



Source: Venkatesh et al. (2003)

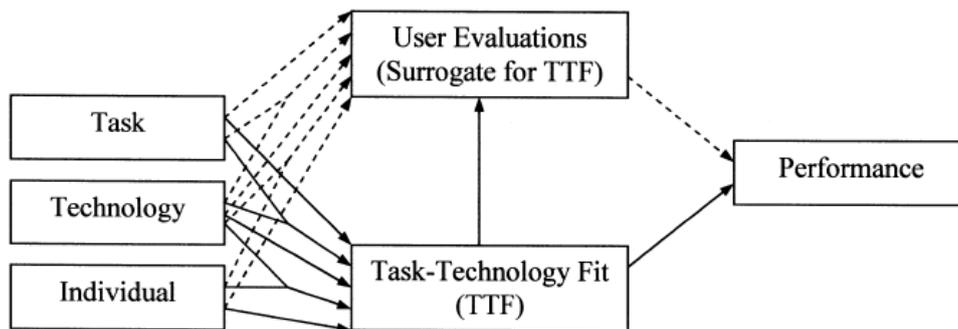
Intrinsic motivations appear to be a salient factor in the context of the World Wide Web (Moon, J-W & Kim 2001). Hsu and Lin (2008) conducted a study on the acceptance of weblogs. They found that perceived enjoyment and ease of use are positively related with knowledge-sharing behaviour. Previous studies suggest that perceived enjoyment is significantly related to perceived ease of use (Davis et al. 1992; Venkatesh 2000). However, perceived usefulness seems to have no effects on blog use in the weblog study by Hsu and Lin. A possible explanation for this is that the influence of perceived usefulness is more critical in work-related environments than non work-related situations (Hsu & Lin 2008; Moon, J-W & Kim 2001). Additionally, Hsu and Lin found that community identification and the attitude toward blogging activities influence a blog user's intention to continue to use blogs.

Goodhue and Thompson (1995) indicate several limitations of utilisation-focus research. Firstly, users' beliefs only seem to have a significant impact on utilisation in a voluntary-use setting (Staples & Seddon 2004). For many system users, utilisation in a work context has more to do with the function of how jobs are designed than the quality or usefulness of the systems, or the attitudes of users toward using them. Secondly, a higher level of utilisation of a system may not automatically lead to a higher performance. Even in the voluntary context, a poor system (i.e. one with low Task Technology Fit) may be utilized extensively for various reasons such as social factors, habit, and ignorance (Goodhue & Thompson 1995; Pentland 1989).

2.1.2 Task-Technology Fit (TTF)

The Task-Technology Fit (TTF) theory argues that the match between information systems functionality and task requirements leads to positive user evaluation, a high level of utilisation, and a positive impact on performance (Goodhue 1995; Goodhue & Thompson 1995). According to Goodhue (1995), technology includes both computer systems and user support services. Tasks are defined as the actions carried out by individuals in turning inputs into outputs. In the model, user evaluations are surrogates for TTF, which is based on the extent to which systems meet their needs and abilities. The TTF model assumes that information systems give value by being instrumental in some tasks, and that users will reflect this in their evaluation of the system (Goodhue 1998).

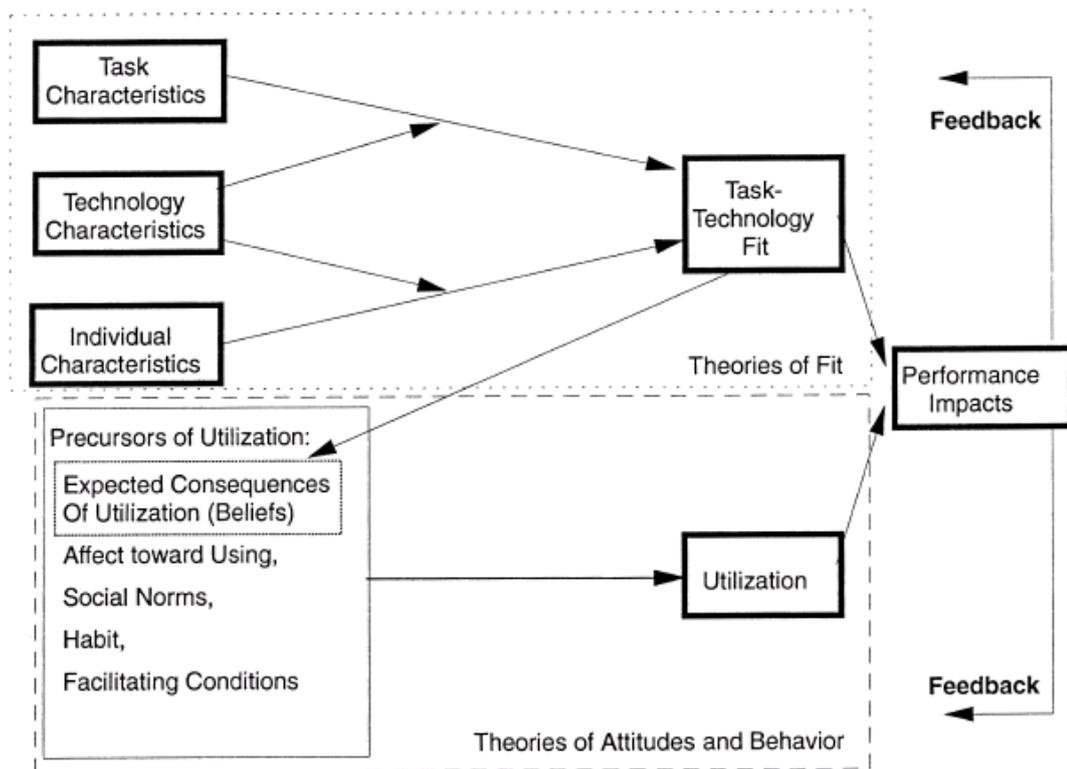
Figure 2. 5 Model of Task-Technology Fit and User Evaluations



Source: Goodhue(1995)

The essence of TTF comes from the Technology-Performance Chain (Figure 2.7), in which the TTF not only influences performance, but also affects utilisation through users' expected consequences of utilising information systems. The TPC model demonstrates that fit-focused research is complementary to utilisation-focused research since computer systems have to be utilized before they can deliver performance impact (Goodhue & Thompson 1995).

Figure 2. 6 Technology- Performance Chain and individual performance



Source: Goodhue & Thompson (1995)

TTF studies exist on both individual and group levels. The initial TTF was proposed and examined on the individual level (Goodhue 1995; Goodhue & Thompson 1995). Goodhue and Thompson (1995) claim that information technology must match the individual needs and task characteristics in order to have a positive impact on individual performance. TTF was later applied to group-level studies. Several scholars tested the effectiveness of Group Support Systems (GSS) based on the TTF model because the poor fit of the GSS with the group's task accounts for more than half of the variation of group interaction. Zigurs and Buckland (1998) examined the relationship between attributes of group task complexity and group performance and tested this with published GSS experiments (Zigurs et al. 1999), and the results, support the theory. Shirani et al. (1999) compared the quality of idea-generation tasks performed by groups with synchronous and asynchronous communication technology in an experiment. They used two communication technologies, e-mail and GSS, and defined two levels of task structure. The results indicate that GSS-supported groups generated more total and basic ideas, while groups using e-mail performed a deeper problem analysis as indicated by a higher proportion of inferential ideas generated by

these groups. The number and proportion of inferential ideas were also significantly higher in the less structured task than those in the more structured one. Additionally, Murthy and Kerr (2000) discovered that group members performed significantly better when communicating face-to-face for problem-solving tasks, and when communicating via the GSS for the idea-generation tasks.

The TTF model has also been tested by incorporating other models and additional variables. Dishaw and Strong (1999) and Dishaw et al. (2002) extended the TTF by integrating the model with TAM constructs. The TTF variable was introduced as a determinant of users' perception. Similarly, after conducting a laboratory experiment, Mathieson and Keil (1998) claim that the perceived ease of use can be a function of task-technology fit and so can perceived usefulness. In another study, by extending the TTF with the information richness theory, Lim and Benbasat (2000) developed and tested a Task-Representation Fit Model to explain how the multimedia representation is perceived to be more useful than the text-based representation when individual decision-makers utilise organisational data. However, Dennis and Kinney (1998) tested the effects of media richness on decision-making between two individuals in using computer-mediated and video communication and found that matching media richness to task equivocality did not improve performance. Through a meta-analysis, Dennis et al. (2001) developed a Fit-Appropriation Model, in which appropriation refers to what the group receives in the form of training, facilitation and rules and policies concerning the effective use of the system which also affects GSS performance. Dennis et al. (2001) argue that utilisation also depends on the appropriation support, in addition to the task-technology fit.

Staples & Seddon (2004) conducted a large-scale survey to test the TPC model in both voluntary use and the mandatory use context and found strong evidence that the TTF affects the performance in both settings. Nevertheless, they also found that in mandatory settings, social norms may overpower beliefs about the expected outcomes of use. Moreover, task-technology fit is more of a subjective measure than an objective one. Laboratory experiments found strong support for the linkage between "cognitive fit" and performance (Jarvenpaa 1989; Vessey, I 1991).

Although the TTF embraces technology adoption as a process, Zigurs and Khazanchi (2008) argue that the existing TTF theories treat technology and

task as characteristics, and “fit” becomes ‘a function of how those characteristic interact or intersect’ (p.9). This largely ignores the change of individuals’ perceptions of certain technologies with their experiences of system use. For instance, in a longitudinal study, Fuller (2003) discovered that although the performance of a poor TTF team was lower at the initial stage. TTF seemed not to matter any more after the team had learned to appropriate and adapt the technology for tasks. Moreover, this view becomes problematic in distributed groups because the way members use collaborative technologies is deeply embedded within the process, group, and task environments (Zigurs & Khazanchi 2008). Technology appropriation and adaptation is especially common in distributed groups (Majchrzak et al. 2000).

2.1.3 External Factors

Some other factors have been approved as being important in published TAM and TTF studies, and these are named as external factors, since they are external to users, technology and tasks. Some of them have been mentioned in previous sections. In the adoption process, these factors act as precursor, moderator or mediator in the published adoption studies. The aim of reviewing them is to reveal the complex and dynamic nature of the adoption process.

External factors exist on various levels, including individual, group, organisational, and environmental levels, and Table 2.1 lists some examples.

Table 2. 1 External factors in technology adoption

Levels	External factors	Empirical evidence in TAM & TTF
Individual & group	Social influence, including subjective norm, social factors(cybertrust), image	(Jasperson et al. 1999; Lee, Y et al. 2001; Malhotra, Y & Galletta 1999; Staples & Seddon 2004; Venkatesh & Davis 2000; Venkatesh et al. 2003) (Gefen et al. 2003)
Organisation	Organisational culture; Training, facilitation and rules and policies concerning the effective use of the system	(Dennis et al. 2001; Leidner, Dorothy et al. 2006; Leidner, Dorothy & Kayworth 2006)
Environment	National culture	(Leidner, Dorothy & Kayworth 2006; Massey et al. 2001; Maznevski & Chudoba 2000)

On the individual level, the Social Influence Model (SIM) of Technology Use (Fulk et al. 1990; Schmitz & Fulk 1991), suggests that users' perceptions are subjective and socially constructed, which affects their media choice and use behaviour. Thus, although these media are evaluated in some degree by objective features, they are also substantially determined by the attitudes, statements, and behaviours of the significant others (e.g. bosses, peers, family and friends).

In the innovation literature, social influence is defined as 'processes by which individuals are affected by others' social construction of perceptions of events, ideas, objects, and behaviour and are subject to pressure to conform their behaviour, attitudes, and beliefs to that social reality (Lewis & Seibold 1993, p.344).' Social influence has an impact on individual behaviour through three mechanisms: compliance, internalization, and identification (Venkatesh & Davis 2000; Warshaw 1980). The effects of compliance influence individuals' behavioural intention in mandatory contexts (Ajzen 1991) while social influence in voluntary contexts affects individuals' perception through internalisation and identification (Venkatesh et al. 2003). Venkatesh et al. (2003) develop three measures to assess social influence: subjective norm (influence from important others), social factors (culture and

agreement) and image (i.e. personal identification). Among these, “subjective norm” is considered to be the best to represent social influence, especially in the workplace, and this is validated by both elaborated TAM and TTF studies (Jasperson et al. 1999; Lee, Y et al. 2001; Malhotra, Y & Galletta 1999; Staples & Seddon 2004; Venkatesh & Davis 2000). According to Hsu and Lu (2004), social norms, attitude, and flow experience explain about 80% of online game playing. In the context of social software, Hsu and Lin (2008) found that a user’s community identity is positively related to this user’s willingness to blog in the voluntary context.

Social influence was found to affect utilisation in both the mandatory and voluntary context. Staples and Seddon (2004) prove that social norms have a significant impact on utilisation in the mandatory-use setting by conducting a large-scale survey among university librarians. Thompson et al.(1991) examined the effects of social factors on personal computing, and confirmed the existence of a positive relationship between perceived influence and actual utilisation.

Another salient social factor which affects technology adoption is cybertrust (Dutton & Shepherd 2006). Gefen et al. (2003) tested trust and TAM constructs on consumers’ shopping experiences through electronic vendors’ websites and found that consumer trust is as important to online consumers as it was for TAM’s antecedents. Dutton and Shepherd (2006) claim that in the rapidly expanding online public sphere, cybertrust can be critical to the successful development of different forms of ‘e-services’ including e-government, e-commerce, e-learning and e-participation.

When considering group adoption of technology, social and physical environments are also critical to the performance (Kock 2005). In the TTF model, user support services are included in the definition of technology by Goodhue (1995). Through a meta-analysis of published Group Support Systems (GSS) studies, Dennis et al. (2001) revealed that the appropriation support (the group receives in the form of training, facilitation and rules and policies concerning the effective use of the system) is equally critical to GSS performance, in addition to the fit between the task and GSS structures (communication support and information processing support). Additionally, differences in organisational and national culture among members in a dispersed team may also affect their adoption of new technology (Leidner et al. 2006; Leidner & Kayworth 2006; Maznevski & Chudoba 2000).

The nature of the adoption process is dynamic rather than static, especially in the virtual environment (Zigurs & Khazanchi 2008). When implementing new technology within a group, members are unlikely to simultaneously adopt the computer system. It is more likely that members will be influenced by each other's attitudes and actual utilisation. Moreover, interpersonal interaction is likely to change the social structure of a group, organisation, and virtual network. Thus, a dynamic and contingent view is required for investigating the adoption of social software.

2.1.4 A Contingent Perspective for Technology Adoption

Although TTF and TAM research mentions some contingent factors, technology adoption is largely studied by variables rather than process. Nevertheless, the contingent perspective emphasises the dynamic and emergent nature of the technology adoption process.

The effect of information and communication technologies depends on how they are used by people. The actual behaviour of systems often differs from the intended impact as people adapt them to their own needs (Markus & Robey 1988). Interactive computer systems, such as ICT, are "social-technical" systems. Although people have different attitudes or patterns when using the same technology (Rogers 2003), technology acceptance can be influenced by an interaction among the characteristics of individual users, the groups and organizations in which they are implemented, and the computer systems themselves (Hiltz & Johnson 1990). Also, different responses to technology may be given by the same group of users in different settings due to differences in the adaptation process (Markus 2005). Orlikowski (1992) argues that technology does not determine behaviour; rather, people generate social constructions of technology using resources, interpretive schemes, and norms embedded in the larger institutional context. The nature of technology changes along with technology use and social structures emerge during the recurrent use of technology (Orlikowski 2000). This perspective is particularly important for the specific case of e-collaboration technologies because this type of technology is often "radically tailorable" and integrated into complex configurations with other tools (Markus 2005; Orlikowski 2000). In other words, the properties of e-collaboration technologies include those initially

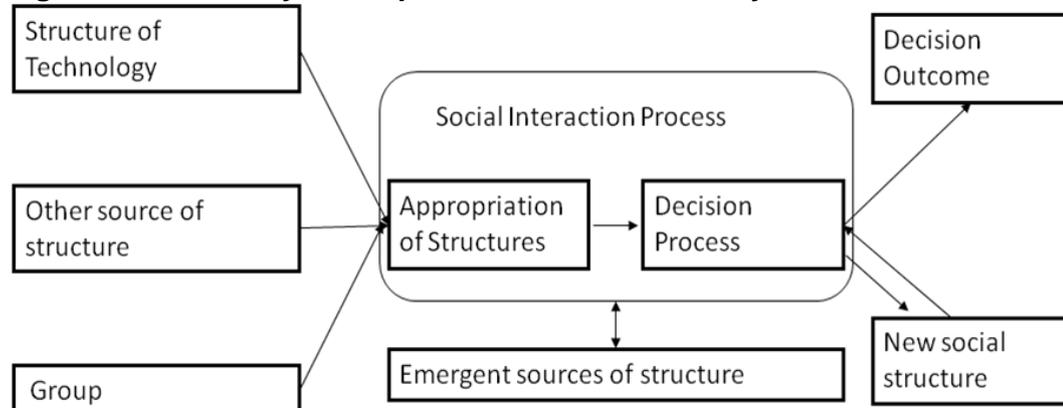
created by designers and the products of users' actions (Orlikowski 2000, p. 407).

2.1.4.1 Adaptive Structuration Theory

The Adaptive Structuration Theory (AST) emphasizes the dynamic nature of the technology adoption process (DeSanctis & Poole 1994). AST is particularly popular in the area of group decision support systems (Jones, M et al. 2004) and has been applied in virtual groups (e.g. Majchrzak et al. 2000). AST assumes that group outcomes are not determined by the effects of single elements (such as technology or task characteristics), but by a complex and continuous process in which the group appropriates those elements (DeSanctis & Poole 1994).

AST provides a high-level theory which explains the relationship between technology use and social interaction in creating group outcomes in an organisational context (DeSanctis & Poole 1994). The central concepts of AST are structuration and appropriation (ibid).

Figure 2. 7 Summary of Adaptive Structuration Theory



Source: Adapted from DeSanctis and Poole (1994)

Social Structures and Structuration

According to Giddens (1984), *structuration* refers to the ways in which social systems (structures) are produced and reproduced in social interaction (humans). Structures refer to rules and resources organized as properties of social systems including institutions and social practices. These are both mediums and the outcome of the reproduction of the activities of human agents' activities. Consistent with the structuration theory, AST propose that 'social structures serve as templates for planning and accomplishing tasks'.

That is, designers incorporate some of these structures into technology. Users 'create new structures within the technology' by reproducing or modifying it (DeSanctis & Poole 1994, p. 125).

There are social structures within technology and action, and two types of structures interplay with each other. According to DeSanctis and Poole (1994), the social structures of advanced information technology can be described by the structural features of the technology and the spirit of the feature set. *Structural features* refer to 'the specific types of rules and resources, or capabilities, offered by the system', which provide meaning and control to group interaction. The *spirit* of the feature set is described as being 'the general intent with regard to values and goals underlying a given set of structural features', which supplies a normative frame with regard to behaviours which are appropriate in the context of the technology. This 'property of the technology as it is presented to users' can be identified by reading the philosophy of the technology by analysing: a) the design metaphor underlying the system; b) the features it incorporates and how they are named and presented; c) the nature of the user interface; d) training materials and on-line guidance facilities; and e) other training or help provided with the system (p.126). Meanwhile, IT is only one source of structure for groups. DeSanctis and Poole (1994) argue that it requires considering other sources of structure such as work tasks and group and the organisational contexts should be considered in order to analyse the use of a particular technology. Use of technology structures may vary depending on the task, the environment, and other contingencies which offer alternative sources of social structure. When groups interact with technology, tasks and environmental structures, their outputs emerge as new sources of structure. For instance, once a group enters data into a group support system, the information generated by the system becomes another source of social structure.

Appropriation and Social Interaction

Another key concept in AST is *appropriation*, which in this context refers to the actions taken by individuals or groups which instantiate structures. The structural features of a technology may be appropriated by a group through various 'appropriation moves'. Variation in the interaction process can be illustrated by four aspects of appropriation, the first of which is that groups

may actively select to appropriate a given structural feature in different ways. For instance, the group can either directly use technology structures or make judgements about them. Secondly, the appropriation of technology may be 'faithful' or 'unfaithful' depending on whether or not it is in line with the spirit and designed structural features. Thirdly, group members may opt to appropriate the features for different instrumental uses or purposes. A fourth aspect of appropriation is the attitude the group displays when it appropriates technology structures, such as 'comfort', 'respect' and 'challenge', since these attitudes have a significant influence on stakeholders' intention to use (DeSanctis & Poole 1994,p.129-30).

AST argues that the nature of technology appropriations will vary depending on the group's internal system. Factors which may influence how a group appropriates available structures include: members' style of interacting, members' degree of knowledge and experience with the structures embedded in the technology, The degree to which members believe that other members know and accept the use of the structures, and the degree to which members agree on which structures should be appropriated (ibid., p.130-1).

Group decision processes vary with the nature of technology appropriations. The idealised profile of group appropriation is that "given advanced information technology and other sources of social structure $n_1 \dots n_k$, and ideal appropriation processes, and decision processes the fit the task at hand, then desired outcomes of advanced information technology will result" (DeSanctis & Poole 1994, p. 131). However, a desired group decision process may not appear when appropriation diverges greatly from the ideal. Improvement in decision outcomes will only emerge if the group's decision processes are suitable for the task (DeSanctis & Poole 1994). For instance, greater participation and information-sharing facilitate idea-generation tasks.

The link between AST and TAM, TTF

Contrary to opposing the TAM and TTF theories, AST enriches both by adding a dynamic aspect. Similar to the TAM, attitudes towards technology are also considered as important factor to influence actors' intentions to appropriate. Also, a high task-technology fit is likely to be associated with greater AIT appropriation moves, more faithful appropriation, and more positive attitudes toward appropriation. Nevertheless, it is the appropriation

which influence the performance rather than the fit between the task and technology (DeSanctis & Poole 1994). This is because individuals and groups may actively choose to appropriate the structural features of a technology.

2.1.4.2 Relevance with Social Software

Although in the original paper, the adaptive structuration theory is tested on small group interaction in the context of GDSS technology, the concepts and relationships posited by AST can be applied to other advanced technologies and other organisational contexts (DeSanctis & Poole 1994). This theoretical perspective has not only been tested in the area of group decision support systems (Chin et al. 1997; Chudoba 1999; Salisbury 2002), but has also been applied to computer-mediated communication (Majchrzak et al. 2000).

In this study, social software refers to Web2.0 based technologies, which are regarded as being significantly different from previous automatic transaction-focused information systems, such as the Enterprise Resources Planning (ERP) system (Chui et al. 2009). Social technologies support communication, collaboration, cooperation and connection (Cook 2008). Thus, undoubtedly, social interaction will be the focus of social software studies. Moreover, social software offers users opportunities to configure applications according to their own needs. Thus, it is possible that individual attitudes toward web applications may change with experience (Castañeda et al. 2007). The Adaptive Structuration Theory seems to be an ideal base from which to study social software-supported collaboration.

However, the premise of the AST is that advanced information technologies are employed to automate the functions in organizations for the purpose of changing organisational structures and increasing efficiency (Naik & Kim 2010). This differs from the objectives of social software. Also, the making of web-based groups is often separated geographically, culturally and temporally, which is different from the common idea of organization. Therefore, although the AST alone may not be sufficient to explain social software-supported collaboration, it signifies the facts, namely, that sources of social structures exist in multiple dimensions, individuals use technology in more than one way and the nature of the social interaction process is dynamic. Thus, the AST offers guidance for investigating web-based activities.

Naik and Kim (2010) developed an Extended Adaptive Structuration Theory Framework for the determinants of virtual team success. With an emphasis on social psychological aspects, their conceptual model consists of four main components: structural characteristics (organisation, task, technology, group and individual), social interaction (socio-emotional processes, decision processes), control structure (mission) and outcomes (performance and satisfaction). In their model, the main extension to the AST is a control structure since virtual teams are usually formed with specific goals. Also, an individual dimension (personality, leadership, knowledge) is added to the structural characteristics. The third difference is that the socio-emotional process is used as a proxy for the appropriation of technology. Moreover, following the AST assumption that there is no static fit between task and technology, Naik and Kim define the social structure which affects the appropriation of task-technology fit in three dimensions, namely organisational, group and individual.

2.2 Knowledge Management

Knowledge management (KM) provides a broad theoretical background to this study, since collaboration is considered to be an approach for knowledge creation. Knowledge can be regarded as an organisational resource (Alder 1989), and organizational knowledge is 'information embedded in routines and processes which enable action' (Baskerville & Dulipovici 2006). Knowledge creation has become an important activity for organisations to compete and survive in this turbulent environment, as well as bringing societal, national and global consequences.

Broadly speaking, there are two main philosophical stances in Knowledge Management research (Swan 2004): "knowledge management as technology" (e.g. Salton 1968; Schreiber et al. 2000) and "knowledge management as people" (Nonaka & Takeuchi 1995; Nonaka et al. 2000). According to Alvesson and Kärreman (2001), the basic assumption of the "KM as a technology camp" is that knowledge is regarded as an objective entity which can be codified, stored, and distributed, and that IT systems can capture and transfer knowledge (Swan 2004). The purpose of KM is to capture and disseminate explicit knowledge which can be supported by IT

systems. In this case, 'weak ties' are also important (Hansen 1999). The outcome of KM is the reuse of knowledge.

In knowledge management systems research, earlier efforts were made to optimise the processes of capturing, codifying and storing knowledge (Alavi & Leidner 2001). However, the difficulty of these processes and the problem of knowledge creation by computer systems shifted the research focus to more human aspects of knowledge, namely, the creation, transfer and application of knowledge (ibid).

The "KM as people camp" asserts that knowledge is social by nature and considers that the development of knowledge is closely linked to the development of social relationships, networks and communities of practice (Swan 2004). This perspective argues that there are limits to codification, since much valuable knowledge remains tacit in people's heads and social communities. The purpose of KM is the sharing of tacit knowledge. In this case, 'strong ties' are important (Hansen 1999). The outcome of knowledge management is to exploit and create new knowledge. Representative work has been done by Nonaka (1991, 1994; and Takeuchi 1995; and Toyama 2003; et al. 2005; et al. 2000). Technology is seen to be an enabler for developing learning communities or communities of practice, but not an essential component of knowledge management (Swan 2004).

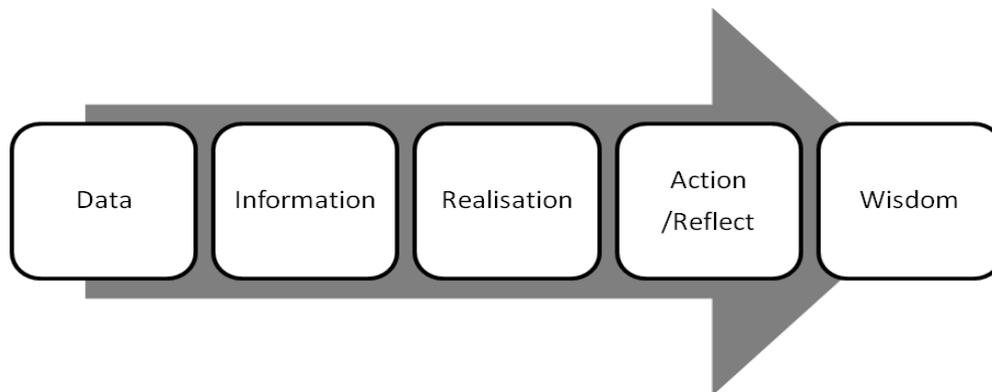
Orlikowski (2002) suggests that KM researchers should focus on "knowing" (a verb connoting action, doing, practice) rather than knowledge (a noun connoting elements, facts, processes, dispositions). Although this review will focus on the knowledge creation process, the concept of knowledge will be briefly reviewed in order to set the foundation of the discussion.

2.2.1 The Concept of Knowledge

In the literature, a great deal of efforts has been put into separating knowledge from data and information. Data represents observations or facts independent of context. So data is not directly meaningful (Zack 1993). Information appears when data is placed within context and becomes meaningful, which is often in the form of a message (Kakabadse et al. 2003; Zack 1993). Knowledge is "justified true belief", which people believe and value based on the meaningful and organized accumulation of information through experience, communication or inference (Lave 1988). Knowledge is

regarded as being humans' productive use of information. Thus, in order to acquire new knowledge, an individual has to take action and reflect on the processes to acquire new knowledge (Kakabadse et al. 2003). Knowing how to use information in any given context requires wisdom, which is a dialectic integration of a person's affect, will, cognition and life experience (Pascual-Leone 1983). The flow of knowledge is presented in Figure 2.8.

Figure 2. 8 Chain of knowledge flow



Source: Kakabadse et al. (2003)

Various terms have been used to describe knowledge types and forms (Kakabadse et al. 2003), and the most prominent characteristic of knowledge is codifiability (Nonaka & Takeuchi 1995; Polanyi 1966; Zhang & Faerman 2004). In management studies, the terms explicit knowledge and tacit knowledge have been widely used to describe codifiability (Nonaka & Takeuchi 1995). The common belief is that it is possible to codify, transfer and stored explicit knowledge, while tacit knowledge cannot be codified. The latter type refers to the implicit knowledge people use to perform their tasks and make sense of their world, such as expertise and unique experience, which can only be transferred in brainstorming sessions and one-to-one conversations (Hansen et al. 1999). Knowledge characteristics tend to affect approaches to designing and developing systems (Alavi & Leidner 2001). In a knowledge portal implementation project, Zhang and Faerman (2004) moderated the relationship between organisational and technological factors as well as knowledge sharing processes and found that the nature of knowledge influenced the success of the knowledge portal project. Specifically, the level of codifiability appeared to substantially alter the system implementation strategy.

2.2.2 Knowledge Creation

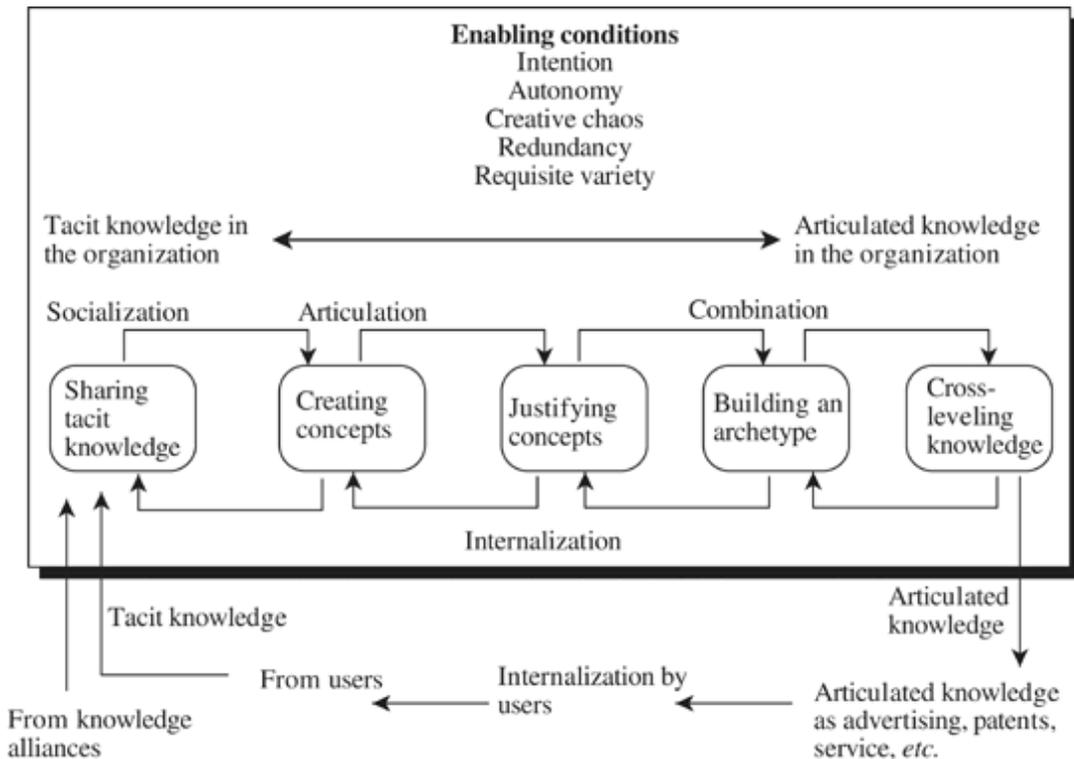
Knowledge creation is a dynamic human process which transcends existing boundaries (Nonaka & Takeuchi 1995; Nonaka et al. 2000). Knowledge is created through interactions among individuals or between individuals and their environments, rather than by an individual operating alone. Nonaka's (2003) work is influenced by Giddens' (1984) structuration theory, which believes that humans are able to carry out 'reflexive self-regulation' (Giddens 1984). That is, human actors take an active role in creating and recreating the structures embedded in their environment through every social encounter. Knowledge is created through such interactions between human agencies and social structures.

Nonaka (& Takeuchi 1995; et al. 2000) use four conversion modes to describe what an individual experiences in knowledge creation. Knowledge creation is perceived to be a dynamic process of continual socialization, externalization, combination, and internalisation (SECI) (Table 2.2). There is interplay among the four activities, and each of them is a mode of knowledge creation. This process is depicted in Figure 2.9.

Table 2. 2 Summary of four conversion modes in Nonaka's SECI model

From	Tacit knowledge	To	Explicit knowledge
Tacit knowledge	<p>Socialisation <i>Sharing and creating tacit knowledge through direct experience</i></p>		<p>Externalisation <i>Articulating tacit knowledge through dialogue and reflection</i></p>
Explicit knowledge	<p>Internalisation <i>Learning and acquiring new tacit knowledge in practice</i></p>		<p>Combination <i>Systemizing and applying explicit knowledge and information</i></p>

Figure 2. 9 Organisational knowledge creation process



Source: Baskerville and Dulipovici (2006) adapted from Nonaka and Takeuchi, (1995)

Socialisation is the process of converting new tacit knowledge through shared experiences, and this can be seen as the process of knowledge exchange. Individuals articulate tacit knowledge through dialogue and reflection. Tacit knowledge can be acquired only by sharing the same experience such as apprenticeship, or informal social meetings outside the workplace. Mental models and mutual trust can be created and shared. Socialization is not limited to organizational boundaries. Instead, it is a way to bring tacit knowledge into an organisation from its customers and knowledge alliance partners (Nonaka & Takeuchi 1995).

Externalisation or articulation is the process of articulating tacit knowledge into explicit knowledge. This process is about sharing. Explicit knowledge becomes the basis of new knowledge. The successful conversion of tacit knowledge into explicit knowledge depends on the sequential use of metaphors, analogies, figures or stories. Individuals become part of the group and adjust their intentions and ideas to be consistent with the group norms and values. This process has to be enabled by certain conditions. That is, the organisation must give its employees a degree of autonomy and provide a degree of redundancy in the workforce to enable reflection and

creativity. Inkpen(1996) argues that it is necessary to foster 'creative chaos' to promote innovation and creativity.

Combination is the process of converting explicit knowledge into more complex and systematic sets of explicit knowledge. This process enables the knowledge transfer of explicit knowledge. Codified knowledge is collected from inside or outside the organization and then combined, edited or processed to form new knowledge. This new explicit knowledge is then disseminated across all levels of the organization. A well-designed knowledge support infrastructure and architecture can extend the human ability to store and access information (Baskerville & Dulipovici 2006; Davenport et al. 1998).

Internalisation is the process of embodying explicit knowledge into tacit knowledge. It is the process of learning and acquiring new tacit knowledge in practice. Through internalisation, explicit knowledge created is shared throughout an organisation and converted into tacit knowledge by individuals. New knowledge is internalised through learning by doing or experimenting, and this new knowledge once again becomes tacit (Nonaka et al. 2000, pp. 9-13).

Nonaka and Takeuchi's (1995) knowledge creation model has been criticized by some scholars mainly for two reasons: 1) tacit knowledge and explicit knowledge dichotomy and 2) using a radically subjective definition of knowledge, i.e., knowledge is created by managers (e.g. Gourlay 2006; Hildreth et al. 1999). In this study, the researcher disagrees with these criticisms. First, in the book, Nonaka and Takeuchi draw knowledge creation in two dimensions, i.e. ontology and epistemology. They acknowledge Polanyi's (1966) view that human beings create knowledge by involving themselves with objects. Secondly, their SECI model views the creation of organizational knowledge as involving a continual interplay between the tacit and explicit dimensions of knowledge and a growing spiral flow as knowledge moves through individual, group, and organizational levels. They emphasize a spiral process rather than separate stages. Tacit knowledge is implied in each process, since individuals are the actors who perform socialization, externalization, combination and internalization. Thirdly, since all knowledge is context-dependent, Nonaka's works are not exceptional. Nonaka and Takeuchi specify that study is about knowledge creating in companies for innovation. Therefore, it is not surprising to see that in an ideal

learning organisation, managers are assumed to be people who understand both organisational strategy and the operational process(Gourlay 2006). Thus they become key individuals in the process of knowledge creation. Also, knowledge is influenced by power (Lave & Wenger 1991; Walsham & Barrett 2005). Thus, individuals in management positions are more likely to intervene in the creative process whether or not they directly create knowledge or not (Walsham & Barrett 2005).

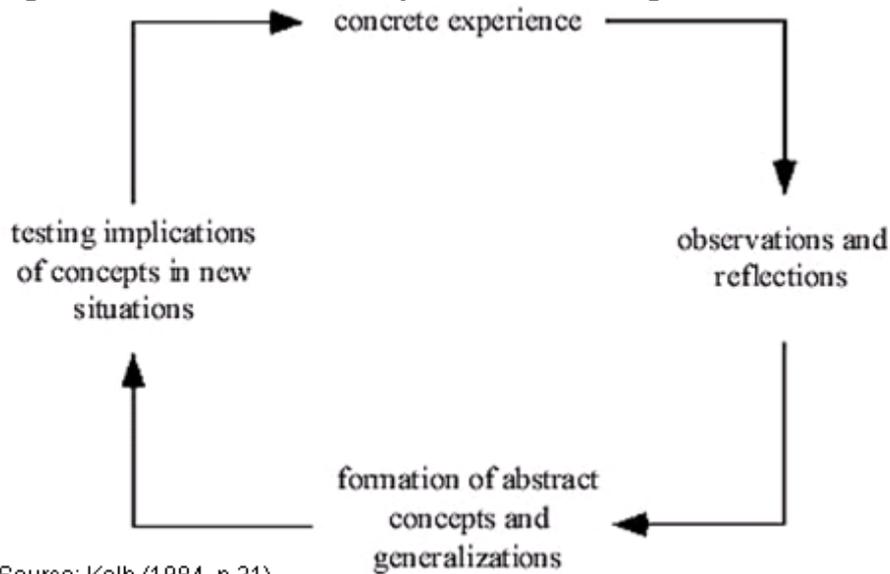
Nonaka's model suggests that knowledge creation exists on two levels, namely, individual and interpersonal.

2.2.2.1 Knowledge Creation on an Individual Level

The main component of any organisation is a collection of individuals, and knowledge creation on an individual level can be understood to be a learning process. According to Kolb(1984), "learning is the process whereby knowledge is created through the transformation of experience" (p.38). Behind this statement is the theory of experiential learning (Argyris & Schön 1978; Kolb 1984), which considers that the learning process encompasses two levels, namely operational learning and conceptual learning. The former refers to the acquisition of the physical ability to produce some action (skill or know-how) while the latter refers to the acquisition of the ability to articulate a conceptual understanding of an experience (know-why) (Kim 1993).

Knowledge creation through experience is an ongoing cycle. Lewin (in Kim 1993) describes it as " a person continually cycles through a process of having a concrete experience, making observations and reflections on that experience, forming abstract concepts and generalizations based on those reflections, and testing those ideas in a new situation, which leads to another concrete experience" (p.38). This description highlights two key issues. First, it is 'experience' which gives meaning to abstract concepts and allows one to validate ideas created during the learning process. Secondly, the feedback process (social learning and problem-solving process) provides the basis of goal-directed action and an evaluation of the consequences of that action (Kolb 1984).

Figure 2. 10 The Lewinian Experiential Learning Model



Source: Kolb (1984, p.21)

A similar view can also be found in the KM literature, which emphasises the importance of social interaction (experience). Nonaka believes that tacit knowledge can only be exchanged through socialisation. Polanyi (1966) and Tsoukas (2003) argue that knowledge transfer happens through social interaction because tacit knowing is required to pass on encoded forms of knowledge.

2.2.2.2 Knowledge Creation on an Interpersonal Level

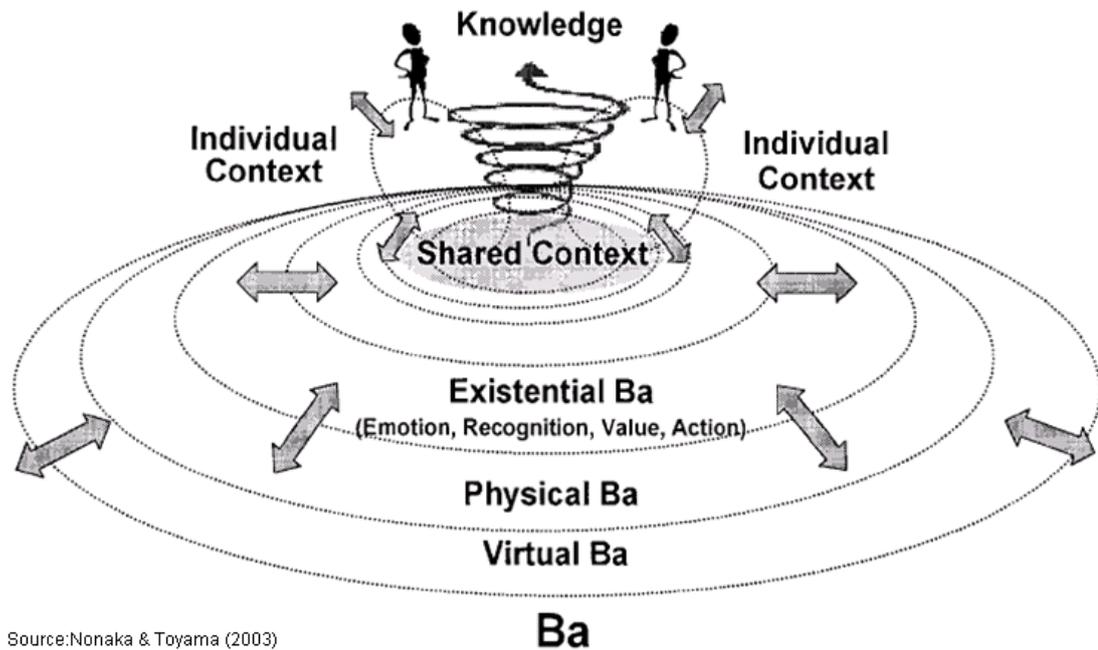
Nonaka and Konno (1998) added the concept 'ba' to the original SECI model. 'Ba' is defined as being 'a shared space for emerging relationships' in which knowledge is shared, created and utilised (ibid). Ba can be a physical, virtual, or mental space (Figure 2.12).

Participation in a 'ba' creates another form of knowledge creation, the creation of shared knowledge, which is the foundation of collaborative activities such as communities of practice, knowledge networks, and strategic communities (Baskerville & Dulipovici 2006; Kodama 2005). Weinberger illustrates knowledge creation in a virtual space with Wikipedia's content co-production and describes the process as 'the knowing happened not in either one's brain but in their conversation' (2007, p. 144).

'Ba' unifies physical space, virtual space and an individual's mental space. 'Ba' provides the energy, quality and place to have individual conversions and ascend the knowledge spiral (Nonaka et al. 2000). Mental space refer to individuals' mental models, such as perspectives, beliefs, and viewpoints

(Nonaka & Takeuchi 1995).The nature of ba is a multiple interacting mechanism (Nonaka & Toyama 2003; Nonaka et al. 2000).

Figure 2. 11 Conceptual representation of ba



Source:Nonaka & Toyama (2003)

'Ba' has three key features which relate to this study: interaction, openness, and coexistence of multiple forms. 'Interaction' is a key concept in understanding 'ba'. Although individuals are the primary driving forces of creation, knowledge is created through the interaction of individuals or between individuals and their outside world. In a shared space, all participants interact with each other and contribute through action and interaction. The nature of 'ba' is 'openness'. Although 'ba' sets a boundary for social interaction, its own boundary is open. It is important for individuals to share time and space in creating knowledge. 'Ba' not only enables participants to share time and space but also transcends time and space. For instance, face-to-face meetings allow a close physical interaction among participants, which helps them to form a common language. A weblog enables ongoing virtual interaction and potentially attracts more participants. The third feature is that 'ba' can emerge in individuals or groups, formal or informal settings (e.g. project teams or informal circles), in online or offline discussions (e.g. e-mail groups or customer meetings) (Nonaka et al. 2000). In a more recent article, Nonaka and Toyama (2003) further specify the concept of 'ba', in which 'ba' is perceived as an existential place where participants share their own contexts and create new meaning through

interaction. The authors suggest that the boundary of 'ba' should be kept permeable to maintain the level of energy for knowledge creation. The 'interfaces' amongst 'ba' also evolve along with 'ba' itself. In order to maintain coherence in various forms of 'ba' and their participants, a trustful sharing of knowledge and continuous exchanges are required between all units involved to create and strengthen the relationships(Nonaka & Toyama 2003).

2.2.3 Collaboration as an approach for knowledge creation

Collaboration can be defined as the degree to which team members actively help one another in their work (Hurley & Hult 1998). One effective way of creating knowledge is collaboration (Inkpen 1996; Powell, W 1998). This study is interested in collaborative knowledge creation (or knowledge co-creation) because knowledge co-creation (or 'shared knowledge creation' as depicted in Nonaka's 'ba' concept) is the basis of collaborative networks such as communities of practice, knowledge networks, and strategic communities (Baskerville & Dulipovici 2006; Kodama 2005).

General speaking, collaboration is a social process, which often starts with informal conversations and is mainly voluntary (Kraut & Egido 1990; Kraut et al. 1987). The collaborative process involves relationship development and task implementation (ibid). The basic type of collaboration is interpersonal collaboration, which is common in research collaboration. According to Kraut, Galegher and Egido(1987), research collaboration goes through phases of initiation, execution, and public presentation, and at each stage, interactions occur between different task-level activities and relationship-level activities. In the initial stage, the primary goal is to establish an interpersonal relationship based on shared interests. Potential collaborators exchange information about their research interests, professional goals and individual work styles to identify their areas of commonality or compatibility. Together they set out an initial plan about their research objectives and approaches. In the execution stage, the main objective is to carry out tasks. Collaborators articulate their own tacit knowledge through dialogue and reflection to produce more detailed plans with a clear division of labour. At this stage, effective communication and coordination are particularly needed. In the final stage, knowledge is synthesized when collaborators write up and

present their research. When dividing the task of writing, collaborators must agree on 'what they want to say and how to say it' and decide how to allocate credit (Kraut et al. 1987). After the collaborative work is completed, each collaborator internalises the new knowledge acquired from the experience, and the tacit knowledge owned by individual collaborators is ready to be used in the next group work.

Outcomes of collaboration are not always positive, especially in cases of cross-boundary collaboration (Cummings & Kiesler 2005). So what prevents group from creating knowledge via collaboration? Inside organisations, the barriers identified include individual values, trust building, knowledge transferring, and constraints in the organisational and technological environment (Hansen & Nohria, 2004). Many things can go wrong in a cross-boundary group, such as problems with the structure or technology, an issue between groups, or conflict between two people, or simply an administrative mistake (Cummings & Kiesler 2005). Gratton (2007) suggests that inter-organisational collaboration requires companies to build up their capacity to work collaboratively with outsiders.

Trust and mutual knowledge are often considered to be the basis for collaboration (e.g. Cramton 2001; Dodgson 1993). Nevertheless, studies suggest that interpersonal trust can effectively and efficiently reduce complexity by enabling people with different knowledge bases and experiences to collaborate, in either a virtual or face-to-face context (Jarvenpaa et al. 1998; Lewis & Weigert 1985; Luhmann 1979; Paul & McDaniel 2004). However, although "swift trust" has been reported in temporary virtual teams, trust is usually developed overtime (Powell, A et al. 2004). In summary, collaboration consists of task activities and relationship development, and the process can be affected by the contingencies in the context. Trust is considered to be fundamental to collaboration.

2.2.3.1 Social Capital and Knowledge Creation

The KM theory assumes that the development of knowledge is closely linked to the development of social capital (Brown & Duguid 2001; Nonaka et al. 2000; Swan et al. 1999). The Social Capital theory suggests that social capital and knowledge creation tend to have a positive relationship, since social capital directly affects the combine-and-exchange process and

provides relatively easy access to network resources (Nahapiet & Ghoshal 1998). Nevertheless, there is a trade-off. Over time, interpersonal network generates strong norms and mutual identification among network members, which reduce openness to new information and diverse opinions (ibid). This study aims to explore how social capital affects knowledge co-creation.

According to Alder and Kwon (2002), "social capital is the goodwill available to individuals or groups. Its source lies in the structure and content of the actor's social relations. Its effects flow from the information, influence, and solidarity it makes available to the actor." This definition indicates that social capital consists of two parts: the interpersonal relationships of a person and the resources embedded in those relationships (Coleman 1988; Nahapiet & Ghoshal 1998). Since this study seeks to understand how social capital affects the knowledge movement, it adopts Nahapiet and Ghoshal's (1998) three dimensions of social capital, namely structural, relational and cognitive.

2.2.3.1.1 Structural dimension

The structure of a relationship refers to the feature of links among actors within or across boundaries. Through a network structure, individuals have the opportunities to identify and assess other people's knowledge. The two main ways of analysing these patterns are strength of ties (how often actors interact) and network density (who interacts with whom) (Granovetter 1985; Kang et al. 2007; Uzzi 1997). In this area, there are two distinguished theories, namely network closure and structural holes. Theorists who believe in network closure favour strong ties. That is, closed networks are more likely to establish effective norms and trust each another, thereby strengthening social capital (Coleman 1988). In contrast, the school of structural holes values weak ties because these theorists believe that a sparse network with few redundant ties can provide greater social capital benefits by preventing actors from being locked in and ensure their ability to innovate (Burt 2001).

However, these two network structures are not mutually exclusive. It is suggested that strong ties provide an efficient mechanism for sharing fine-grained and in-depth knowledge (Coleman 1988) while novel information flows to individuals are often brought through weak ties (Burt 2001). Hansen (2002) illustrates that strong ties are suitable for sharing complex and tacit knowledge while weak ties are appropriate for codifiable information.

Adler and Kwon (2002) indicate that these two theories are different in their respective internal and external foci and assumed goals. Network closure provides social capital with cohesiveness benefits within an organization or community while structural holes in the focal actor's external linkages provide cost-effective resources for competitive action. Therefore, both network closure and structural holes can yield benefits. The value of network structure "depends on the state of the other sources of social capital and on the task and symbolic environment confronting the actor" (Adler & Kwon 2002, p. 25).

2.2.3.1.2 Relational dimension

The relational dimension of social capital refer to those assets created and leveraged through relationships(Nahapiet & Ghoshal 1998). Key features of this dimension are trust and trustworthiness, norms, obligations and expectations, identity and identification. Trust is considered to be a central characteristic of relationships which promotes effective knowledge creation(Abrams et al. 2003) and unites other facets of the relational dimension. Trust can be viewed as being both a motivational source of social relations (Putnam 1993) and an asset resulting from collective activities (Adler & Kwon 2002; Lin 1999).

Trust exists on the basis of friendship, kinship and experience, as well as membership (Adler & Kwon 2002; Kang et al. 2007). The two main forms of trust are generalized trust and dyadic trust (Kang et al. 2007; McAllister 1995). The former refers to a situation where individuals trust each other because they are members of a social unit, which is impersonal and institutional. The latter refers to a situation where trust between two parties is the result of their direct experience of each other, which is created in the process of a mutual interchange of favours. Nevertheless, generalized trust can transform into dyadic trust once the actors have direct experience of one another. Very often, they co-exist in a relationship.

Both generalized and dyadic trust can encourage interaction among actors. The literature suggests that generalized trust may be effective for the exchange of in-depth knowledge and sharing in limited domains when associated parties agree on the overarching goals and adopt the norms of reciprocity of a unit (Kang et al. 2007; McAllister 1995). That is, individuals do not necessarily have personal relationships with every other member of the

network because trust is granted on the basis of the norms and expectations of the group as a whole (Putnam 1993). Dyadic trust is a result of associated parties' direct experience. It requires less effort to build and maintain (Jones & George 1998; Sheppard & Tuchinsky 1996). Dyadic trust presents as the norm of generalized reciprocity. That is, "I will do this for you now, knowing that you will do something for me somewhere down the road." Thus, the receiver considers returning the favour as an obligation (Nahapiet & Ghoshal 1998).

Meanwhile, both types of trust have limitations. Although generalized trust may result in strong shared norms, it may not be conducive to fostering knowledge exploration, since it may reduce actors' motivation to accept new ideas (Jones, G & George 1998). In the absence of control and monitoring by a third party, dyadic trust allows actors to exchange a wide range of knowledge. However, the duration of the relationship and the scope and kinds of knowledge shared may be limited (Leana & Van Buren 1999). Additionally, although long-term trust-based relationships facilitate the exchange of tacit knowledge and interactive learning, the members of a social network may be locked in the established ways of doing things at the expense of their own innovative and learning capacity due to loyalty or over-commitment (Boschma 2005).

2.2.3.1.3 Cognitive dimension

According to Nahapiet & Ghoshal (1998), the cognitive dimension refers to "the resources providing shared representations, interpretations, and systems of meaning among parties" (p.244). The cognitive dimension affects knowledge combination and exchange (Nahapiet & Ghoshal 1998). The important facets of this dimension in the context of knowledge creation include shared language, codes and shared narratives (ibid).

Language is the means of communication and influences our perception (Nahapiet & Ghoshal 1998). Codes are "applied to organise sensory data into perceptual category and provide a cognitive frame of reference for observing and interpreting our environment" (ibid, p.253). A shared language enhances the capability to combine knowledge. However, knowledge creation involves a high degree of tacit knowledge (1996; Nonaka 1991) and the effective transfer of knowledge requires not only access to relevant knowledge, but also actors' ability to identify, interpret and exploit the new

knowledge (Boschma 2005). To acquire the transferred knowledge relies on the competencies of an actor and the resources made available to that actor (Adler & Kwon 2002; Lin 1999). The existence of a shared language enables the combination of information via perspective-taking and perspective-making (Boland & Tenkasi 1995). Shared narratives provides powerful means in social networks for creating, exchanging and preserving rich sets of meaning (Nahapiet & Ghoshal 1998). Narrative methods, such as stories, myths and metaphors, can help to reduce the level of codification by providing context, process and analogue (Baskerville & Dulipovici 2006). Shared narratives facilitate the combination of different forms of knowledge, including those which are largely tacit (Nahapiet & Ghoshal 1998; Orr 1990). However, Nooteboom (2000) notes that, "A trade-off needs to be made between cognitive distance, for the sake of novelty, and cognitive proximity, for the sake of efficient absorption. Information is useless if it is not new, but it is also useless if it is so new that it cannot be understood." (p.153) In other words, sources of novelty suffer from too little cognitive distance, while communication problems appear from too much cognitive distance. Boschma (2005) proposes using a geographical cluster to resolve this problem. Boschma describes the cluster as being "endowed with a common knowledge base made up of diverse, but complementary, knowledge resources', which provides the mechanism for acquiring new ideas" (p.64).

2.2.3.1.4 Contextual factors

Social capital is affected by a number of contextual factors, including task, organisation and institution. As discussed in the structural dimension, the value of network ties depends on the nature of the task (Hansen 2002). Strong ties are suitable for complex tasks and the transfer of tacit knowledge while weak ties are suitable for routine tasks and the transfer of explicit knowledge. Moreover, the development of social capital depends on the organisation and institution (Adler & Kwon 2002; Boschma 2005). These contingencies further affect knowledge creation.

Both organisational structure and organisational culture affect knowledge creation. The settings of an organization or a network are both "the mechanisms that coordinate transactions" and "the vehicles that enable the transfer and exchange of information and knowledge in a world full of uncertainty" (Cooke & Morgan 1998 in Boschma 2005, p. 65). In other words,

what influences actors' ability to act is the degree of autonomy and control defined by organizational arrangements (Adler & Kwon 2002). Organizations connect independent actors through various means such as co-location and building a network. The formal arrangements provide actors with access to complementary physical and intellectual resources. However, too much interdependency results in bureaucracy. A learning culture in organisations encourages knowledge sharing and creation (Baskerville & Dulipovici 2006). Organisational learning can be regarded as the shared value system of people in a social setting, which often only takes effect when there is an action orientation which motivates this learning (Argyris 2004). Organisations need to develop their absorptive capacity, i.e. their ability to identify, assimilate and exploit knowledge (Cohen & Levinthal 1990) .

Institutional level norms are closely related to those of the group and organizational levels. Institutions are "sets of common habits, routines, established practices, rules, or laws that regulate the relations and interactions between individuals and groups" (Edquist & Johnson 1997, p.46 in Boschma 2005). There are two types of institutions, namely formal institutions such as laws and rules and informal institutions such as cultural habits and values (Zukin & Dimaggio 1990). Both of these have an impact on the magnitude and the approach with which actors or organizations coordinate their actions. For instance, consented procedures, and a legal system which secures ownership and intellectual property rights provide a basis for economic coordination and interactive learning. It is much easier to transfer information among people with a similar cultural background or the same language (Maskell & Malmberg 1999). However, similar to previous levels of norms, the institutional norms and structures may also evolve into a situation of lock-in and hinder the process of innovation (Freeman & Perez 1988). To foster knowledge capital in an organization, Boschma (2005) propose loosely coupled systems to balance stability (reducing uncertainty and opportunism), openness (triggering novel ideas) and flexibility (restructuring the relationships for the implementation of new ideas).

Table 2. 3 Summary of Social Capital Dimensions

Social Capital Dimensions	Types	
Structural dimension		
Network ties	Strong ties	Weak ties
Network configuration	Network closure	Structural hole
- Features	Intracorporate community for cohesion	External linkages for innovation
	In-depth knowledge	Novel information
Relational dimension		
Trust	Generalized trust	Dyadic trust
- Features:	Members of a social unit	Direct experience
	Need to develop shared goals and norms of reciprocity	Norms of general reciprocity
	In-depth knowledge or explicit knowledge	A wide range of knowledge
Cognitive dimension		
Shared language and code	Cognitive proximity	Cognitive distance
Shared narratives	Stories, myths, and metaphors	
- Features:	In-depth knowledge	Novel information
Contingencies		
Task	Degree of complexity ; extent of tacit knowledge	
Organisation	Organisational culture and structure	
Environment	Rules & regulations; shared value	

2.2.3.1.5 Types of social networks for knowledge creation

According to Brown and Duguid (2001), two practice-related social networks are essential for understanding learning, work and knowledge flow, namely communities of practice (CoP) and networks of practice (NoP). A community of practice refers to a closely associated group of members engaged in a shared practice. Members have formed strong interpersonal ties through direct contact and continuous interaction in small communities (Lave & Wenger 1991; Wenger 1998). In contrast, networks of practice refer to a large, loosely associated, geographically distributed group of individuals engaging in a shared practice. NoP members may not know each other and often do not expect to meet in person (Brown & Duguid 2001).

The Table below shows a comparison of the two types of networks in terms of social capital (structural, cognitive, and relational), size, group types, tasks, contexts and boundaries. In terms of social capital, CoP consists of a tightly knit group of people. The community itself has an identity. NoP members are

not bonded strongly, and although they are relatively anonymous to each other. However, they share a broad common interest (e.g. delivery of public services). Similarly, CoP members are interested in the same subject (e.g. social housing). The difference is that to ensure full participation, CoPs have norms of direct reciprocity (Wasko & Faraj 2005). The size of CoPs varies from tens to hundreds. They tend to be smaller than NoPs. Finally, in a CoP, the boundaries are set by tasks, culture and history of the community (Nonaka & Toyama 2003). In contrast, the boundaries of NoPs are fluid. Networks are self-organised, and individuals choose to participate voluntarily. Activities on the NoP are open to other individuals who are interested in the shared practice (Nonaka & Toyama 2003; Wasko & Faraj 2005).

Table 2. 4 Comparison between Communities of Practice and Networks of Practice

Characteristics	Communities of Practice (CoPs)	Networks of Practice (NoPs)
Structural dimension	Closely associated	Loosely associated
Relational dimension	Known; Norms of direct reciprocity	Unknown; Emergent relationship
Cognitive dimension	Same interest	Same interest
Size	Vary from tens to hundreds;	Large group
Types, tasks & contexts	Planned; Specific interest in best practice; voluntary	Emergent (Self-organising); broad shared interest; voluntary
Boundary	Clear; Membership is fairly stable	Open; Membership is not fixed;
Examples	(Quan-Haase & Wellman 2007)	(Wasko & Faraj 2005)

Additionally, although the two types of networks are compared separately, both CoPs and NoPs are important for organisations, since they contain long-term information and knowledge flow. Their competitive advantage lies in organisations' ability to balance and coordinate autonomous communities of practice internally and leverage the knowledge that flows into these communities from networks of practice (Brown & Duguid 2001; Brown et al. 2000; Wasko & Faraj 2005). This view echoes the previous discussion about network closure and structural holes (Adler & Kwon 2002). An optimum network for continual knowledge creation is a mixture of both weak and strong ties.

2.2.4 IT and Knowledge Creation

In the context of knowledge management, IT-based systems are developed for three common applications in organisations: the coding and sharing of best practices, the creation of corporate knowledge directories, and the creation of knowledge networks (Alavi & Leidner 2001).

The potential technological support for knowledge creation is implied in Nonaka's works (Nonaka & Konno 1998; Nonaka et al. 2000). Nonaka identified four types of context in the knowledge creation process: originating 'ba' (for sharing), dialoguing 'ba' (for conversation), systemising 'ba' (for combination) and exercising 'ba' (for action). These types are defined by two dimensions of interactions, namely the type of interaction (individually vs. collectively) and the media used in such interactions (face-to-face vs. virtual)

The fundamental assumption of Nonaka's model is that the selection of media is based on the involved nature of knowledge (i.e., explicit or tacit). Nonaka and Konno (1998) suggest that, in the use of IT capabilities, such as data warehousing and data mining, document repositories are limited in enhancing the efficiency of the combination mode of knowledge creation. However, in their review article, Alavi and Leidner (2001) suggest that '...IT as applied to KM need not be constrained to certain types of knowledge' (p.115). The advances in communication and information technologies, especially the increased flexibility of systems, enable greater possibilities than those which existed with previous classes of information systems (ibid). For instance, computer-mediated communication may increase the quality of knowledge creation by enabling a forum for constructing and sharing beliefs, for confirming consensual interpretation, and for allowing the expression of new ideas (Henderson & Sussman 1997).

However, IT plays a limited role in knowledge management is limited. For instance, individuals have to know what they are looking for when searching the repository (Powell, W 1998). The use of IT for knowledge creation in virtual teams varies with task characteristics and group composition and is mediated by a shared communication norm (Malhotra, A & Majchrzak 2004). Organisations continue to suffer from a low level of inside knowledge flow (Gebauer 2008; KPMG 1998). Moreover, the dynamic needs of knowledge creation require flexible IT systems (Alavi & Leidner 2001).

2.2.4.1 IT and communities

Pervious reviews of social capital reveals that an ideal network for knowledge creation is a balanced mixture of strong and weak ties (Hansen 2002; Nahapiet & Ghoshal 1998). To enhance knowledge creation, IT needs to both enable weak ties and reinforce strong ties (Alavi & Leidner 2001).

In theory, technologies such as community systems will influence the strength of interpersonal relationships, personal knowledge, and access to information by facilitating interactions among community members (McDermott 2002). Geib et al. (2004) measured virtual communities for knowledge development and exchange, and found that technological features were only used when they supported user processes. In learning and professional communities, users demanded both personal information and work-related information and knowledge. Moreover, Geib et al. (2004) examined both online and offline interactions among members and revealed that interactivity in personal meetings is higher than in online communities. Nevertheless, interaction through community systems is considered to be absolutely necessary (ibid).

Web-based social software provides greater flexibility and sociability by design. Thus, the following section will present a review of the functions provided by social software for knowledge creation.

2.2.5 Social Software and Knowledge Creation

The Internet is designed to support communication and communities (Cook 2008). The Web/Internet not only enables workers to overcome time and space barrier, but also facilitates knowledge creation by providing access to external resources, space for ongoing conversations and additional channels for interaction (Carley & Wendt 1991; Malhotra, A & Majchrzak 2004). Web-based collaboration has several potential benefits such as supporting a user in forming informal connections with another user, prolonging conversations between/among members with synchronous and asynchronous interaction, providing a space as both a meeting place and a resources portal. Furthermore, its access is not limited by time and distance in most cases, and it possibly facilitates close group relationships (McKenna & Green 2002).

Social software has advanced the Internet in terms of its support for communication and community. According to O'Reilly(2006), "Web2.0 is the

business revolution in the computer industry". Boyd (2007) believes that this advancement of the Internet exists in neither technological nor social features. Rather, 'social software emerge as a product of collective action and network affects'(Boyd, D 2007). Boyd (2007) argues that the difference between traditional communication software (e.g. e-mail) and social software (e.g. blog) is that the former type arranges people into groups with a top-down approach and assigns membership, while social software with a bottom-up approach enables users to organise themselves into a network based on their preferences.

In terms of knowledge creation, the key areas of social software are weblogs, wikis, and the social network services of different kinds (Boyd 2003 in Avram 2006).

Web2.0 Social software such as blogs and wikis enables online "conversations". On websites, individuals create knowledge through a process of discussion with questions and answers, collaborative editing, or through a process of storytelling (Wagner, C & Bolloju 2005) (p.ii). Online conversations have been recognized as a useful medium for knowledge exchange and extraction (Wagner, C & Bolloju 2005). In particular, storytelling is regarded to be a fundamental form of knowledge transfer for its use in codifying tacit knowledge(Brown 2000; Brown et al. 2005) and refining the knowledge. As a kind of narrative method, storytelling reduces the level of codification by providing context rather than eliciting information from the source. McAfee describes Web2.0 social software as new platforms which "focus not on capturing knowledge itself, but rather on the practices and output of knowledge workers" (p.23).

Social software not only supports one-to-many broadcasting (e.g. blogs) but also enables many-to-many conversations. Wikipedia is a good example. Although the quality of the content of Wikipedia has been questioned by many, the growth of Wikipedia presents the possibility of people using social software for knowledge co-creation⁸. As Weinberger says, contributors 'edge toward an article acceptable to both of them through a public negotiation of knowledge and come to a resolution. Yet the page they've negotiated may not represent either person's point of view precisely' (Weinberger 2007, p. 143).

⁸ Contributors have been using the wiki discussion page for co-editing articles.

Moreover, social software also provides support to capture and represent unstructured conversations while accommodating contextualization, search and community. Wagner and Bolloju (2005) match three social software applications, namely, blogs, wikis, and discussion forums to four types of community developed by the American Productivity and Quality Centre (APQC 2001). The four community types are “help communities” (to support each other on everyday problems and share ideas on an ad hoc basis), “best practice communities” (that developed, validated, and then shared best practices), “knowledge stewarding communities” (that maintained a body of knowledge for day-to-day use as well as the community around it) and “innovation communities” (that sought breakthrough ideas). Each community emphasizes different requirements. Help communities are to connect people and enable spontaneous exchange. Best practice communities are to provide process support for idea validation and refinement. Knowledge stewarding communities require document management, community management and enlisting of experts. Innovation communities are to bring together individuals with multiple perspectives and identify new trends (ibid).

The unique requirements of each community dictate the required technological features. The results suggest that light-weight conversational technologies suit all communities except for knowledge-steward communities, since this type of community requires enterprise solutions, including document management and portal functionality. Help communities can be served by threaded discussion forums with explicit questions and corresponding answers and chronological organisation. Best practice communities can benefit from a joint incremental development of practice facilitated by wiki technology. The weblogs of a diversified expert group can provide an ideas pool for innovation communities (Wagner, C & Bolloju 2005).

Although social software such as weblogs and wikis can be used to support communities on their own, they are increasingly being used in combination with other social software tools (e.g. social bookmarking, RSS feed, social tagging) to form social networking sites.

Social networking sites (SNSs) can be viewed as being online communities, which allow Internet users to share interests and activities, or to explore the interests and activities of others by providing a variety of ways for users to

interact, through chat, messaging, email, video, voice chat, file-sharing, blogging and discussion groups (Experian-Hitwise 2008).

According to Boyd and Ellison (2008), the features which distinguish SNSs from other web-based services are that they “allow individuals to 1) construct a public or semi-public profile within a bounded system, 2) articulate a list of other users with whom they share a connection, and 3) view and traverse their list of connections and those made by others within the system” (p.211).

As indicated by definition, various social software tools can be aggregated in social networking sites to suit the needs of the community. For example, Facebook supports chat, messaging, blogging (writing notes), music-sharing, and so on. In terms of knowledge management, a community system centred on connected individual and group weblogs was designed for the National Institute for Mental Health in England to support knowledge co-creation and to bridge organisational and occupational divides within the mental health field (Avram 2006; Bryant 2004). In the UK’s public sector, the Improvement and Development Agency (IDeA) developed a Communities of Practice (CoP) platform to facilitate learning and knowledge-sharing across local government. The CoP site has installed a number of social software tools, including wikis, blogs, and RSS feeds.

Although social software offers great potential to support knowledge creation, much of the discussion is on the conceptual level. A problem with social networking sites is unequal participation (Hargittai 2008). In relation to knowledge creation, unequal participation appears to be a large number of Internet users consuming the content created by a few of them. This phenomenon is identified as ‘power-law distribution’ by Clay Shirkey (2003), which “appears often in unconstrained social systems where people are allowed to contribute as much or as little as they like”(Shirky 2005a). This participation issue existed in the period of pre-social networking sites. In her book *Online Community*, Preece (2000) gives some reasons for this. One factor can be anonymity. Being anonymous online tempts people not to follow the norm of reciprocity, i.e., taking from the community without repaying. Lack of physical proximity can be another reason. The greater the physical distance the more difficult it becomes for people to form a reciprocal relationship. Also, lurking is a common phenomenon in online communities although lurkers often have a strong sense of community. However, there is considerable evidence of reciprocity online, both between those linked by

both weak and strong ties (Preece 2000). Researchers suggest that people with a strong reputation and identity within their social systems tend to repay favours (Preece 2000; Wellman & Gulia 1999).

Nevertheless, empirical evidence about successful application of Web2.0 social software for knowledge creation purpose is still absent in the academic journals. Most case studies are published in business readings and report the implementation of social software within organisational boundaries (Li & Bernoff 2008).

2.3 Adopting Social Software for collaboration

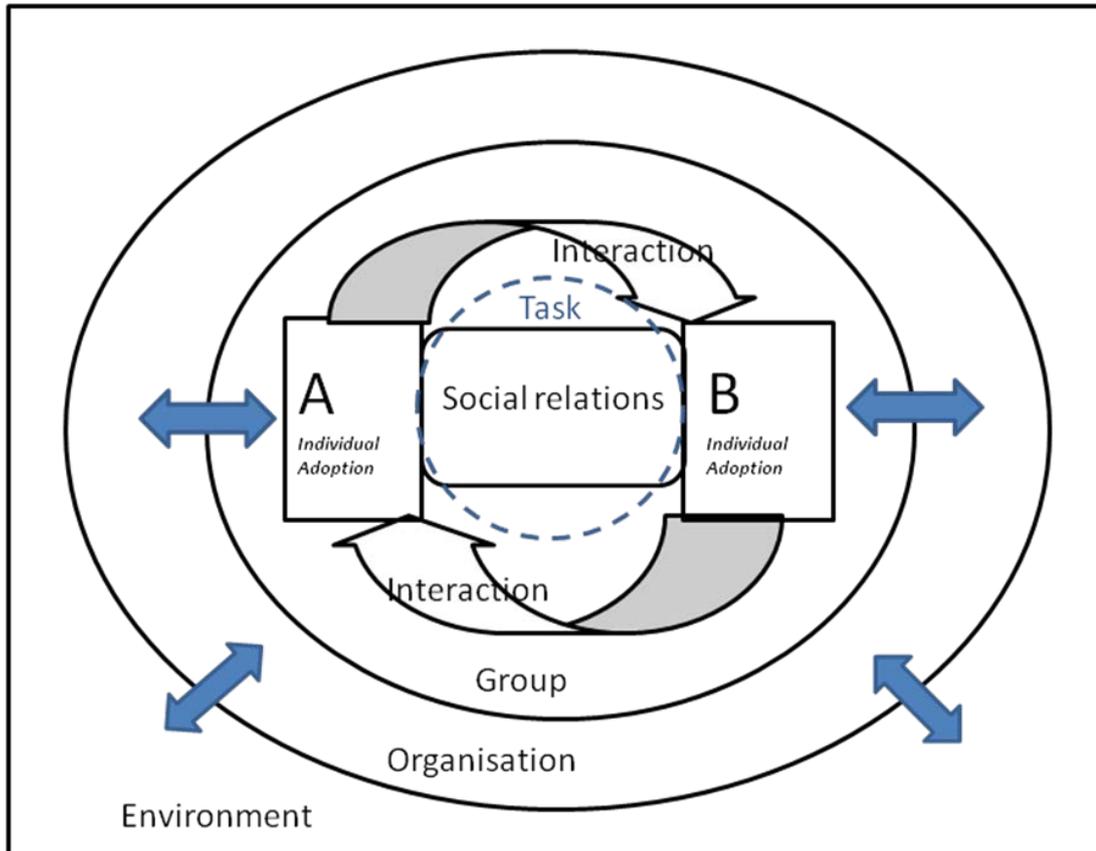
In this study, social capital is proposed to link two streams of studies, namely, social software adoption and the process of collaboration. The characteristics of social capital not only constitute some aspects of the social structure, but also facilitate the actions of individuals within that structure (Coleman 1990). Based on this understanding, we conceptualise social capital as social relations and social interaction. Social relations provide the structure for technology adoption while social interactions trigger changes in social relations.

Social capital was emphasized because of the characteristics of Web2.0 social software. As a type of conversational technology (Wagner, C & Bolloju 2005), social software provides a space for individuals to engage in ongoing conversation. This web-based association can be perceived as another form of relationship because it possibly extends into real life. Anthropologist Michael Wesch (2010) recently pointed out that Web2.0 social software is not merely a tool but also a form of connection. Additionally, since conversations are stored in the social software, technology itself becomes another layer of social structure, which continuously shapes, and is shaped by human action (Orlikowski 1992).

2.3.1 Conceptual framework

The conceptual framework for this study is shown in Figure 2.13.

Figure 2. 12 Conceptual framework for social software-supported collaboration



In the framework, structure of social software adoption composes of social relations, task, individual, group, technology, organisation, and environment. These structures may affect an individual's initial acceptance of social software. Once this individual starts using the application, the person's adoption behaviours may be affected by two processes, i.e., individual learning and communication process(Barki et al. 2007).

Individual learning exists in the forms of independent exploration, and organised training. Independent exploration refers to user's information search behaviours undertaken independently to improve one's knowledge and mastery of an IT, over and above those that are required by organized training programme (Barki et al. 2007; Vandebosch & Higgins 1996). Individuals' learning activities are likely to vary with their personality.

Changes in adoption behaviours also occur when users interact with each other and exchange information in order to adapt to new ways of performing their tasks (Barki et al. 2007; Papa & Papa 1992). In other words, the individual is likely to adapt the way he or she uses social software according to the implicit or explicit communication norm shared between two people or

among a group. Thus, social relations, such as prior history and similar knowledge base, may influence the way users interact with each other.

Furthermore, though belief affects attitude, attitude and behaviour reinforce each other. Because individuals' direct experience result in strong attitude-behaviour relations (Ajzen & Fishbein 2000), individual's perception of and attitude towards social software are likely to change after using it. Thus, social software adaptation is an ongoing process.

Social interactions generate new social structures (Giddens 1984), no matter whether it happens online or offline. New structures may emerge in the context, such as shared communication norms. Additionally, because social software is based on the World Wide Web, activities are potentially visible to the individuals who are not involved in the original task. The boundary of a group is permeable when individuals can join and leave the group freely. Permeability is perceived important for continuous knowledge creation(Nonaka & Toyama 2003).

The constructs in the model are outlined below first.

2.3.1.1 Task

The importance of task is emphasized in the technology adoption studies (Goodhue & Thompson 1995; Zigurs & Buckland 1998). In computer-mediated studies, a frequently used model for conceptualizing group task is McGrath's (1984) Group Task Circumplex. Tasks are categorised on four basic processes: generate, choose, negotiate, and execute. We use McGrath's typology to define the structure of tasks in this study. Definitions of these tasks are provided in table 2.6. Traditionally, it is believed that for successful adoption, there must be a "fit" between task and technology. However, this belief is challenged in the context of virtual group (Zigurs & Khazanchi 2008). Although task-technology fit matters at the initial stage of adoption, it becomes irrelevant when group members learns and adapts(Fuller, R & Dennis 2009).

2.3.1.2 Technology

DeSanctis and Pool (1994) suggest that technology should be assessed by both structural features and spirit. Structural features are the functionality of

a software application. Spirit of technology refers to the attributes that are likely to affect group behaviour. In terms of features, Ease-of-use interface is emphasized in technology acceptance studies (Davis 1989; Davis et al. 1989). In virtual team research, technology characteristics, such as multiplicity of cues, immediacy of feedback, and social presence are perceived to influence group performance (Daft & Lengel 1986; Dennis et al. 1999). Also, anonymity on the system is reported as an important factor that affects participation (Chan et al. 2004; Fjermestad & Hiltz 1998; Postmes et al. 2001).

2.3.1.3 Group

A group shares social identity (Turner 1982). The members in a group are aware of each other and expect mutual interaction (McGrath 1984). Both group characteristics and group composition affect technology use. Group size, group virtuality and group heterogeneity are reported to influence collaboration (Dennis & Williams 2005; Griffith et al. 2003; Malhotra, A & Majchrzak 2004). Communication is often an issue in large groups where technological assistances are needed. High level of virtualness hinders communication in distributed group (Griffith et al. 2003). However, it is possible to establish trust when group members have prior history or similar level of knowledge (e.g. Tan et al. 2000). This is supported by the studies on social capital (Nahapiet & Ghoshal 1998). Increase in structural dimension (such as prior history), relational capital (such as trust), and cognitive capital (including shared language, codes, and shared narratives) tend to benefit knowledge creation (Nahapiet & Ghoshal 1998) (see 2.3.3.1 for social capital definition).

2.3.1.4 Individual

In the diffusion of innovation studies, personality is studied as a construct that affect individuals' decision to adopt new technology (Rogers 2003). In virtual team research, personality is perceived to have influence on group performance (e.g. Barry & Stewart 1997; O'Neill & Kline 2008). Extraversion and openness are reported as important factors in computer-mediated communication (Balthazard et al. 2004; Rohrbaugh 2007; Straus 1996). The

concept of openness is similar to innovativeness defined by Rogers and Shoemaker (1971), which can be interpreted as willingness to change.

2.3.1.5 Context

Organisational and environmental context provide pre-conditions for implementing technological solutions (Ryan et al. 2002). Organisational culture and structure, as well as training are perceived influential on virtual collaboration (Naik & Kim 2010). Organisation culture is the shared pattern of values and beliefs that shape organisational members' perception (Schein 1985). Individuals, as members of organisations, are likely to be influenced by existing norms and values. The hierarchical structure is likely to affect individuals. Training is perceived as an important element in technology adoption (Dennis et al. 2001). Although some think Web2.0 social software is extremely easy to use (Jack Vinson in Avram 2006, p. 2), others found wikis difficult to use (Mader & Abel 2009). This is possibly to do with the diffusion stage of Web2.0 social software. Thus, the growth of the Internet and social networking sites is taken into consideration.

2.3.1.6 Social interaction

One of the results of social interaction is growth in structural ties, which affects the development of cognitive and relational dimensions of social capital. Shared understanding and trust are reported essential in distributed collaboration (Malhotra, A et al. 2001; Paul & McDaniel 2004). In virtual communities, being recognised as a member of a community (social identity) or expert is likely to affect user participation (Andrews 2002; Butler et al. 2002; Chan et al. 2004; Hars & Ou 2002).

The details of variables in each category is summarised in Table 2.5.

Table 2. 5 Variables that affect structural characteristics

Variables	Descriptions
Task dimension	
- Task categories <ul style="list-style-type: none"> • Generate • Choose 	<p>The tasks are collaborative and cooperative in the sense that the group is not required to decide on a single best response or to evaluate the quality of members' contribution, e.g., idea generation.</p> <p>The tasks require co-ordination in a more typical sense. Value of contribution that each member makes to the group product depends on the contribution of other members, e.g., problem solving, decision-making</p>
- Task complexity	The task attributes that increase information load, diversity, or rate of change. The complexity level is defined by outcome multiplicity; solution scheme multiplicity; conflicting interdependence; outcome uncertainty
Technology dimension	
- Ease of use	The degree to which a person believes that using a particular system would be free of effort
- Multiplicity of cues	The number of ways in which information can be communicated, such as text (spoken or written words themselves), verbal cues (tone or voice), or non-verbal cues (physical gestures)
- Immediacy of feedback	Immediacy of Feedback is the extent to which a medium enables users to give rapid feedback on the communications they receive
- Social presence	The extent to which a technology enables a communicator to experience communication partners as being psychologically present
- Anonymity	Different forms of anonymity 1) the group knows who the members are, but cannot identify individual contributions. 2) Members do not even know who belongs to the group. 3) Individual contributions may be "anonymous". 4) People may use "pen names" or "pseudonyms".
Group dimension	
- Group size	Number of people in a group
- Group virtuality	The extent of virtuality can be measured by time differences of members, geographical dispersion, number of organisations, and reliance on ICT
- Group heterogeneity	The degree of diversity in cultural, knowledge, functional or organisational background among members.
- Prior history	Prior direct experience

Table 2. 5 Variables that affect structural characteristics (Cont.)

Variables	Descriptions
Individual dimension	
- Extraversion	Extraverts tend to be co-operative, enthusiastic, outgoing, and friendly.
- Openness /innovativeness	An individual's capacity to be cognitively and behaviourally flexible in dealing with new situations.
- Self-efficacy	judgments of how well one can execute courses of action required to deal with prospective situations
Organisational & environmental dimension	
- Organizational culture	The shared pattern of values and beliefs that shape organisational members' perception
- Organizational structure	The hierarchical structure present in organization
- Training	Training in technology usage, group processes, and cross cultural awareness.
- Growth of the Internet	Growth in the number of social networking sites and the Internet users
Social interaction	
- Shared understanding	An organized understanding or mental representation of knowledge that is shared by members
- Physical meetings	Face-to-face meetings
- Trust	Trust can be defined as belief in the social system and group members
- Social Identity	The individual's knowledge that he belongs to certain social groups together with some emotional and value significance to him of this group membership
- Expert	Exchange knowledge for intangible returns such as self-esteem and self-efficacy

2.3.2 Elaborate conceptual framework with GSS literature

To elaborate the conceptual framework, we look into the literature of web-supported collaboration.

Computer-based systems have been widely applied to support group-related activities such as knowledge transfer and collaborative learning. A variety of terms are associated with computer supported collaboration, including, e-collaboration, virtual team, distributed work, computer-supported cooperative work, and electronic meeting systems, and so forth. The subject, group support systems (GSS)⁹, is a notable and well-established research

⁹ In Group Support Systems literature, the term "GSS" often refers to Group Decision Support Systems. However, the functions of GSS are not limited to decision-making. For instance, Pinsonneault and Kraemer (1990) make a related distinction between Group Decision Support Systems, "GDSS" and "GCSS" or "Group Communication Support Systems," which they observe as having "similar impacts on some aspects of group processes and outcomes, but opposite impacts on other aspects" (p. 143). When Fjermestad and Hiltz (1998, 2000) reviewed GSS literature, they defined Computer-Mediated Communication (CMC) and GSS as being two different communication modes. Similarly, McGrath and Hollingshead (1994)

stream in the information systems field and serves as a foundation for the literature review.

Prior to GSS research, scholars from a social psychology background have studied small group decision-making, generally in the “Face-to-Face” (FtF) condition (e.g. Hare 1962; McGrath 1984; Shaw 1971; Steiner 1972), and the GSS concept was first raised by Doug Engelbart in the 1960s (Wagner, G et al. 1993). In the 1970s, scholars began to explore the effects of media, such as the telephone. The first recorded experiment of computer supported decision-making was conducted by Turoff and Hiltz in 1982. However, it is DeSanctis and Gallupe’s (1987) seminal paper, ‘A foundation for the study of Group Decision Support Systems’, that provides a fundamental framework for research on GSS (Fjermestad & Hiltz 1998).

DeSanctis and Gallupe (1987) define GSS as systems which ‘combine communication, computer, and decision technologies to support problem formulation and solution in group meetings’ (p.589). They propose a ‘contingency’ theory to help to explain the fact that the success of GSS is the interplay among various factors including the nature and structuring features of the technology, group size, the type of task, and the communication mode (collocated or dispersed). Based on communication model, two types of GSS are mainly discussed in the literature, namely, Group Decision Support Systems (GDSS) and Group Communication Supported Systems¹⁰ (GCSS). GSS research stream considers that the effectiveness of the technology depends on its appropriate design and use by the group (DeSanctis and Gallupe 1987).

Meanwhile, social psychologists continue to study the human factor in the context of distributed groups (e.g. Geister et al. 2006; McKenna & Green 2002; Michinov et al. 2004; Schiller & Mandviwalla 2007). In virtual group, the impact of technology is often examined by an input-process-output model (Pinsonneault & Caya 2005; Powell, A et al. 2004). The model focuses on the process of interaction.

categorised GSS into GCSS (Group Communication Support Systems), GISS (Group Information Support Systems), GXSS (Group External Communication Support Systems) and GPSS (Group Performance Support Systems) in the discussion. Nevertheless, although it is useful to distinguish them for purposes of discussion and analysis, these types of systems are often intermeshed in practice (McGrath & Hollingshead 1994). For discussion, GSS is categorised into two types, i.e. GDSS and GCSS.

¹⁰ Same as Computer-Mediated Communication (CMC) The reason has been given in the previous footnote.

The underlying assumption is that the input factors at Time 1 affect performance at Time 2 through a series of interactions. The interaction process has to be measured by addressing the question of how group interaction mediates the input-performance relationship. Thus, social interaction processes have to be addressed by studying the role of social software in distributed groups. For the purpose of this study, the communication side of technology use is emphasized, and the main sources of literature come from published literature reviews, and a database search.

Sources of literature

Fjermestad and Hiltz (1998; 2000) carried out comprehensive reviews on all GSS experimental research before 1998, and all the case and field studies undertaken before 2000. They reviewed the articles using an integrated theoretical framework, which was developed on the basis of seven contingency theories¹¹ and consists of four major categories of variables: contextual or independent variables; intervening variables; group adaptation processes; and outcomes (Fjermestad 1998). Their reviews provide a complete coverage of factors present in GSS literature.

This study is interested in Web technology, which has a potential effect on how tasks are carried out, and how people interact with each other and their surroundings. Recent published case and field studies on web-based GSS are reviewed. Using the INSPEC database, ten web-based GSS case and field studies were identified, which were published in IS key journals and conference proceedings¹² between the years 2000 and 2009. Appendix 4

¹¹ Seven contingency theories include DeSanctis and Gallupe (1987), Jalassi and Beauclair (1987), Dennis George, Jessup, Nunamaker, and Vogel(1988), Pinsonneault and Kraemer (1990), Poole and DeSanctis(1990), Hiltz, Dufner, Holmes and Poole (1991) and Nunamaker, Dennis, Valacich, Vogel, and George (1991).

¹² The key words "group support", "group decision", "distributed-*", groupware, "virtual-*" were used to search for GSS empirical studies published in the Proceedings of the Hawaii International Conference on System Sciences (HICSS), Decision Support Systems (DSS), Journal of Management Information Systems (JMIS), Information & Management, MIS Quarterly (MISQ) and Information Systems Research (ISR) between 2000-2009. 82 results returned. 53 of these were published between 2004 and 2008, 49 were journal articles, and 33 were conference articles. Then the key words 'Web', 'Internet' and 'online' were used within the results respectively, and 23 articles remained. Afterwards, the studies were screened following the main criteria used by Fjermestad and Hiltz (2000): 1) they studied one or more specific groups comprising at least three members; 2) they used a web-based system with at least minimal features designed to support group communication and collaboration processes. The study had to be an action research, case study, or field study which required the group to work on a specific task. Additionally, publications on collaborative learning were included for the purpose of this research.

summarizes the methodology and other parameters, as well as the results of each study.

Several recent published literature review articles provide a good overview of virtual team research (Martins et al. 2004; Naik & Kim 2010; Pinsonneault & Caya 2005; Powell, A et al. 2004). Powell et al. (2004) organised the virtual team literature published between the years 1991 and 2002 on the basis of an input-process-output model and proposed future research themes. Martins et al. (2004) identified key constructs in virtual team literature such as team inputs, team processes, team outcomes, and moderators of performance. Pinsonneault and Caya (2005) also reviewed empirical studies of virtual team research, and categorised the existing literature into an input-process-output table and proposed future research directions. Naik and Kim (2010) reviewed studies from the early eighties until recent publications and proposed an extended adaptive structuration model for studying critical success factors in virtual teams . These articles provide a guide for the literature search.

The literature was categorised using the general categories in the adaptive structuration theory, namely, sources of structure, social interaction and outcomes.

2.3.2.1 Structural dimension

2.3.2.1.1 Task

Task has been regarded as an essential element in the study of work groups (Straus 1999) and technology adoption studies (Goodhue & Thompson 1995; Zigurs & Buckland 1998). It is possible for individuals to share ideas and collaborate virtually without physical meetings when they work on a specific task (Meyerson et al. 1996).

Based on group objectives and behaviours, McGrath (1984) presents a typology of eight different group tasks which reflect four basic processes: generate, choose, negotiate, and execute. Only the first two of these will be examined, since both negotiating and executing tasks are out of the scope of discussion¹³. For Generate tasks, each member can contribute ideas

¹³ Negotiation tasks involve inherent conflict in viewpoints or interests. For these tasks, social presence is crucial because reaching consensus among group members is highly dependent on co-ordination. Execute tasks are those require physical movement, co-ordination and

independently. Each original idea will increase group productivity. The group requires a low-level of consensus. Choose tasks requires more co-ordination compared to Generate tasks. A shared understanding or consensus is required. The level of “process communication needs” vary with the complexity of the task. Intellectual tasks are about resolving problems and choosing correct answers. Decision-making tasks require making a judgement and reaching a consensus on a preferred answer. McGrath’s typology suggests that the greater the interdependence among members, the more communication acts are required (Straus 1999). The details of tasks in two processes are summarised in the following table.

Table 2. 6 Summary of McGrath's task categories

Basic processes	Task types	Descriptions	Communication needs	Interdependence among members
Generate	Planning tasks; creativity tasks	Generating plans or ideas, e.g. agenda setting; brainstorming	Little coordination; no need to reach consensus	Minimum interdependence
Choose	Intellective tasks	Solving problems with correct answers (problem solving)	Moderate level of communication and limited coordination; division of labour may be needed for task planning; easy to reach consensus	In principle, each member can find the solution individually
	Judgement tasks	Deciding issues with preferred answers (decision-making)	High incidences of communication acts; reaching consensus through discussion; require considerable coordination	High interdependence

We used McGrath’s Group Task Circumplex to describe tasks as this typology seems to be suitable for the discussion of computer-mediated communication (DeSanctis & Gallupe 1987; Naik & Kim 2010; Straus 1999). Tasks can also be described by their characteristics such as analyzability, uncertainty, equivocality (Daft & Lengel 1986), complexity, enjoyability, and predictability (Hiltz et al. 1991). Among these characteristics, task complexity is emphasized in technology adoption studies (Zigurs & Buckland 1998; Zigurs et al. 1999).

2.3.2.1.2 Technology

According to DeSanctis and Poole (1994), there are gaps between the designer’s views of software and the user’s DeSanctis et al.’s (1994)

athletic contests (McGrath 1984). The subject of this research is asynchronous social software. The technology is not suitable for these two types of tasks.

software evaluation framework provides us a guide to describe the technologies involved in this study and identifies the gaps. DeSanctis et al. (1994) suggest that users' or surrogate users' can identify the gaps in terms of interface characteristics, functionality and holistic attributes. The interface characteristics address questions like "how easy is the system to operate?" Software intended for "end users" is expected to be easy to learn, easy to use, and to promote user satisfaction. The functionality of software refers to the range of operational tasks it supports, which are what make the software identifiable as a certain type of system. Holistic attributes refer to questions like "how is the system likely to affect behaviour in a group?" This is the "spirit" of technology (DeSanctis et al. 1994). Interface and holistic attributes have been studied in technology acceptance and virtual team literature.

An "ease of use" interface is emphasized in technology acceptance studies (Adams et al. 1992; Davis 1989; Davis et al. 1989; Segars & Grover 1993). Thus perceived ease of use affects the perceived usefulness of the technology (Davis 1989). Its importance has been validated in the adoption of Internet/Web-based applications (e.g. Agarwal & Karahanna 2000; Castañeda et al. 2007; Ebner et al. 2007; Gefen et al. 2003; Hsu & Lin 2008; Premkumar et al. 2008). Hsu and Lin (2008) tested the relationship between technology acceptance, knowledge sharing and social influence. Perceived ease of use and perceived enjoyment appear to be the most important reasons for bloggers to share knowledge online.

Virtual team research studies technology in terms of the features which affect behaviour. These features include richness, social presence and synchronicity. The Media Richness theory is the one most used to address the effect of the richness of technology on virtual team interaction (Daft & Lengel 1986; Rasters et al. 2002). Daft and Lengel categorize media as being rich or lean based on four criteria: feedback, multiple cues, language variety, and personal focus. The Media Richness theory suggests that performance improves when managers use richer media for equivocal tasks and leaner media for non-equivocal tasks (Daft & Lengel 1986; Daft et al. 1987). However, there is a lack of empirical support for the theory mainly because media choices made by managers are different from those predicted by the Media Richness theory (Dennis & Kinney 1998). It is suggested that basic aspects are used to study media characteristics (ibid). Multiplicity of cues, immediacy of feedback, social presence and parallelism are considered to be important for virtual team interaction (Daft & Lengel

1986; Dennis et al. 1999; Naik & Kim 2010). Among these characteristics, parallelism (the existence of simultaneous conversation) doesn't seem to be an issue in the case of web2.0 social software.

In addition, anonymity also affects individuals' online behaviour. Fjermestad and Hiltz (1998) found that although anonymous conditions have positive effects on creative tasks, identified conditions have been significantly better than anonymous conditions in five measures of effectiveness. Chan et al. (2004) found that providing members with an identity encourages their participation in the online community.

2.3.2.1.3 Group

A group can be loosely defined as being two or more individuals interacting in a way in which each person is influenced by and exerts influence on the other individuals (Shaw, 1976 in McKenna & Green 2002). Although some scholars emphasize physical presence (e.g. Hogg 1992), Turner (1982) proposes a social identity model stating that "the subjective sense of togetherness, we-ness, or belongingness" is what constitutes group formation (p.16). Also, the interaction process is fundamental to groups. McGrath(1984) defines groups as being "social aggregates that involve mutual awareness and potential mutual interaction (p.7)". Both definitions have also been used in the discussion of virtual groups (McKenna & Green 2002; Powell, A et al. 2004).

Group characteristics and group composition affect the use of technology use. The factors which influence collaboration include group size, group virtuality and group heterogeneity.

GSS are beneficial when technologies are used in medium to large sized groups (6 or above)(Fjermestad & Hiltz 1998). In an electronic brainstorming experiment, Dennis and Williams (2005) found that, as a group's size increases, the relative benefit of electronic system increases.

GSS studies suggest technology benefits are more likely to occur when group members are geographically distributed(Fjermestad & Hiltz 1998). The term "virtualness" was coined by Griffith, Sawyer and Neale (2003) to replace the technological, physical, or temporal structures of a group. Griffith et al. (2003) argue that the virtualness of teams affects whether or not potential team knowledge is transformed into usable knowledge. Khazanchi

and Zigurs (2007) suggest that the extent of group virtuality can be measured by the time differences of members, geographical dispersion, number of organisations, and reliance on information and communication technologies. Nevertheless, relationships in virtual groups develop over time and a close relationship may cause users to be indifferent about communication technologies (Robert et al. 2008)..

Diverse perspectives are needed to develop new knowledge. However, group heterogeneity can also hinder knowledge transfer. Different cultural and knowledge backgrounds can create barriers to effective communication (Dennis & Kinney 1998). Virtual team studies found that equal level of knowledge possessed by team members lead to increased cohesiveness, trust and a higher perception of decision quality in virtual teams (e.g. Tan et al. 2000). Also, it is difficult to achieve shared understanding among members with no prior history of working together due to lack of support for informal interactions(Cramton 2001). Robert et al. (2008) examined social capital and knowledge integration in the distributed teams and revealed that prior direct experience, frequency of contact and shared knowledge base make it easy for members to communicate and integrate knowledge (Robert et al. 2008). Moreover, the authors found that knowledge integration between members who have developed relational capital is not affected by media type (i.e., lean or rich).

2.3.2.1.4 Individuals

Personality can affect individuals adoption of new technology for collaboration by influencing both the individual adoption of technology (Rogers 2003) and the group performance (e.g. Barry & Stewart 1997; O'Neill & Kline 2008).

Personality is almost always assessed using the Big Five personality theory (Barry & Stewart 1997; Digman 1990), which consists of five traits: extraversion, openness to experience, emotional stability, agreeableness and conscientiousness. Among these, extraversion was found to be the key personal trait at an individual level (Barry & Stewart 1997). Also, extraversion is the only personality trait examined in virtual team studies (Balthazard et al. 2004; Naik & Kim 2010; Straus 1996). The extraversion dimension consists of two components: Ambition (initiative, surgency, ambition, and impetuous) and Sociability (sociable, exhibitionist, and expressive) (Hogan 1986 in

Barrick & Mount 1991). Extraverts tend to be co-operative, enthusiastic, outgoing, and friendly. In the group context, extraverts are more likely to participate actively in group discussions, exhibit leader behaviour, and command high levels of intragroup popularity (Barry & Stewart 1997). Therefore, extraverts tend to exchange social information through communication technologies, which helps to build a relationship among virtual team members (Chidambaram 1996; Powell, A et al. 2004). The more social information communicated in a virtual team, the higher trust can be achieved (Jarvenpaa & Leidner 1999).

“Openness to experience” can be another important personality trait, since social software-supported collaboration represents a new way of working. Openness refers to ‘an individual's capacity to be cognitively and behaviourally flexible in dealing with new situations’ (Digman 1990, p. 13; Rohrbaugh 2007). Openness is similar to Rogers and Shoemaker’s (1971) notion of innovativeness, which refers to the degree to which an individual is willing to adopt innovation. Innovativeness can be interpreted as an individual’s willingness to change (Rogers & Shoemaker 1971). Rohrbaugh (2007) found that managerial openness affects the adoption of an asynchronous meeting system in the public sector. Managerial openness is assessed on both personal and organisational levels because mutual adaptation has to be made for the successful routinization of new technology (McCartt & Rohrbaugh 1995; Rohrbaugh 2007).

Additionally, self-efficacy also influences user’s decision to adopt. Self-efficacy was defined by Bandura (1982) as “judgments of how well one can execute courses of action required to deal with prospective situations” (p. 122). By theorizing self-efficacy beliefs as proximal determinants of behaviour, Hill (with Smith and Mann 1987) find that both self-efficacy and outcome beliefs exert an influence on decisions to learn a computer language (Davis 1989). In a study of online community, Chan et al. (2004) uncover that participation is influenced by the informants’ perception of self-efficacy on the topic in discussion.

2.3.2.1.5 Context

Existing organisational and environmental conditions are prerequisite for implementing technological solutions (Ryan et al. 2002).

A simple view of organisational change process is Lewin's (1947) three-step mode: unfreeze – transition – refreeze. This model indicates that organisations contain both driving forces and restraining forces towards change. However, once change has occurred, changes become the new norms embedded in the system. Social software, as a technological innovation, has just been introduced into the work context. Thus we focus on what affects the adoption of this new way of working.

Organisational culture and structure, as well as training are important for virtual collaboration (Naik & Kim 2010).

According to Schein(1985), organisation culture is the shared pattern of values and beliefs which shape the perception of organisational members. It can be analysed at various different levels, including visible artefacts, espoused beliefs, values, rules, and behavioural norms, and basic underlying assumptions (Schein 2004). Organisational culture can be integrated, differentiated or fragmented. Integrated culture implies shared assumptions, which facilitate the development of trust, cohesion and shared understanding (Frost et al. 1985). A fragmented or differentiated organisational culture reflects a multiplicity of subcultures, and within those subcultures there are shared assumptions(Schein 2004). IS researchers suggests that the outcomes of IT development and implementation can improve if organisations have a learning culture, i.e. a culture in which knowledge is shared, norms and values are known, and in which innovative ideas are encouraged and developed(Hirschheim, R. & Klein 1994; Ryan et al. 2002; Tolsby 1998).

Organisational structure is the degree of hierarchy present in an organisation, which defines how the organisation functions by design. Hierarchical and control-orientated design may work against grassroots innovation supported by social software(Li & Bernoff 2008). However, it is possible for strong leadership to create a vacuum for cross-boundary innovation (Malhotra, A et al. 2001).

Training in both technology and communication is important in computer-supported group work(Fjermestad & Hiltz 1998; Fjermestad & Hiltz 2000). Duarte and Snyder (1999) suggest that virtual teams hold face-to-face team-building sessions prior to undertaking their virtual assignments. Malhotra and Majchrzak (2004) found that developing communication norms in distributed teams helps to develop trust among

members and encourages knowledge sharing. Blackburn (2003) proposed a comprehensive virtual training programme, including training in technology usage, group processes, and cross cultural awareness.

Additionally, Web2.0 social software applications were first adopted by individuals for leisure. The growth of social networking sites, as well as the Internet affects individuals' perception of the virtual world as well as their behaviour online. Thus, the wider environmental context should also be considered.

2.3.2.2 Social interaction

Social relations are developed through online and offline interactions.

In virtual teams, shared understanding and trust are essential for collaboration (Malhotra, A et al. 2001; Paul & McDaniel 2004; Pinsonneault & Caya 2005; Powell, A et al. 2004).

Reaching a shared understanding about a team's task, structure and procedure is likely to be more challenging in distributed groups than in co-located teams (Martins et al. 2004). The barriers for a shared understanding in virtual teams are complex team and management structures, the cultural diversity of team members, and ICT-mediated communication (de Rooija et al. 2007). The level of shared understanding can be improved by having physical meetings or using media with rich visual support and a social presence.

Malhotra and Majchrzak (2004) identified contingent IT use in distributed teams. Members face a paradox between the need to share their own knowledge for knowledge creation and the loss of control over their own knowledge if they share it. To resolve the problem, writing communication norms prior to virtual collaboration is likely to enable the development of trust and encourage knowledge sharing (Malhotra, A et al. 2001). Building trust also depends on interaction during the collaborative process. Jarvenpaa and Leidner (1999) identified that virtual teams which exhibit highly trusting behaviour, exchange significant social communication and predictable communication patterns such as substantial feedback, positive leadership, enthusiasm, and the ability to cope with technical uncertainty.

In virtual learning and knowledge communities, recognition encourages knowledge sharing (Chan et al. 2004; Wasko & Faraj 2005). Chan et al. identified three types of recognition, namely, identity, expertise, and tangible

recognition. Among these three, identity and expertise have demonstrated a clear positive impact on self-esteem, self-efficacy, sense of obligation, and sense of community. The effects of these forms of recognition in turn encourage participation through the moderation of time and interest on the topic of discussion(Chan et al. 2004).

Tajfel (1982) defines social identity as “the individual's knowledge that he belongs to certain social groups together with some emotional and value significance to him of this group membership” (p. 31). This identification process leads individuals to perceive themselves in terms of shared social identity (i.e. self categorization). The known group characteristics are likely to affect its members' behaviour when they acknowledge that they belong to the group (Michinov et al. 2004). For instance, a sense of community tends to encourage participation(Blanchard & Markus 2004). Identity is also found to have a positive effect on the quality of shared information and knowledge shared (Chan et al. 2004).

Experts are observed to contribute to online communities without expecting reciprocity from others or high levels of commitment to the network (Wasko & Faraj 2005). As owners of knowledge and expertise, these experts tend to exchange their knowledge for intangible returns such as self-esteem and self-efficacy (Chan et al. 2004; Constant et al. 1994; Jarvenpaa & Staples 2000; Wasko & Faraj 2005). This seems to relate to the self-image construct in Venkatesh's model. “Self image” is defined as the degree to which the use of technological innovation is perceived to enhance one's status in one's social system. People who use the system tend to have a high profile in the social system(Venkatesh et al. 2003).

2.3.2.3 Outcomes

User satisfaction has been widely used as a surrogate measure for IS success (DeLone & McLean 2003). According to Doll and Torkzadeh(1988), user satisfaction is “the affective attitude towards a specific computer application by someone who interacts with the application directly”(p.261). Empirical evidences have shown a strong association between user satisfaction and system benefits (Iivari 2005). User satisfaction has been found to have a positive correlation with users' work performance, job satisfaction and organisational performance (Petter et al. 2008). Hiltz and Johnson (1990) examined user satisfaction in the context of CMC system

and have identified two relevant dimensions of user satisfaction: task-related and social-emotional. Task-related dimension of satisfaction relates to interface satisfaction (ease-to-use) and system performance satisfaction (e.g. productivity increase). “Social-emotional” dimension of satisfaction refers to “unexpressive” (i.e., ability of conducting social emotional communication online) and “mode problems” (i.e., constraints on communication mode or information overload).

The work of Hiltz & Johnson (1990) suggest that factors other than CMC system are strongly related to user satisfaction. According to them, individual attributes and system differences (especially documentation) strongly correlate with individual's attitudes toward the system interface. Whereas the users' perceived ability to facilitate expressive personal communications and aspects of the social context (e.g., group characteristics) associate with “social-emotional” dimension of satisfaction with CMC system (1990). Similarly, DeLone & McLean (2003) indicate “system quality”, “information quality” and “service quality” singularly and jointly affect both use and user satisfaction. GSS literature suggest that outcomes from the group decision process are the result of the interplay of intervention and adaptation of the group with contextual factors and positive effects will emerge only if group interaction facilitates them (Fjermestad 1998). In other words, user satisfaction is likely to be reflected in the social relations with other collaborators.

2.4 Summary

This chapter established the background of social software-supported collaboration by reviewing technology adoption and knowledge management literature. The adoption of technology adoption, especially in the virtual context is a contingent process, and adoption is constrained by structures in technology, task and context, and developed through social interaction. Knowledge creation is, in essence, a social process. Knowledge is developed through social relations and communities. The traditional role of technology in knowledge creation is to support the storing and dissemination of explicit knowledge. Social software differs from traditional technologies in its capability to support two-way communication and connecting people to networks. Thus, social software is not merely a tool but a form of social

relationship. The adoption of social software for collaboration is not only influenced by structures in tasks, technology, and contexts but also potentially changes with social relations. A framework is proposed to describe interpersonal-level social software-supported collaboration, and since empirical evidence on this topic is still absent in academic journals, evidence was drawn from the web-based GSS literature to elaborate the framework, which will be used to guide data analysis.

Chapter 3 Research Methodology

This chapter begins with the development of this study, research objective and research questions. This is followed by the philosophical foundation and justification for using a mixed methodology. Then, it moves to detailed discussions on the methodological approach which was deployed to formulate research questions. The data collection and analysis procedures of the two case studies are introduced. Finally, the justification and validation of the case study approach is provided.

3.1 Shape of the study

The researcher's own experience of working in a distribution team within a large IT company made her aware of the potential benefits of social software for collaboration. However, the researcher noticed that different individuals adopted different social software at a different rate. The frequency of online interaction varied when the same social software was used for different purposes. Collaboration was carried out through a combination of online and offline communication channels. In 2007, Web2.0 social software such as weblogs and wikis, were still much less known to and used by users than emails¹⁴ and instant messages in this IT corporate environment. It is acknowledged that high technology companies are much more advanced in the adoption of advanced information technology than elsewhere (Brynjolfsson & Hitt 1996). At this stage, the main question was "can asynchronous social software effectively support collaboration amongst users with less technical background?"

To address this question, this study conducted an exploratory work about students' group weblogs. Although these were student blogs, their settings were similar to those of internal corporate weblogs in the following ways. The weblogs were primarily open to students who registered for the course module. A standard weblog template was used. Group members were from different disciplines. The aim of the exploratory work was to understand the role of social software in the collaborative process. The question to answer was "can use of social software lead to positive collaborative results?"

¹⁴ Emails can be used as both synchronous and asynchronous tool for communication. It is possible to argue that within the same organisation, people tend to expect instant replies. So emails are more synchronous than asynchronous for internal communication.

Interviews and weblog content were used to gain insights about Weblogs-supported collaboration, and the collected data is summarised in Table 3.4.

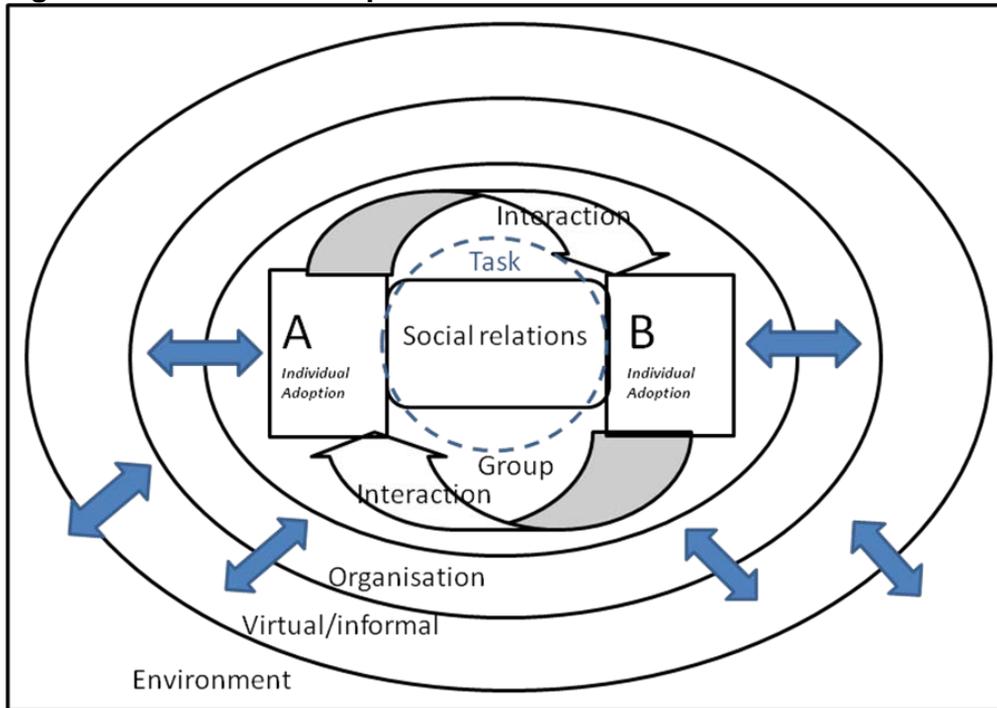
The outcomes were important in providing evidence of the nature of social software-supported collaborative processes, and offered ground for this study to proceed with the anticipated research objective and questions. The exploratory work indicated that asynchronous social software can be useful for collaboration in the work context under certain conditions (Chapter 4). However, the adoption of social software was likely to be demand-driven. In a mandatory setting, social norm could lead to “unfaithful” use (see definition in 2.1.4.1 "Appropriation and Social Interaction"). Social relations which emerged in online interaction affected use behaviour.

A second exploratory study was conducted in a local council, which was selected due to the availability of access. Interviews were conducted to gain an idea of how social software has been used in local government. Three of the interviewees worked in the same team: team manager, senior officer and trainee officer. Both semi-structured and open interview questions were asked. The exploratory work revealed the difference between the adoption of social software inside and outside of the local authority. Access to social media was controlled centrally. Secondly, interviewees’ answers depicted the current ways of collaboration in local government. Additionally, the results revealed the effects of age difference on people’s adoption of social software. The team manager reported that only young team members were using social software. The results of this work, together with the collected secondary data on local e-Government (see Chapter 5) suggest that the UK’s local government is far behind compared to private corporations in adopting social technologies for collaboration. This small project enabled the researcher to acquire a good understanding of UK local e-Government and was beneficial for the analysis of the TALKnet case study.

After the second fieldwork, the objective of this study and research questions were finalised. The objective of the research is to provide a systematic understanding of the impact of asynchronous social software on collaboration. The context chosen for this is the UK’s public sector, and it is anticipated that this will have some bearing on the theory generated.

The conceptual framework was constructed based on the author's own experiential knowledge, prior theory and research (Chapter 2), and two exploratory studies.

Figure 3. 1 Revised conceptual framework



The research questions are as follows.

- RQ1: What motivates actors to adopt social software for collaborative tasks?
- RQ2: What is the role of social software in supporting collaboration?
- RQ3: To what extent can using social software affect the nature of collaboration?
 - RQ3 a, b, c, d: How does technology/task/social capital/context enable or constrain the adoption?

3.2 Overview of research process

The overall research process is as shown in Table3.1. Although the process is presented in the linear form, the actual process of this study follows Van de Ven's (2007) Engaged Scholarship model. Engaged Scholarship is a general model of implementing pluralistic methodology, which defined as being a participative form of research for obtaining the different perspectives of key

stakeholders, which is an iterative process of the following four activities (Van de Ven 2007, pp. 9-10):

- Problem formulation: situate, ground, diagnose and infer the research problem by determining who, what, where, when, why, and how the problem exists up close and from afar
- Theory building: create, elaborate and justify a theory by abduction, deduction and induction
- Research design: develop a variance or process model for empirically examining the alternative theories
- Problem solving: communicate, interpret, and negotiate findings with the intended audience

The key to Van de Ven's model is its emphasis on the feedback loop of the researchers' own reflection during the course of the investigation. Van de Ven (2007) asserts that following this approach, researchers can increase the likelihood of advancing the fundamental knowledge of a complex phenomenon.

Table 3. 1 Overview of research process

Step 1	Step 2	Step 3	Step 4
Literature review & Exploratory study on student group blogs (8 weeks)	Interviews with local government officers & Literature review on local e-government	Interviews with TALKnet users	Case study on TALKnet (2006-2009)
Study of 20 group weblog used by 115 students; Answering if social software can support collaboration? Quantitative and qualitative analysis of weblog content and interview data	An exploratory study aimed at finding out how social software has been adopted by local councils. Qualitative analysis of interview data	Pilot study with three TALKnet users Qualitative analysis of interview data	Study of TALKnet adopted in local government: social network data on the active TALK wikis (313 users and 47 group spaces) and blogs, interviews, and secondary data are used to answer research questions SNA, quantitative & qualitative analysis on web content and interview data
Results revealed the complexity of Web-supported collaboration and highlighted the importance of group process and social influence. The outputs from this study informed theory building, research design	Results helped researcher to understand public sector as the context for social software-supported collaboration. The results helped to further develop research model	Results provided researcher a general overview about how TALKnet has been used. The results helped researcher to refine interview questions.	Results and reflections informed future research
Collected in Feb.-Jul. 2008	Collected in Nov.2008	Collected in Apr.-Jun.2009	Most data collected in Jun.-Aug.2009

3.3 Philosophical foundations

Research philosophies are distinguished in terms of their ontological and epistemological perspectives¹⁵. In information systems research, two research philosophies¹⁶ can be distinguished on the basis of an epistemological position. These are positivism and interpretivism (Burrell & Morgan 1979; Myers 1997; Orlikowski & Baroudi 1991; Van de Ven 2007). The underlying philosophical assumptions of qualitative research can be positivist, interpretive, or critical.

Positivist studies are premised on the existence of a priori fixed relationships within phenomena which are typically investigated with structured instrumentation. Such studies are primarily conducted to test theory, in an attempt to increase the predictive understanding of phenomena. Interpretive studies assume that people create and associate their own subjective and intersubjective meanings as they interact with the world around them. Thus, interpretive researchers thus attempt to understand phenomena by 'accessing the meaning that participants assign to them (Orlikowski & Baroudi 1991, p. 5).

In the view of critical realists, objects are intrinsically complex with undiscovered capacities or susceptibilities which are only identified in certain conditions. A researcher should start by distinguishing between the transitive dimension, i.e. rival theories and approaches about the world which imagine what reality is like transitive objects, and the intransitive dimension, i.e. what the world is like regardless of our current state of knowledge (Bhaskar 1978; Smith 2006).

¹⁵ Ontology focuses on the nature of things, while epistemology deals with how we gain knowledge about those things (Van de Ven 2007). Campbell (1988) points to a circularity problem in these definitions because any ontological description presupposes an epistemological one, and vice versa. "Ontology has to do with what exists, independently of whether or not we know it. But to describe what exists I have to use a language of knowledge claims, and hence contaminate the definition with epistemology" (Campbell 1988, p. 440).

¹⁶ All commentators distinguish at least two philosophical paradigms, namely, positivist (empirical-analytic, objectivist, functionalist) and interpretive (subjectivist, constructivist), e.g., Lee (1991) Several other commentators add another, critical (Orlikowski & Baroudi 1991) or pragmatism (Robey 1996; Tashakkori & Teddlie 1998). Many distinguish four; functionalist, interpretive, radical humanist, radical structuralist (Burrell & Morgan 1979; Hirschheim, R & Klein 1989), or normative, interpretive, critical, dialogic (Deetz 1996). Refer to Mingers (2001) for further discussions.

As an advocate of critical realism, Mark Smith (2006) emphasizes the 'time-space specific' nature of a social event. He writes,

“Social structures... are time-space specific and only relatively enduring and they are reproduced, modified or transformed through the activities of agents. In short, we should start with the assumption of an open rather than a closed system. In turn the activities of agents are shaped by the pre-existing social structures they are thrown into and have capacities to do things and susceptibilities to other forces depending on their position in the structures (Bhaskar 1979; Sayer 1992, 2000). Social structures are both the medium and the outcome of the activities of agents... (pp 255-7)”

Although positive and interpretive approaches are still dominant among researchers of group technologies (Morton et al. 2003), contemporary research practice in information systems is moving toward a pluralist approach. That is, the selection of research methods is based on the research goal. The pluralist approach argues that research results will be richer and more reliable if different research methods, preferably from different existing paradigms, are routinely combined together (Mingers 2001).

Mixed methodology is reviewed and justified as a suitable research method for this study in the next section.

3.4 Mixed methodology

According to Creswell et al. (2003), a mixed study “involves the collection or analysis of both quantitative and/or qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of the data at one or more stages in the process of research.” (p. 212)

Advocates of mixed methodology view knowledge as being both constructed and based on the reality of the world we experience and live in (Johnson & Onwuegbuzie 2004). Thus, both quantitative and qualitative approaches have their own distinctive strengths and weaknesses, and can be usefully combined to complement one another in the study of social activities.

When research approaches are mixed in ways which offer the best opportunities for answering important research questions (Johnson &

Onwuegbuzie 2004, p. 16), the pluralist position will improve communication among researchers from different paradigms (Maxcy 2003), and help to shed light on how research approaches can be fruitfully mixed (Hoshmand 2003).

A mixed method design is applied in this research due to the nature of the IS field, the subject area and the research questions of the study.

3.4.1 Suitable for IS research

It is desirable to apply multiple approaches in information systems research due to the richness of the research context (Kaplan & Duchon 1988; Mingers 2001; Vessey, Iris et al. 2002). Although a mixed methods design is not the mainstream in IS research (Chen & Hirschheim 2004), applications of information systems involve both technical and social aspects. It is often difficult to recognize cause-effect relationships (Vessey, Iris et al. 2002). The nature of the IS field is “fragmented adhocracy” (Banville & Landry 1989), which often challenges the existing findings and also provides a source of new hypotheses.

Kaplan and Duchon use a case study to illustrate the value of combining qualitative and quantitative methods, such as resolving the discrepancy between the qualitative data and the quantitative analysis and understanding the impact of a computer system on users. In the article, the authors suggest that researchers move “beyond outcome evaluations” to “process measures” in order to improve their understanding of what affects technology acceptance and its use (p.582). Kaplan and Duchon emphasize that, for technology-impact studies, there is a need to explore both sides of the interaction, i.e. the impact of a computer system and the perceptions of its users (ibid). Similarly, Mingers (2001) provides two primary advantages of employing mixed methods on both philosophical and methodological levels. Firstly, multiple methods help to overcome the weakness of a single paradigm, since methods focus on more than one aspect of the situation and reveal the ‘ontologically stratified and differentiated’ world we are in (Bhaskar 1994). Secondly, a research process typically proceeds through several phases, and at each phase, different tasks and problems are posed for the researcher. Thus, different research methods tend to be more useful in relation to different phases. Even when methods perform similar functions, combining a range of approaches may yield a better result (Mingers 2001, pp.

243-4). Tashakkori and Teddlie (1998) provide some additional advantages of using mixed methods, which include triangulation, seeking to validate the data and results by combining a range of data sources, methods, or observers; creativity, discovering fresh or paradoxical factors that which stimulate further work; expansion, widening the scope of the study to take in wider aspects of the situation. The complementary roles of quantitative and qualitative methods in social research are summarised by Bryman(1988).

Table 3. 2 Comparison of quantitative and qualitative methods

Dimensions	Quantitative	Qualitative
Role of research	preparatory	means to exploration of actors' interpretations
Relationship between researcher and subject	distant	close
researcher's stance in relation to subject	outsider	insider
relationship between theory/concepts and research	confirmation	emergent
research strategy	structured	unstructured
scope of findings	nomothetic (general laws)	ideographic
image of social reality	static and external to actor	processual and socially constructed by actor
nature of data	hard, reliable	rich, deep

Source: Bryman (1988, p. 94)

3.4.2 Suitable for e-collaboration studies

Mixed methodology is preferred for studies about electronic collaboration (e-collaboration) because this stream of research investigates how a group of individuals use electronic technologies to work together to accomplish a common task. In this research stream, interactions among users and technologies are at the centre of the discussion (Kock 2005). These interactions include: interdependency between users via their technologies; interdependency between users who use technologies; indirect interdependency between users who use IT, mediated by a 'meta-user', e.g., a supervisor (Burton-Jones 2005; Burton-Jones & Gallivan 2007). It is possible to argue that social elements sometimes supersede technological elements as the main influencer of effective system usage.

Some CSCL (Computer-Supported Collaborative Learning) researchers advocate using mixed methods to tackle all standpoints (Collazos et al. 2002;

Daradoumis et al. 2004; Frechtling & Sharp 1997; Martínez et al. 2003). Martínez et al. (2003) propose the use of a social network analysis (SNA) in combined with qualitative methods to evaluate the social aspects of group work.

3.4.3 Relevancy to this particular research

This study adopts mixed methods. The research collects both qualitative data (interviews, user-generated content and other secondary data) and social network data. Then, it integrates the qualitative data analysis, social network analysis and quantitative statistics to understand what happens and why.

Web2.0 social software-supported collaboration is a complex social phenomenon. It involves technology, people and their surrounding elements. In this research, the relevance of social software to work collaboration is examined by people's perceptions, their digital footprints, and related social context. Although qualitative data collected from the semi-structured interviews is the main source of data to capture people's perceptions, SNA and a quantitative analysis are used to help to identify the difference between their perceptions and reality. Secondary data is further applied to provide complementary evidence. A mix of qualitative and quantitative methods is used for this study mainly for the following two reasons.

Firstly, this research looks for an in-depth understanding of the impact of social software on work collaboration. The social processes by which an information system is adopted and accepted by people and through which it interacts with its social settings are at the centre of the discussion. Thus, an interpretive approach helps to obtain scientific knowledge by means of understanding the social interaction by which the subjective meaning of the reality is constructed (Walsham 1995a). Case studies are preferred to generate interpretive knowledge (Orlikowski and Baroudi, 1991), since researchers are able to engage in the social setting investigated, and possibly learn how the interaction takes place from the participants' perspectives (Chen & Hirschheim 2004). Additionally, the impact of researchers' own assumptions, beliefs, values and actions on their research and multiple interpretations are also considered by interpretivists (Oates 2006).

Second, positive research usually aims to test and validate established theories about how things happen (Johnson & Onwuegbuzie 2004). An analysis of prior studies is usually used to generate hypotheses in quantitative research. Although hypothesis testing is not the purpose of this study, the existing literature helps to formulate the research assumptions. Also, in the interviews, participants were asked to describe processes retrospectively, and there may have been errors in their memory. Quantitative methods provide precise and numerical data, which can be used to cross-check interview data.

Implementing mixed methods is not without problems. Having confronted the challenges, a mixed methods strategy of implementation is proposed for this study.

3.4.4 Challenges of implementation

Although implementing a pluralistic methodology benefits the IS field, the researchers have to compare multiple models and perspectives in order to reveal the robust features of reality by identifying those features which appear to be invariant or convergent across at least two independent theories (Azevedo 1997 in Van de Ven 2007). It is often easier to construct a meaningful explanation in cases where the evidence is convergent (or invariant) across the models because differences and inconsistencies can be treated as bias or errors. However, it becomes more difficult to explain when different data sources yield inconsistent or contradictory information about a phenomenon.

Researchers have to face at least two challenges, the first of which is that they must be open to different results. Friedman (2000) suggests that researchers use arbitrage as a strategy for developing holistic, integrative explanations based on different accounts of the same phenomenon. Friedman (2000, pp. 23-4) argues,

“the way to see, understand, and explain complex problems in the world is to systematically connect the different dots, bits, and pieces of information through arbitrage – ‘assigning different weights to different perspectives at different times in different situations, but always understanding that it is the interaction of all of them together that is really the defining feature of the [system].” (in Van de Ven 2007, p. 15)

The second challenge is that contradictory information from different sources

may represent instances of conflicting values and interests among pluralistic stakeholders about the problem or issue being examined. Explanations of a problem domain should reflect these contradictions when observed. To dissolve the paradox, Van de Ven (2007) suggests using some general methods for reasoning through paradoxes by either, balancing between opposites, shifting levels of analysis, alternating positions over time, or introducing new concepts.

Due to the existence of the above challenges, mixed-methods approaches often place heavy demands on time and funding resources, as well as researchers' skills (Mingers 2001). Also, the validity of mixed methods research has been called into question in debates over the extent to which the underlying paradigms and methods of quantitative and qualitative research can be seen to be compatible (Claire Hewson in Jupp 2006, p. 180; Mingers 2001). While the theoretical debates are ongoing, researchers are utilizing and further refining mixed methods approaches (e.g. Creswell & Clark 2007; Johnson & Onwuegbuzie 2004; Teddlie & Tashakkori 2006).

3.5 Research design

With an emphasis on the researcher's reflection, Mingers (2001) offers a guide to mixed methodology research design. Mingers argues that, in principle, a research study may be concerned with three different worlds, namely, material, personal, and social, and four different phases, namely, appreciation, analysis, assessment and action. This framework offers twelve possible combinations to map methodologies. Among twelve possibilities, Mingers indicates five generic types of multimethod research design: sequential, parallel, dominant, multimethodology, and multilevel (Table 3.3).

Table 3. 3 Different Types of Multimethod Research Designs

Type of design	Method mix	Illustration
Sequential	Methods are employed in sequence with results from one feeding into the later one.	Do a statistically analyzed questionnaire then follow up with some in-depth interviews to better understand the results. Or, undertake ethnographic research and content analysis to design a questionnaire.
Parallel	Methods are carried out in parallel with results feeding into each other	Observation and recording of computer usage together with interviewing and cognitive mapping of users
Dominant (Imperialist)	One method or methodology as the main approach with contribution(s) from the other(s)	An intensive study using ethnography or participant observation with some statistical data analysis in the Appreciation phase
Multimethodology	A combination of methods, embodying different paradigms, developed specifically for the task	Interviews, data analysis, and questionnaires, combined with root definitions and conceptual models (from SSM), and strategic choice commitment package.
Multilevel	Research conducted simultaneously at different levels of an organization and using different methods	Survey of call-centre operators and interviews/cognitive mapping with supervisors and managers.

Source: Mingers (2001, p. 252)

Creswell et al. (2003) classify mixed methods research designs into six primary types of designs: three sequential (explanatory, exploratory, and transformative) and three concurrent (triangulation, nested, and transformative). Each varies in terms of its use of an explicit theoretical/advocacy lens, approach to implementation (sequential or concurrent data collection procedures), the priority given to quantitative and qualitative data (equal or unequal), the stage at which the data is analyzed and integrated (separated, transformed, or connected), and procedural notations (Hanson et al. 2005, p. 228).

This study primarily follows sequential transformative designs. Such designs are useful for giving voice to diverse perspectives, advocating for research participants, and a better understanding of a phenomenon which may be changed as a result of being studied (Hanson et al. 2005). The advocacy lens of this study is critical realism. The data of both case studies was collected in sequence, and priority was given to the qualitative data. Other types of data were considered as being complementary evidence. Different types of data were integrated at the data interpretation stage and during the discussion. Moreover, although a sequential design was adopted, the real process was iterative rather than linear. In both case studies, the quantitative data analysis provided the basis for the qualitative analysis while the

analysis of the qualitative data triggered a further analysis of the quantitative data. The procedures will be described in details in the data analysis section.

3.5.1 Case study Strategy

This research is a qualitative study, since it is designed to help the researcher to understand issues or particular situations from the participants' perspectives, as well as the behaviour of people in these situations and their surrounding environment (Kaplan & Maxwell 2005, p. 30). The study adopts case study strategy with mixed methods to achieve the research objective.

Case studies interpret a social setting. Researchers using case studies have to recognize their own influence on the subjects, examine perceptions of different groups, and pursue multiple interpretations (Oats, 2006). In a case study research, the researcher explores in depth a programme, an event, an activity, a process, or one or more individuals in depth. The case(s) are bounded by time and activity, and researchers collect detailed information using a variety of data collection procedures over a sustained period of time (Stake, 1995). The case study approach is suitable for investigating "a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident ". (Yin 2003, p. 13).

Case study research can be positivist, interpretive, or critical, depending upon the underlying philosophical assumptions of the researcher. Yin (2003) and Benbasat et al. (1987) are advocates of positivist case study research, whereas Walsham (1993) is an advocate of interpretive in-depth case study research. A typical interpretive case study researcher uses interviews and documentary materials to tackle the research issues (Myers 1997). When a positive perspective is adopted, questionnaires, coded interviews, or systematic observation are utilized as their preferred techniques for gathering data (Boudreau et al. 2001). A case study inquiry copes with a technically distinctive situation in which there will be many more variables of interest than data points, and relies on multiple sources of evidence, with data needing to converge in a triangulation. It also benefits from the prior development of theoretical propositions to guide the data collection and analysis (Yin 2003).

This study adopts a critical perspective, since mixed methodology is demanded because of the rich context involved in information systems research (Mingers 2001). The researcher agrees with Yin (2003) that existing theory should play an important role in guiding the data collection and analysis. However, although some observations from one case study are likely to be transferred to another scenario, generalization should not be the purpose of the case study, since the cases are always bounded by the case and research settings (Stake 1995; Van Maanen 1988).

3.5.2 Choice of methods

The choice of methods is partly influenced by research questions. Initially, the study decided to use interviews as main method because users are still unclear about how to employ social software effectively. It is possible to assume that a combination of reasons motivate individuals to adopt social software. Similarly, the way those individuals apply social software, as well as the degree of influence on collaboration is expected to vary with individual capability, technology, task and environment. As a piece of qualitative research, this study is interested in describing and understanding complexity of the phenomenon. Interviews can help to explore people's more personal, private and special understandings, opinions, what people remember doing, attitudes, feelings and so on (Arksey & Knight 1999). Meanwhile, this study also recognises the limitation in retrospective description. Thus, website content were collected and analysed to cross-check interviewees' answers.

In addition, the design of this study has been emergent. Interviewees of this study were volunteers. However, it was found that most of TALK interviewees were active users on the website. The sample did not represent the whole population. To address the possibility of bias in their answers and the problem of limited data access, social network analysis and web content analysis, as well as other secondary data provided complementary support.

3.6 Data collection and analysis

3.6.1 First case study: students' group blogs

The case was conducted in a twelve-week Master's programme delivered by the University of Manchester. Group blogs were used for plenary discussion and group assignments. Detailed case background is provided in Chapter 4.

3.6.1.1 Data collection

The researcher conducted 16 semi-structured interviews, 14 of which were with students. The other two were with course tutors. 12 of the 14 students had registered with the course, and the other two students used the group blogs for other courses. The collected data is summarised in the table below.

Table 3. 4 Data collected for first case study

Data collected	Sample	Level of Analysis	Subjects
Blog content	20 group blogs	Group	872 blog entries on 19 small group blogs and 228 blog entries on the big group blog
Semi-structured interviews	16 interviewees	Individual	MSc students from both business & computer science departments who used group blogs for course modules, and two course tutors

3.6.1.1.1 Blog content

Blogs capture individuals' digital footprint. Both user-created content and system-automatically generated data was collected from 20 group blogs. User-created content included user's profile data and blog entries. System auto-generated data included the time-stamp on individual posts. This data was supplementary to the interview data, which provided information such as users' backgrounds and areas of interest, purpose of using social software, and the exact time when the data was entered. Additionally, since they are conversational technologies, comments on users' blogs sometimes also indicated how close two actors were in real life.

3.6.1.1.2 Interviews

After analysing the blog content, the researcher conducted semi-structured interviews with students and course instructors. Students who attended the course were invited by e-mail. Participants were provided with a list of interview themes in advance, and an interview guide was used for

conducting the interviews (Appendix 3). Interview lasted from forty-five minutes to an hour, and most of them were recorded. All of the recorded interviews were transcribed. In this study, interview data helped to link perceptions with observed online behaviours, as well as connecting offline events. Meanwhile, because of the flexibility of the interview design, reflections were allowed to be added into the interview guide along with conducting the research.

Table 3. 5 Student interviewees' profiles

Background	Business : 7
	Computer : 7
Gender	Male: 8
	Female: 6
Age	22-35 yrs
Nationality	9 countries
Web experience	4-12 yrs
	Ave: 9 yrs
PC experience	4-18 yrs
	Ave: 11 yrs
Blogging experience	0-6 yrs
	Ave: 2.4 yrs
Work experience	0-13 yrs
	Ave: 3.5 yrs

3.6.1.2 Analysis procedure

The analysis of this case was an iterative process. Before the semi-structured interviews were conducted, each student's online participation was evaluated based on the quality of user-generated content and the number of entries in the blog (Appendix 4). The results were reviewed and approved by the course instructor. A basic statistical data analysis was applied to the collected data. Informed by the analysis of blog content, the researcher conducted the interviews and analysed the data. A further quantitative analysis was performed to obtain supporting evidence of identified themes.

The interview data was analysed using predefined codes based on Fjermestad's (1998) GSS integrated framework using NVivo software. The framework was chosen because it is built on seven popular GSS theories and covers a broad scope of variables. Final categories are presented in table 3.6. A cross-group analysis was conducted to understand the role of

weblogs in the collaboration process. Then, the results were analysed based on the conceptual framework to improve research model.

Table 3. 6 Final categories in the first case study

Categories	Subcategories	Categories	Subcategories
Context	Evaluation Facilitation Time pressure Training	Social Influence	Image Recognition Social norm
		Task	Task complexity Task importance External source
Group	Group heterogeneity Group history Group size Initial agreement Leadership Level of knowledge Physical proximity Subject type Trust	Technology	Conversational Faithfulness Informal Instrumental use Transparency Usability
		Other	Language barrier Openness Quality of content
Group process	Consensus on technology appropriation Coordination Division of responsibilities Free riding Information overload Learning Level of effort Media choice Participation in group meetings Participation on social software Roles in the group	Outcomes	Attitude to group blogging General satisfaction Time spent Willingness to work again Work quality
Individual	Experience with blog Experience with task Perceived ease of use Perceived enjoyability Perceived Task-technology fit Perceived usefulness Personal motivation		

3.6.2 Mini-exploratory work in UK local council

The results of the first exploratory study helped the researcher to refine the research design. The UK's public sector was chosen as the research context for several reasons. Firstly, the exploratory work with group weblogs has demonstrated that in mandatory settings, social norm may lead to "unfaithful" use. Also, language barriers appeared to influence the choice of communication channels. Thus, it seems a voluntary context with a single cultural background is more suitable for the general research objective, that

is, to understand the role of social software in collaboration. Availability of access is another reason for selecting the public sector. Local council officers, as knowledge workers, are appropriate subjects for this study. Meanwhile, the TALK project itself and published documents (e.g. SOCITM 2003) suggest that there is a need for UK local authorities to adopt Web2.0 applications to break the boundaries and transfer knowledge.

At the point of starting the research, a mini-exploratory study was conducted to gain insight into the status of social software adoption in the UK's local government. Access to the local council was obtained by personal referral. Three interviews were conducted with officers, lasting between forty minutes to over an hour. All of the interviews were recorded and transcribed. Interview transcripts were analysed using NVivo 8. The significance of this study is mentioned in section 3.1. The findings from this study, together with existing literature in local e-Government informed the researcher of the background of the TALKnet case.

3.6.3 Second case study: TALKnet

TALKnet (talknet.eu) is a product of the TALK (Transferring Across Local Knowledge) project, which was developed to provide a space for open communication and collaboration across the UK's local government. Detailed case background is provided in Chapter 5.

The subject of the investigation is the registered users of TALKnet. Over a three-year period, TALKnet has developed into a community of over 800 registered users, more than 500 of which come from over 100 UK local authorities. An overview of users profiles is summarized in the table below.

Table 3. 7 TALKnet users profile

TALKnet users' profile	No. of members	Percentage
UK local governments:	516	78%
The rest public sector:	38	6%
Third sector:	31	5%
Academia:	32	5%
Private sector:	22	3%
Total UK members:	639	96%
The rest of the world:	24	4%
Total Valid Members*	663	100%

Notes: This total number only includes the members who provided valid work email account. It excludes members with private email addresses and those with duplicate accounts.

3.6.3.1 Data collection

This study conducted interviews, and collected social network data and user-generated content, as well as documents. The investigation carried out by the TALK project (or Knowledge Transfer Chain national project, see Chapter 5 for details) provided insights into how new ICTs have been adopted by local authorities in general, which helped to understand and explain TALKnet adoption. Therefore, data related to the TALK national project was also collected. Table 3.8 lists all of the data collected for the TALKnet case.

Table 3. 8 Data collected for second case study

TALK project (i.e. KTC national project)	TALKnet adoption study
<ul style="list-style-type: none"> ● Feb 2006 –Oct 2006 Project documents, meeting minutes and email correspondences ● Jul 2006 Two pilot interviews with officials in local authorities ● Aug – Oct 2006 Secondary data on investigating take-up of 12 key national projects (incl. interview audio files, interview notes, and reports) ● Sept 2006- Oct 2008 Documents of TALK events (records of participants, events summaries) 	<ul style="list-style-type: none"> ● Aug 2006 – Jul 2009 Social network data (313 members on 47 group spaces; 23 personal blogs) ● Apr -Jul 2009 Pilot interviews; semi-structured interviews with nine interviewees, including both project members and TALKnet users

3.6.3.1.1 Interviews

Two sets of interview data were collected: interviews to investigate the level of take-up of new ICT in local authorities (TALK or KTC national project) and interviews to explore the level of adoption of TALKnet. For the KTC project, pilot interviews were conducted with the Head of Organisational

Development and former project manager in two local authorities. These were analysed together with the other interview records conducted by the researcher's colleagues for the TALK project.

For the TALKnet adoption research, pilot interviews were conducted with two TALK project board members and one TALKnet users for project background and feedback on the interview guide. Then individual TALKnet users were contacted via personal referral. A list of interview themes was attached to the e-mail invitation. If participants agreed to take part, they received an interview sheet to be completed before the interview. The sheet contained questions about personal information and communication preferences (Appendix 5). Then, semi-structured interviews were conducted with TALKnet users (interview template in Appendix 5). These interviews lasted between forty-five minutes to two hours. On average, each interview lasted longer than an hour. Most interviews were recorded electronically and were subsequently transcribed. Job titles of interviewees included Head of Business Improvement, Project Manager, Principle Marketing Officer, Business Support Manager, and HR advisor (Table 3.9). Two of the academic staff interviewed used to hold senior positions in local councils. These interviewees have an average of 13 years Internet experience. Most of them have more than two-year social software experience.

Table 3. 9 Interviewees profile for TALKnet adoption

Alias	Sex	Age	Internet Exp. (yrs)	SS Exp. (yrs)	Work Exp. (yrs)	Org	Comm choice 1	Comm choice 2	Comm choice 3
N240	M	30-40	10	4	15	Private	E-mail	IM	Web space
N268	M	30-40	11	2	21	Public	E-mail	Phone	F2F
N69	F	40-50	12	1	18	Public	E-mail	F2F	Phone
NA1	M	40-50	14	2	30	Private	Phone	F2F	E-mail
N52	M	50-60	15	5	32	Public	E-mail	Phone	F2F
N189	M	50-60	21	8	36	Public	E-mail	F2F	Phone
NA2	F	50-60	10	0	30	Acad	E-mail	F2F	Phone
N234	M	50-60	12	2	35	Acad	E-mail	Phone	F2F
N201	F	50-60	15	3.5	32	Public	E-mail	Phone	F2F

Notes: 'SS' refers to social software including blogs and wiki. 'Comm choices' refer to the first, second and third choices of communication medium (frequency of use). Alias are used in the social network analysis.

3.6.3.1.2 Social network data

The social network data was supplementary to the interviews. The network data is part of TALKnet users' digital footprints, which offered access to examine how TALKnet has been used by its members and allowed the

researcher to analyse the change in the structure of the online social network over time.

The researcher was granted access as a site administrator. However, it was not possible to view users' and groups' log files, since they were kept by the Atlassian Software Company. As a consequence, it was not possible to ascertain the frequency with which individual users logged on to TALKnet and how much time they spent there. Meanwhile, the users did not provide a great deal of personal information. Most people only completed three parts of the registration details: username, full name and email address. Members on TALKnet were treated as a population, and the following steps were taken to collect the data.

Firstly, two lists were created by copying the profiles of users and groups from the site. One list was for individual users, and the other was for groups. There were 831 registered users (24/07/2009) and 92 groups (on 04/08/2009).

Next, by searching users' email addresses on the Internet, I was able to identify the validity of their emails and the organisations they worked for. 633 of all of the registered users, had provided valid work email addresses. This method also helped to eliminate duplicated accounts. Users' personal details were used to create an overall profile of TALKnet users (Table 3.7).

When a group is formed on TALKnet, a wiki space is simultaneously created for it, and the third step was manually matching each space with a group. By doing so, the interest of each group was identified, when a space was created and when it was last edited, who had contributed to the space, and what particular tools the group used (e.g. blog, tag, image, video). Group data was cleaned up by removing empty spaces and the spaces created for testing only. Usually, the created and last edited dates of this kind of space are the same day. The number of groups remaining was 47.

Fourthly, information about the members in each group space was completed by using the collected individual personal details. Meanwhile, some duplicated accounts (e.g. when users who had more than one role in a group) were removed. Additionally, non-group members who commented on the wiki space were included in the group, in order to ensure that number of people reflected the real group size. After these steps, there were 313 users in 47 group spaces.

3.6.3.1.3 *Other data sources*

Archival data on local e-government was collected, and was used to describe and analyse the status of ICT adoption in the UK public sector, which was the broad context of this study. A review of secondary materials was undertaken to offer historical, social and policy context for the study as a whole. Secondary data included TALK project implementation documents, meeting minutes and email correspondences, project interview notes, reports on five national projects case studies, as well as TALK events documents. Google Analytics was installed on the site by an MBS project member in May 2008, and this also provided an overview of the site traffic.

3.6.3.2 *Analysis procedure*

The analysis procedure was iterative. Although themes emerged in the initial interview analysis, the picture of TALKnet adoption was not clear until the social network data was collected. Having been informed by the social network analysis (SNA), the researcher revisited the qualitative interviews and analysed them using a coding template. Additional network data was collected to support the interview analysis.

3.6.3.2.1 *Social network analysis*

Based on relational concepts, SNA views actors and their actions as interdependent. Linkages between actors are regarded to be channels for the transfer of resources (Wasserman & Faust 1994). The benefits of using SNA for e-collaboration research are at least twofolds. Firstly, SNA can be applied to depict patterns of relationships among actors, to examine the structure of those patterns and reveal their impact on people and organisations. Secondly, social networks can be visualized as graphs or sociograms, which represented actors as nodes and the relationships among them as lines. Visualisation aids to present and communicate the research results (Daradoumis et al. 2004). Although the value of SNA has long been discovered by some CSCL scholars (Cho, H et al. 2002; Wortham 1999), SNA has not been used widely in e-Government studies. Only one research has been identified, in which SNA is applied to examine the patterns of the UK's sub-regional e-government partnership (Cotterill & King 2007). Nevertheless, SNA alone is not sufficient to interpreting the full picture

of the collaborative process. In this study, SNA and graphs are only used as tools to initiate the discussion in the qualitative interviews.

Key metrics for analysing the connection of a social network are network centralisation, density and Core/Periphery fitness (Borgatti 1999). Because the study is interested in knowledge transfer, a geodesic distance was used to measure the information flow in a network. In addition, since the participation among TALKnet users was unequal, three centrality metrics were calculated for brokers to measure their roles in the TALKnet network. Also, an E-I index was calculated to measure an actor's internal-ness and external-ness to determine whether or not an electronic network facilitates actors to transcend their existing boundaries.

Table 3. 10 Social network analysis metrics

SNA Metrics	Descriptions
Network centralisation	Network centralisation measures whether a network revolves around a single very connected node (i.e. star structure). The metrics can only be calculated on the complete network.
Density	The proportion of connections (lines) relative to the total possible.
Core/Periphery fitness (C/P)	C/P network includes a set of well-connected central nodes and peripheral nodes connected to the core directly. Above 0.5 is good fit.
Geodesic distance	A geodesic is a shortest path connecting any two nodes. Longest geodesic distance in a network reflects the communication in the network.
External-internal index (E-I)	E-I index takes the number of ties of an actor to external bodies, subtracts the number of ties to other actors in the same organisation, and divides by the total number of ties. The value ranges from -1 to +1.
Degree centrality	Degree centrality is the number of nodes that the actor connects with, which measures who is the most active in a network.
Betweenness centrality	Betweenness centrality is the number of times that a node lies along the shortest path between two others, which measures how important an actor is at bridging the gap between other actors in the network
Closeness	Closeness is the sum of geodesic distances to all other nodes, which measures how easy it is for one actor to communicate with others in the network.

Source: (Borgatti 1998; Hanneman & Riddle 2005)

3.6.3.2.2 Interview analysis

A coding template was developed based on the conceptual framework (Table 3.11), after which the interview transcripts were coded with the predefined codes. Some additional codes were identified and added into the sheet. The framework was used to guide the task of weaving all of the data together into a final narrative.

Table 3. 11 Coding template used in the second case study

	Task dimension		Organisational and environmental dimension
TASK1	Communication needs	CONT1	Organisational culture
TASK2	Member interdependence	CONT2	Organisational structure
TASK3	Task complexity	CONT3	Training
	Technology dimension	CONT4	the Web context
TECH1	Ease of use	CONT5	Other networks/communities
TECH2	Multiplicity of cues		Social Interaction
TECH3	Immediacy of feedback	SOCI1	Shared understanding
TECH4	Social presence	SOCI2	Trust
TECH5	Anonymity	SOCI3	Social Identity
	Group dimension	SOCI4	Expertise
GRP1	Group size	SOCI5	Physical meetings
GRP2	Group virtuality	INAPT1	Instrumental use
GRP3	Group heterogeneity	INAPT2	faithful/unfaithful
GRP4	Prior history	INAPT3	Use frequency
	Individual dimension		Outcome
IND1	Extraversion	OUT1	Effectiveness
IND2	Openness /innovativeness	OUT2	Satisfaction
IND3	Prior experience	OUT3	Usability
IND4	Self efficacy		

3.6.3.2.3 Computer software used in the data analysis

The interview data was analysed using the NVivo 8. UCINET (v 6.282) and Netdraw (v 2.095) were used to analyse and present the social network data. The network data was also analysed using the SPSS 16.0 (Statistical Package for Social Scientists) software. Additionally, a free software Internet Community Text Analyzer (ICTA) was used for analysing blog content.

3.7 Justification for case study approach

The features of case study research make it an appropriate method for this enquiry. Firstly, the study explores the linkages between social software and collaboration. However, the phenomenon is ill-defined, since there is still a lack of clarity about how social software can be used effectively in a work environment (Brynjolfsson & McAfee 2007). The nature of this research is both exploratory and explanatory. Secondly, as a process, collaboration involves a number of variables to a different extent at different stages of collaboration, including individuals' background and skills, features of technical artefacts, and organisational and industrial settings. The

researcher has little control over these events. In addition, as a research strategy, case studies enable a combination of qualitative and quantitative methods. They are excellent in dealing with a full variety of evidence, including documents, artefacts, interviews, and observations (Yin, 2003). Therefore, the case study method is chosen to provide multiple facets of the issue.

However, case studies have been criticised as lacking reliability and external validity by social scientists. Reliability refers to the consistency of the methods and processes used in a study. External validity is the main weakness of the case study approach because it is concerned with exploring the detail of a specific phenomenon and does not produce representative findings which can be generalised. Nevertheless, although generalisation is suitable for positivist research it should not be pursued by qualitative researchers, since a case study reflects only one event in one context at one point of time (Van Maanen 1988). Interpretive researchers suggest that transferability is more suitable for non-positivist research (1986; Sahay et al. 1994). Moreover, Sahay et al (1994) argue that it is hard to apply the traditional standards used to evaluate positivist research, namely, internal validity, external validity, reliability and objectivity, to studies of socially-constructed information technology. Sahay et al (1994) suggest using four alternative criteria developed by Hirschman (1986) to replace the traditional criteria for research outside the positivist tradition.

3.8 Validation of case study design

These four criteria are credibility, transferability, dependability and confirmability, which resemble those of positivist research to some degree but are less rigid.

Credibility

Having acknowledged the possibility of multiple socially-constructed realities, the researcher needs to demonstrate that the descriptions of the different social interpretations have been derived in a credible manner. For both cases studies, the researcher collected multiple sources of evidence and priority was given to qualitative data. Rich data was collected from interviews and user-generated content. The researcher also had frequent discussions with her supervisor and received feedback about data categorization and interpretation.

Transferability

The transferability of a particular interpretation can be assessed by comparing it with interpretations constructed in other contexts. Although comparative analysis across sites was not applicable because of the research settings, the researcher conducted a cross-group analysis within the first case study and integrated the results of the first and second case studies in the discussion.

Dependability

Dependability relates to temporal stability and internal consistency. The objective is to demonstrate that the researcher's judgment is dependable. This study developed interview guides for two case studies, which were reviewed by a supervisor. Interview questions were revised based on the feedback received.

Confirmability

It is acknowledged that the researcher cannot be detached from the research phenomenon. The researcher's goal is not to eradicate value judgments, but to eradicate bias. The initial outcomes were published on a personal website and shared with some interviewees and TALKnet users. The researcher also attended a workshop organised by the North West E-Government Group and shared the findings with some local council officers. Additionally, part of the

social network analysis and findings were presented at the 6th UK social network analysis conference.

Additionally, Eisenhardt (1989) argues that induced theory is likely to be empirically valid when it is tightly linked to the data. Walsham (1995b) supports this view and emphasizes on the importance of detailed descriptions of how findings were derived. This study elaborated analysis procedures in details. Moreover, this research follows an iterative process. Conceptual framework was developed based on theories and empirical studies. The framework was revisited based on the findings from exploratory study. Such iterative process enhances the rigor of research (Carroll & Swatman 2000).

3.9 Summary

This study adopted a case study approach with multiple methods. Research framework was developed from the author's own experiential knowledge, priory theory and empirical evidence. The framework was further developed based on the findings from the exploratory studies and additional literature review. The revised framework was applied to the case study in the UK public sector. To answer research questions, this study employed both qualitative and quantitative methods and collected social network data, website content, and interview and secondary data. Social network analysis and statistical analysis provided complementary support to qualitative analysis. The analysis procedure was iterative. Tactics were applied to improve the validation of case study approach.

Chapter 4 Exploratory Study: Student Group Weblogs

This chapter presents a case study of the adoption of weblogs for group assignments. It aims to investigate if social software can be used to support collaboration, and how it takes place by examining the group adaptation process. Firstly, the background to the case and the weblog features are introduced. The data analysis consists of two parts, the first of which is an analysis of user-generated content, which provides an overview of weblog usage. The second part is cross-group analysis, which aims to identify the key elements which that affect adoption. Following this, a discussion is developed and the conceptual framework is revisited.

4.1 Case background

The case was conducted in a Master's programme delivered through the University of Manchester. The twelve-week programme consisted of a ten-week taught module and a group project. The group project was supported by two types of group weblogs: one discussion weblog for the entire cohort ("large blog") and nineteen group weblogs for individual case study projects ("small blogs"). The large weblog was used for a plenary discussion. Each small group was given a case study of a real company (although some were anonymous) and asked to critically analyse the case and complete a group report within 30 days. This study focused on the 30-day case study project. However, an eight-week blog debate was also included in the analysis because the interview data revealed that individuals' blogging experiences on the large blog influenced their behaviour on small group blogs.

Figure 4. 1 An overview of the MSc programme

Wk 1-5 Taught module	*	Wk 7-11 Taught module	*
		Wk 5-12 Cohort online debate	
			Wk 8-12 Case study

One hundred and fifteen students from both the business school and the computer science department registered for the programme. Students in

each department, came from different courses: two groups from computer science and three groups from the business school. However, only three of the five courses listed this programme as a core module. Although most of the participants were full-time students, a small number were studying part-time. The course instructor divided the large cohort into nineteen small groups, and deliberately mixed students from the business school and the computer science department.

The learning objective of this Master's programme was to develop a thorough understanding of IS strategy and enterprise systems. Blogs were used primarily because of the limited teaching capacity and restrained access to resources. The instructor expected that using blogs would encourage an extended discussion among students and would monitor students' participation. A large group blog was set up at week five, and used Google's Blogger. It was open to the entire cohort to share ideas and debate the three topics: enterprise system, information management, and Web2.0 and social computing. All students were asked to register in their real names and use their university email addresses. Although the large blog was initially closed to the cohort the instructor implied that the weblog might "be opened generally and subsequently" to the public.

At week eight, the cohort was divided into nineteen groups of 6-8 students, and it was suggested that they meet up as soon as possible. Each group was given a specific case study. Students were asked to develop a report describing the case and discussing it critically, relating the issues to the concepts and models introduced in the course, the discussions on the course large group weblog, and other materials they had found.

The course instructor created nineteen group blogs using Google's Blogger and assigned students to them. The small group blogs were open to individual group members, as well as the course instructor and tutor only. Students were expected to use blogs to develop their reports on the case studies. It was suggested that they use small group blogs for the following purposes: post work schedules with agreed deadlines, post drafts of material and comments on individual drafts. The instructor monitored these weblogs to ensure that all members were playing their part in producing the report. Additionally, a short training session was provided to students who found it difficult to use the blog before launching the small group blogs.

Overall, the project represented 40% of the assessment of the module. 15% of the mark was assigned to individuals' use of blogs and 25% was awarded for the quality of the final group report. 7% of the 15% was an individual mark relating to personal activities on the main course discussion blog, based on both the quantity and the quality of posts and comments. 8% was given for personal interactions and posts on the group discussion blog. An individual's blog mark consisted of two parts: the number of entries (both posts and comments) and the quality of the contributions. The quality of entries had four grades: A (Highly relevant, well argued contributions), B (Good posts, but only moderate personal input), C (Posts OK on general topics, but not particularly relevant; little or no argument), and D (Irrelevant posts or simply interacting to prove on blog).

4.2 Weblog features

By its nature, a weblog is an anytime and anyplace Web-based information and knowledge site (Wagner, C & Bolloju 2005). Content organisation and retrieval is supported by blog features such as archival, search, and categorisation. As one type of social software, weblogs potentially support communication, coordination, information repository, sociality, information filtering and recommendation, and cooperative learning (Olson & Olson 2008). Several characteristics are embedded in the design of a weblog, which affect the tasks the weblog supports. Firstly, weblog content is time-indexed, i.e., reverse-chronological organisation, which makes it more useful for news distribution than for topics with longevity (Wagner, C & Bolloju 2005). Although users can possibly work around via indices and access to archives, it is common to see repetitive discussions on the same topic. Secondly, by design, weblogs are one-to-many broadcasting tools, which support bloggers to produce content by automating the writing process (Du & Wagner 2006). It is suggested that the one-to-many conversation mode is ideal for experts to publish their expertise, or ordinary people to share personal stories/diaries with a small group of others (Wagner, C & Bolloju 2005). Nevertheless, although weblogs are created for individual publishing, most blogging tools also offer team support. Additionally, as weblogs are based on the Web, users benefit from a jointly kept searchable repository (Wagner, C & Bolloju 2005).

In this case study, Google's Blogger was specifically chosen because the lecturer had used Blogger before and found it to be "quick and easy". The default Blogger interface was chosen, which provided functions including search, archival, comment, contributor list and RSS (Figure 4.2). The instructor created blogs and assigned authors' rights to students, which meant that students were able to add, edit and delete their own entries but they were not able to make any cosmetic changes to the user interface. When students wrote/edited a post, they were able to change the text font and size, adjust the text colour and alignment, add links, run a spell-check, attach a photo or video to the blog post, and create labels for the post (Figure 4.3). Table 4.1 lists the specific features enabled on Google's Blogger for this course, as well as tasks supported by blogging tools by categorising the features into the general weblog characteristics noted in the literature.

Table 4. 1 Technological features of Google's Blogger

Characteristics of Weblog	Enabled features on Google's Blogger
Interface	Default Blogger template shows blog posts (max. seven posts), blog archives and contributors.
Broadcasting	The WYSIWYG (What You See Is What You Get) editor allows users to change text font and size, adjust text colour and alignment. Users can add a photo or video to blog post and create labels for the post.
Automated	When users compose new blog post, Blogger saves content automatically. Users can run spell-check feature.
Commenting	Readers can leave comments right below a blog post, in a pop-up window or on a separate page.
Shared Information repository, access, and retrieval	Posts are archived chronologically. Search box allows users to search within a blog.
Coordination	Readers can choose to subscribe to a blog's RSS (Really Simple Syndication) feeds to receive update notification.

Notes: Categories of weblog characteristics are mainly based on (Wagner & Bolloju 2005).

Figure 4. 2 Interface of group blog in Google Blogger

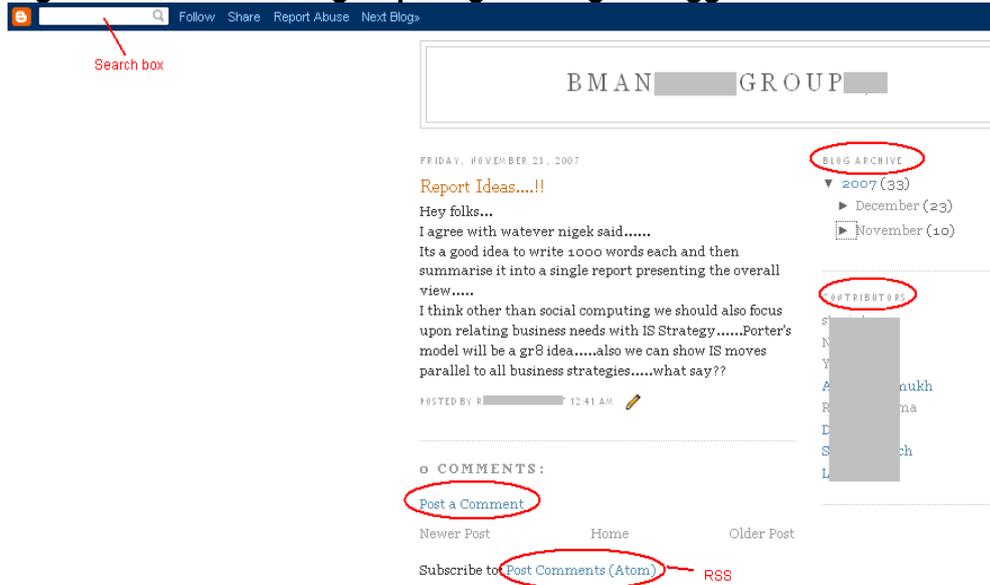
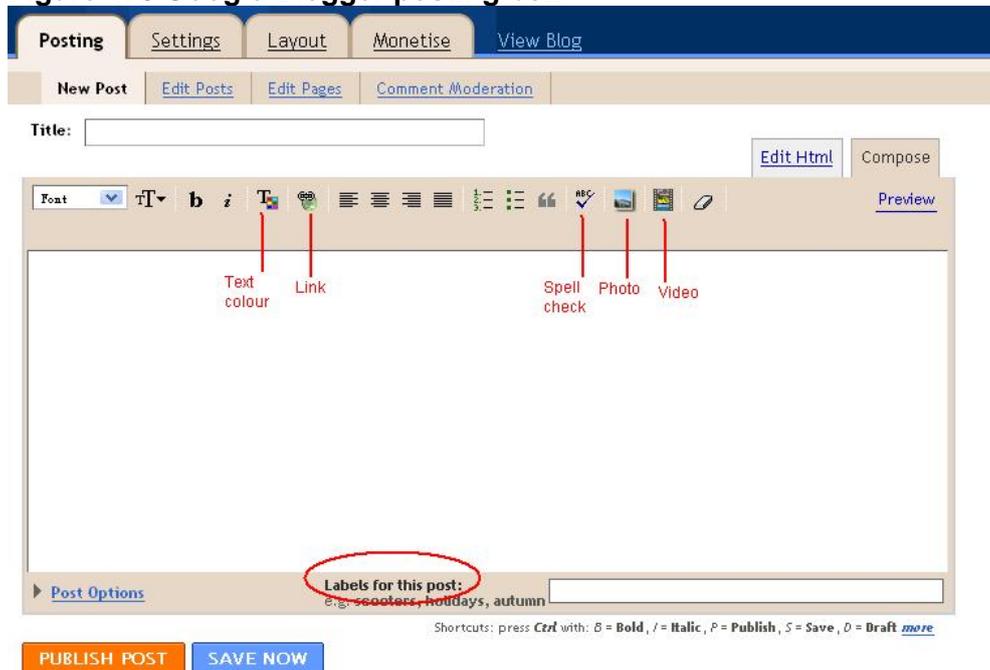


Figure 4. 3 Google Blogger posting box



4.3 Overall analysis

109 of the 115 students contributed to the small group blogs, and 101 students contributed to both blogs.

Although initially the large main blog was planned to run for three weeks only, it actually lasted for nearly three months, one month longer than the small blogs. Students continued to post articles onto the large blog even after the evaluation period. In contrast, students stopped posting to the small group

blogs immediately after they submitted their group reports. A comparison of the quality and quantity of blog entries between the large and small groups is provided in Table 4.2.

Table 4. 2 Number and quality of entries on large and small group blogs

	Small Blog	Large Blog
Nr of entries/Blog mark	1049	872
A	183	198
B	388	607
C	113	64
D*	365	3
Group size	6 or 7	101
Blog active period	15/11/07-14/12/07	24/10/07-15/01/08

* D would be given when the post was about group meeting schedule, acknowledgement, notification, information such as structure of report; marking scheme, or any questions unrelated to the case study.

Interactions on the large group blog were assessed by the number of comments on each post (Table 4.3). About two thirds of the 219 posts had less than three comments, and one third received more than four comments. Online interactions in small groups were less active and varied greatly. This will be investigated further in the part about cross-case analysis.

Table 4. 3 Number of comments on the large group blog

No. of Comments*	No. of Posts	% in Total
0-3	136	62%
4--10	73	33%
>10	10	5%
Total	219	100%

Nevertheless, some students were far more active than others on the large blog. Table 4.4 shows the top ten contributors in the large group blog. Six of the ten people came from the computer science department, and the rest were based in the business school. They belonged to different small groups. In total, these ten people made 305 entries, which accounted for 35% of the total entries on the large blog. The quality of these contributions was high. 281 entries were marked A and B. No irrelevant content (D) was written by these ten people.

Table 4. 4 Top ten contributors to the large group blog

Name	Group	Dept	A	B	C	D	Entry counts
SC	10	CS	1	56	8	NIL	65
AH	8	MBS	14	38	6		58
AC	7	MBS	7	20			27
DB	17	CS	3	21	2		26
NB	3	MBS	7	17			24
KD	1	MBS	14	9			23
LL	8	CS	4	13	5		22
IS	14	CS	1	18	1		20
PN	1	CS	5	15			20
LH	9	CS	8	10	2		20
Total entries by Top 10 contributors			64	217			305
% in Total entries							34.98%

Moreover, in the small groups, it was found that the number of “D” entries on each blog negatively correlated with the mark of the group report scored by the lecturer (Table 4.5). A blog post would be marked “D” when its content was irrelevant to the assigned subjects. It could be about a group meeting schedule, acknowledgement, notification, and information such as the structure of a report, marking scheme or any questions unrelated to the case study.

Table 4. 5 Correlations between the number of “D” posts and group report marks

		D_Total	Mark
D_Total	Pearson Correlation	1.000	-.490*
	Sig. (2-tailed)		.033
	N	19.000	19
Mark	Pearson Correlation	-.490*	1.000
	Sig. (2-tailed)	.033	
	N	19	19.000

*. Correlation is significant at the 0.05 level (2-tailed).

Previous studies have shown that to develop a higher degree of trust, a group can either have face-to-face meetings early in a distributed project (Robey et al. 2000) or exchange more social communication via the Internet over a longer period (Jarvenpaa & Leidner 1999). Thus, it is possible to assume that the amount of social communication on the blog suggests the

strength of ties among group members. In other words, the more “D” posts a group blog has, the weaker the bond is among members. This will be investigated further in the cross-group analysis.

4.4 Cross-group analysis

This part compares the process of weblog adaptation across three groups. Following Miles and Huberman (1994), we tried to maximize the variation by selecting respondents who were known to hold different views and opinions about the technology in order to identify different usage patterns.

The research observed two different ways of using small group blogs by comparing online group interaction. In the first type, members used the group blog as a notice board, but there was little online interaction among members. The other way was more interactive, where members replied to each other’s blog entries.

We selected three groups because they appeared to have distinctive features. Two members of each group were interviewed, which made it possible to cross-check their answers for validation.

Table 4. 6 Summary of the three groups’ interaction and outcome

Group	# of Posts	# of Comments	Average comments per post	# of Meetings	Relevant Content (# of posts)	Social Comm. (# of posts)	Group Mark (100%)
G1	21	44	2.1	4	33	7	84
G2	28	34	1.2	3	39	16	68
G3	33	53	1.6	0	34	38	76

Notes: “Relevant content” is a sum of A, B, C posts. “Social communication” is the total of D posts.

The table summarises the three groups’ interaction and outcome. The number of comments suggests that G1 and G3 had more online interaction than G2’s blog. On average, G1 had more comments on each post than the other two groups. G1 and G2 had group meetings almost every week, while G3 did not have a proper meeting, apart from a brief chat among several members on the day when the case study was assigned. On the blog, G3 had much more social communication than G1 and G2. Although G2 members generated more project-related content, G1’s report received the highest mark among the three groups. Next, the input, adaptation process and outcomes of these three groups were compared in detail.

4.4.1 Comparison of Input

In terms of input to the adoption process, the only difference among the three groups was group dimension.

The key elements which affected group technology adoption included group size heterogeneity, proximity, subject type, members' initial attitudes to the weblog, and initial agreement (Fjermestad 1998).

Table 4. 7 Comparison of group input

Group	Size	Heterogeneity	Proximity	Subject type	Members' attitudes at T1	Initial agreement.
G1	7	3 CS, 4 MBS	1 part-time	2 freshers, 4 professionals, 1 unknown	Some members have reservations about using weblogs for case study project	20 th Nov. Agreed on division of labour
G2	6	2 CS, 4 MBS	1 part-time	1 fresher, 4 professionals, 1 unknown		29 th Nov. Agreed on style of interacting
G3	6	4 CS, 2 MBS	2 -3 part-time	2 freshers, 4 professionals		No agreement

The three group inputs were similar (Table 4.7). Each group comprised a mix of computer science students and business school students. All three groups contained freshers and professionals. Initially interviewees from each group expressed their reservations about whether weblogs were suitable for group discussion. However, there were some differences in the groups' physical proximity. In G1, only one member worked part-time and his workplace was close to the campus. The situation was similar in G2. However, in G3, an interviewee recalled that there were two or three part-time students. So it was difficult to arrange a meeting with them. I interviewed one part-time student in G3, whose workplace was about a forty-minute drive from the campus.

All three groups tried to have a brief meeting when the case study was assigned, but some members were absent on the day. The three groups differed greatly in terms of their first meeting.

At G1, most members gathered online and left comments on the first post. Then a member took the initiative to organise a group meeting. In the first meeting, they divided the topic, and agreed on individuals' responsibilities and group communication norms. As one interviewee recalled,

“(In) the first meeting and also (on) the blog, we decided how to divide the blog... We discussed the case firstly. Then we have to write our own posts... When you finish your part, just post it on the blog. It is open to comment. So we agreed everything in the first meeting... Everyone was clear about what they were working for. We had rules.”

At G2, three members appeared in the first blog post. In G2’s first group meeting, members agreed on an interacting style. However, no communication norm was shared. As one interviewee reflected,

“We were not doing much on collaboration. Because even in the meeting, we used to talk about how to get the work done rather than what it is. We were talking about how to complete the assignment. Everyone worked individually. There was no group work as such.”

No evidence showed that G3 reached any agreement on a communication norm. The group work process was described by one interviewee as follows:

“Initially there was no proper interaction on the blog until the deadline is coming ... in the introduction week, we never had personal meeting...there was one guy who took initiative to divide the group work into six pieces. And each one took one part to complete an assignment.”

4.4.2 Comparison of adaptation processes and outcomes

The three groups differed on the adaptation process (e.g., media choice, consensus on appropriation, attitudes to software, participation, level of effort, diffusion of responsibility), and process gains and losses (e.g., synergy and learning, free riding).

A comparison on these factors is summarised in Table 4.8. Moreover, the number of comments and replies were counted along a time dimension (Figure 4.4). This was to capture how students were engaged and interacted on the group blog (Table 4.9). In addition, the time it took each post to receive the first comment was calculated. The results were used to compare the immediacy of feedback across the groups. These analyses provided complementary evidence for the interview data.

Table 4. 8 Comparison of adaptation factors among three groups

Adaptation Factors	Group One	Group Two	Group Three
Media choice	text message, mobile, email, blog, Facebook, FtF meetings, and Yahoo messenger	text message, mobile, email, blog, FtF meetings and Yahoo messenger	"We exchanged each other's mobiles. But 99% percent was on the blog."
Consensus on appropriation	"...The blog was mainly used for posting and reviewing each other's posting and discussing" "In the first meeting, we decided that we would have weekly meeting. The development between those meeting dates would be communicated through the blog."	"For us, we used it (the blog) as notice board..." "We actually discussed during the meeting, and then we put the summary on the blog..."	No explicit consensus due to the absence of contact
Attitudes to software	"...the blog was good for group discussion...But if you use another tool (together), it will be better." "One of advantages of blogging is mainly you can sit at an appropriate place, maybe your home, when there is a good environment, you can think clearly."	"Blog is asynchronous. People get bored to read... If I put three paragraphs on the blog and ask them to read, it's not happening." "I think blog as a communication tool... just to communicate with each other, like you have to arrange group meetings"	"It (the blog) was useful. At least when 2 or 3 group members were professionals, it helps a lot. Because ... it was not actually possible for personal meetings."
Participation (See table 4.6 for the details)	Four group meetings and ongoing discussions on the blog.	Three group meetings and limited online discussions among several members	No group meetings. Very limited discussions.
Level of effort	"That everybody was focused, and very punctuate..." "At the end, we combine all the work together. Because there were overlaps. We decided to organize it and rewrite it again."	"So what was happening was there was no brainstorming on the blog. Somebody posted something. We don't need to reply to that."	"Although we didn't have much contact, everyone else did do what they need to do by the deadline." "We did our best."

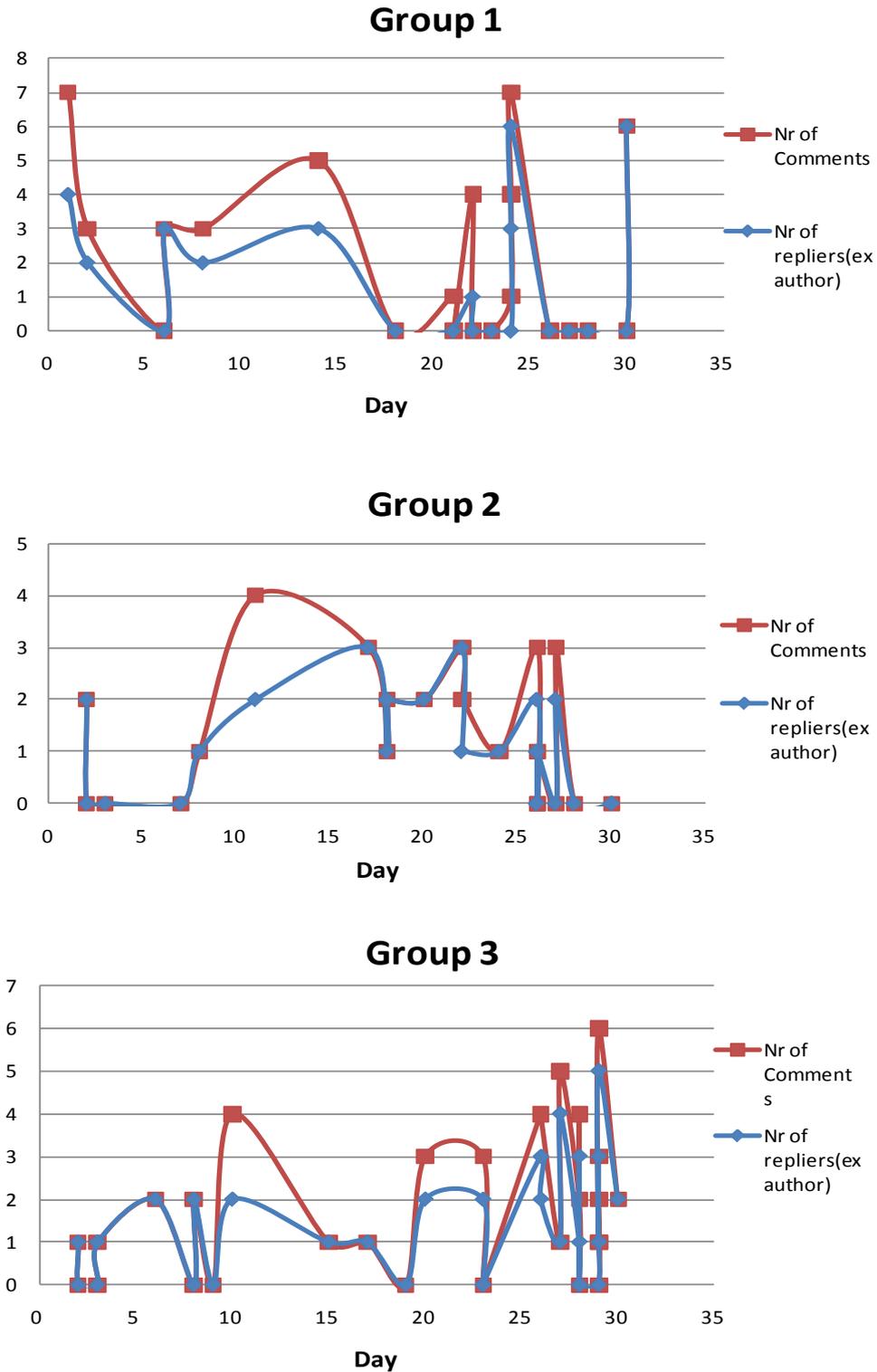
Table 4.8 Comparison of adaptation factors among three groups (Cont.)

Diffusion of responsibility	No conflict. It was agreed in the meeting.	In the meeting, some freshers refused to take complex parts	The topic was divided online and responsibilities were distributed on the "first come first pick" basis.
Process gains	Synergy: "That was the one group that has good team spirit." Learning: "The most important thing is that all of us have different experience in different fields and we shared part of it with each other in this coursework."	Learning: "You get to meet people from different backgrounds." Lack of synergy: "(we were) not really a close group because we didn't kind of know each other..."	Lack of learning and synergy: There was no active discussion. "It was just completing the assignment by using the blog." "But another thing is you don't actually know the persons. Human relationship as such can't be done through that."
Process losses	No free riding	"...there was one guy who didn't attend the meetings three times in the row..." "In general, one or two people were absent in every meeting."	"There are one or two people who didn't contribute. We don't have ways to track them down. They don't comment on the blog. You can't do anything about them really."

Table 4. 9 Comparison of time spent on waiting for comments

Group	Nr of Posts	Nr of Commented Posts	Waiting Time(days)	
			Mode	Average
G1	21	11	1	2.18
G2	28	18	2	3.44
G3	33	22	1	1.95

Figure 4. 4 Comparison of online interaction among three groups



Notes: Number of repliers excluded authors. That is, authors who commented on their own posts were not included.

4.4.2.1 Group one

This group was efficient in communication from the beginning. On the group blog, JB suggested having a group meeting on the 15th November, and four members added seven comments within a day. The next day, MA

announced on the blog that a meeting room was arranged and wrote “one group one soul” in the signature. On the blog, one member suggested that everyone read the case study before going to the meeting. On the 20th November, the group had its first meeting and agreed on the division of topic, schedule and responsibilities. A summary of the meeting results was published by HS on the blog. Members started to publish their own drafts on the 28th November. Critical reviews of other members’ writing were observed on the weblog. High quality comments initiated discussions between authors and readers. During the writing period, another group meeting was held on the 6th December. After all the individual parts were completed, the third group meeting was held on the 11th December. Overlaps were found between individual members’ writings. The group decided to meet up again and restructure the report on the 12th December.

As a result, G1 obtained the highest mark among the three groups. General satisfaction was observed on their weblog, and all of the members replied to the final post to say farewell immediately after submitting the report. One of them wrote,

“It was a good learning experience working with you all through the course of this case study. Apart from the case itself being interesting, with ample opportunity to learn from the case itself, I would say we all did our part exceptionally well...”

Group members seemed to enjoy the collaboration experience. One member recalled the shared identity of G1,

“It was a good group. I would say there was good team spirit. Everybody wanted to do well and score good mark... That everybody was focused, and very punctuate. ”

Additionally, it was noticed that the members of this group used multiple channels to contact each other. Apart from writing on blogs and meetings, they also sent text messages, e-mails, and used Facebook, mobiles and Yahoo Messengers.

4.4.2.2 Group two

One member posted five out of six members’ contact numbers on the blog on the 16th November. The group did not have its first meeting until the 29th November. One interviewee recalled that the group agreed to post a meeting

summary on the weblog. However, no meeting summary was found, apart from a post about the allocation of tasks written on the 10th December. In G2, online interaction on the blog was limited to two or three members (Figure 4.4).

Moreover, unlike G1, the students in G2 did not have proper discussions on the weblog. According to one interviewee, this was because of the agreed style of interaction. The group decided to only have discussions in the meetings and to use the blog for updating meeting notes and ideas. Members were not obliged to comment on each others' posts. As one interviewee recalled,

“So what was happening was there was no brainstorming on the blog. Somebody posted something. We don't need to reply to that. There were a few replies, maybe two or three. Saying something like 'I don't think this way' 'it doesn't work that way'. But there was not much brainstorming. Everybody took care of each part and the report was done.”

Because no rule was made on post writing, individual members wrote their learning and reflections without citing references. The low level of codifiability also made it hard to initiate a two-way conversation. One interviewee expressed his frustration.

“Yea, we did post ideas on the blog. There was lots of that. You had to search all the time. It's like every time people just posted the ideas.”

Although G2 had three meetings, little bonding took place among the members. One interviewee reflected that “we were not really a close group as we didn't know each other.” Nevertheless, the interviewee thought that other members provided adequate support to each other, and the response from other members on the weblog was “prompt enough”. However, a comparison among three groups revealed that on average, members in G2 waited the longest time to receive a reply (Table 4.9).

The group also appeared to have an issue with trust. As one member said in the interview,

“Blog is asynchronous. People get bored to read... If I put three paragraphs on the blog and ask them (other members) to read, it's not happening.”

Additionally, it was found that individuals' knowledge base also affected the use of the blog and general satisfaction. One interviewee considered the case study project not to be at all complex and said that there was no need to

use the blog for discussion. However, the same person also noted that the “freshers” (students without work experience) in the group were more active on the weblog.

4.4.2.3 Group Three

This group had the highest level of virtualness. Students found the blog to be useful, mainly because it enabled asynchronous communication among members. According to one interviewee, members mainly relied on the blog to communicate with each other. There was very limited online interaction at the beginning (see Figure 4.4). The only activity in the group was that one or two members wrote on the blog. The use of the weblog did not change until an “action plan” was proposed on the weblog on the 7th December. The plan divided the project and writing tasks were allocated on the basis of “first come first get”. Nevertheless, the comments on the weblog seemed to be polite and lacked a critical review. This was probably because personal relationships were not established in the first place. As an interviewee noted,

“...you don’t actually know the persons. (This is unlike) when you have personal meetings. Apart from doing the job, you get to know the person. Human relationship as such can’t be done through that (the blog).”

The blog was just used to publish individual members’ writing. There was little learning among the members. Subsequently, the quality of the work suffered. As one interviewee said,

“I thought I performed better on the individual task. When I had group task, purely there was not much critique going on the small group as there was in the individual task.”

4.5 Critical analysis

4.5.1 Task

According to McGrath (1984), the basic task process when a group solves a problem or makes a decision is to “choose “. McGrath further divides the choosing of a task into two categories, i.e., problem-solving tasks with correct answers, and decision-making tasks with preferred answers. However, problem-solving and decision-making are essentially subtasks of a group project. Thus, the broad category “choose” task is used in this study. McGrath suggests that a shared understanding or consensus is required

when carrying out “choose” task. The level of process communication needs to vary with the complexity of the task. The greater the interdependence among members, the more communication acts are required (Straus 1999). The findings suggests that although students had discussions on the weblogs, they made decisions in the FtF meetings. Weblogs were merely used to announce the decisions. In other words, findings suggested weblogs only supported tasks with certain answers, i.e., problem-solving tasks in this case.

Additionally, the limited evidence suggests that task complexity also influenced weblog adoption. This task required students to critically analyse information systems management and strategy in real companies, which demanded a good understanding of both technology and business. One interviewee reported that he did not use group blogs very often because he found the topic easy, since his background was management consulting.

4.5.2 Technology

It is suggested that weblogs are more suitable for one-to-many broadcasting than many-to-many discussions (Wagner, C & Bolloju 2005). The fit between task and technology was also questioned by the students. Two weeks after the launch of the large blog, a student published a post on it questioning “Is a blog the best tool for discussion?” The blogger indicated that the main problem was the replication of topics. This post itself triggered a discussion, and fifteen other students commented on it. The unified view among these contributors was that a weblog was not the best tool for discussion, and some ways of adapting blogs for discussion purposes were proposed.

Although a similar issue was raised again on one small group blog, some students reported the time-management benefits brought by weblogs. As one interviewee said,

“The benefit (of the small blog) is everyone can access from where they are as long as they have internet...you don’t have to meet up. You can do electronically. It gives you the functionality which is critique effectively through the comments.”

Despite the dispute, the evidence suggests that weblogs support both one-way and two-way communication in the knowledge-creating process.

Table 4. 10 Knowledge management tasks supported by weblogs

Tasks	Interviewee quotes
Personal Reflection	“On the main blog, I used to just put on my view. I did not put any comments which can initiate discussion. I just put on my view.”
Discussion	“If I want to write something, I normally search the Google and read something to get some information. And then I come to the blog to post something...Some of my posts question the benefits of ERP. Some of students, one or two, have worked in ERP companies. They commented on what I wrote...so it was good.”
Information/knowledge sharing	“For me, if I found something good, I posted it on our small group blog and the main blog. I did this because I think someone else may find them useful.”
Knowledge co-creation	“We divided the work. Everyone finished their work and uploaded it on to the blog. We asked questions and made comments. Also, we had meetings on how to write the final one after collecting the contributions from the blog.”

All of the interviewees thought that Google’s Blogger was easy to use. However, weblog functions such as labels and user profiles were not widely adopted. One interviewee admitted that lack of experience in writing blogs could be the reason that he did not fully exploit the blog features.

“Actually I didn’t write any blogs before, but I didn’t find it difficult. It was straightforward but I didn’t use the features either. That’s probably the reason.”

Also, it was observed that although some links, images and videos were attached in the large blog, these were almost absent in the small group blogs. One interviewee gave the following reason:

“For the small blogs, everyone just put their ideas. So there was no need for links or comments.”

Although the large weblog was only open to students who registered with the course, all of the participants thought that it would make little difference if the blog was “open to the public” because of the level of anonymity on the large blog. Only a small number of students created their own online profiles. As one interviewee recalled,

“In the main blog, everybody is more or less anonymous. Some people I only know by name. It was a big class. It’s not much different from a public blog.”

Additionally, it was reported that the quality of user-generated content on the blog affects students' intention to use and behaviour. As some interviewees recalled,

“The advantage (of using large group blog) is I did not know people have so much knowledge. So I got exposed to...lots of different things, like Microsoft and Google doc...”

“You can find anything you are interested... I used it (the main blog) as a repository.... It is efficient and effective.”

“I enjoyed it because of the wealth of information...”

In contrast, as we found in the cross-group analysis, personal views and ideas could discourage others from commenting on the posts (Group 2).

A further examination of the blog content revealed that the entries in the large blog were written by students with relevant work experience. They were written as a personal story. However, in the small group blog, the entries did not mention any personal experience or provide specific references. As one student commented,

“Practically, it was not possible for everybody to read everybody’s blog (posts on the small group blog)...You need to give that person references.”

Thus, a possible explanation for the contradictory evidence is that it is the codified knowledge that is valuable to readers. This argument is supported by the literature. Zhang and Faerman (2004) found that the level of codifiability appeared to influence the perceived usefulness of the knowledge portal. Although codified knowledge can be distributed on a virtual platform, knowledge cannot be transferred without social interaction (Nonaka et al. 2000). Weblogs can only support knowledge co-creation to some extent. As a previous quote (knowledge co-creation in Table 4.10) suggests the weblog was only used to collect members' comments on each part of the report. The group met up to write the final report.

4.5.3 Group

Project groups in this study share similar group size and composition. The only difference we found was the degree of group virtuality. In the literature, researchers reveal a negative relationship between the level of virtualness and the degree of social ties among members (Warkentin et al. 1997). That is,

distributed group members tend to have weaker social ties than normal groups. Weak ties reflect a low level of trust, which has a negative effect on performance. The findings of this study echo previous research that groups with effective face-to-face meetings achieve better outcomes (Robey et al. 2000). In particular, when comparing G1 and G2, the importance of the shared communication norm at an early stage was highlighted in the adaptation process. A trusting relationship was reported in G1 while it was not developed in G2. Among the three groups, the one with the highest level of virtualness exchanged most social communication on the weblog. However, it was reported that no bond was developed among G3 members. Thus, real discussion was absent in this group.

4.5.4 Individual

Individuals' skills and experience and tasks within the weblog appeared to affect their use. One interviewee noted the skills gap that existed among class members.

“From my personal view, half of people have not used blogs before ... There was post asking ‘how can I post comments, how can I make blog entry’.... There were at least 20 or 30 people who have never used blogs before. And there were may be 20 people who read blogs and know tagging stuff like that. But the percentage was quite small. Some of those guys were talking about tagging. The majority of people were not very familiar with blogging.”

Most interviewees had used weblogs prior to this module. However, none of them had used group weblogs, and some of them had reservations.

“No, not (using blogs) for collaboration (before). They are all individual ones, I have to say...when I first start this group blog, I was wondering... it was appropriate tool for discussing topic. I have had my own reservation. Because I thought the interface was not appropriate.”

Additionally, it was found that the quality of user-generated content was perceived differently by different subject types (i.e., fresher or professional). It was found that in small groups, blogs were used more frequently by students who had no work experience (freshers).

“Only a few people looked at the blog and got some guidance for their parts. Mainly freshers, the people didn’t work before, they need some guidance on writing formal report.”

This can perhaps be explained by Fjermestad and Hiltz’s (1998) findings of group support systems. That is, members only use GSS when they perceive that a task is complex. Students who lack knowledge of the task or technology use a blog to reach out for support.

4.5.5 Context

Students faced time pressure to complete project assignment. Evaluation affected adoption. The findings suggest that perceived pressure from the course instructor (subjective norm) was the main factor which affected students’ weblog use intentions and behaviour. Some interviewees admitted that they contributed to the blog to gain marks and to show others that they had contributed.

One interviewee mentioned that they could not make jokes on the small group weblog because it was supervised by the course instructor. To share jokes, they had to email each other.

Although the course instructor’s intervention was to ensure equal participation, it led to unfaithful use by both small and large groups. This was especially evident in the large group blog. It was reported that some students wrote on the blogs purely to gain marks, which caused an information overload. As recalled by one interviewee,

“There was a period after 2 or 3 weeks after this blog was set up. The Prof in the class said ‘I don’t see much posting. You have marks based on that.’ So suddenly there was a big activity. And then, you know, after two days, I saw there was a huge list.”

These unfaithful users paid little attention to previous blog entries, and were not interested in having a conversation with others, which caused genuine users a great deal of frustration. As one interviewee described,

“It was just frustrating (to see) there was no comment because there was no tagging and there were no much follow-on... There was not any logical order, so it was just post after post. Some of them could be just about the same thing just like a week later on. It was actually difficult to pick out good articles.”

Despite the fact that unfaithful use reduced the usability of weblogs, it was found that interactions which took place on the large blog affected individuals' usage behaviour of the small group blogs. This will be addressed in the next section.

4.5.6 Social interaction

In most small groups, students interacted both online and offline. The findings suggest that groups tended to make decisions in the FtF meetings. Physical meetings helped to set the communication norms, and to resolve conflicts. Online interactions further affected individuals' use of the weblog. Social structures emerged in both large and small group weblogs.

On the large blog, students made several suggestions, including reading others' posts before writing, posting a comment instead of starting a new thread for relevant topics, using RSS feeds to keep up-to-date with posts, applying labels to categorise posts, and structuring blog posts by following a standard format. Some participants adopted these suggestions when using small group blogs.

“Because we had discussion on the larger group blog, it suggests stop repeating posts; and putting comments to the same topic. It will be easier for readers to navigate. So I used more comments.”

“In the main blog, someone has also made similar comments (points). I think the purpose of using the blog is to discuss. The only way to discuss is taking what others said and commenting on the post. As oppose to starting a new post. If you want to discuss one thing, it is better to be under one thread. “

Also, individuals' expertise was recognised by their entries on the large group blog. Their contributions further encouraged other students to join the discussions (Table 4.11). One interviewee reported that he had FtF discussions with a student who was recognised as an ERP expert in the large blog for a small group project.

Additionally, it was noted that a close relationship was formed among a small number of people through online conversation. As one student described,

“The big one, it was somewhat funny feeling because I thought I was part of small group in the big group. If you read the blog, you can understand. There were smaller groups within that big group. There was a group of people who always read others’ post saying ‘it was a good post.’ and make some comments. There was communication within that group.”

This claim was supported by our previous analysis of the top ten contributors. Their contributions accounted for 35% of the total entries. This followed the Web’s “Power Law distribution”, that is, few weblogs attract a large readership and the majority are read by only a few people (Shirky 2003).

In terms of small groups, social structures were not only embedded in the initial agreement, but were also shaped by group interaction. By comparing two interviewees’ comments (Table 4.13), it was found that the members of the group with the clear initial agreement also supported each other by providing comments on the posts. It was also noticed that a social structure emerged from the way in which members interacted with each other, which further affected users’ interaction with the blog, as well as their perception of it. Because student MA had a positive experience with weblogs, MA continued using the weblog for discussions in another course.

It was interesting to see that although having strong reservations about using blogs to discuss academic topics, student VS thought that a weblog could be used as a notice board after completing the project and created a weblog to replace emails for another course.

Table 4. 11 Perceptions before and after using group blogs

Elements	Student MA in G1	Student VS in G2
Perceptions and attitudes to blogging at T1	“Really at the start of this blog, I told my friends that we used the blog (at home) just for fun, like for football, for sharing jokes. Here they use it for academic.”	“I am not generally very interested in blogging actually.” “The topics related to gossip or general gossiping or news or something. Informal things can be discussed (on the blog). Not this”
Face-to-face meetings	In the first meeting, members agreed on divisions of labour, communication norm (see Table 4.8) “In our meeting, we asked what was your experience, what you could contribute.” “We read each other’s work and discussed in the meeting.” Everyone participated in the meetings.	In the first meeting, no specific communication norm was agreed (see Table 4.8). “We made decisions in the meeting. We just posted meeting minutes on the blog.” In general, one or two people were absent in every meeting.
Online interactions	“We supported each other by giving comments... also we make second reading to check if we meet requirements.” “In our group, someone asked questions at 3 or 4 o’clock in the morning... You feel like it (the blog) will enhance you to work hard.” Most posts were replied within a day (Table 4.9). Everyone wrote on the weblog from the start of the project.	“Somebody posted something. We don’t need to reply to that. There were a few replies, maybe two or three, saying like ‘I don’t think this way.’ ‘It doesn’t work that way.’ But there was not much brainstorming. Everybody took care of each part and the report was done.” Most posts were replied within two days (Table 4.9). The online conversation was mainly among two or three members.
Perceptions about blogging at T2	“The blog was good for group discussion.”	“I don’t think the blog is very useful. It is not made for discussing things on the formal report.” “It suits something open to general debate. We don’t need to find out answers”
Future use	“For me, I will be interested in using it (again). (Actually) I did it (used the blog) in another assignment after this one... Because I think it (blog) will be beneficial from my experience with this blog.”	“That coursework for Second life was much difficult than this one... Because we sent emails to others, but there was no reply. So I decided to open a blog and use it as a notice board. (But)we didn’t actually use that one.

Notes: T1 refers to the time when users just started using weblogs; T2 refers to the time after the project was completed.

It was found that groups which held FtF meetings used multiple communication channels. Apart from writing on blogs and meetings, they also sent text messages, e-mails, and used Facebook, mobiles and Yahoo

Messengers. In contrast, the group which did not have physical meetings relied on the weblog to communicate with each other. Perhaps this can be explained by a recent study on knowledge integration in virtual teams. Robert, Dennis, and Ahuja (2008) found that, in established virtual teams, when team members communicated face-to-face, what affected knowledge integration is was relational capital rather than the communication media used by the team.

Since the whole project lasted for only one month, group members were bonded by specific tasks and time pressures. So the distributed groups had to develop swift trust (Jarvenpaa & Leidner 1999). Initial agreement in the first meeting can provide a foundation for relational development. However, Jarvenpaa and Leidner contend that this type of trust is fragile and temporal. In this case, G1 continued to develop trust as the members actively contributed to the blog. High quality user-generated content was added to the site. One interviewee perceived this enthusiasm as peer pressure to contribute.

“In our group, someone asked questions at 3 or 4 o’clock in the morning. When you saw that, you feel you can contribute at any place any time. You feel like it will enhance you to work hard.”

Frequent online interaction further helped to develop personal relationships among G1 members.

In comparison, G2 had a low level of interaction on the blog in the beginning. In G2, although members agreed to post a meeting summary and to suggest articles to other members in the first meeting, lack of feedback, a slow response rate (long waiting time), and uncoded contributions weakened the ties between members.

In G3, social capital was absent in the beginning. After dividing the responsibilities, members began to interact with each other. Although one interviewee suggested that little relational capital was developed in the group, the structural ties embedded in the weblog supported members to identify themselves within the group. As one interviewee noted,

“It feels more like a group work because you have a record of communication and a record of contribution (on the blog).”

4.6 Revisiting conceptual framework

The findings from the case study highlight two aspects which were not addressed in the initial framework, the first of which is the subjective norm. This is a person's perceived influence from his/her important others on usage behaviour (Fishbein & Ajzen 1975). The important others can be bosses, family or peers. In this case study, the perceived influence of the course instructor was the most salient because the blog use was evaluated. The instructor monitored students' participation in the weblogs. Although the initial intention was to encourage equal participation, the intervention led to unfaithful use at the same time. In the small groups, interviewees also reported the perceived influence of peers in terms of the immediacy of feedback.

The second element is the existing network in the virtual context. In this case study, the large group blog was set up before the small group projects. This was essentially a virtual network external to the class. The findings suggest that a relationship developed among the regular contributors to the large group blog, and their interaction further influenced individuals' use of the small group blogs.

4.7 Summary

This chapter analysed the adoption of group weblogs for problem-solving tasks. Initial agreement on the group communication norm appeared to be most influential in the appropriation of weblogs and the final outcomes. Nevertheless, the actual interactions on the weblog also supported relationship development. Two additional elements, the subjective norm and the existing virtual network were found to be relevant to users' adoption of the weblogs, and both of these elements will be taken into consideration in the second case study.

Chapter 5 Case Background

The purpose of this chapter is to understand how and why TALKnet was launched. The concept of e-Government is reviewed first. This gives an overview of e-Government by identifying its key elements, implementation and evolution, as well as applications of social software in the public sector. Next, the study focuses on the status of the UK's local e-Government, and the third part provides a detailed account of the TALK project, including TALKnet technical features and an overview of its usage.

5.1 E-Government

Information and Communication Technologies (ICTs) are regarded as a key driver of government modernisation.

E-Government is expected to bring benefits and opportunities both internally and externally. The benefits include improving efficiency by saving costs, improving services based on a better understanding of user requirements, helping to achieve specific policy outcomes by involving stakeholders, being a major contributor to government reform, and helping to build trust between governments and citizens by opening up the policy process (OECD 2003).

5.1.1 Definition of e-Government

In the literature, e-Government is defined as:

- the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) which have the ability to transform relationships with citizens, businesses, and other arms of government (World Bank 2005).
- the use of ICTs, particularly the Internet, as a tool to achieve better government (OECD 2003)
- the use of information and communication technologies (ICTs) to improve the activities of public sector organisations and their agents (Heeks 2003)

- any way IT is used in order to simplify and improve transactions between governments and other actors, such as constituents, businesses, and other government agencies (Sprecher 2000)
- the continuous optimization of service delivery, constituency participation and governance by transforming internal and external relationships through technology, the Internet and new media (Gartner 2000)

Various versions of e-Government definitions reveal the scope of e-Government and its different dimensions. In essence, 'e-Government is about the transformation of internal and external processes of government using information and communication technologies to provide efficient and user-focused services to citizens, businesses and other stakeholders'(Weerakkody et al. 2008, p. 333). The notion of e-Government covers a wide range services from government to government (G2G), government to business (G2B), government to citizens (G2C) and government to employees (G2E) (Fang 2002; Hiller & Bélanger 2001; Moon, M 2002).

- Government to government (G2G): provides government departments or agencies cooperation and communication online based on a mega database, and facilitates the internal transfer of information and commodities.
- Government to citizen (G2C): disseminates information to the public online, including basic services such as education, healthcare, tax payment, license renewal.
- Government to business (G2B): simplifies procedures by moving regulatory information and forms online; drives e-transaction initiatives such as e-procurement and the development of an electronic marketplace for government purchases.
- Government to employees (G2E): facilitates the management of the civil service and internal communication with governmental employees. ICTs can be used for information dissemination (e.g., intranet) and online transactions (e.g., electronic pay-checks).

Although these four elements of e-Government are often addressed separately in the literature, it is suggested that a holistic view should be adopted when implementing e-Government (Dunleavy et al. 2006; Jones, DS & Crowe 2001). The essence of the UK's public sector modernisation agenda is to improve services by reengineering business processes and re-designs through information technology (Cabinet Office 2006). Thus, both internal and external aspects have to be considered in the implementation of e-Government.

5.1.2 Development of e-Government

Overall, implementing new ICT in government follows the process of 'invention-innovation-diffusion', Coleman suggests that 'organisations first automate existing processes, then identify opportunities for innovation especially in terms of efficiency, before finally transforming themselves anew' (Coleman in UNDESA 2008, pp. 110-1). In other words, e-Government moves from automation to transformation.

In the e-Government literature, various stages of e-government development are proposed (Layne & Lee 2001; NAO 2002). These stages revolve mainly around four phases, namely, information/web presence, interaction, transaction and transformation (Bhatnagar 2004; Hiller & Bélanger 2001; Jones, DS & Crowe 2001; Layne & Lee 2001) (Figure 5.1).

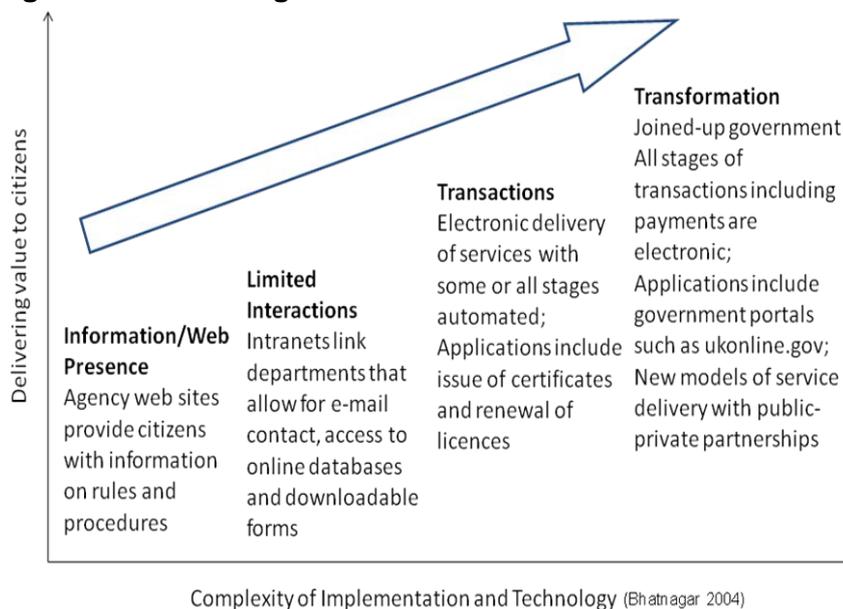
- Information/web-presence: Governments simply post information about government services, policies, and agencies online. Information flows one-way from government to citizen.
- Interaction: Governments involve basic levels of interaction between citizen and government in the way, services operate. For example, government sites allow citizens to make simple requests via e-mail and access online databases and downloadable forms.
- Transaction: Web-based self-services allow individuals to interact with the government and conduct transactions completely online. Examples include filing tax returns and renewing licenses.

- Transformation¹⁷: All government services are integrated and operate across government agencies and departments. Citizens can use a single portal (e.g. UKonline.gov) to access different services. The government is completely transparent to citizens and businesses.

Although these categories of e-Government are distinguished in theory, in reality, they are inextricably entwined (Jones, DS & Crowe 2001). For instance, as the UK's first joined-up service, the English National Land Information Service (ENLIS) involves information provision, interaction and integration. The dimensions of e-Government involved depends on the nature of the service being delivered (Jones, DS & Crowe 2001; NAO 2002).

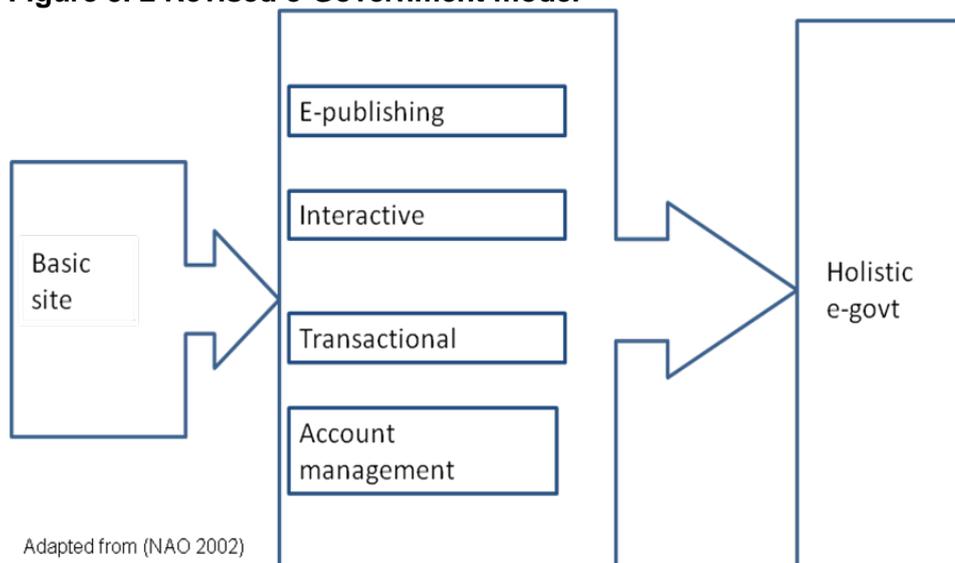
An alternative approach was proposed by the National Audit Office (Figure 5.2). The basic site is the starting point. In stage two, public organizations put different services online depending on their individual circumstances and the services they offer. Stage three, holistic e-government (joined-up e-governance or transformational government), is the most sophisticated stage. It is achieved when public sector websites connect central, regional and local governments, and facilitate 'one-stop shop' services online for citizens (NAO 2002).

Figure 5. 1 Main Stages of E-Government Evolution



¹⁷ The final stage of e-government is referred to by different names such as horizontal integration (Layne and Lee 2001), transformation (Baum & Di Maio 2000), transforming government (Murphy 2005), integration (Jones, DS & Crowe 2001), holistic e-government (NAO 2002), and fully integrated or single point of access (Irani et al. 2006; Weerakkody et al. 2008)

Figure 5. 2 Revised e-Government model



Due to its complexity, a recommended approach in adopting ICT is to ‘think big, start small and scale fast’ (Accenture 2001; Holmes 2001). That is, the approach suggests planning with a big vision, starting with small projects to limit the potential risk and avoid a high profile disaster. In the UK, local e-Government followed this approach. For instance, ODPM selected twenty-two national projects as examples using new ICTs to develop best practice solutions for priority services, with the expectation of transferring the learning from these projects across local government.

However, in the early stages of e-government implementation, 70% of e-government initiatives failed to meet the initial transformation objectives (Beynon-Davies & Martin 2004; Di Maio 2006; Gandhi & Cross 2001; Weerakkody et al. 2008). Most of these failures were attributed to the inability of the government to reengineer business processes in response to the e-government model (ibid). The challenges of e-Government implementation exists on both external (citizen) and internal (government) sides and involve technological, social and organisational issues (Irani et al. 2007; Layne & Lee 2001; Weerakkody & Choudrie 2005).

Irani and his colleagues (2007) carried out a series of workshops across the UK to identify the road map for future e-Government initiatives. On the basis of the answers provided by a mixture of participants, both academics and practitioners, researchers identified key issues in technological, social and organisational research themes (Table 5.1). Although the problem of the scalability and flexibility of ICT systems and processes was the most cited

issue across the workshops, technological change will not be realized without social and organizational change (ibid). Similarly, Jones and Crowe (2001) also indicate that the benefits of E-Government initiatives will be limited without large scale organisational change to the wider structures of government. Research by Hiller and Bélanger (2001) reveals that one of the biggest obstacles to most G2C online transactions is the lack of integration of online and back-office systems. Thus, organisational structures surrounding ICTs must be transformed in order to realise the full potential of technology.

Table 5. 1 Main issues involved in e-Government development

Technological	Social	Organizational
<ul style="list-style-type: none"> • The need for flexible and scalable technology; • Privacy and security of available services; • Shared services (incl. common identity management); • Standards, coordination and integration between government services and departments; • Identification and authentication; • Impact analysis on citizen or organisation 	<ul style="list-style-type: none"> • Engagement with citizens, government authorities and other stakeholders; • The need for a citizen-centric process; • Take-up of e-Government services and incentivisation; • Diversity of different socioeconomic and cultural factors within citizen groups 	<ul style="list-style-type: none"> • Interaction between and across government departments; • Coordination and ownership issues between agencies and departments; • Political engagement, policy making and the mandate to deliver automated, technology-supported services; • Project management of e-Government initiatives; • Management of risk and knowledge so as to optimize and learn from e-Government experiences; • Metrics for measuring and evaluating organizational performance and capabilities

Adapted from Irani, Elliman, and Jackson (2007)

E-Government is considered to be the major contributor to government reform. With the advancement of ICTs and the rise of the information society, governments have to provide more sophisticated, efficient, cost-effective and value-added services for citizens, businesses and government bodies themselves. In the literature, there are three types of public management: traditional public administration, New Public Management (NPM) and network governance. Hartley (2005) compares these three types (Table 5.1).

Table 5. 2 Changing concepts of governance and public management

	Traditional public administration	New Public Management	Networked governance
<i>Context</i>	Stable	Competitive	Continuously changing
<i>Population</i>	Homogeneous	Atomized	Diverse
<i>Needs/problems</i>	Straightforward, defined by professionals	Wants, expressed through the market	Complex, volatile and prone to risk
<i>Strategy</i>	State and producer centred	Market and customer centred	Shaped by civil society
<i>Governance through actors</i>	Hierarchies Public servants	Markets Purchasers and providers Clients and contractors	Networks and partnerships Civic leadership
<i>Key concepts</i>	Public goods	Public choice	Public value
<i>Innovation</i>	Some large-scale, national and universal innovations	Innovation in organisational form more than content	Innovation at both central and local levels
<i>Improvement</i>	Large step-change improvements initially, but less capability for continuous improvement	Improvements in managerial processes and systems. Customer focus produces quality improvements in some services	Aiming for both transformational and continuous improvement in front-line services
<i>Role of policy-maker</i>	commanders	Announcers/commissioners	Leaders and interpreters
<i>Role of public managers</i>	Clerks and martyrs	Efficiency and market maximizers	'Explorers'
<i>Role of the population</i>	Clients	Customers	Co-producers

Adapted from Benington & Hartley (2001) and Hartley (2005)

The traditional public administration, evident in the post war period up to the early 1980s, is characterised as a bureaucratic and rule-based approach. Because the environment is relatively stable, innovation tends to be on a large scale. Policy-makers act as commanders who are in charge of creating legislation and then support for whole-scale changes, while officials are responsible for carrying out the detailed work of implementation. In contrast, both New Public Management (NPM) and networked governance put more emphasis on customers. NPM was developed from the 1980s onwards in the UK, New Zealand and elsewhere. At the time of NPM, the innovations were politically radical, with an emphasis on organisational restructuring and 'customer' focus. Policy-makers in the national cabinet remained as

'commanders', while other politicians became 'commissioners' of services or 'announcers' of change. Senior officials turned into public managers, acting as efficiency maximizers and sought innovations to improve the quasi-market and the quality of service delivery. Since 1997, there has been a shift to more networked forms of governance in the UK (Newman 2001). Different from NPM, networked governance requires innovation at both central and local levels, and aims for both the transformation and continuous improvement of front-line services. Policy-makers take a leadership role in translating new ideas into new forms of action. Public managers become explorers who 'are expected to use their initiative and imagination' and 'be responsive to more or less constant political guidance and feedback' (Moore, M 1995, p. 299). Meanwhile, the public is regarded as co-producers of service and innovation (summarised from Hartley 2005, p. 30).

In the network governance, the government no longer makes decisions alone. Solutions come from the co-production process of key stakeholders. This new role of government certainly requires change in organisational processes, structure and culture. In relation to e-Government, this is the objective of the final phase of the e-Government model, i.e., transformation. Realising transformational government requires both system integration and organisational reform. However, the latter is extremely challenging. For instance, the UK's online initiative was launched in September 2000, and by December 2000, the UKonline.gov.uk citizen portal was set up, providing a 'one-stop shop' to public services online. Nevertheless, on the internal side, things have been changing slowly (Griffin et al. 2004). According to a report published by the Cabinet Office in 2005, the UK e-Government initiative is increasing its emphasis on the automation of existing back-office processes and integration both within, and between, services (Murphy 2005; Weerakkody et al. 2008). Details of the current UK e-Government status will be discussed in section 5.3.

5.1.3 Social software and e-Government

Web2.0 technologies are regarded as being applications which require little investment, but which result in a high level of take-up. Users are producers of content, taste/emotion, contacts and reputation/feedback (Osimo 2008).

Successful examples include Wikipedia, TechCrunch Blogosphere, de.li.cious, and TripAdvisor.

In order to support the EU's policy development for e-Government, the Institute for Prospective Technological Studies (IPTS) conducted an assessment of the relevance and implications of web2.0 technologies to government-related activities. Web survey, desk research and case studies were employed for the investigation. The results show that web2.0 technologies have been applied in both front and back office in the government context. Additional applications of social software were found in the interviews as well as in the published government document. These are summarised in the table below (Table 5.3)

Table 5. 3 Applications of Social Software in the Public Sector

Domains	Applications	Examples
<i>Back office</i>	Regulation	Peer-to-Patent: a web site where patent applications are published and pre-assessed by self-appointed experts on a purely voluntary basis. Evidence is then submitted to the US Patent Office for evaluation and decision.
	Cross-agency collaboration	Intellipedia is a wiki platform managed by the CIA which enables the direct collaboration between the analysts of the 14 US intelligence agencies.
	Knowledge management	An international law firm has implemented an internal knowledge management platform which enables information knowledge sharing through blogs, group newsfeeds, group bookmarking. The Department for Culture, Media and Sport in the UK has set up an internal wiki to manage corporate information around briefings, lines to take and frequently asked policy questions
<i>Front office</i>	Service provision	PatientOpinion is a website launched by General Practitioner to improve the National Health Service. It collects and publishes patients' feedback and ratings on the services they have received at hospitals.
	Delivery process	TidyOldham is a website launched by Oldham Council which allows residents to report anything blighting their neighbourhood by uploading photos and to track the progress on the site.
	Political participation and transparency	Petitions.gov.uk is an online service where citizens can submit petitions directly to the Prime Minister, and view and sign petitions submitted by other users.
	Law enforcement	Mybikelane is a website where cyclists post photos of cars illegally parked, with a view to raising awareness about the problem.
	Recruitment	RAF careers Bebo page successfully exploits the network effect by allowing frontline staff to tell their own stories using video and chat to give users highly engaging content

Adapted from (Oldham 2007; Osimo 2008; COI 2009)

Of all of these applications, social software has the most visible impact on political participation. In contrast, the impact is less visible in the back office domain (Osimo 2008). The situation is similar in the UK. Most Web2.0 applications have been implemented in the domain of the front office. For instance, in order to engage citizens, 48 local authorities have created a fan page or group on Facebook (by 22nd July 2009) and 125 local authorities have their own Twitter accounts (by 10th February 2009) (Azyan 2009). However, it is found that 90% of local authorities block social media sites. Among these, about 67% of authorities have placed total ban on use, enforced either through policy or by a software block (SOCITM 2010b).

5.2 UK Local e-Government

5.2.1 Development of UK local e-Government

After introducing a modernization agenda in 1997, the UK government have launched a set of initiatives. In 2000, it announced a target date of 2005 when all government services to the citizens and businesses should be available electronically. According to the website of the Department for Communities and Local Government (DCLG, formerly known as the Office of the Deputy Prime Minister, ODPM), the average local authority was 98% per cent e-enabled in 2006.

Local e-Government initiatives tackled both front office and back office. In February 2001, the Government announced sponsorship for the introduction of a local government electronic service delivery, and £675 million was made available up to 2005/06 to help local authorities and partnerships to complete their plans (Office of the e-Envoy 2003). To obtain a share of this, local councils were required to prepare an annual Implementing Electronic Government (IEG) statement showing the action they planned to take to meet the 2005 target.

In November 2002, the ODPM published a National Strategy for Local e-Government to increase the awareness and uptake of new ICT in local government. Twenty-two national projects were established to develop and disseminate best practice and these covered key priority services provided by local authorities and utilised different technology sets. The objective of the initiative was to ensure that all councils had access to key electronic services and building blocks without having to build them from scratch (ODPM 2003). The final products of these twenty-two national projects were published on the Product Catalogue (www.productshare.org.uk). The main local e-Government Programme concluded in December 2005.

In November 2005, the Government published the document Transformational Government – Enabled by Technology. This signalled that local e-Government was entering a new phase. The UK government began to work toward reengineering and e-enabling back office processes and information systems to facilitate more joined-up and citizen-centred e-government services (Weerakkody et al. 2008). The vision of the strategy was 'better using technology to deliver public services and policy outcomes

that have an impact on citizens' daily lives' (Cabinet Office 2005, p. 3). However, transforming government through technology was only part of the agenda. The vision was also about 'making government transformational through the use of technology - creating and retaining the capacity and capability to innovate and use technology effectively as technology itself develops' because 'this is the only way in which public services can keep up with a continually changing and globalised society' (ibid p.4).

5.2.1.1 Reality of UK local e-Government

The modernisation agenda has achieved different levels in central and local government. At the central level, a coordinated approach was adopted and progress in e-Government development has been steady across the board. The majority of agencies achieved above average service scores (Accenture 2001). However, at the local level, the implementation of e-government varies greatly from one authority to another. The results are affected by a number of factors including population size (Cotterill 2007), senior management support (McNeal et al. 2003), leadership (Hutt et al. 2000) , organisational structures and cultures (Rashman et al. 2009). Due to the varied and localised nature of local authorities, learning from e-Government best practice is limited (ODPM 2006).

Moreover, the UK's public sector was criticized for overspending on IT and creating a 'digital landfill' (PublicTechnology.net 2010). According to a report conducted by specialist IT supplier Erudine, the UK government is not benefiting from innovative IT solutions as much as it could. Incremental changes were being rewarded in practice at the cost of long-term sustainability, and this interplayed with the fact that most government IT was owned and run by 'incumbent prime contractor third parties'. A key issue is that technology stays as 'e-veneer' in the government. Martin Rice, CEO of Erudine, commented.

"Government is run on back-office IT that is a tangled mess of legacy software running on often near-obsolete hardware. This is governed by a web of Service Level Agreements and contracts and beset by empires that ensure the status quo is kept alive – along with the vast bills that the taxpayer is left to foot." (PublicTechnology.net 2010)

The issue of the outdated back office system was also mentioned by several interviewees of this study.

Nevertheless, the UK local authorities are under pressure to transform, and this pressure to change not only comes from central government, such as internal efficiency savings targets, but also from technological, social changes and the economic situation. In terms of central government policies, local authorities were required to deliver GBP1.2 billion in accumulated efficiency savings by 2007-2008 by realising the benefits of e-Government (European Commission 2005). Meanwhile, changes in the wider society demand public sector transformation. According to an Omnibus survey, 70% of UK households had access to the Internet in 2009, and people are becoming increasingly familiar with online transactions. In 2007, Internet sales rose by 30% and six in ten web users visit government sites. 49% of youths (8-17 years old) in the UK who use the Internet have a page or profile on a social networking site(Omnibus 2007). In 2009, nearly two-thirds of all UK residents were participating in 'social computing' , rising to 87% of 18 to 24 year olds (Koehler 2010). Also, due to the current economic crisis, UK public expenditure cuts seem to be inevitable in the coming years (BBC 2009). Therefore, public sector managers have to think creatively about how to provide the same services with less money and in what form.

5.2.2 Local innovation

Innovation has always been the key objective of local e-Government. For instance, it is mentioned throughout the national strategy for local e-government.

'We want to foster local innovation and use it to build solutions that can be shared widely; we want you to be able to use the products of Pathfinders and National Projects; by doing so, we want to make it easier and cheaper for you to deliver local e-Government.' (p. 7)

'Our objective is to create the environment to encourage and harness local innovation, to maximise progress and promote cost-effective solutions.' (p.11) (National Strategy for Local e-Government in SOCITM 2003)

The first question to ask is 'who are involved in public sector innovation?' A study by Borins (2006) revealed that over half of the innovations in the public sector were initiated by middle management and lower level staff. In the sample of economically-advanced countries of the Commonwealth,

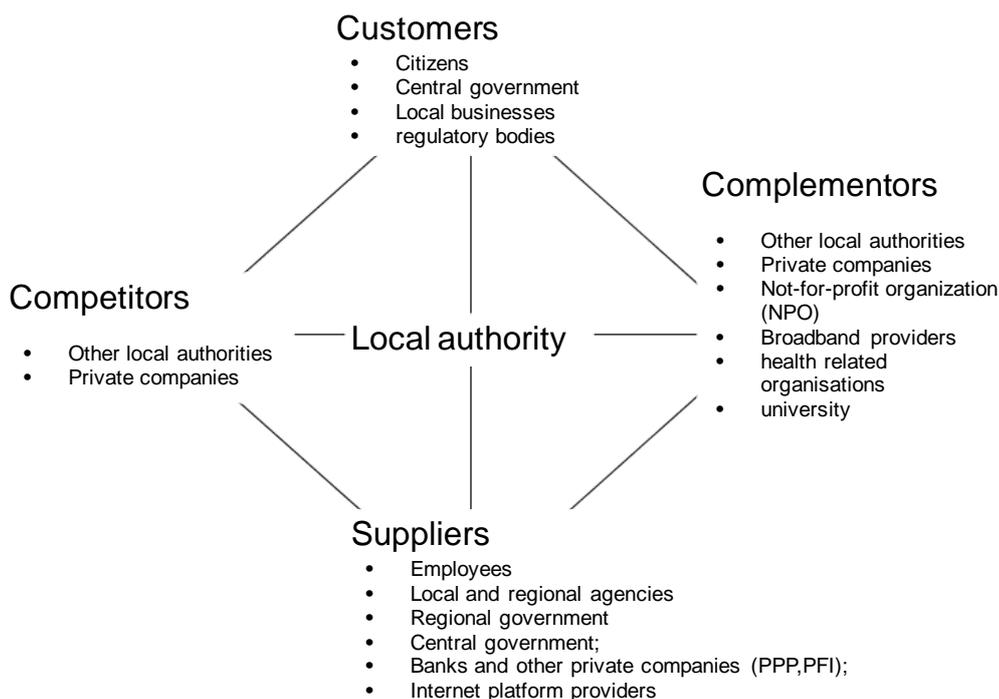
innovations were initiated by middle managers or front-line staff (82 percent), agency heads (39 percent), politicians (11 percent), interested groups (2 percent), and individuals outside government (5 percent)¹⁸. In the UK, citizens-involved innovation is a recent trend, and a good example of this is the Open Data plan. In order to improve public services, the UK government has provided access to state data to developers. The plan has already produced impressive results, including an application which provides information on local routes and timetables when a postcode is entered (Young 2009). Social software applications accelerate this trend, especially in the aspect of political participation (Osimo 2008). For instance, Digital Britain Unconference is a group weblog which holds an “unconference” to discuss the Digital Britain report and make recommendations to it. The weblog was born after a few people had conversations on Twitter and it soon attracted other people. The recommendations made by citizens were passed on to the Digital Britain team in national government. Moreover, this social movement pushed the report team to rethink their consultation approach and increased use of social media (Thompson, B 2009).

In the digital age, local authorities have to reposition themselves (Griffin & Halpin 2002; Hartley 2005). This study draws a value net to identify the key players involved in local e-Government (Figure 5.3). Value Net is a schematic map helping to visualize the players in a business and helping the business to identify their roles (Nalebuff & Brandenburger 1996). The players in the list below are certainly not exhaustive. However, by drawing the value net, it is expected to identify who the customers, suppliers, competitors and complementors¹⁹ are for local government. Although it is out of the scope of this study to assess their roles, the diagram highlights the intermediary role of local authority, as well as the potential source of innovation.

¹⁸ These numbers add up to more than 100 percent because respondents were allowed to give multiple answers.

¹⁹ Definition of complementor: 1 A player is your complementor if customers value your product more when they have the other player's product than when they have your product alone. 2 .A player is your complementor if it is more attractive for a supplier to provide resources to you when it's also supplying the other player than when it is supplying you alone.

Figure 5. 3 the Value Net of a Local Authority



Based on categories from Nalebuff & Brandenburger (1996)

The TALK project also reveals that the local authorities today tend to be less important as decision-makers, but more important as knowledge providers and arbiters (Brooks et al. 2007). Local councils can play the role of orchestrator which matches demand with supply (ibid.), as explained by Viv Slater, Development Manager of Oldham City Council:

‘Our role has become much more involved in the market side and in developing and working with people, than actually being, as we traditionally were, the provider - the organisation that got in there and delivered the care ultimately. We now orchestrate suppliers, and in so doing we are trying to be less prescriptive about the way things happen. We need to move beyond a mindset that says we need this many of this, and that many of that, and try and provide everything to people.’

Three different leadership approaches were identified in local innovation (Brooks et al. 2007). They are: skunkworks, strong leadership, and a collective approach.

‘Skunk works’ is a bottom-up type of ‘under the radar’ innovation. A new idea is allowed to develop to some maturity before being announced to the wider

organisation. Strong leadership and sponsorship is a traditional top-down approach. The project is championed by the most senior people in all relevant authorities.

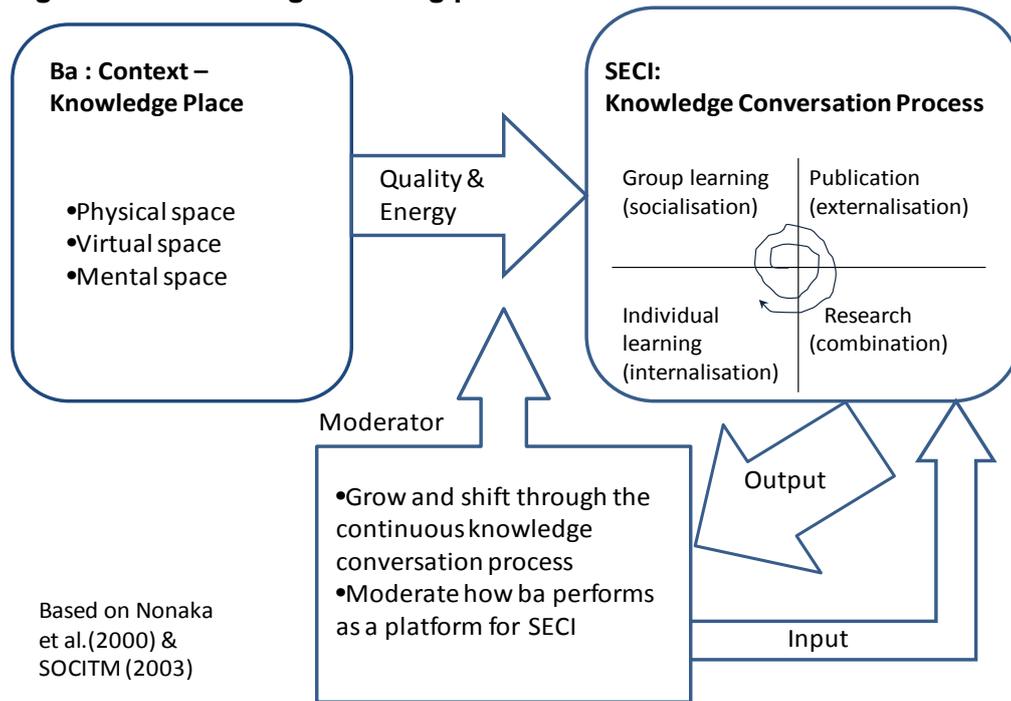
The 'collective' approach combines 'skunk works' and strong leadership strategies. Leadership manifests itself across the project, with each stakeholder showing his or her own commitment, strength, thoughts, and leadership. In other words, citizens share rights and responsibilities as recipients of the service. Under this approach, innovation requires changes in culture, and the hearts and minds of people (Brooks et al. 2007). The concept of shared responsibility among stakeholders resembles the social software-supported collaboration described in the literature (Li & Bernoff 2008). Nevertheless, the third innovation strategy challenges the status quo of local authorities (Brooks et al. 2007).

5.2.3 Knowledge management

Innovation is realised by means of a knowledge-creating process (Nonaka et al. 2000). Based on Nonaka's model, knowledge is created through socialisation (sharing and creating tacit knowledge through direct experience), externalisation (articulating tacit knowledge through dialogue and reflection), combination (systemizing and applying explicit knowledge and information), and internalisation (learning and acquiring new tacit knowledge in practice). Various 'ba' provide spaces for these processes. 'Ba' is a context-knowledge place. It offers a platform for knowledge conversation, as well as a space for self reflection. 'Ba' exists in multiple forms, such as physical spaces, virtual spaces and mental spaces.

In the context of local government, physical spaces, such as events, project meetings, and informal meetings, offer opportunities for group learning. Virtual spaces, such as e-mail groups, intranet and wiki space, allow individuals to share and publish documents. Knowledge transfer is also affected by mental space such as a shared knowledge background.

Figure 5. 4 Knowledge-creating process



5.2.3.1 Knowledge management in UK local government

UK local authorities are not only under the spotlight of external performance comparison but also face increasing demand to achieve better outcomes with fewer resources. Thus, public sector managers cannot afford to ignore knowledge management. Local councils are encouraged to ‘exchange skills and ideas between local authorities and between local authorities, central government and other public, private and voluntary sector organisations’ (DTLR 2001, p. 47; in Rashman et al. 2005). The Audit Commission urge ‘top performing councils’ to ‘share their knowledge and capacity with local government as a whole’ (Audit Commission 2001; Rashman et al. 2005). However, learning across local authorities is still limited (ODPM 2006; Rashman et al. 2005). In a study conducted by the Beacon Scheme (identification, reward and showcasing good practice in the UK public sector), Rashman and her colleagues found that the uptake of learning through Beacons was less than its potential. Also, in local e-Government national projects, it was evident that not only ‘the learning gained by the staff employed by the councils leading the Projects’ but also the residual knowledge which rested on the heads of consultants failed to transfer (ODPM 2006).

The barriers for knowledge sharing inside local authorities can be: pressure of existing work places leaves individuals little time to look for alternative solutions; the culture of the individual rises due to less face-to-face interaction; a blame culture discourages public sector managers from experimentation; overly-prescribed quality management procedures inhibit experimentation; flexible working may reduce the time of direct interaction (SOCITM 2003). On the inter-organisational level, knowledge transfer is influenced by both central and local government, since the Government's policies are concerned with externally-driven performance assessment and local councils' own learning and capacity-building (Rashman et al. 2005). Additionally, technological knowledge in ICT-focused change tends to be very specialised and fragmented, and this fragmentation also hinders the transfer of knowledge transfer(ODPM 2006).

Table 5. 4 Factors influencing knowledge management in local government

Intraorganisational	Interorganisational	Knowledge
<ul style="list-style-type: none"> • Pressure of work • The culture of the individual • Blame culture • Prescriptive quality management regimes • Flexible working 	<ul style="list-style-type: none"> • Performance assessment policies • Local council's capacity of learning and knowledge sharing 	<ul style="list-style-type: none"> • Specialized and fragmented technological knowledge

(SOCITM 2003; Rashman et al. 2005; ODPM 2006)

5.2.3.2 Local partnership

Knowledge transfer happens through social interaction (Nonaka & Takeuchi 1995). On the interorganisational level, knowledge transfer across local authorities is realised through partnership or joined-up services. The ODPM launched two initiatives to develop local partnership, namely National Projects (2002-2005) and the Partnership Programme (2002-2006). Twenty-two national projects were created to develop and disseminate best practice solutions among local authorities. Each national project was a partnership between councils covering either a priority service (e.g. schools admissions, planning services) or a technical building block (e.g. smart cards, customer relationship management, and websites). The purpose of the initiative was to ensure that all councils had access to key electronic services and building blocks without having to build them from scratch (ODPM 2003).

Between 2002 and 2006, 101 Local e-Government Partnerships were funded by the Partnership Programme with a total of GBP 68 million. The aim of the programme was to 'deliver more effective, more efficient and more joined up local government services' (ODPM 2005).

Mixed results of local partnership have been reported (Cowell & Martin 2003; Griffin et al. 2004). The reported benefits of working together include skills and knowledge sharing, a better understanding of what each other does, access to each others' resource and expertise, and improved delivery of national targets (Cotterill 2007). However, evidence suggested that some local authorities did better than others in terms of joined-up services (Cowell & Martin 2003). Griffin et al. (2004) even claim that joined-up e-Government is still more of an aspiration than an actuality.

In the literature, silo departments, tensions between centralisation and decentralisation, technological complexity, as well as IT-led partnerships provide barriers to joined-up services. Although the reported silo-mentalities of Government departments were created in the industrial era of the past (Jones & Crowe 2001), the 'silo' culture still exists in local government (Cowell & Martin 2003) and inhibits horizontal integration (Layne & Lee 2001). Although the 'information silo' is hard to break down, this is essential in order to remove the boundaries and increase the transparency of governance in order to realise transformation agenda. Secondly, tensions between centralisation and decentralisation affect the forming of local partnerships (Cowell & Martin 2003). On the one hand, local authorities seeking horizontal integration may welcome pressure from central government to achieve smooth coordination. On the other hand, closer vertical integration between local and central government, with tighter control over priorities and performance being exerted from central government, are perceived as being constraints on more effective horizontal integration at a local level. However, a loosening of vertical integration may not be sufficient to facilitate local horizontal integration (Cowell & Martin 2003). Technological complexity is another barrier to partnership. Very often, multiple databases exist in a local authority, and horizontal integration is challenged by the integration of heterogeneous databases and system compatibility (Layne & Lee 2001). Also, when investigating the take-up of local e-Government, TALK project members found that although e-Government projects were charged by business leaders, the projects were actually led by IT managers

due to a gap in the technological knowledge of business managers. Therefore, some designs did not meet the requirements of users. A similar issue was identified by Cotterill and King (2007) in local e-Government partnership. They revealed that sub-regional e-government partnership is largely IT-led and 'has little representation from citizen-facing directorates' (p.240).

Prior research on local partnership suggests that a number of factors influence the successful implementation of e-government solutions among local authorities. These factors include: professionalism and attitude of the council leadership (Hinnant & O'Looney 2003; Ho 2002; McNeal et al. 2003); participation in wider networks beyond the immediate locality (Cotterill & King 2007; McNeal et al. 2003); extent of support from non-IT departments (Ho 2002), how long the local council has operated a website (Ho 2002; Moon, MJ & Norris 2005), the existence of a local e-government strategy (Moon, MJ & Norris 2005), the population size of the council (Ho & Ni 2004; Norris & Moon 2005) and staff workload (Ho & Ni 2004). In the context of UK local government, scholars have proposed several approaches to improve the implementation and results of ICT projects. Suggestions on the individual level include encouraging entrepreneurship (Bartlett & Dibben 2002; Kawalek 2007), nurturing new front-line leadership initiatives (Cowell & Martin 2003), and recognising hybrid managers as e-Champions (Foster & Griffin 2003). On the organisational level, solutions include fostering Knowledge transfer (Rashman & Hartley 2002) and reforming government structure (Cowell & Martin 2003),

5.2.3.3 Social software and knowledge management

ICTs can be used as tools for knowledge sharing or cooperative working. Electronic network connects individuals. The social software-embedded network can serve as both a channel for knowledge distribution and a space for knowledge creation. The scope of an electronic knowledge network can be intraorganisational or interorganisational, and an online network can support closely associated groups (community of practice) and loosely associated groups (network of practice).

Diffusion studies suggest that an organisation's innovativeness is affected by its interconnectedness, i.e. 'the degree to which the units in a social system

are linked by interpersonal networks' (Rogers 2003, p. 412). Networking across public organisations is also important. Evidence shows that learning from external sources has enhanced the performance of local authorities (Rashman et al. 2005).

The UK Government launched its Knowledge Network programme in October 2000 as a high-profile exercise in knowledge-sharing across government departments. The initial reactions to the Knowledge Network were mixed (Bellamy 2002). Some were concerned that the information would be skewed to serve the government's political ends. However, considerable enthusiasm was expressed among civil servants (ibid). In February 2002, the Office of the e-Envoy carried out an assessment of departmental benefits from the Knowledge Network. The results showed that the longer Knowledge Network departmental systems have been in operation, the better their performance has been (Cabinet Office 2002).

The Improvement and Development Agency (IDeA) coordinates a range of learning mechanisms for local government. The IDeA website hosts the largest electronic knowledge network across local authorities, the Communities of Practice (CoP) platform. Because the purpose of the IDeA is to facilitate learning and knowledge sharing across local government, which is similar to the TALK project, the following is a close look at the IDeA and CoP websites to determine the usage of the local knowledge networks.

5.2.3.3.1 IDeA and CoP

Technology

The IDeA website is a portal which hosts discussion forums, a Communities of Practice platform and a directory of professional networks. Also, the website itself is a knowledge repository which gathers the latest good practice in the public sector. The CoP platform is built for knowledge-sharing across local government, which is similar to the purpose of TALKnet (see 5.4.4 for details). Thus, it is worth having a close look at the features of CoP.

The CoP platform is structured as an aggregation of communities, and an individual has to register to see a list of communities. The individual needs to request to join an individual community before being able to read the content. Some communities grant immediate access while most are private and access has to be approved by facilitators. A minimum of three community

facilitators is required to open a community on the CoP platform. Member lists and forums are enabled in all communities, and the facilitator of each community can select features from wikis, blogs, event calendars, libraries and news feeds. Members can also create sub-communities within a community. New social software features (blogs and wikis) were implemented in 2006. On the CoP site, both wikis and blogs are based on a WYSIWYG (What You See Is What You Get) editor. The visibility of blog content can be managed by the blog owner. The default setting is public, i.e., viewable from the Community Hub and personal blog page, but this can be changed to private, i.e., viewable by selected communities. Once a community is created, its basic information is published in the A-Z index of communities. The basic information includes community name, date started, size, lead organisation, lead facilitator and description. On the user profile page, both manually-input content (i.e., self-introduction) and automatically aggregated content (including latest contributions, total contributions, membership in other communities) is available. Although the CoP platform supports a member search ('People Finder'). There is no overall member list. Registered users can only see the names of members within the community they have joined.

Users and usage

At the start of November 2009, the CoP had 43,000 registered users. By the end of October 2009, the IDeA website (distinct from the Communities of Practice platform) received an average of 80,000 visits per month which generated an average of 300,000 plus page impressions per month. The CoP platform received an average of 61,000 visits per month, which generated an average of 20,000 contributions per month²⁰.

In terms of user information, due to incomplete user information and the fact that local authorities subcontract areas of work to external organisations, users' work backgrounds are estimated. Based on the IDeA annual survey, it

²⁰ There is no published data about IDeA and CoP web usage and user information. These statistics were collected by directly contacting website managers. Page impression is the result of a single request made by a user for a single web page. Visits are a series of one or more page impressions made by one user. Contributions to CoP include forum postings and responses, library entries (e.g. word, PDF, wmv etc.), wiki entries, blogs and blog comments.

is estimated that about 70 to 80 percent of IDeA website visitors work in local authorities (see Table 5.5). Around 80 to 90% users of the CoP platform (excluding Fire and Police) are from local authorities.

Table 5. 5 IDeA website users' work background

	Number	Percentage
Public – local government	467	81.1 %
Public – central government	18	3.1 %
Public – NHS	4	0.7 %
Public – other	15	2.6 %
Private sector	24	4.2 %
Voluntary sector	16	2.8 %
Other (please specify)	32	5.6 %
Total	576	100.0 %

Notes: This is based on an annual user survey from a random sample of 5000 registered users. Total number is the people who responded to the questionnaire.

Despite the large number of registered users, an internal review found that activities on IDeA and CoP websites are piecemeal and uncoordinated within IDeA. There are more community activities in some areas of the public sector, than others, such as electronic services delivery (ESD) (Koehler 2009a).

5.2.3.4 Factors which energise a knowledge network

Online networks only enable knowledge transfer by providing a space for connection and interaction. The contribution of the electronic system to overall performance is restricted to the activity level (Geib et al. 2004). Use of the electronic network depends on individuals, organisational procedures and policies, physical meetings and web content.

Leaders and explorers

The importance of individuals to the activities and success of transformational government is emphasized in the literature. Hartley (2005) argues that, in the context of networked governance, policy-makers should take a leadership role in interpreting new ideas into new forms of action, while public managers are expected to become explorers using their initiative and imagination and being proactive to constant political guidance and feedback (Moore, M 1995). Leaders in Hartley's claim are similar to the notion of opinion leaders in intrapreneurship studies (Pinchot 1985). Opinion

leaders are open to external communication and influential in the decision process (ibid). In local partnership research, it was observed that the seniority of individual representatives and their capacity to commit to decisions on behalf of their organisations influenced the activities and success of inter-organisational collaboration (Cotterill 2007; Raco 2002). The idea of explorers resembles the concept of boundary spanners or brokers. These people have close ties both within their own organisation and to those involved in the alliance (Hutt et al. 2000) and connect separate social networks. In the cross-sector knowledge network ('industrial district' in Inkpen & Tsang (2005)), it is crucial to have boundary spanners who explore new ideas and knowledge by maintaining weak network ties (Rowley, Behrens & Krackhardt 2000).

Experiment culture

Knowledge acquired through learning and experimentation is part of the learning cycle (Kolb 1984), and to move from automation to transformation, the government needs to create learning and evaluation systems which will foster a 'culture of experiment' to replace the current 'blame culture' (Jones, DS & Crowe 2001). An organisation can foster an experimental culture by means of policy and procedures. For example, a case study conducted by a TALK project is Leeds Digital Pen and Pencil, which found that Leeds City Council operates a policy which allows some parts of the organisation to develop new ideas to a certain level of maturity before being approved by all committees concerned. However, changes in the control procedure may inhibit experiment (Gibson 2010).

Web content

The quality of web content is important in attracting readers. Storytelling is a narrative technique which can drive knowledge transfer (Brown 2000; Brown et al. 2005; Leidner, D & Jarvenpaa 1995). This is a powerful technique for sharing uncodified knowledge. For example, storytelling was used by the Department of Trade and Industry (DTI) to capture the experience and lessons learned from coordinating a large and complex project (SOCITM 2003). On the Web, a storytelling technique helps to engage readers. For

instance, the Royal Air Force (RAF) set up a Bebo page (<http://www.bebo.com/theroyalairforce>) for promotion (COI 2009). They invited frontline staff to tell their stories using video and chat, and such engaging content attracted over four thousand fans to the Bebo page.

5.3 TALK project

5.3.1 Project purposes

The purpose of the TALK project was to create new levels of knowledge and ability in carrying out the modernisation of the public sector, The ODPM initiated a Knowledge Transfer Chain (KTC) project (later branded as 'Transferring Across Local Knowledge', TALK) in February 2006. Specifically, the project aims to facilitate local government to build new relationships and networks, to work collaboratively, and to learn from each other (ODPM 2006).

TALK was born in response to a need for capturing the tacit knowledge involved in ICT projects. After heavily investing in local e-Government, the ODPM realized that, although ICT had potential benefits, the challenge was that technological knowledge tended to be specialized and fragmented. This problem was becoming apparent with the conclusion of the active development phase of the 22 National Projects, in that

“the learning gained by the staff employed by the councils leading the Projects is not transferring in the same way as the products themselves. It is also becoming apparent that that residual knowledge rests to too great a degree in the heads of consultants and not directly in the local authority world (ODPM 2006, p. 6).”

In order to improve this situation, the ODPM quickly initiated another national project: The Knowledge Transfer Chain (KTC).

Table 5. 6 ODPM-sponsored National Projects

National Project	Receiving Local Authority
Acknowledge	Leeds City Council
APLAWS	London Borough of Camden
DigiTV	Kirkless Metropolitan Council
e-Pay	London Borough of Hammersmith and Fulham
FAME	Newcastle City Council
ITEX - developed through the NOMAD National Project	Kirkless Metropolitan Council
Knowledge Management	Wiltshire County Council
LAWS	West Sussex County Council
LGOL Net	Tameside Metropolitan Borough Council
NePP	London Borough of Newham
NOMAD	Cambridgeshire County Council
PARSOL (Regulatory Services)	Wandsworth Council
PMF	St Helens Metropolitan Borough Council
RYOGENS	Warwickshire County Council
Smartcard	Bracknell Forest Borough Council
Valuebill	London Connects
CRM	Leeds City Council
e-Benefits	Rotherham Metropolitan Borough Council
ENCORE	London Borough of Croydon
Pan London School Admissions	London Borough of Wandsworth
Workflow	Sedgemoor District Council
Working with Business	Lichfield District Council
eTrading Standards (eTSN)	Trading Standards Institute

Source: Communities and Local Government website <http://www.communities.gov.uk>

The specific objective of the KTC programme was “to capture and subsequently share and enable transfer of the tacit knowledge accrued from the implementation of products produced from the e-Government national projects(ODPM 2006, p. 11)”. In the programme, tacit knowledge refers to a) characteristics (individual knowledge and skills required to develop tactics and coalitions), b) know-how (conditions including culture such as folklore, and anecdotes, and organisational arrangements such as structures, and processes), c) competencies and d) context. Convinced that the required scale of knowledge transfer could not be handled by existing workshops, the ODPM went for a new technological solution, i.e., open-source software. Meanwhile, the ODPM emphasized the importance of “conveying complex knowledge through plain language and key insights” adjusted to local government. They proposed using multiple codifications, i.e., sharing the same insights and lessons in different forms, including case studies, diagnostic guides, and stories. Thus, the IT solution would be useful to

provide a range of media in both live and historic forms, such as blogs and repositories. Moreover, to support the knowledge transfer, the KTC programme introduced a technique called storytelling, i.e., using fictional examples to illustrate a point.

5.3.2 Stakeholders

Initially, the main stakeholders of this project were the ODPM, ProductShare team, Leeds City Council (LCC), Manchester Business School (MBS), IDeA, Regional Centres of Excellence and Local authorities. However, the ownership of project was transferred twice during the process. After the ODPM was restructured into the DCLG, the leadership of the TALK project was transferred to LCC in September 2006. Leeds City Council, Tameside Metropolitan Borough Council (TMBC) and Manchester Business School were the key partners in the project. In March 2007, it was proposed to operate TALK as an independent body with an overarching 'parent' organisation, Manchester Business School, to oversee the strategy and governance, and this proposal is still being discussed.

5.3.3 Process

The KTC project began with eight work streams and involved seven parties at project board level. After completing the first work stream, several work streams were merged. Meanwhile, the project was given its own brand, i.e., "TALK", and the MBS, together with Leeds and Tameside councils became key partners. TALKnet was initially built by the IT department of Tameside council based on Atlassian's Confluence enterprise wiki. Atlassian is an Australian software company. The administration of TALKnet was transferred to the MBS later.

To investigate the take-up of e-Gov 'national products' in local government, the TALK project went through four steps: a) Instigation – the process of identifying key individuals, key projects and analysing the background of local authorities; b) Elicitation –the process of identifying and attempting to capture tacit knowledge; c) Classification – the processes of classifying discoveries and developing themes across the knowledge artefacts

uncovered; and d) Presentation – the strategy of presenting knowledge in a fashion which captures the imagination and motivation of target audiences.

The main events and facts of the TALK project from 2006 to 2009 are listed in Table 5.7. The UK e-Government policies and events related to local government during the same period are also summarised in the table. The overall development of the UK's e-Government possibly affected the TALK project and the use of TALKnet directly and indirectly.

Table 5. 7 Main events and facts of the TALK project and the UK's e-Government 2006-2009

	TALK main events	Relevant UK e-Government Initiatives and Reforms
2006	<p>Feb. 06 KTC programme was officially initiated.</p> <p>March, 2006 'TALK' became the brand of the project.</p> <p>Jul. 06 TALKnet was soft launched.</p> <p>Jul-Oct 06 Investigated uptake of key national projects</p> <p>Sept. 06 Change of programme manager: ownership was transferred from central to local government.</p> <p>Sept. 06 TALK Preview (local event)</p> <p>Nov. 06 Exhibited at t-Gov EXPO (national event).</p> <p>Dec. 06 TALK Preview-training (local event)</p>	<p>May 06, ODPM (sponsor) was restructured into DCLG & new leader appointed.</p> <p>Sept 06, A vision for data sharing has been published making it clear that Government is committed to greater information sharing in instances where it is in the public interest.</p> <p>Sept. 06, UK's Centre for Excellence for Local eDemocracy is transformed into the International Centre for Excellence for Local eDemocracy (ICELE). The new centre aims to help local authorities improve two-way engagement with communities by providing best practice advice, support and practical solutions, focusing on the use of technology.</p>
2007	<p>Jan. 07 TALK Round Table (local event)</p> <p>Mar-Apr 07, MBS became a 'parent' organisation with TALK being an independent body.</p> <p>Jul. 07 formal launch event of TALKnet was organised by DCLG.</p> <p>Oct –Dec 07 Three TALK training workshops (local events)</p>	<p>Jan. 07, the Transformational Government Annual Report 2006 is published. This first annual report covers the progress across the three main themes of UK's eGovernment strategy: customer-centric services; shared services; and professionalism.</p> <p>Jan. 07 cabinet office announced that the number of government websites is reduced to 26 from 577. Information of continuing relevance from closed sites is transferred to the portals www.direct.gov.uk and www.businesslink.gov.uk.</p> <p>Jul. 07, a report by the National Audit Office shows that UK government websites have improved only slightly since 2002.</p>
2008	<p>Jan. – Jun. 08 Five TALK Round Table (local events)</p> <p>Jun 08 TALK Pecha Kucha (local event)</p> <p>Jun 08 In Conversation (local event)</p> <p>Oct 08 TALK event in London</p>	<p>Jun. 08, the Cabinet Office published the Excellence and fairness: achieving world class public services document setting out the Government's overall approach to improving public services over the next few years.</p> <p>Jul. 08 the Cabinet Office published the Transformational Government Annual Report 2007, which describes the latest developments towards designing and delivering public services around the needs of citizens.</p>

Table 5.7 (Cont.): Main events and facts of the TALK project and the UK's e-Government 2006-2009

	TALK main events	Relevant UK e-Government Initiatives and Reforms
2009	<p>Apr. 09 End of DCLG sponsorship</p> <p>Ongoing use of TALKnet. In July 2009, 1134 Absolute Unique Visitors/Month</p>	<p>Jan. 09, e-Government National Awards announced that 11 winners have received the UK's highest level commendation for the best e-Government and technology-driven services.</p> <p>Jan. 09, the British Government published the "Digital Britain: the Interim Report". The report underlines the importance of the communications sector, its crucial contribution to the economy and its role in building Britain's industrial future.</p> <p>Feb. 09, the Government published a new policy on Open Source software that will ensure maximum value for money for taxpayers.</p> <p>Mar. 09, the Government published the document "Working Together - Public Services on your side", setting out how this delivery of the approach (set in 'Excellence and fairness' report) will be accelerated over the coming years.</p> <p>Mar 09, Central Office of Information published Social Media Guidance.</p>

Source: <http://www.epractice.eu/>

5.3.4 TALKnet

TALKnet (talknet.eu) was soft launched in July 2006 as a collective effort of LCC, TMBC and MBS. TALKnet was developed to provide a space for open communication and collaboration across UK local government. It aimed to enable transformation and innovation in the public sector. To our knowledge, TALKnet was the first Web 2.0 platform in local government and was a pioneer in using this technology for work purposes.

5.3.4.1 Technology

The core technology used by TALKnet is Wiki. The site also supports other Web2.0 activities, including blogging, tagging, social bookmarking, image sharing, Really Simple Syndication (RSS), Podcasts and videocasts, as well as mashups. There are two types of wiki space on the TALKnet, namely, group and personal. When a group or individual is registered, the group or individual can choose to create a space. The interface of the group space resembles that of the individual one in most ways. The only differences

between the two types of space are the starting page and privacy settings. The starting page of the individual space is a personal profile with fixed headings, while it is blank page for the group space. The group space administrator can customize the starting page with templates and widgets., and individuals can also customize their personal space with templates. Also, the administrator of a group Wiki can control access to the group space. A group space can be open to selected individuals, group members, TALKnet members or the public. In contrast, the default setting of the personal space is open to TALKnet members, and cannot be changed. Both types of space have a blog function, and it is left to the individual or group administrator to decide whether or not to create a blog for the Wiki space. The interface of the blog is the same on both types of space.

Figure 5. 5 Interface of group Wiki space (with customised template)

The screenshot shows a Wiki page titled "UEPHA & Greater Manchester Fuel Poverty Initiative". The page is part of a group Wiki space and features a customised template. The main content area includes a "Home" section, a "Labels" section with a list of tags (uepha, greater manchester, miltown, fuel poverty, vulnerable, pghp, elderly, pcf, health, housing, energy, suppliers, mental, care, practitioners, ugh), and a "Recent Blogs" table. The "Recent Blogs" table lists several blog entries with their titles, authors, and dates. Below the table, there are sections for "Attachments" and "Labels". The "Attachments" section lists various documents related to the project, such as "Health Commission for a Station Day #1" and "Project Brief". The "Labels" section shows a grid of labels with associated content counts. The right sidebar contains navigation and utility sections: "Space Navigation" with a search bar, "Contributors" listing users like Claire, Phil, and Paul, "Useful Links" including "Page Information" and "Page History", "Bookmark it" with social media icons, "Page Views" showing the current page's view count, and "Subscribe" with a link to subscribe to the space.

Labels: uepha, greater manchester, miltown, fuel poverty, vulnerable, pghp, elderly, pcf, health, housing, energy, suppliers, mental, care, practitioners, ugh

UEPHA & Greater Manchester Fuel Poverty Initiative

Aims and Objectives

The UK Public Health Association (UEPHA) Greater Manchester Fuel Poverty Initiative is a partnership of local authorities, Primary Care Trusts, energy suppliers and other partners can work together to optimise the contribution they make to improving housing conditions for vulnerable people and reduce health inequalities.

The strategic objectives of the project include creating a total which is a combination of the following:

- influence the role of health practitioners
- build upon the relationship with the energy suppliers
- join the members of the Housing Health and Safety Rating System (HHSRS)
- identify creative ways in which existing resources can be used to meet the needs of vulnerable client groups effectively and
- create the total impactable for use by other organisations

The total recognition that it is not the job of Health or Social Care professionals to improve housing but to recognise that Health and Social Care professionals are the effectors of poor housing on health through their every day work.

Health professionals can therefore assist local authorities to target those most at risk of those poor housing and the project aims to develop a structure by which PCITs and LAs can work together in a practical way to bring about this improvement. In particular, it has begun to work with PCITs to identify local practice for establishing fuel poverty initiatives within PCIT policy and procedure.

Find out more about the history of the project, the UK Public Health Association and the Health and Housing Fuel Poverty team who manage the pilot and an archive of email reports and documents on the [Greater Healthier Homes website](#). This project is supported in Greater Manchester by the [Greater Manchester Public Health Network](#).

Below are the 20 labels and its **UEPHA & Greater Manchester Fuel Poverty Initiative** listed alphabetically. Click on a label to see its associated content.

Label	Count
association	1
care	1
effectively	1
elderly	1
fuel	1
housing	1
mental	1
practitioners	1
public	1
health	1
housing	1
local	1
social	1
suppliers	1
uepha	1
vulnerable	1

Title	Author	Date Posted
Good News Box 6	Claire, Phil, Xibbena	16/01/2011
A guide to Blog this	Claire, Xibbena	16/01/2011
Health and Housing Conference	Phil, Toffenham	16/01/2011
Energy Review	Claire	16/01/2011
Health and Housing Support Team	Claire, Xibbena	16/01/2011
End of the First Year of the Fuel Poverty Project	Claire, Xibbena	16/01/2011

Attachments

Health Commission for a Station Day #1	PowerPoint
Project Brief	Word Doc
UEPHA for a station	Powerpoint
Cleaning Room Slide	PowerPoint
Fuel Poverty and Health Inequality for a station	PowerPoint
Health Commission Action Plan	Word Doc
Milton app	PowerPoint

Figure 5. 6 Interface of personal Wiki space (with fixed headings)

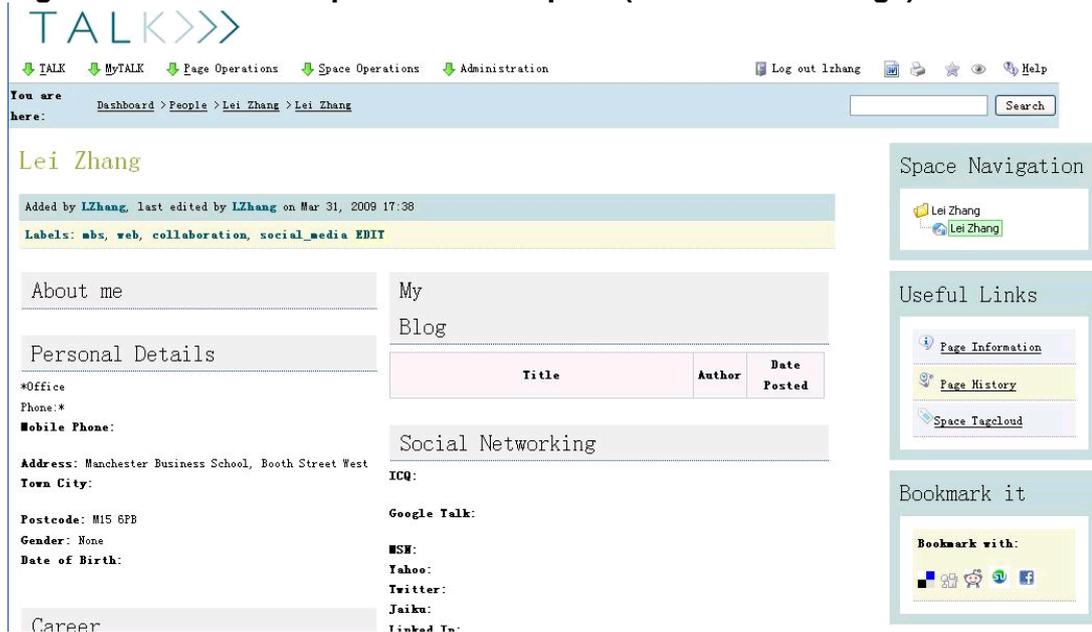


Figure 5. 7 Interface of blog



5.3.4.2 Users and usage

Over the years, TALKnet has developed into a community of over 800 registered users. More than 500 of these are from over 100 UK local councils (Table 5.7). These local authorities cover six regions in England, Wales, and Northern Ireland. However, the majority of members are from two regions: North West England and Yorkshire & the Humber.

Table 5. 8 TALKnet users' work background

	No. of members	Percentage
UK local authorities	516	78%
The rest public sector	38	6%
Third sector	31	5%
Academia	32	5%
Private sector	22	3%
Total UK members	639	96%
The rest of the world	24	4%
Total Valid Members	663	100%

Notes: The total number only includes the members who provided valid work emails. Private emails and duplicate accounts are excluded.

In terms of Wiki space, there were 92 group spaces and 300 personal spaces (04/08/2009). Of the 92 group spaces, 47 spaces were updated by members after being created. There were 313 TALKnet members from 84 organisations on the active spaces. In terms of blogs, 21 group spaces created blogs, while 23 individuals had their own personal blogs. However, most of the long-lasting blogs were personal blogs.

In July 2009, TALKnet had 1134 Absolute Unique Visitors in the month, and 46% of these were returning visitors²¹. However, currently, the content on the TALKnet is only updated by a few enthusiastic "TALKers" who write their personal blogs. There is much less continuous use of the collaborative work space.

5.4 Summary

This chapter reviewed the concept of e-Government, the history and current status of the UK's local e-government as well as social software applications in the e-Government context. E-Government is described as an embodiment of innovation, and innovation is realised through knowledge creation. In the networked society, local authorities have more responsibility for

²¹ Statistics are collected from Google Analytics. Visitor is a unique and valid identifier of a user i.e., via registration process. Returning visitors are the visitors who have been to the website more than once.

knowledge-sharing than decision-making. In the UK, e-Government has been developed unevenly across local governments. It is reported that learning from successful local e-Government is limited (Rashman et al. 2005). Although social software is perceived as having the potential to support knowledge management, the electronic network only provides a platform for knowledge transfer. Knowledge is developed through the development of social capital. The performance of the electronic network relies on other factors including leaders and explorers, experiment culture, and web content.

Chapter 6 Case Study: TALKnet

This chapter introduces TALKnet as a case study to explore whether or not social software can be used to support collaborative tasks, and how and why this takes place. Multiple data sources were used to perform a critical analysis of TALKnet usage. Data collected from semi-structured interviews was treated as the main data source, and the remaining data sources provided complementary evidence. An analysis of social networks and a content analysis were conducted first to obtain an overview of the TALKnet adoption, which provided a basis for analysing the interview data. Next, primary and secondary data were combined to examine the reasons for the limited usage of TALKnet.

6.1 General analysis

639 of the 663 registered users who had a valid work email address were from the UK, and 516 users which were about 78% of the total were from local authorities. Users from local authorities were highly concentrated in two England regions, namely, the North West region and Yorkshire and Humber region. There were 92 group wiki spaces in total, 47 of which were updated with content by TALK members after being created. These spaces were named as 'active spaces' and they were the focus of the network analysis. 21 wiki groups had also opened blogs, though only two of these had been updated within the last three months. Although those blogs were attached to group spaces, they were largely owned by individuals²². Very few of the 300 users who had created personal spaces, had uploaded content in their user profile (i.e., the front page of personal space). Nevertheless, active bloggers provided a short self-introduction. 23 individuals wrote blogs. Five of them updated their blogs within the last three months. These blogs were included in the analysis.

²² One of project blogs was shared by two people.

Table 6. 1 Summary of the usage of wiki spaces and blogs

Type	Wiki Space	Number
Group	Total spaces	92
	Active spaces*	47
	Collab spaces* (active)	30
	Spaces w/t blogs	21
	Members(active)	313
	Organisations(active)	84
Personal	Total spaces	300
	Spaces w/t blogs	23

Notes: Active spaces exclude the ones that were not updated after being created.

Collab spaces are the ones used by more than one organisation.

Multiple sources of data were used to analyse how and why TALKnet was used. Firstly, social network analysis (SNA) was employed to find out who was connected with whom on the TALKnet. SNA presented the changing configuration of this network over time and provided a basis for analyzing the interview data.

6.1.1 Group wiki spaces

There were 313 TALKnet members from 84 organisations in the 47 “active” spaces, and 15 of the 47 active spaces, had lasted less than a month. Eight of them survived after a year, and the remainder lasted less than one year (see Table 6.2). The average space size (number of people in a space) was 9. No correlation was found between the space size and the length of space active period (i.e., the difference between the created date and the last edited date).

Among the active spaces, 30 group spaces were used by individuals from more than one organization, and these spaces were named as “collab” spaces. A “collab” space indicated two situations, one of which was that members who shared the same wiki space were from different organizations. The other was when a single organisation-owned wiki was commented on by individuals outside this organization. Nevertheless, more than one third of the spaces were owned by a single organisation (Table 6.3). However, there was a positive correlation between the length of a space active period and the number of organisations its members belonged to (Table 6.4). In other

words, the more organisations involved in a space, the longer this space was used.

Table 6. 2 Active period of group wiki spaces

Active period	No. of Spaces
< 1 month	15
1-3 months	13
3-6 months	5
6-9 months	3
9-12 months	3
> 1 year	8
Total	47

Table 6. 3 Number of organisations in each active space

# of Organisations/space	# of Spaces
One	17
Two-Five	18
Six-Ten	9
Eleven-Twenty	2
Above twenty	1
Total	47

Table 6. 4 Correlation between space active period and wiki space size

		Space Org Count	Space Active Time
Space Org Count	Pearson Correlation	1.000	.186**
	Sig. (2-tailed)		.000
	N	461.000	461
Space Active Time	Pearson Correlation	.186**	1.000
	Sig. (2-tailed)	.000	
	N	461	461.000

** . Correlation is significant at the 0.01 level (2-tailed).

Notes: Although there were 313 members on the 47 wiki spaces, there were 461 records because some members belong to more than one space.

6.1.1.1 Evolution of wiki network

In order to capture the network evolution of group wikis, three interpersonal and three inter-organisational networks were built based on the dates when the group wiki spaces were created: P1 (01/08/2006-31/07/2007), P2 (01/08/2007-31/07/2008) and P3 (01/08/2008-04/08/2009).

On the individual level, a social network analysis seeks to determine who is talking to whom on the site. This is sought because connection is regarded as being the first step toward collaboration. On the organisational level, a

social network analysis helps to identify the collaborative relationship between and among organisations.

Six social matrices were constructed, three for individuals and three for organisations, and these were based on the wiki spaces shared by the individuals. The social matrices were then used as the datasets for UCINET, a SNA software package, to create a visualisation of the network and to calculate network measurements. Network centralization, density, core/periphery fitness, and maximum geodesic distance were used to describe the characteristics of social networks. On the individual level, the measurements' centrality (including degree centrality, closeness and betweenness) were used to calculate the importance of the brokers. An E-I index was used to describe an actor's connection with the internal organisation and the external world. The definitions of these measurements are provided in Chapter 3. The following section presents an overview of the changes in the wiki network over three time periods.

2006-2007

Within the first year of the TALKnet launch, 75 actors used group wiki spaces.

When the data was first imported into the software, it was a connected network. However, after examining the actors who held the network (brokers), one of the brokers was found to provide technical support. So this actor should not be considered to be a member of the network. After the actor was removed, the network was separated into three parts²³.

There were 56 actors from 33 organisations in the main component of the network, and there were 706 connections between them. Although employees of local authorities were dominant in the wiki network, academics were much more active than local council officers on TALK wikis. The dominance of scholars was reflected in the inter-organisational network (Figure 6.1). Although the broker (N160) in the interpersonal wiki network

²³ PC and JD were brokers who connected the whole network initially. PC created two IDs on the TALKnet. One of them (A240) was used to provide technical support to some wiki groups. A240 was removed from the network. JD worked in a local council IT department. Although JD also helped some groups to set up a wiki space, those spaces were not included in the analysis due to their low level of activity. The actual "active" wiki spaces he was involved in were IT-related. So JD was kept in the network.

was from a local authority, MBS (Org75) was the organisation which held the entire inter-organisational network.

2007-2008

During P2, 83 actors from 35 organisations joined wikis. Having removed the actor who provided technical support, the network was almost connected. 81 actors formed the main component of the network, with 1252 connections between them. Academics were still more active than local council officers. Only two out of six brokers (N189, N217, N240, N250, N252, and N314) were from local government (Table 6.5). The brokers are examined in detail in the section 1.2.1.1.2. On an inter-organisational level, MBS was still the node which connected the whole community.

2008-2009.

During P3, 176 actors from 44 organisations joined the TALK wiki, and the main component of the network was 138 actors with 4380 connections. A closed group (clique) was formed on the network. Members of the clique were from the same local authority (Org25). There were three brokers in the network. N201 and N189 worked in two local authorities. N217 worked in a university. On the organisational level, local council (Org 20) replaced MBS as the node which connected separate sub-groups in the community.

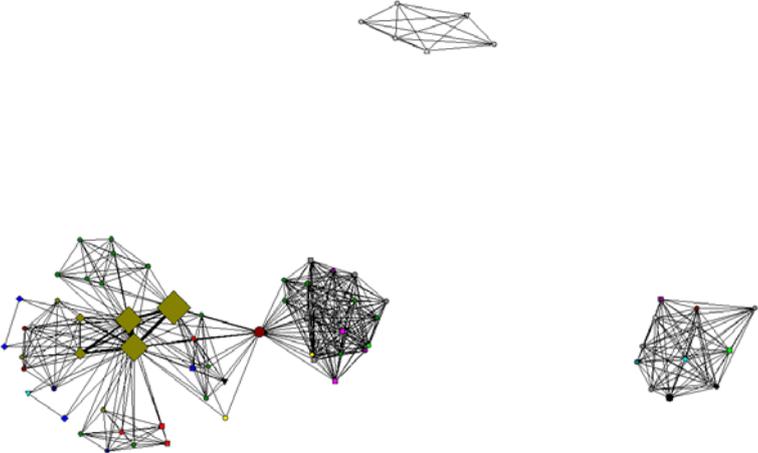
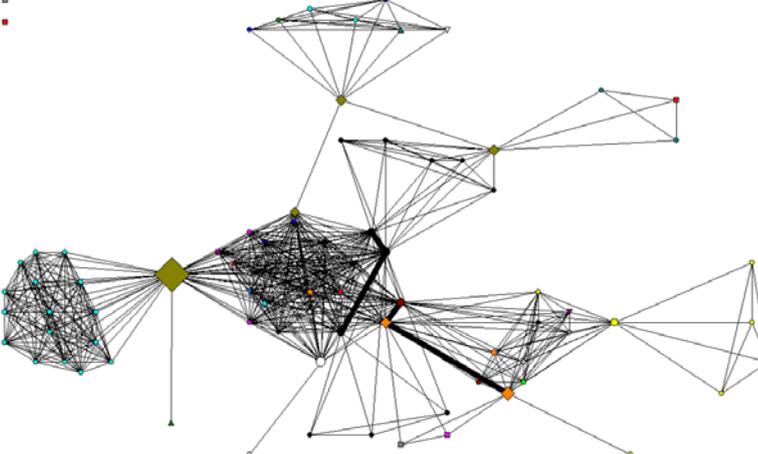
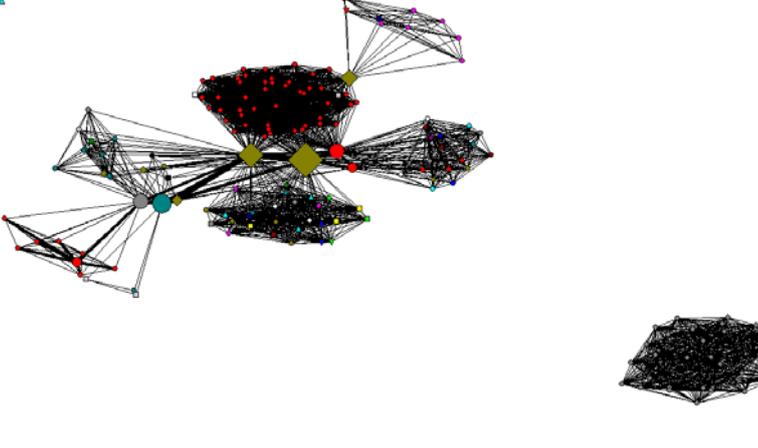
When comparing the three time periods, it could be seen that the number of nodes almost doubled during 2008-2009. The connectivity of the network, measured by the “density” – the proportion of connections (lines) relative to the total possible, declined from 0.2539 to 0.1951 from P1 to P2. However, the density of the main component increased again from 0.1951 to 0.2342 from P2 to P3.

As an extension of the concept of centralization, a core/periphery (C/P) network includes a set of well-connected central nodes and peripheral nodes directly connected to the core. Studies show that a fit of 0.5 or greater is regarded as being a good fit (Long & Siau 2006). The C/P fitness of the interpersonal wiki network decreased from P1 (0.200) to P3 (0.032). This suggested that a large number of people were on the edge of the network and not well-connected to the central nodes (actors).

A geodesic is the shortest path connecting any two nodes, and the longest geodesic distance in a network reflects the communication in the network, i.e., the maximum time it takes to pass a message from one end to the other end of the network. The maximum communication path in the main component of the wiki network increased from 3 to 5 in P2, and decreased from 5 to 4 in P3. Both the density and Geodesic measures delivered a consistent message. That is, as the network expanded in P2, weak ties increased in the network. As the relationship among individuals continued to develop, the ties between the actors were strengthened. Thus, the connectivity of the network rose in P3.

On the organisational level, network centralisation, density, and Core/Periphery fitness were used to measure the inter-organisational network. Network centralisation checks whether or not a network revolves around a single very connected node (i.e., a star structure). Network centralisation and density continued to increase from P1 to P3 (Figure 6.2). In P3, the network centrality reached 70.92% and the density was 0.3288. These increases implied that the network was dominated by a few organisations. When the organisations were ranked by the number of wiki users, the top five organisations from the two most active regions (Northwest and Yorkshire) counted 58% of the total population of the wiki network (Table 6.8). Perhaps this was not surprising, since the local partners in the TALK project came from these two regions. However, the result also suggested that TALKnet adoption was confined by region and the project failed to realize its initial ambition, i.e., to transfer knowledge across UK local government.

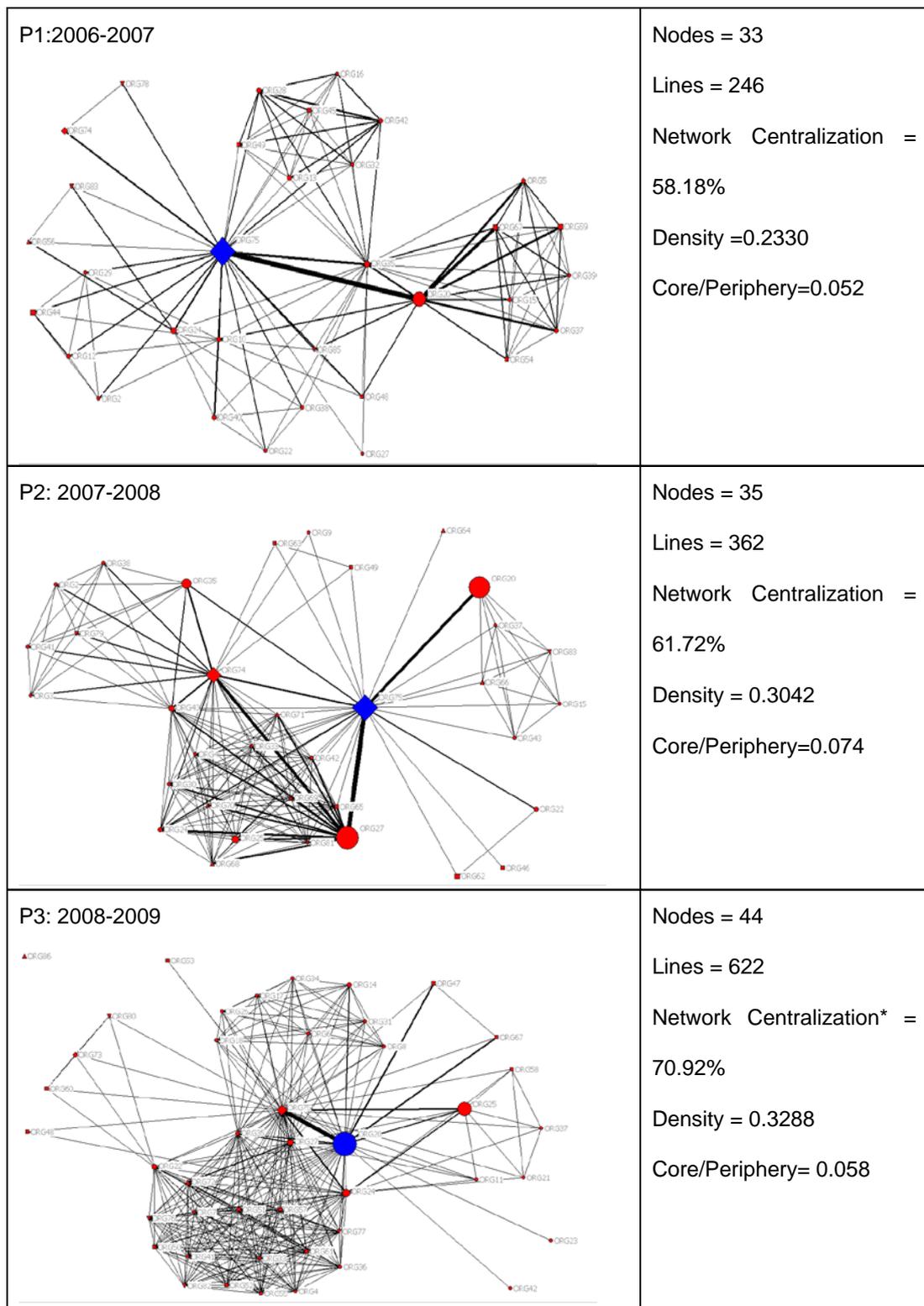
Figure 6. 1 Interpersonal networks

<p>P1: 2006-2007</p> 	<p>N=74 L=890 Nm=56 Lm = 706 Dm=0.2539 C/Pm=0.200 Max.G-M=3</p>
<p>P2: 2007-2008</p> 	<p>N=83 L=1252 Nm=81 Lm=1252 Dm=0.1951 C/Pm=0.052 Max.G-M=5</p>
<p>P3: 2008-2009</p> 	<p>N=176 L=5376 Nm=138 Lm=4380 Dm=0.2342 C/Pm=0.032 Max.G-M=4</p>

Notes1: Nm, Lm, Dm, C/Pm and Max.G are nodes, lines, density, Core/Periphery and maximum geodesic in the main components

Notes2: Colour of the nodes = organisations the actors belong to ; Size of the nodes = the number of spaces the actors belong to ; Shape of the nodes=sectors the actors belong to ; Strength of ties= the number of online spaces two actors share

Figure 6. 2 Inter-organisational networks



Notes: Shape of nodes refers to sector; Size of nodes refers to the number of spaces that particular organization joined; Tie strength refers to the number of times two organizations joined the same space. Blue nodes are the brokers of three networks

6.1.1.2 Brokers

Brokers are essential to a network because they hold the entire community together (Wasserman & Faust 1994). Without them, the network would split into sub-groups.

In this study, organisations were treated as a type of community when analyzing interpersonal network. Based on Merton's (1968) definition of "broker", individuals internal ties are the connections inside their organisations, while external ties are the ones which link them to the outside world.

The brokers were listed in three time periods and their degree, betweenness and closeness were calculated. An actor's Degree centrality is the number of nodes the actor connects with, which measures who is the most active in a network. Closeness is the sum of the geodesic distances to all other nodes, which measures how easy it is for one actor to communicate with others in the network. Betweenness centrality can be loosely understood as the number of times a node lies along the shortest path between two others, which measures how important an actor is to bridging the gap between other actors in the network (Borgatti 1999; Wasserman & Faust 1994).

The results showed that five out of eight individual brokers were on the TALK project board. However, two of the board members stopped using TALK after a year (Table 6.6). This was confirmed in the interviews as one of the local partners dropped out of the TALK project during the process. Two board members (N240 and N250) were dominant in the network in terms of degree centrality, closeness and betweenness. However, PC (N240) also provided administrative support, and although his administrative account was excluded from the total data, his centrality data could be distorted. In terms of degree centrality, there was a sharp increase in PK's (N250) connections. Although, as board members, PC and PK had the highest betweenness, the value of KS's (N189) betweenness had the highest degree of increase (93%). This implies that KS became increasingly important in bridging the gap between other actors in the network. Most brokers' closeness decreased as a result of network expansion, and PK was the only exception. This result suggests that it was easier for PK to communicate with others in the network in P3 than in P2. This was possibly to do with the popularity of PK's personal blog, which will be analysed in the next section.

To find out how well these brokers linked with actors inside and outside their existing network, the E-I (external-internal) index was calculated. This index can be applied at the entire population, group and individual levels. At the individual level, E-I index takes the number of ties an actor has to external bodies, subtracts the number of ties to other actors in the same organisation, and divides by the total number of ties ($E-I \text{ Index} = E-I/\text{Total}$). The value of the index ranges between the maximum possible degree of "external-ness" (+1) and the maximum possible degree of "internal-ness" (-1) (Hanneman & Riddle 2005). On the individual level, the actor's organisation was used as the boundary between internal and external worlds. On the organisational level, "region" was assumed to be the boundary of the existing network.

The results of the E-I index showed that brokers started with more external ties, and over time, the increase of internal ties surpassed that of external ties. These brokers (N189, N217, N240, N250, and N252) became more internally orientated in P3. A plausible explanation for this trend is that early adopters who built their external relationships introduced TALKnet to their colleagues at a later stage. However, apart from a few active members, most users were confined within their initial group. Table 6.9 shows that nearly 300 people only participated in one wiki space. Literature suggests that wikis work well for groups that already know each other (Jim Cashel in Cook 2008). So one possible reason is that the members in the majority of TALK wiki groups belonged to existing communities and TALKnet was not the main communication medium for these groups. The second possible explanation is that knowledge workers tend to be specialised in one aspect. Also, the topics covered in TALK wikis were not broad enough might be another reason.

On the organisational level, most local council's E-I index was negative in the three time periods. This also implied that local authorities tended to collaborate with authorities within the region. The only exception was Org20. Its degree of "external-ness" increased over time (-0.167, 0.333, 0.882). Org20 was from Yorkshire region and one of TALK project local partner. Four of top five active organisations were from the Northwest region, so it was not surprising to see Org20 networking with Northwest local councils.

Table 6. 5 Brokers in interpersonal wiki network

Brokers	06-7	07-8	08-9	Org	Sector	TALK Project
N160 (JD)	✓			Org35	Local government	Board
N189 (KS)		✓	✓	Org25	Local government	Non-board
N217 (MC)		✓	✓	Org75	Academia	Board
N240 (PC)		✓		Org75	Private	Board
N250 (PK)		✓		Org75	Academia	Board
N252 (PS)		✓		Org35	Local government	Board
N314 (VW)		✓		Org74	Academia	Non-board
N201 (LB)			✓	Org24	Local government	Non-board

Notes: "Board" refers to TALK project board member

Table 6. 6 Centrality of brokers

Brokers	Degree			Betweenness			Closeness		
	06-7	07-8	08-9	06-7	07-8	08-9	06-7	07-8	08-9
N160 (JD)	30	n/a	n/a	650.3	n/a	n/a	80	n/a	n/a
N189 (KS)	n/a	26	31	n/a	79	1132	n/a	149	255
N217 (MC)	n/a	11	60	n/a	287	1152	n/a	189	225
N240 (PC)	28	42	113	86.5	1087	2731.8	89	133	169
N250 (PK);	52	9	106	442.5	512.3	2578.2	72	194	176
N252 (PS)	n/a	16	n/a	n/a	304	n/a	n/a	192	n/a
N314 (VW)	3	16	n/a	0	94	n/a	123	193	n/a
N201 (LB)	n/a	n/a	30	n/a	n/a	520.5	n/a	n/a	258

Table 6. 7 Individual brokers' E-I Index

Broker	2006-7				2007-8				2008-9			
	Int	Ext	Tot	E-I	Int	Ext	Tot	E-I	Int	Ext	Tot	E-I
N160 (JD)	0	28	28	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
N189 (KS)	n/a	n/a	n/a	n/a	1	25	26	0.923	17	12	29	-0.172
N217 (MC)	n/a	n/a	n/a	n/a	2	10	12	0.667	32	29	61	-0.049
N240 (PC)	4	51	55	0.855	3	69	72	0.917	75	66	141	-0.064
N250 (PK);	4	32	36	0.788	3	7	10	0.4	51	48	99	-0.03
N252 (PS)	0	13	13	1	5	12	17	0.412	n/a	n/a	n/a	n/a
N314 (VW)	0	4	4	1	3	13	16	0.625	n/a	n/a	n/a	n/a
N201 (LB)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	11	14	25	0.12

Notes: Int = Internal ties; Ext=External ties; Tot = Total ties

Table 6. 8 Top Five active organisations' E-I Index

Org	Region	Sector	# of Ppl /Space	2006-2007				2007-2008				2008-2009			
				Int	Ext	Tot	E-I	Int	Ext	Tot	E-I	Int	Ext	Tot	E-I
ORG20	YS	LG	105	7	5	12	-0.167	2	4	6	0.333	2	32	34	0.882
ORG75	NW	Aca	76	8	17	25	0.36	12	17	29	0.172	23	17	40	-0.15
ORG25	NW	LG	40	n/a	n/a	n/a	n/a	9	6	15	-0.2	4	4	8	0
ORG27	NW	LG	27	2	0	2	-1	9	6	15	-0.2	18	12	30	-0.2
ORG24	NW	LG	21	4	3	7	-0.143	9	6	15	-0.2	21	6	27	-0.556

Notes: Int = Internal ties; Ext=External ties; Tot = Total ties

Table 6. 9 Summary of the number of wiki spaces each individual joined

# of spaces joined	# of individuals
One	284
Two	12
Three	7
4-10 Spaces	6
more than 10	4
Total	313

6.1.2 Personal Weblogs

In terms of weblogs, 21 wiki groups created project blogs in their spaces, while 23 individuals had their own personal blogs. However, most long-lasting blogs were personal blogs, and these were emphasized in the analysis. Nevertheless, at the time of the data collection, only five personal blogs and two project blogs²⁴ had been updated within the last three months. Compared to wikis, weblogs were much more active in terms of frequency of update and the number of comments.

It was observed that all of the blog writers were also wiki users. Additionally, four out of eight wiki brokers (N189, N240, N250, and N201) were also active bloggers on TALKnet. Thus, it is assumed that there is a connection between weblogs and wikis in terms of network development. To understand the link between weblogs and wikis on TALKnet and the role of weblogs in knowledge management, personal weblogs were sampled over two time periods (1/1/2008-31/6/2008; 1/1/2009-31/6/2009).

²⁴ Project blogs were opened for particular projects. However, it seems that the majority of project blogs were not written by a "group". Instead, blogs were updated by a single person. Occasionally, the blog was updated by two people.

The weblog content was exported from TALKnet and imported into Internet Community Text Analyzer (ICTA) software. This software was selected because it claims to offer a relatively complete network by combining name networks and chain networks (Gruzd & Haythornthwaite 2008). By using text mining, the software finds all mention of personal names in the online postings and uses them as nodes in the name network. A chain network is made of the names of the contributors. The software was initially developed for a discussion forum, but it is suitable for analyzing threaded discussions (Gruzd & Haythornthwaite 2008). However, because narrative methods were used to write blog posts, hundreds of names were mentioned in the content, and this caused a problem in creating the name network. The irrelevant names had to be identified manually, so some of them could have been missed out. Nevertheless, this did not affect the main purpose of using this tool, which was to show the link between weblogs and wikis.

Social network data was obtained from ICTA software and imported into UCINET. Then the attributes of wiki users were imported into UCINET as attributes of the nodes in the blog network. Since not everyone in the blogosphere used wikis, the attributes of non-wiki users were added separately.

During the selected time periods, weblogs appeared to be a connected network around N250 (Figure 6.3). This suggested that bloggers commented on each other's weblogs. The blog network connected not only actors with strong ties but also those with weak ones in the wiki network. Meanwhile, non-wiki and non-Talknet users also commented on the weblogs. N250 was the most popular blogger based on the number of comments and hits the blog received. The weblogs were structured in threaded conversations²⁵. The relationships between readers of this blog were observed to be developed over time when the writers were extending their reach. Thus, it is possible to argue that personal weblogs had assisted the development of the wiki network.

²⁵ Users could click on either "reply" or "comment" when they wanted to leave a comment on the blog. Sometimes they wrote comments when they were actually replying to previous threads. Thus, it is possible for links to be captured incorrectly in the chain network in ICTA software.

text mining function of ICTA software was first used to obtain an overview of the topics discussed on weblogs. The top topics were visualised in ICTA (Figure 6.4). When clicking on each topic, a detailed view was provided (Figure 6.5). Then, the blog content was browsed through, and randomly selected blog posts were analysed.

Two observations were made from the analysis. Firstly, the content of TALK weblogs covered a wide range of topics. These included comments on the latest news articles, reflections on personal experiences, book reviews, and so on. Nevertheless, these diverse topics were related to local government by the writers. The excerpts of Ken's blog gave an example of conversations on TALKnet (Figure 6.6). Ken started with his latest experience of a technology conference, and then, he introduced the book *The Big Switch*. He came across in the event and related the key message "web computing turns into utility" to the possible efficiency-savings in local authority. In this particular post, Ken shared his reflections ("externalisation" in Nonaka(2000)). Rob's question triggered further discussion on the impact of Web utilities on local authorities other than efficiency. Ken answered Rob's question by giving a more specific example (cloud computing) and its potential benefits in terms of job satisfaction. Peter and Maura joined successively and moved the conversation further down to two lines: human resource policy ("work at home pilots") and technological solutions ("Powerline computing") (This phase is similar to "combination" in Nonaka (2000)). The four participants in this ongoing conversation were from four organisations. It seemed that Ken was not aware of the existing IT practice raised by Maura. This can possibly trigger inter-organisational learning. The analysis of the blog content provided complementary evidence to what was found in the interviews.

Figure 6. 6 Excerpts from Ken's weblog

Subject: BOXING CLEVER
Date: 2009-04-29
From: Ken

I have just returned from attending a series of presentations in London, hosted by a software company I have had the pleasure of working with for nearly 10 years. They are a USA company, ON BASE and the UK reseller AVANQUEST whose products my Council uses. And I really enjoy the 'world view' they have on EDRMS and its mix of applications across the world.

...

The Big Switch: Rewiring the World, from Edison to Google by Nicholas Carr. It has echoes of a number of debate's we have had in TALK around open source. Its contention is that the computer is escaping its box, something we have also echoed in TALK in discussing 'Children Outside the Box'. The blog we had was why buy the cow when all you want is milk.

...

Carr states 'The World Wide Web, is turning into the World Wide Computer'...It's becoming a utility. And so what does that mean to you and I in the Local Authority offices we work in? Because we are currently some of the biggest buyers of computers and software, as the shift in the nature of computing has been almost invisible. Like power, as long as you have a web browser and a fast Internet connection, you don't really care where your software is running. YouTube, MySpace, Facebook, Wikipedia, Google Search, Yahoo Mail, Flickr - none of those programs is running on your PC's hard drive. They're all utility services that you share with thousands of other people...

And we represent companies, who have spent millions or even billions of pounds building private data centers, filling them up with complicated computer systems, and hiring squads of IT professionals to keep everything running. Ever since businesses began installing computers a half a century ago, they've assumed that they had to buy and maintain all their own hardware and software.

Not now, that assumption is being overturned, and we need to begin rethinking all past decisions and investments as the credit crunch drives ever bigger efficiency savings programmes. Do we really need those expensive systems and do we need the IT departments? It's as big as the early Eighties when personal computers displaced mainframes!

...

It's the TRANSFORMATION WORD again as the implications of the transformation of computing go far beyond business or even technology. When electricity turned into a utility, it pushed the price of power down dramatically, and that set off a chain reaction that fundamentally changed not only business but media, culture, education, and, in the end, all of society. The expansion of the middle class, the spread of secondary education, the rise of mass media and culture, the flood of consumer products---none of those things would have happened without the cheap current pumped out by big utilities.

...

This was an enjoyable read on the train coming back to Manchester. And it's a subject we need to move from reading about as an interesting debate. we need to stop just staying safe, and using whats 'out of the box'. We need to see what can be implemented by being innovative and a little risky. The cost benefits may raise Alistair Darlings eyebrows, and deliver some of his efficiency savings.

Sharing information

Reflections: relevance to local authorities

Figure 6. 6 Excerpts from Ken's weblog (continued)

Subject: Re: BOXING CLEVER
Date: 2009-04-30
From: Maura
In-Reply-To: Ken

Some of the utility power is already there. In Leeds we've been looking at Powerline computing. Use a special adaptor and plug your laptop into the power socket to connect to the Internet. (Yes such a thing does exist, though there is more to be done)

Innovation - yes. Borne of necessity - yes. We found that the governments 'Computers for Kids (giving laptops to disadvantaged kids to use at home), had one hurdle that hadn't been thought about. Those kids had no phone line in their homes. Why? because you need to have a credit rating to have a phone installed. If you don't have a bank account and a credit card etc, how do you get one of those? So the parents of deprived kids use pay as you go mobiles for telecoms and don't have a landline at home.

Subject: Re: BOXING CLEVER
Date: 2009-04-29
From: Peter
In-Reply-To: Ken

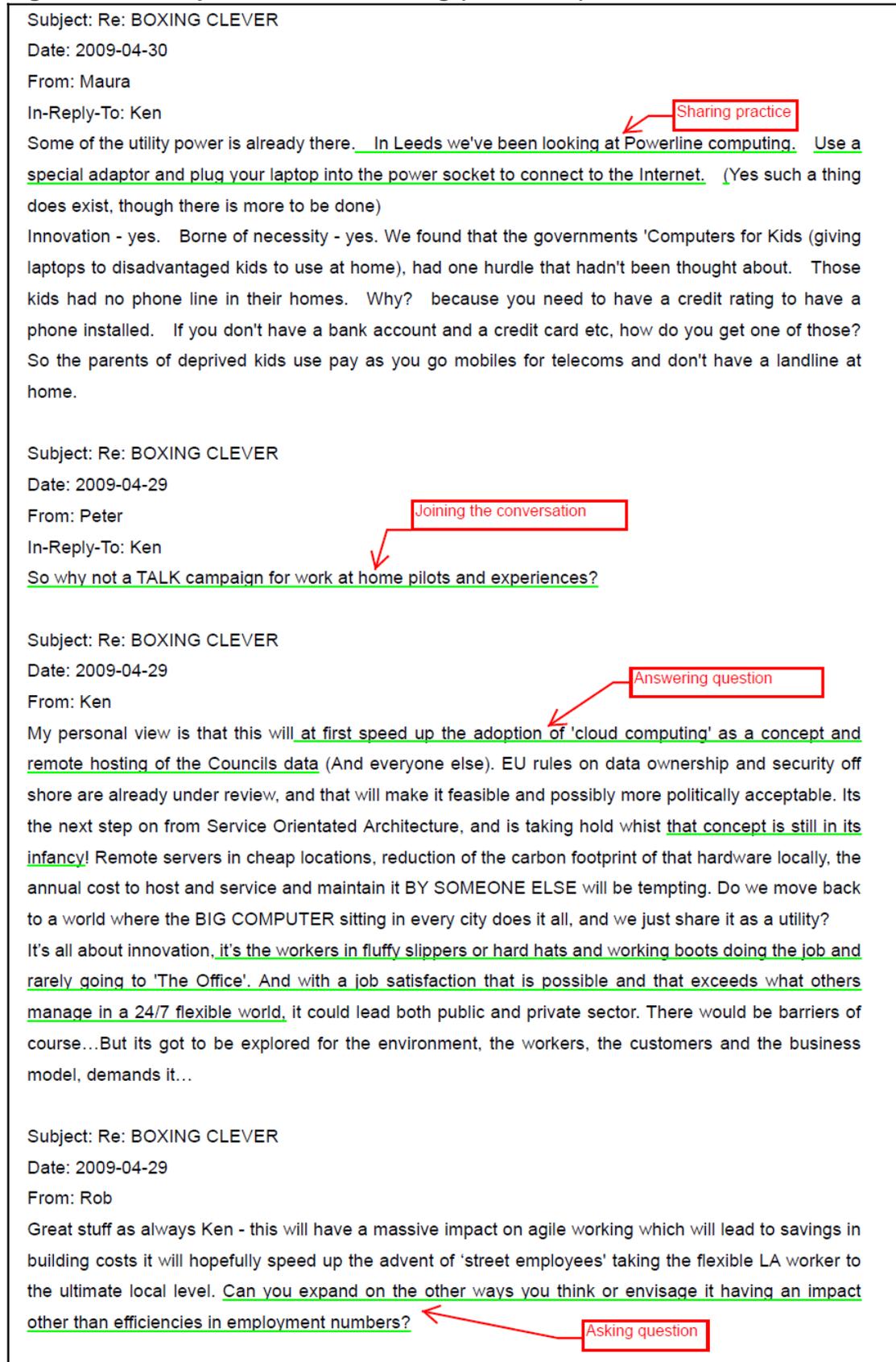
So why not a TALK campaign for work at home pilots and experiences?

Subject: Re: BOXING CLEVER
Date: 2009-04-29
From: Ken

My personal view is that this will at first speed up the adoption of 'cloud computing' as a concept and remote hosting of the Councils data (And everyone else). EU rules on data ownership and security off shore are already under review, and that will make it feasible and possibly more politically acceptable. Its the next step on from Service Orientated Architecture, and is taking hold whist that concept is still in its infancy! Remote servers in cheap locations, reduction of the carbon footprint of that hardware locally, the annual cost to host and service and maintain it BY SOMEONE ELSE will be tempting. Do we move back to a world where the BIG COMPUTER sitting in every city does it all, and we just share it as a utility? It's all about innovation, it's the workers in fluffy slippers or hard hats and working boots doing the job and rarely going to 'The Office'. And with a job satisfaction that is possible and that exceeds what others manage in a 24/7 flexible world, it could lead both public and private sector. There would be barriers of course...But its got to be explored for the environment, the workers, the customers and the business model, demands it...

Subject: Re: BOXING CLEVER
Date: 2009-04-29
From: Rob

Great stuff as always Ken - this will have a massive impact on agile working which will lead to savings in building costs it will hopefully speed up the advent of 'street employees' taking the flexible LA worker to the ultimate local level. Can you expand on the other ways you think or envisage it having an impact other than efficiencies in employment numbers?



Notes: The conversations were in the reverse chronological order.

In summary, the network analysis revealed that the use of wiki spaces accelerated in 2008 and 2009. Over three hundred TALKnet members were active on wikis. However, online interactions among them were very limited. Nodes were not well connected on both interpersonal and inter-organisational levels. A few individuals linked the subgroups in the wiki network. The number of individual brokers' internal ties increased faster than their external ties. The adoption of Weblog was also low. However, active bloggers were connected with each other. The collected evidence suggests that weblogs supported the development of the wiki network.

A social network analysis and content analysis provided the basis for analysing the interviews. Primary and secondary data was used to investigate the reasons for the limited usage of TALKnet.

6.2 Critical analysis

The conceptual framework (Figure 2.13) suggests that social software adoption is associated with task, technology, and social capital, as well as context.

6.2.1 Task

An analysis of the group wiki content showed that most wiki spaces were used to publish information and case studies. Although some wiki spaces were created for the generation of ideas, few of them actually achieved this objective. The tables below show the limited activities on the TALK wiki. Very few of the wiki pages were co-written. When reviewing the page history, it was found that the content in most spaces was created by a single person²⁶. The interviewees revealed that technological difficulties was one of the reasons which hindered the adoption of wiki, and this will be discussed further in the next section.

Group wiki spaces with 10 repliers were tracked. The space, TALK long meetings, was used to generate ideas. The conversation among these ten members lasted for almost six months (172 days). However, the

²⁶ The TALKnet administrator was excluded when the number of page editors was calculated.

conversation did not start in the virtual space. In fact, it was a conversation which had been extended after a physical meeting.

Table 6. 10 Number of Editors on Group Wiki

Role	# of Editors/Space	# of Spaces
Editor	1	31
	2	12
	3	3
	4	1
Total		47

Table 6. 11 Number of Repliers on Group Wiki

Role	# of Replier /Space	# of Spaces	Total Comments
Replier	0	30	0
	1	9	9
	2	2	4
	3	2	6
	4	1	4
	6	1	6
	7	1	7
	10	1	10
Total		47	46

6.2.2 Technology

It was reported that technological issues with TALKnet had prohibited the TALK wiki from “turning into a social network”. The most-mentioned issue was users’ profiles. On the TALKnet, members’ profiles were indexed alphabetically rather than by interests or expertise. Most of the content in profiles depended on user input. There were no automatically generated user activities in profiles. It was hard for one member to tell what kind of things another member was doing. A relevant issue was that a direct message function was not supported by TALKnet.

“It is more about the construction behind it. In terms of technical doing of setting up a space and inviting people to join, it is difficult (on TALK). I have set up a space (on TALK). I am conscious that if I set up a space, I want to invite SCC team network to join it. But I am not sure the (invitation) capability is there, other than navigating TALK themselves to find it.”

Another frequently mentioned issue was that wiki technology on the TALKnet was not easy to use.

“For quite a few months, I struggled with setting it up. I found it technically difficult to use. Some functions I didn’t use, things like setting up a space. Technically it’s not easy and it should be easier.”

“We found it difficult about how to set the project space up. We can see what we wanted to do from the other sites. But it took us a little while to put various components together.”

Additionally, although a TALKnet help wiki was constructed to provide a wide range of technical support with video-recorded user instructions, members did not seem to be aware of it. For instance, one interviewee mentioned,

“For me, to collaborate with wiki, it is not very easy to use. I know it could be easier. Maybe when I joined a wiki site, like TALK, all you need to do is to send me a message saying ‘DR, this is how you can use it.’ Not in words. It should be ... where you can record the screen. You air a movie, and you can talk at the same time.”

Another example is the wiki template. Although there were ready-made space templates, there were no clear instructions about how to apply them. One interviewee described the difficulty of setting up a project space.

“We have only done that by looking at other websites to understand what we can do. We are not sure if there is more we can do to it. We worked out ourselves in the end...We asked PC and AP to look at it. Sort of get us going. If we are going to do it again, there should be some kind of templates that set you off running.”

Nevertheless, the technical difficulty only appeared in the initial stage.

“Once you’ve got it up running, it’s really easy to use. But setting it up, in other words, you need to tidy, to have everything you want. That isn’t easy.”

One interviewee suggested that the initial technological difficulties could lead to different outcomes due to the difference in the level of shared enthusiasm.

“Once I was in there, I still found it difficult. Because first there was enthusiasm, I was enthusiastic. But getting my colleagues interested was very difficult. Secondly, because of this enthusiasm gap, there was little energy, little use of what I have created on there.”

Although social software applications are often adopted by self-learning programmes, whether or not wikis are easy to use is disputed (Avram 2006; Mader & Abel 2009). Usability appeared to be an issue on the TALKnet. Training in technology usage and the group process is emphasized in virtual team literature (Blackburn et al. 2003; Duarte & Snyder 1999).

6.2.3 Social capital

Social capital is the part of social structures, which affects the adoption of technology. It includes cognitive and relational capital, as well as existing structural ties. Social interaction strengthens the interpersonal ties, and new social structures emerge from interaction.

In terms of social capital as existing structures, this study identified the relevance of the similar knowledge base and experience, prior history, and geographical and political similarity in TALKnet adoption. Firstly, the importance of a shared knowledge background was stressed by one interviewee in the exploratory study. This local officer was discouraged from adopting new technology by the irrelevant content.

“The portal I had access to is IT people behind this. It wouldn’t have that kind of knowledge I would be looking for. Therefore, I would use another method. If there would be a portal or forum that there are people I would like to get in touch with, I would use it.”

On TALKnet, an active user also considered that lack of information from similar backgrounds was “demoralising”.

“...every time I use it (TALK), I get my spirit down because nobody is talking about SCC council or CRB. Nothing comes up apart from the stuff I put on there. So in that sense, it’s quite demoralising.”

It seems that a similar experience helped the readers to associate themselves with the writers. Conversely, a lack of knowledge and expertise stopped people from contributing.

“Some of other contributors, it’s very interesting their stuff. It’s good to have that perspective. I don’t feel I have any relationship with that.”

“(I only contributed occasionally.) That’s a personal thing because I don’t feel like having expertise on that topic...”

Secondly, relational capital had a social influence on individual adoption. Most of the non-board members interviewed said that they adopted TALKnet because of personal recommendations from colleagues (Table 6.12). Only two interviewees started to use TALKnet by themselves.

Moreover, prior history with other social software users also affected the adoption of new technology. One interviewee described how a Communities of Practice (CoP) discussion forum was adopted by people who had known each other beforehand.

“I have got a membership of community of practice for local government. That’s quite useful. That started off when I was in the graduate scheme straight out of the university. There were 50 people in my year. We all enrolled this forum... Everyone is contributing towards people’s queries and searches for good practice and ideas. ... That was a closed forum for graduates.”

The above description implies a strong bond between CoP forum members. Although recently IDeA opened up the CoP platform to a wider community, it is possible to assume that the prior history between existing members may have influenced the engagement of new members who joined virtually.

However, TALKnet challenges the status quo as it is operated in exactly the opposite way. In the absence of a real network, the TALK board tried to encourage people to build virtual ties before physical meetings.

It was found that similarity in geographical background encouraged users to adopt TALKnet. As one interviewee revealed why she decided to use TALK wiki for the project she was managing.

“So partly because I need somewhere to put my project, partly because this is a Great Manchester initiative. TALKnet kind of looks familiar for Great Manchester people when you log on it. You have loads of things about it. ”

In the literature, geographical and political similarity between local authorities was found to be important in successful knowledge transfer (Rashman et al. 2005). This is also reflected on whole TALKnet since the website is

dominated by a few organisations from two geographically-close regions: The North West and Yorkshire.

Social interaction

TALKnet users interacted both online and offline. Online interactions were in the forms of comments and visit hits. Offline interaction was reported not only in TALK events but also in non-TALK events such as training and other public sector events.

By mapping TALK events on to a wiki network, it was found that the development of the wiki network was heavily influenced by offline events. There were nineteen TALK events in total including six training sessions. Two of these were national events organized by the DCLG. The remainder were mainly based in Manchester. 17 events²⁷ were recorded between September 2006 and October 2008. Five events were held in P1, eleven in P2, and one in P3. Trainings was organised to introduce the application of social software in the context of local government, as well as how to use blogs, and wiki technologies. According to the collected records, the largest local event was TALK Pecha Kucha, to which twenty-two people signed up. MBS project partners also tried to promote TALK on other occasions, including training and public sector events. As one interviewee recalled,

“I knew about it because I have been doing some training about management skills with Manchester Business School, been in the Transform programme by NC. We have been encouraged to try to use it.”

Although the number of registered users increased overtime, one board member argued that “the network was not there yet” on TALKnet, and this argument was supported by the network analysis. It was reported that physical meetings are the current dominant method in the building of local government networks (detailed discussion in 6.2.3.5). However, when comparing TALKnet to the Community of Practice (CoP), a board member indicated that lack of financial resources and commitment from local project partners hindered the development of an offline network.

²⁷ The detailed records about two of the training sessions on blogs and wikis were missing, but project members confirmed that the training did take place.

“CoP... is better organized and has partner behind it, which is IDeA who has a lot of resources to put behind it, a lot of people to put into the mix, and have a lot of networking connections at all kinds of different places.”“(Unlike CoP), TALK didn’t really get into their network. Local partners didn’t really get into their network.”

As mentioned previously, the interactions in the group wikis were limited. , and most spaces were edited by one person (Table 6.10). The total number of comments in the wiki space was 46 in 17 wiki spaces (Table 6.11). There were more interactions on the blog, and one of the interviewees reported that the sense of ownership made him continue to write on his weblog. Nevertheless, only five people had updated their blogs in the past three months. The blog network analysis suggests that the visible audience of the most active blog was about twenty people, and this is a very small number compared to 800 registered TALKnet users. The limited scope of the weblog network was observed by one interviewee.

“...within the blogging community, within TALK community, there are people talking to each other. But I don’t think it’s leaking yet out into a wider community”

However, the page visitor counts suggest some blogs have reached a wide reader group beyond the TALKnet.

Although some people dismissed online acquaintances such as Facebook friends as a list of names, others argued that “media is connection”(Wesch 2010). The evidences on Weblogs suggest that relationship developed in the virtual world could be extended into the real world. Meanwhile, it was possible to associate names with real persons when bloggers wrote about their personal experiences. Some bloggers reported their offline collaboration with other bloggers (examples in 6.2.3.6 Outcomes). Weblogs support conversational interactions between individuals (Avram 2006; Boyd, S 2006) and a real relationship results from two-way communication. Literature suggests that narrative methods, especially storytelling techniques are a fundamental way of knowledge transfer because they reduce the level of codification by providing context, process and analogue (Baskerville & Dulipovici 2006; Wagner, C & Bolloju 2005). Some evidence was found in the interview. One interviewee reported that he gained knowledge through reading weblogs and formed an image of a particular blogger by reading his

posts.

“I feel that I know KS (through his writing). I have never met him, but I genuinely feel I know him. I would very much like to meet KS in flesh just to see my perception. I feel he is a wonderful man. I feel he cares. I feel he works very hard. I feel occasionally he gets frustrated. But I feel he does really good stuff. I think KS does it for the community.”

The main findings in social interaction section are that real world interaction affected adoption in TALK wikis whilst online conversations on the blogs influenced the development of relationship in the real world.

6.2.4 Individuals

“Openness to experience” is used to measure an individual’s willingness to adopt innovation. The interviewees’ motivations for adopting TALKnet were compared by using their quotes.

The study reveals that local council officers who had personal blogs were mainly for expressing their views. Evidence suggests that blogs was also used for individual learning by some people. Project blogs were used to inform and sharing information and knowledge with other members in the project groups. Also, it was reported that perceived usefulness of social software emerged during the adoption process. N268 tried group wiki first but he experienced both technical and social problems. He learned about weblogs in one of TALK workshops and started blogging. He said,

“I started writing my own blog and from that I found the use of TALK ... I could read other people’s blog and contribute to their ideas. They would contribute to my blog as well...I found a better use of it for me as an individual than for me as a person who works in a big organisation.”

Six interviewees reported that they came to know TALKnet through personal recommendation. One interviewee found TALKnet accidentally. All interviewees had used the Internet for over ten years²⁸. However, only four of them (N52, N201, N189, and N240) had used social software prior to join TALKnet. Although three interviewees (N234, N268 and NA1) did not use

²⁸ Interviewees’ IT skills are assessed by their Internet experience, social software experiences, as well as additional information they provided in the interviews.

social software before, they had vision on the potential use of blogs and wikis. They used TALKnet far more frequently than other TALKnet members. The two interviewees (N69 and NA2), who did not use TALKnet as often as the rest, reported their need for training on social software. It is possible to use Roger's (2003) diffusion of innovation theory to explain difference in individual adoption of social software. According to Roger, individuals' attitude to innovation (innovativeness) varies. Nevertheless, both NA2 and N69 used TALKnet as a result of social influence (see quotes in Table 6.12).

Table 6. 12 Interviewees' motivations to adopt TALKnet

Aliases	Quotes	Role on TALKnet	Job role	How joined?
N52	'I used TALK because of the project. I compared TALK with IDeA and other platforms. I saw the advantages of using TALK.'	Project blogger & space admin	Business Process Manager	Newsletter
N69	'Because we are dealing many partners cross the whole area, including local governments and PCT. It's (TALKnet) a good way to communicate about situation.'	Project blogger & space admin	Project manager	Recomm.
N201	'I contributed to TALK because I have got something to say.' 'I also use Facebook, twitter, WordPress. Occasionally I use second life...'	Blogger	Marketing officer	E-mail invitation
N189	'It's interesting because they have different view points...you have a lot of people outside the community, the private sector, the academic world.' 'I see TALK is like smoking. It provides me a socially acceptable space.'	Blogger	Business Support manager	Recomm.
N268	'Really because I feel like have got something to say. Still, it is based on personal development.' 'I felt we were neglecting modern technology, web2.0 is part of that.'	Blogger	HR officer	Recomm.
NA1	'The reason I joined it was to respond to a particular post. I found it fascinating the way people were sharing things ...' 'My new project is related to local government.'	Active reader	Private	Recomm.
N240	'I designed it.' 'what I helped was to try to get people to think how they can use technologies, like wiki, twitter, blog how they can bring them into their environment ...'	Blogger	Private	Board member
N234	I firmly believe social network sites will be the fundamental way people communicate in terms of their business. I am not a big user.	Active reader	Former local council officer	Board member
NA2	'I joined it because P is promoting it and I wanted to be part of that.' 'So in the earlier days, I did look at it. I just don't have enough of time.' '...It's kind of gender and age issues...from my experience,'	Occasional reader	Former local council officer	Recomm.

In addition, in relation to previous discussion on “easy-to-use”, one interviewee emphasized that, to make social software applications work in local councils, minimum skills should be required from users.

“They (People) are not going to be trained up to use the different methods because that would take administrative rights from our IT. So it (social software application) has to be simple. There have to be framework there. Namely, you can automatically set something up rather than expecting people have the knowledge of setting it up themselves, coz they are not going to get training, not going to get the support, and not going to get the IT infrastructure to be able to interact.”

6.2.5 Context

The fact that TALKnet was not extended into the network of local government was reflected in the organisational context. The lack of support and understanding from leaders inhibited TALKnet adoption. This was mentioned by three interviewees.

“I was asked to stop updating group space on the TALK because the project board plans to launch their own website.”

“...but not many people (in the project) have logged on TALK regularly. Some even didn't register.” “They (senior managers) should have asked them to use.”

“Also getting the permissions from leaders to use TALK in that respect is difficult as well... I prepared it (wiki space) but I didn't go long. ”

Leaders' own IT competence may be the reason why they found the concept of social software hard to grasp. One interviewee mentioned,

“I know some senior officers are still printing their emails out and writing their responses, and then giving back to PA to actually send the email...”

This issue has been noted by IDeA, and they have developed a strategy to encourage councillors to use social media. Nevertheless, they acknowledge that this will be a long-term strategy. As the Improvement Strategist at the IDeA Ingrid Koehler wrote on her blog (2009b),

“But many councillors also have characteristics that make it unlikely that they’ll be signing up for Twitter or starting their own blog any time soon. On average, they may be a bit older than the usual profile of social media user. They may or may not have developed the basic IT and social web skills through work or personal experience. And local politicians are insanely busy juggling work, family, community and political responsibilities – and while social media can be time saving in the long run, it does take time to get set up and gain confidence.”

Secondly, there was a trust issue. Social software has the potential to empower ordinary employees in an organisation (Li & Bernoff 2008), and this works against the hierarchical structure of local councils. As one interviewee put it,

“The difficulty with it (social computing like TALK) is coming against local authorities’ view that their staff are there to work. And it’s a ‘trust’ issue. You can look at, for example, some authorities ask staff to clock in and clock out using clock cards. Other organisations say ‘hang on, we pay them to do the job. How many hours they work and how they choose to do it are up to them as long as they can deliver it.’ And there are divergent views about this. So TALK is somewhere in that. If you trust your staff, you can say to your staff that ‘you can use TALK, you can use the new technologies’.”

Thirdly, the “current way of working” in local authorities, such as primary communication way of networking, and IT management, also places constraints on the adoption of social software, the interviewees were asked to rank their most used method of communication in their daily work, and e-mail was ranked top by local council officers. Thus, the e-mail culture can be an obstacle to social software adoption. One interviewee found that TALKnet was not used because officers preferred e-mails.

“...though it (TALK wiki) was used to support NWoW project, it was not used by colleagues. I don’t know why... Perhaps it is because most people are unfamiliar with social media. There is a culture about email. They use emails for everything” “Only one training session was given at the start of the project. Members were sent an email with a link saying training materials are on TALK. Because the training materials were not attached to the email and not everyone has registered on the TALK, someone came to the meeting without the documents.”

One interviewee observed that local council officers preferred pen and paper to writing on the electronic media.

“On one of the projects I run, document management, people can’t let go paper. And it’s an old style of thinking because people are brought up by a particular way of working. TALK is one of the challenges to that, old way of working”

Physical meetings are the dominant way of developing networks in local government. As one interviewee put it,

“I often get people following me up: ‘I googled you and I found that.’ ... But the majority of contacts I got are because I stood there and presented face to face with them”

Another interviewee described how a local informal network was formed,

“It would be particularly working life in Great Manchester. You bumped into the same people in different meetings. You might be doing slightly different job, but you still ended up bumping into them. That is almost inevitable. So once you start building that network as long as you are in Great Manchester, it will stay with you and so almost through the circle of meetings.”

The co-existence of a departmental structure and small communities was confirmed by another interviewee. This kind of informal network is developed based on shared interests and stays at the local or regional level. These communities are developed to overcome the constraints placed on the learning and sharing practice by hierarchical structures. However, these informal networks raise another issue of “scattered knowledge”. Such informal networks are similar to Communities of Practice (Brown & Duguid 1991; Lave & Wenger 1991). The shortcoming of CoPs is that strong interpersonal ties between community members may inhibit them from continual knowledge creation (Nonaka & Toyama 2003). TALKnet was designed to support open communication across disciplines. However, it has made a limited impact on the existing network. Both evidences on the TALKnet and e-Government literature suggest the importance of shared knowledge and the political background on knowledge transfer (Rashman et al. 2005).

In local authorities, the existing physical environment, such as how information and communication technology is managed in the councils, also

restrains people from adopting social software. According to SOCITM(2010b), up to 90% of local authorities have placed a ban on social networking sites, and two thirds of them have completely banned social networking sites from the work environment. It is, therefore, inevitable that local council employees will find it difficult to understand the potential of social software and improve their skills. A fundamental change in the IT services of local government was suggested by one interviewee.

“In local authorities, IT departments have to change. They can all go wiki. They can set up wiki sites. They can set up collaborative websites. They can set up websites if they want to coz they are all IT trained. But they are working on policies of people who are 10 or 20 years ahead of them. That’s all about security. It’s about protection. It’s about methods of communication out. It’s not about collaborative technology. I mean the bosses, the chief executives, the directors. They are not thinking we need to communicate in a wiki style with our 20 year old citizens. IT staff, who are in the middle, could do it. They could put the structure in place. But the decision is not being made to do that. Which means if they are not putting them in place, further down the chain, it’s still gonna be 10 years behind now because you need 5 or 6 years to change all the BIP (business improvement package)... It is about ‘big ships turning slowly’”

On the wider contextual (environmental) level, TALK project itself faced the shortage of resources. The project was initiated by DCLG (formerly known as ODPM) in 2006. Project owner provided strong support at the beginning. However, in late 2006, central government underwent a reform. The DCLG sponsor left the government. New leader in DCLG was not very keen about TALK. Management of the project was transferred to local partner. As mentioned previously in 6.2.3.3, TALK project suffered the issues such as lack of financial resources and low level of local commitment. In the UK, over 5 million people work in the public sector and over 2 million work in local government (Goodwin 2009). In comparison, the total registered TALK members was just over 800. TALKnet only reached 0.03% of UK local officers.

Also, Web2.0 social software is still in the early stages of diffusion, especially in terms of applying it to the work context. As mentioned in the previous discussions, people are still learning about social software. Practice will be

the best way of improving social computing skills. As one interviewee said,

“...My daughter finds it easy to use new technology. She will just do it...She will learn lessons in the school and learn what good online behaviours are and how it works... Me, just a little bit different. I need confidence, practice and expertise. Maybe this is how you use this stuff. Using it on a frequent basis, like emails, that might encourage me.”

UK government just started exploring the value of social software. In 2009, the government published policy on Open Source software. Central Office of Information published social media guide in the same year. TALKnet appeared to be an early experiment.

In addition, the implicit assumption of TALKnet is that UK public sector is managed under the networked governance model. That is, governance is carried out through networks and partnerships, and civic leadership. The general population should be considered as co-producers (details in Table 5.2). However, literature suggests that in the UK, New Public Management model is still dominant. That is, governance is realized through markets purchasers and providers, and clients and contractors (Benington & Hartley 2001; Hartley 2005). The public is considered as customers.

6.2.6 Outcomes

Participation in the TALKnet was addressed in the previous analysis. This part measures the outcomes in terms of user satisfaction (Applegate 1991; Fjermestad 1998). Interviewees were asked if TALKnet supported their work and their willingness to continue using the system. Despite the low adoption rate of TALKnet, most interviewees confirmed the (potential) benefits of using the site. As suggested in Figure 6.6, on weblogs, idea generation takes place in online conversations, which is a slow and ongoing process (Boyd, S 2006), since the number of participants in the online conversation varies over time, as does the place of the conversation. Five interviewees confirmed that the content on TALKnet sparked ideas and learning, and they carried this inspiration to other meetings.

“I think, a good example is on Peter’s blog, he wrote about ‘Drunks are the Bores of Europe’. Inside, we had several conversations with colleagues about what we thought about, and the social issues in the UK related to alcohol. So yes, I think it kind of opened up other discussions I wouldn’t have necessarily had if I haven’t read that piece. That has got me thinking.”

“It (TALK) gives me a way to analyse the situation when it happens. So it gives me some confidence to get involved in some projects outside my own job and have a different outlook... In terms of my work, I challenge those (colleagues) based on the learning I have taken on TALK in terms of transformation. I challenge people to say ‘is it transformational?’ ‘Are you going to make radical change to how things work?’”

Meanwhile, weblogs on TALKnet provide spaces for individual learning.

“It (TALK) is a space for us, local authority. It is respected. It gave me confidence to say ‘Yes, I want to put my information here.’ I need this opportunity, even nobody is reading it (the blog). This gives me the opportunity of active learning about the project I am coordinating.”

One interviewee also reported an “out of blue” two-way learning.

“A person in Holland contacted me. He works for the advising campaign in local governments in Holland and he asked if he could use the content on my blog. Later, he also sent his presentation for comments. On his slides, there was something that I haven’t come across. So it was two-way learning.”

TALKnet not only supports learning and idea generation, but also helps to build connections through the content. One interviewee also identified new connections from the published content.

“Often there is a blog referring to somebody’s work in a particular field, document management, in my case, where I am looking at how to work more collaboratively across my authority and also find out what other local authorities are doing. It allows me to make contacts to people. I have done this with people in Oldham in Manchester.”

Additionally, several bloggers mentioned their connection with people with whom they had online dialogues. It was reported that a virtual relationship can be extended to other networks. One interviewee connected and spoke to another TALKnet user on Facebook because they had conversed with each

other on TALK.

Social software, like TALKnet, makes things transparent because everything is in the public domain. This may lead to positive outcomes. As one interviewee reported,

“TALK helped me in my work...My voice has got heard (through TALK). Some senior managers read my blog and allowed my idea. Some other council took my idea and used Second Life to build prototype. 3 years later, our council accepted my idea... TALK allows open debate.”

However, as we discussed in the context dimension, challenges remain in the current practice of local authorities. Outcomes are the result of the adaptation of the group within the contextual factors (Fjermestad 1998). The use of TALKnet in NWoW project is an example of this (see the quotes in 6.2.3.5).

An unexpected use of TALKnet was uncovered during the interview. One interviewee used TALKnet for internal training to demonstrate the possibilities offered by Web2.0 social software.

“...one of the things that social networking sites do is to surface alignment and misalignment among people. Authorities like RCC, nobody has any idea as we haven't bought into the same image. Intranet is useless. It has no search engine. It has got limited information on there. So there is no interaction. That means you have got many silos. You need to widen that. So you have to have meetings all the time because you have to have the wide image. If you have a site like TALK, it's a good example, I have used it several time in meetings... Using TALK to do that can widen the debate... TALK helped me to show people the possibilities.”

Another interviewee also thought that his experience with TALKnet helped him to improve his confidence in using Web2.0 technologies.

“Because of TALK, I started to write too, but on the separate blog. As a result of that, other people started to write. As a result of that, my network of family and friends, in the UK and overseas, they started to use Web2.0, or whatever we want to call it. It was very alien. July 2008, it was all about that. I knew there was something there. TALK was catalyst. A year later, I am very aware of this stuff. I am not an expert in using it, but I do use it. I am also an advocate of it now, to other people, with cautious tales as well.”

Additionally, active personal bloggers confirmed that they would continue writing on their blogs. Nevertheless, they also made suggestions to improve TALKnet, such as improving the website interface and navigation, and engaging a wider scope of users.

6.3 Summary

This chapter analysed the adoption of TALKnet for idea-generating tasks. Both interviews and the social network analysis suggested that there is limited interaction on TALK wikis. Instead, learning and ideas generation happened during weblog conversations. The main inhibiting factors for adopting wikis include technological difficulties and the absence of a real network. On the whole, these constraints were imposed by the wider context. The current public organisational structure and culture, as well as resource deficiency, accounted for the limited usage.

Chapter 7 Discussions

This chapter integrates the findings of the two studies presented in chapter 4 and 6. It begins with a discussion of the findings from research questions, and then continues with a discussion of the results from both technological and social perspectives. The discussion is structured around the question “how to ensure that social software is social”. Apart from academic literature, the discussion is also informed by insights from non-academic fields.

7.1 Discussion of results

RQ1: What motivates actors to adopt social software for collaborative tasks? In terms of motivation, the results show that there are similarities and differences in voluntary and mandatory contexts. In both settings, individuals were motivated to adopt social software by a mix of personal motivations and social influence.

In voluntary context, social capital including cognitive, relational and structural capital appeared to have significant influence. However, in mandatory context, social influence from meta-users, such as supervisors and managers had significant effects on user behaviour.

RQ2: What is the role of social software in supporting collaboration?

In this study, online spaces were used for self-learning, self-publishing/broadcasting ideas, documentation, exchange of information and ideas. However, the role of co-creation/co-editing was found to be very rare. The only exception was when group members reached agreement in physical meetings before collaborating online.

RQ3: To what extent can use of social software then affect the nature of collaboration?

This study found that adoption of social software was affected by technological features, task complexity, social capital (e.g., group history, knowledge background), and context (e.g., structure and culture in the public sector). Thus, to influence the nature of collaboration, one has to consider

both technological and social sides. In the following part, we continue the discussion by asking the question how to ensure that social software to be social. It is believed to be the way to encourage adoption.

7.2 How to ensure social software to be social: the technological perspective

This part addresses the question of “how to ensure that social software is ‘social’” from a technological perspective. In other words, it assesses the features of a social software application to see if the application meets Web2.0 norms.

7.2.1 Functionality

The primary functions of social software include communication, cooperation, collaboration and connection (Cook 2008). Social software applications strengthen the way people communicate, interact, and share resources with other members of the community across the web(Wagner, C & Bolloju 2005).

In the two case studies, blogs were used for a large group discussion (collective learning), a small group project (project management), and personal information management (individual learning). Wikis were used for documentation, co-writing and idea-generation.

The findings suggest that blogs and wikis provide multiple functions. That is, both of them have functions to support communication, collaboration, cooperation, and connection. Nevertheless, the degree of support varies with the technological features enabled on the websites. It is possible to argue that it is the features of the software rather than its name (blog or wiki) that represent the nature of a software application. In other words, a so-called Web2.0 social software application may not be any more revolutionary than Web1.0 when certain new features are not enabled or made visible to its users. Thus, the features of the websites in the first and second case studies are compared with a representative Web2.0 social networking website, Facebook, in the following table to see if they meet the Web2.0 usability and functionality.

Table 7. 1 Comparison of features of websites in two case studies and Facebook

Feature class	Features	Google's Blogger	TALKnet		Facebook
Profile details	Age	Y	Y		Y
	Location	Y	Y		Y
	Gender	Y	Y		Y
	Testimonials		Y		Y
	Other data	Y	Y		Y
	Auto user stats	Y			Y
Connectivity	Friends				Y
	Subscriptions	Y	Y		
	Groups		Y		Y
Content	Main content	Group Blogs	Wikis	Personal Blogs	Profiles
	Other content				Photos
	Tagging	Y*	Y	Y*	Y
	Friends only	Y	Y	Y	Y
	Comments	Y	Y	Y	Y
	Editable content		Y		
	Rateable content				
	Viewing statistics			Y	
Technical	Public API		Y		Y
	Embedding allowed	Y	Y	Y	Y
	Many RSS feeds	Y	Y	Y	
	Private messages				Y

Source: Feature class, features and Facebook are based on Cormode and Krishnamurthy (2008).

Notes: Y*: Only content creators are allowed to assign tags.

Cormode and Krishnamurthy (2008) group a number of important site features which mark off a Web2.0 site into four categories, namely, profile details, connectivity, content, and technical.

- Profile details: These are emphasised because users are first class entities in the system. Features include age, gender, location, testimonials (comments from other users posted directly to a user's profile). Other data includes job, education, and so on. Although most content depends on user input, some websites also support automatic user statistics, such as an auto-generated recent activity stream on the Facebook "wall".
- Connectivity: This refers to the ability to form connections between users through links to other users who are "friends", membership in "groups", and subscriptions or RSS feeds of "updates" from other users. Some sites offer segmented RSS feeds, e.g., per-user/group, whereas others only have feeds for several broad categories.
- Content: Users are able to post content in various forms: photos, videos, blogs, comments and ratings on other users' content, the tagging of own

or others' content. Meanwhile, users also have some ability to control privacy and sharing. "Friends only" is similar to "access control", which means the ability to make some or all information visible only to "friend" users.

- Technical: Other technical features include a public API (Application Programming Interface) to allow third-party enhancements and "mash-ups", and the embedding of various rich content types (e.g., Flash videos), and communication with other users through internal email or IM systems.

In addition, McAfee (2006) highlights six key component of Enterprise2.0 to address the use of social software in the business context. These are search functions (page layout, navigation, and search by using keywords), links, authoring tools, tags, and news or update alerts.

The completeness of profile details in both case studies was low. Most content relied on users' manual input. The default settings in Google's Blogger are used in the first case study, and the date a user registered with Google's Blogger, viewing statistics, and blogs the user has access to are generated automatically by the system on the user profile page. Although most students registered the Blogger only for this course, some had their own blogs. A few of them chose to disable the access to their profiles to keep the privacy of personal blogs. A user had to provide full name, username and email when registering on the TALKnet. Apart from these three items, other information could be entered voluntarily. However, personal information would not be visible to other users unless the person chose to activate his or her personal space. There were no "friends" feature on both Blogger and TALKnet. Nevertheless, users could subscribe to updates via e-mail or RSS. In terms of the "groups" function, unlike Facebook, where users can create groups freely, individual TALKnet users had to send a request to the site administrator to create a group space. All of the three websites supported uploading images and videos, tagging, comments and access control. However, on the two blogs, only authors were allowed to assign tags. A page view count plug-in was installed on the TALK blog. Most groups on TALKnet were open to TALKnet members. Only a handful of them limited access to group members only. In terms of system flexibility and extensibility, similar to Facebook, Confluence (TALKnet services provider) allowed the site

administrator to install third party plug-ins and “mash-up” content on the website. Neither site in the case studies allowed the sending of private messages. Both Blogger and TALKnet users reported problems with navigation. In addition, the page layout issue of the TALKnet website was raised by two interviewees.

In summary, both Blogger and TALKnet have some Web2.0 features. However, the main issue is lack of visibility of the users’ activities in both systems. Users were unable to easily ascertain who connected with or talked to whom, and what others’ interests and expertise were on the websites. According to Rogers(2003), observability to the people within the social system determine an innovation’s rate of adoption. In the case of social software, the visibility of users’ activities may enable others to see the benefits of the system and encourage adoption.

7.2.2 User-generated content

As a type of communication media, social software allows “us” to put meaning into the world (Gauntlett 2010). The effects of users having the ability to generate own content in the society is noted by Ivan Illich.

“Tools are intrinsic to social relations. An individual relates himself in action to his society through the use of tools that he actively masters, or by which he is passively acted upon...To the degree that he masters his tools, he can invest the world with his meaning; to the degree that he is mastered by his tools, the shape of the tool determines his own self-image...Convivial tools are those which give each person who uses them the greatest opportunity to enrich the environment with the fruits of his or her vision. Industrial tools deny this possibility to those who use them and they allow their designers to determine the meaning and expectations of others.”(Ivan Illich 1973; in Gauntlett 2010)

Social software applications are “convivial tools” for both content creators and readers. Enjoyment by contributing and reading weblogs was reported in both case studies. For bloggers, writing is a process of individual learning. Once created, the content stays on the Web and is open to examination. Comments initiate conversations, and further, turn self-learning into collective learning. It was reported that constructed comments were valued by content-creators and this was also associated with their satisfaction with the tool. However, the interpretation of the content often requires similar

knowledge background. Thus, the codifiability of user-generated content can affect the perceived usefulness of social software. The codifiability depends on the content-creator's writing style. It was found that narrative methods and references provided contexts and enabled readers to understand the content. Furthermore, links and tags can help readers to assess the value of user-generated content (McAfee 2006).

Another type of user-generated content is explicit data such as information about themselves, their jobs and their interests (Weigend 2009). Such data is not only valuable in e-commerce but also in knowledge management. Aggregated user profiles are online yellow pages, which help knowledge workers to determine who knows what and to support potential collaboration. The importance of this type of data was emphasised by TALKnet users. It is possible to argue that social software and user generated content are almost inseparable. For the majority of users, to using social software is not just about what a tool supports, but also about who is using it and what is on it.

7.2.3 Learning curve

The interface of Web2.0 social software is designed to be easy-to-use and interactive. Various new technologies such as AJAX, user comments and mash-ups are installed on the Web2.0 platform to encourage participation. Although writing and commenting on a site are relatively straightforward, the findings from the case studies suggest that both formal training and experiential learning are important for users to understand and master how to use blogs and wikis effectively. On the one hand, it takes time for users to become familiar with technologies. In the TALKnet study, wikis were perceived as being more difficult to use than blogs. Other Web2.0 applications, such as tagging were still alien to users. On the other hand, apart from learning the technical side of social software, users also needed to adapt to a new mentality via practice.

Blogging expert Lilia Efimova (2009) describes her learning about blogging thus:

“My personal blogging practices became an important source of learning about blogging, especially from the point of view of understanding the aspects of it that are difficult to observe by reading weblogs. Those aspects include, for example, the effort that goes into fine-tuning a weblog tool to fit personal needs, the surprises of receiving feedback on pieces that I never expected to be interesting to others, or the change of daily morning routines as a result of blogging.(Efimova 2009, p. 29)”

Virtual team research suggests that training in both technology and communication is essential in computer-supported group work. In the case of social software-supported collaboration, it is relatively easy to learn how to use the tools. However, the productive use of software applications in relation to one's work also require learning. Efimova (2009) emphasises learning about the personal nature of blogging, and the visibility and boundary-crossing it entails. Potentially, everyone on the Internet can read what you write.

Changes in mentality are also required in the adoption of Wikis. Wikis are considered to be perfect tools for the collaborative or distributed creation of live document (Wagner, C 2004). The main benefit of a wiki is the ability to edit content collaboratively at any time, rather than publishing the final version of the document. However, those used to a publishing mentality may be uncomfortable about the fact that a document could be in a constant state of draft(Cook 2008). Moreover, a Wiki is a type of groupware and adoption of the tool by the entire group is critical to success (Mader & Abel 2009). Social software may challenge existing work practices and bring cultural shifts. In short, the value of social software only becomes evident to users after they have adopted it.

7.3 How to ensure social software to be social: the social perspective

This part addresses the question of “how to ensure that social software is ‘social’” from the social perspective. In other words, it is about how social actors build social capital by means of using software. Similar to other tools, the adoption of social software is demand-driven. In the two case studies, users adopted social software to overcome physical distance, express personal views, or join a social group. Also, the students’ group blog case shows that unfaithful use could occur if demand was absent.

Meanwhile the diffusion theory indicates that individuals differ in their attitude toward change. Rogers (2003) defines five categories of adopter based on innovativeness: innovators, early adopters, early majority, late majority, and laggards. However, there are no variables or factors in Rogers framework that which directly take “social influence” and the peer-to-peer pressure of online social networks into account (Shuen 2008). Nevertheless, in real life, some people start adopting something new independently of the actions of others while others are influenced to adopt innovation when they see others using it (Frank 1969). Moreover, Geoffrey Moore(2002) questions the smooth transition from one adopter category to another. From a marketing perspective, he argues that there is hidden chasm between the initial market (innovators and early adopters) and the mainstream market (early and late majorities) because the early majority only buy in to a new product when many others are using it. In the case of social software, such a chasm was also observed in the case studies. Also, the impact of social influence cannot be neglected. Social influence raises non-users awareness of Web2.0 and social norms affects the usage behaviour.

7.3.1 Content creators as passionate workers

Social software provides knowledge workers with a channel for informal communication. The findings of the second case suggest that some users adopted TALKnet to air their own views.

In his article “Informal Social Communication”, Leon Festinger (1950) summarised the three motivators behind informal communication. Firstly, people need to share with each other and agree on important opinions and attitudes in order to feel that they belong together in the group. Secondly, people need to share their hopes and ambitions with superiors and others in satisfying their need for achievement, affiliation and power. Finally, people need to express emotions such as joy, anger, hostility and the like, as a means of “blowing off steam”(Cook 2008, p. 43).

To some extent, the urge to communicate demonstrates the passions of these knowledge workers. They are eager to share their ideas and inspirations about work practice because they care. Having a place to express their views is essential. As Efimova (2009) says in her thesis, “passion at work”,

“Personal passions have a legitimate place at work. Personal stories and voices turn into trusted relations. People are more likely to believe another human being than an organisation or a computer. Showing emotions, telling personal stories, being passionate in hierarchical environments could be a challenge, but it is becoming an essential part of work (p.230).”

7.3.2 Multiple forms of participation

The value of social software is realised through mass-scale participation. On the societal level, community and collaboration can be witnessed on an unprecedented scale, with “‘many’ wresting power from the ‘few’ and helping one another for nothing”. Such phenomena are “not only changing the world, but also changing the way the world changes”(Grossman 2006). However, on the Internet, content-creators only account for a small percentage of users (Shirky 2003), and this was also shown in our findings. Despite the existence of Power-law distribution, Web2.0 social software provides more equality than “the one-way structure of the commercial mass media”(Benkler 2006). Apart from content creation, findings from our case studies suggest that there are other forms of participation. Some people participate by commenting on what creators produce while others may read without leaving any mark on the websites. However, these people share information with their own networks and help to connect people with similar interests.

The content contributed by users on social software such as blogs is part of their informal learning. The value of such knowledge is confirmed by the CEO of the Centre for Learning and Performance Technologies, Jane Hart (2010), who says,

“It is not just about churning out content (however well instructionally designed) but also about the social aspects of learning. Individuals need to have the opportunity to discuss, collaborate and share their experiences – and thereby add to the body of knowledge around a topic. UGC (user generated content) should therefore be seen as a valuable aspect of the formal learning context – as much as expert generated content. ”

The challenge of the informal learning networks is to filter valuable knowledge. Cook(2008) defines five roles in the social structure of an enterprise. These are creators, organisers, filters, contributors, and

connectors. Cook argues that content creators are not the most important people because they rely on organisers, filers and contributors to categorise, rate and comment on their produced content. The human filtering process is just as valuable as a job of information creation. Meanwhile, connectors discuss, forward information through their own informal networks acting as enablers of social interactions between employees and possibly transcending hierarchical structures (Cook 2008). The existence of these different roles facilitates participation on the website and helps to realise the value of the content. Nevertheless, challenges remain in identifying these roles.

7.3.3 Web-based relationships

Connections can be formed with or without personal engagement in social software. On the web, individuals can connect via linking to one another's article or by leaving a comment on the website. The benefit of the web is that artefact-based connections "can transcend the spatiotemporal limitations inherent in participation" (Wenger 1998, p. 110) because artefacts can travel more easily than people. Although weblogs are designed mainly for personal broadcasting, our findings suggest that it is possible to grow relationships by engaging in interactions over the Web. Most of our interviewees confirmed that TALKnet supported them to develop a personal network. Efimova (2009) had similar findings when studying the blogging practice of knowledge workers.

However, the growth of online connections is not without limits. Anthropologist Robin Dunbar found that the cognitive power of the brain limits the size of the social network that an individual of any given species can develop. Dr Dunbar suggests that the size of the human brain allows for about 150 stable networks ("the Dunbar number") (Economist 2009). Moreover, sociologists distinguish between a person's wider network, as described by the Dunbar number, and his or her social "core". Peter Marsden, of Harvard University, found that Americans "can discuss important matters" only with three people (Marsden 1987). These theories were confirmed by a study on maintained relationships on Facebook, the results of which show "an average man—one with 120 friends—generally responds to the postings of only seven of those friends by leaving comments on the posting individual's photos, status messages or "wall". An average woman is slightly

more sociable, responding to ten. When it comes to two-way communication such as e-mails or chats, the average man interacts with only four people and the average woman with six.”(Economist 2009)Anecdotal evidence was also found on TALKnet. Take active TALKnet user N250 as an example. Although N250 appeared to have over 100 connections in 2008-2009, N250 had visible interactions with eight people in 2008 and ten people in 2009 on his weblog.

In summary, the online platforms help to broadcast ones’ ideas, to form connections and to engage in conversations. However, online social networks facilitate the development of a person’s wider network rather than the core network. Also, the growth of the network will be limited if it is highly centralised. That is, if it only has a few active members connected to a large majority of the network. So the bottom-up approach is not enough when implementing social software in organisations.

7.4 Implementation of social software

This part addresses the conditions for implementing social software for a collaboration and implementation approach.

Based on his study of the European investment bank Dresdner Kleinwort Wasserstein, McAfee (2006) suggests that the success of social software implementation within a big organisation is tied in with the establishment and maintenance of a receptive culture, the use of a common platform, an informal rollout of new tools and a good deal of support and encouragement from managers.

7.4.1 Conditions for implementation

7.4.1.1 Task-technology fit

In the literature, a weblog is regarded as a tool for one-to-many broadcasting and a Wiki is a perfect tool for collaborative creation of live document among a small group of people(Wagner, C 2004; Wagner, C & Bolloju 2005). In TALKnet study, most interactions were observed on individual weblogs. Also, students reported satisfaction with large discussion group. However, the findings suggest that weblogs supported small group projects when a communication agreement was in place whereas most content on group

wikis were entered by individuals. The results show that other factors rather than task-technology fit is more influential on group performance. These factors include individual mindset, social capital, as well as organisational structure and culture. These will be discussed in the following sections.

7.4.1.2 Social capital

Social capital can be perceived as a pre-condition for social software implementation.

Inkpen and Tsang (2005) examine how the social capital dimensions²⁹ of a network affect the transfer of knowledge between network members in three types of networks, i.e., intracorporate network, strategic alliances and industrial districts. Their study implies the conditions of implementing electronic social networks for knowledge transfer on different levels (Table 7.2). Among the three network types, “industrial district”³⁰ refers to the network across organisations, which resembles the network in the TALKnet study. Inkpen and Tsang identify that, in an industrial district, knowledge flows start on a personal level due to the absence of a formal inter-organisational relationship. Thus, individual social capital is critical in facilitating knowledge transfer. The authors argue that interpersonal relationships developed from informal social gatherings and meetings are an important characteristic of ties between members in an industrial district. The growth of individual social capital further drives the development of organisational social capital (ibid).

Our findings on TALKnet suggest that local officers tended to look for resources in physical meetings and personal informal networks. Empirical studies on knowledge-intensive work found that engineers and scientists are more likely to turn to a person for information than to an impersonal source such as a database (Tom Allen in Cross et al. 2001). Findings of this study suggest that existing informal networks affected the adoption of a social networking website. The virtual network was treated as an extension of the real network. Similarity in a geographical, political and knowledge

²⁹ Cognitive and relational dimensions of social capital are not examined in this study due to lack of data.

³⁰ An industrial district is “a network comprising independent firms operating in the same or related market segment and a shared geographic locality, benefiting from external economies of scale and scope from agglomeration” (Brown & Hendry 1998 p.133 in Inkpen & Tsang 2005).

background appeared to constrain the flow of knowledge as well as the scale of adoption in the study. Additionally, brokers from different organisations connected subgroups in TALKnet. Also, it was observed that for all brokers, the growth of internal ties exceeded that of external ones, which implies a possible increase in the connectivity of each individual organisation (structural dimension of organisational social capital).

Table 7. 2 Conditions facilitating knowledge transfer

Social capital dimensions	Intracorporate network	Strategic alliance	Industrial district (cross-organisational network)
Structural dimension			
- Network ties	Personal transfer between network members	Strong ties through repeated exchanges	Proximity to other members
- Network configuration	Decentralization of authority by headquarters	Multiple knowledge connections between partners	Weak ties and boundary spanners to maintain relationships with various cliques
- Network stability	Low personnel turnover organisation wide	Non-competitive approach to knowledge transfer	Stable personal relationships
Cognitive dimension			
- Shared goals	Shared vision and collective goals	Goal clarity	Interaction logic derived from cooperation
- Shared culture	Accommodation for local or national cultures	Cultural diversity	Norms and rules to govern informal knowledge trading
Relational: Trust	Clear and transparent reward criteria to reduce mistrust among network members	Shadow of the future	Commercial transactions embedded in social ties

Source: (Inkpen & Tsang 2005)

7.4.1.3 Corporate IT function

According to Marty Anderson, a professor at the Olin Graduate School of Business at Babson College, “corporate IT” and “shadow IT” co-exist within an organisation. “Corporate IT” refers to a command architecture, which responds to top-down orders. In contrast, “shadow IT” refers to an emergent structure which has no lever with which to manage them (Worthen 2007). The organisation has to develop skills to identify where these two intersect and come up with an appropriate strategy. The Pew Internet and American Life Project conducted a survey in 2006. The results revealed that the boundary

which existed in people's lives between the workplace and the home has broken down and a growing number of Internet users use online services (Worthen 2007). Social software challenges organisational structure. Individual departments increasingly have at their disposal ways of bypassing an IT function which does not give them the same kinds of tools that these web-savvy members of staff are used to using in their personal lives. As pointed out by a TALKnet interviewee, a fundamental change in IT function is required to implement social software in local government. It is the IT department's responsibility to build a Web2.0-enabled IT infrastructure and to write use guidelines. In addition, the transformation has to be sponsored by chief executives. However, evidence suggests that the IT function in local authorities is reluctant to support social software (SOCITM 2010a). Bill Greeves, a blogger of MuniGov2.0 explains why Web2.0 is not welcomed by corporate IT departments³¹.

"Since I am in IT, I am allowed to say this: Most traditional IT departments do not like the idea of Web2.0. Why? Well, it usually relies on infrastructure that is not under our internal control. The perception is that it is harder for us to secure that which we cannot touch. Some 2.0 services also require the opening of non-traditional ports in the firewall. Typically the sound Information Security practice is to lock everything down first and then open things up on a justifiable case-by-case basis."

Nevertheless, Gartner predicted a large-scale shift in technological influence away from corporate IT departments to consumers. Such consumerisation would be the most significant trend to have an impact on IT in the next ten years. In a report on the consumerisation of corporate IT by Gartner technological research says:

"Our core hypothesis is that an agility-oriented, bifurcated strategy – one reliant on top-down control and management, the other dependent on bottom-up, free-market style selection – will ultimately let IT organizations play to their strengths while affording their enterprises maximum opportunity as well." (LaMonica & Berlind 2006)

In other words, it is important for IT departments to gain an insight into how their users actually work and balance both corporate IT and shadow IT.

³¹<http://www.digitalcommunitiesblogs.com/munigov/2009/01/incorporating-web20-in-your-or.php>

7.4.1.4 Cultural Maturity

A survey by KPMG (2007) reports that culture and security are the biggest barriers to realising the full advantage of social software. The reason many that corporate wikis and blogs fail due to a lack of active engagement and regular posting. The report concludes that gaining commitment from the ultimate participants is critical to success. Whilst implementing a new wiki-based intranet for Janssen-Cilag, Nathan Wallace (2007)³² recognised the need for both technical and cultural maturity before being able to truly reap the benefits of social software and proposed an “enterprise collaboration maturity model” (Figure 7.1).

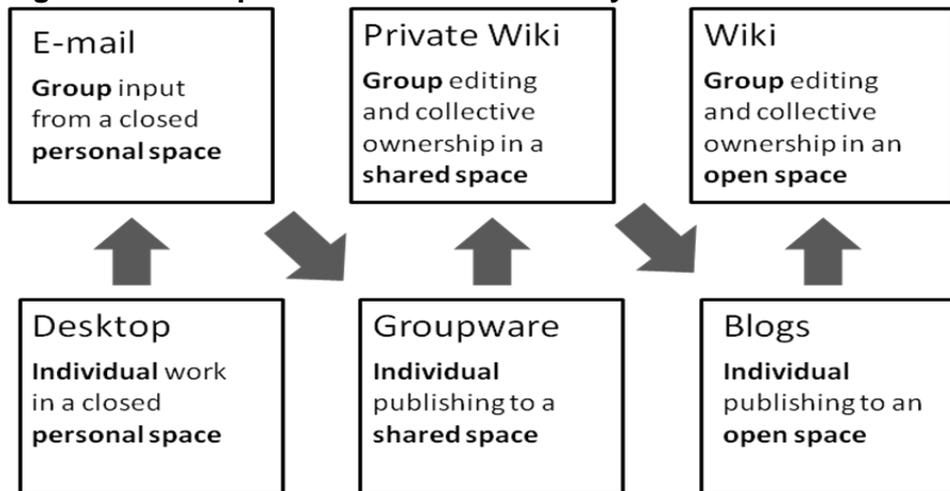
Although Wallace’s work was conducted inside one organisation, some of the findings he revealed were similar to those found in our case studies. Firstly, 85% of wiki pages were contributed by a single author. This suggests that although Janssen-Cilag provided an open Wiki (high capability maturity), it was primarily used as groupware (medium usage maturity). Secondly, users tended to log the finished product, such as a policy or an announcement, rather than work-in-process like thoughts and ideas on the wiki. An e-mail culture was reported in local authorities. An open wiki, such as TALKnet, requires a high capability of maturity, and the maturity model suggests that TALKnet was ahead of its time when implemented in the public sector.

Wallace identifies two cultural barriers to collaboration: sharing knowledge adds more work (“I don’t have time to share”); and sharing knowledge increases risk (“I don’t want to share”). He provides some solutions to minimising each of these barriers. Firstly, the tools for collaboration should be designed to reduce the barriers to contributing: intuitive easy-to-use, single sign on, one-click editing and instant gratification on saving. Secondly, it is necessary to instil an expectation that work-in-progress is just as good as the finished product. In Wallace’s words “Publishing information early and often (rather than infrequently and completely) moves authorship away from essays and succinct conclusions towards sharing of insights and decisions.” He also, suggests that policy can be implemented to migrate knowledge by requesting the recipients to publish information shared verbally with them for a wider consumption. Furthermore, Wallace thinks that risk can be offset by

³² <http://www.e-gineer.com/v2/blog/2007/12/building-enterprise-20-on-culture-10.htm>

increased rewards, such as recognition for contributions or performance based around knowledge sharing. However, it is always hard to implement and judge in practice. Thus, it would be better to encourage employees to contribute to a flow of insights and decisions which are made as part of large projects. Adding to the discussion is less risky for most contributors than publishing final knowledge or changing the existing content (Wallace 2007).

Figure 7. 1 Enterprise collaboration maturity model



Source: Nathan Wallace, www.e-gineer.com

7.5 Encourage adoption of social software

The implementation of TALKnet followed an essentially bottom-up approach. The findings suggest that personal recommendation was the most effective way to make individuals aware of social software and potentially persuade them to try out the tool. As one interviewee said,

“I knew about it because I have been doing some training about management skills with MBS, been in the Transform programme by NC. We have been encouraged to try to use it... I became aware of it. Then we have got this opportunity.” “NC actually sent me a whole lot of sites. TALK is actually the really collaborative site, and it is the one I can get my head around anyway.”

In e-commerce, such a word-of-mouth approach works best when there are three social roles in the social world, namely, connectors, mavens, and salesman. Connectors refer to the “social glue” people who know, and want to introduce you to everyone “you should know”. Mavens are “information brokers” who cannot wait to tell you about the best deals, and give you

advice on where to stay and where to buy. Salesman are the “evangelists” who get you to act and convince you to buy (Gladwell in Shuen 2008). These roles do not need to be occupied by three people. An individual can be a combination of connector, maven and salesman. In TALKnet, although it was possible to identify these individuals, the scale of participation is limited. The results suggest that a purely bottom-up approach was not enough for social software implementation across organisations. Andrew McAfee (2009) suggests that a combined of bottom-up and top-down approach is required for implementing social software in the business.

“I’m a fan of: deploy the tools, talk a little bit about what you want to have happen, and then find pockets of energy, highlight them, discuss them, show the good stuff that emerges. And also, again, signal from the top that this is what you want to have happen.”

McAfee’s comments provide a helpful reference for implementing cross-organisational level social software. A cross-boundary collaboration is inevitably influenced by the individual organisational context.

7.5.1 Bottom-up approach

Social software is for grassroots. The “participatory web” liberates people, allowing them to share and discuss their ideas and experiences, and enables users to organise themselves into a network based on their preferences. Social software is grassroots. Web2.0 websites, such as YouTube, Flickr and Delicious.com, are built by users. It is users who upload videos on YouTube, create interest groups and put photos on Flickr and tag them with their own tags, and share bookmarks on Delicious. Users help software developers to figure out how to build the application in a specific social domain by their participation.

However, not every Web2.0 website is successful in prompting user participation. Ross Mayfield (2006) proposes a staged bottom-up approach: a). identify key user groups, b). identify and understand key users, c). convert key users into evangelists, d). turn evangelists into trainers, e. support bottom-up adoption and emergent behaviours. Similar activities were found on the TALKnet. For example, links to regular bloggers were posted on the website front page. Some interviewees reported that they volunteered to be TALKnet advocates. Nevertheless, the TALKnet results suggest that relying

on bottom-up adoption is not enough to realise the benefits of social software and enable changes in the public sector.

7.5.2 Top-down support

Andrew McAfee (2009) emphasises the importance of “top-down” support to start Web2.0 social software in an organisation. In an interview with McKinsey Quarterly, he told the reporter why he changed from a “bottom-up” believer to a “top-down” advocate.

“One of my initial assumptions was after looking at the Web, you see the phenomenal growth of things like Facebook and Wikipedia and Flickr and YouTube and all that. I thought these technologies were essentially so cool that when you dropped them in an organization, people flocked to them. That was the assumption I carried around in my research.

I very quickly had that overturned. And in fact what you see is—particularly for longer tenured workers, particularly for older workers—this is a big shift for them, changing their current work practices and moving over to Enterprise 2.0. This is not an overnight phenomenon at all. And while there are pockets of energy, getting mass adoption remains a pretty serious challenge for a lot of organizations.”

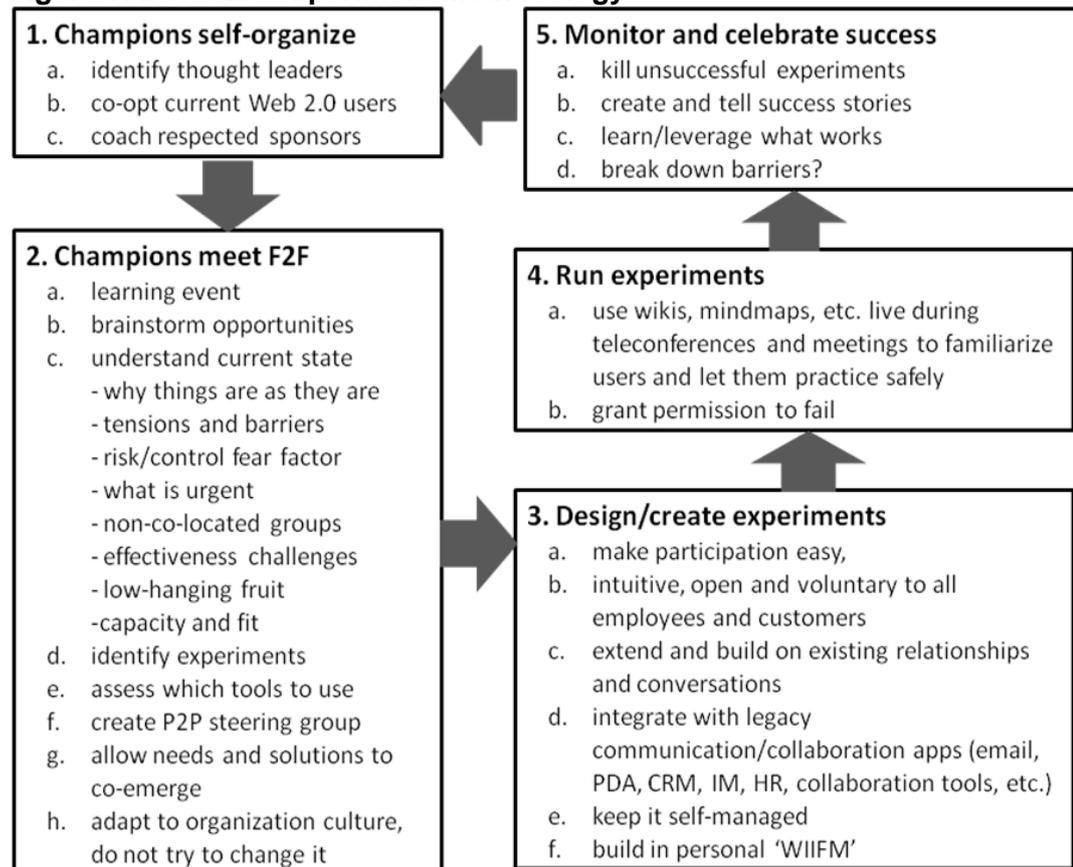
The findings in TALKnet also suggest the importance of top-down support and signal from individual authorities in encouraging local officers to participate in the network. The importance of top management involvement is emphasised by Pan and Scarbrough(1998, 1999). It was found that in most successful cases, the leader of the organisation acted as both visionary and champion. Similarly, McAfee (2009) also indicates that the adoption of social software should be in line with the goal of the organisation. Meanwhile, the top of the organisation needs to send the signals to encourage the adoption (ibid). For example, executives should launch blogs. In both case studies, social norms appeared to influence users’ participation. Only one executive blogged on TALKnet, and the local authority managed by this executive had the most TALKnet users.

Dave Pollard (2007) proposes an adaptable approach which combines bottom-up with top-down. The approach is focused on empowering “champions” to design and create social software experiments. According to Pollard, these champions consist of three self-organised groups:

- The organisation’s thought leaders: those considered to be innovative and ahead of the curve;
- Current users of social software: bloggers, RSS junkies, social bookmarkers and social networkers;
- “Respected sponsors”: those people whose use of social software would raise a few eyebrows and encourage others not to be left behind.

Pollard proposes an experiment methodology for implementing Web2.0. He recommends the champions meet face-to-face and start with a learning event to help those who are unfamiliar with the tools, and get the applications and the current state of the business up to speed. This should be followed by some brainstorming to identify the opportunities and possibilities. Then they should design and create the most promising collaboration experiments to meet five key criteria: participation must be easy; built on existing relationships; integrated with existing tools and processes; can be self-managed by the user without training; contain personal value for the individual.

Figure 7. 2 Web2.0 experiment methodology



Source: Dave Pollard,
<http://blogs.salon.com/0002007/categories/businessInnovation/2007/04/25.html>

Recently, UK government has conducted the largest employee engagement study, covering over half a million civil servants across 95 departments and agencies. The results show that 90% of staff is interested in their work. However only half of staff are involved in decision making, one third believe their opinions count and one quarter believe change is managed well and is for the better. Based on the survey, Sean Trainor of Über Engagement made several suggestions³³. Two of them are:

- Creating ways of involving front line colleagues in the important decisions that will need to be made for change, giving employees a voice
- Integrating best practice, breaking down the silos and pooling the knowledge that exists across all departments and agencies and avoiding duplication of effort

³³ Sean Trainor's post <http://www.uberengagement.com/index/?p=529> Published on 18th June 2010

After reading Sean’s post, Euan Semple³⁴, former Head of Knowledge Management at BBC, asks “why not make the civil service social?” He thinks the engagement study “would be such an opportunity to have a serious attempt to introduce social tools and reverse some of those stats”.

The evidence provides additional support to some findings of this study tentatively. The research suggests that the value of social software platforms like TALKnet is that they bring together people from different disciplines. Such convergence is not the solution but one step toward the emergence of new knowledge. As Gershbein(2009) says “Innovation is achieved after disciplines come together, when their organizing principles, themes, and guiding premises overlay in transparency and there is a resulting exponential accretion of knowledge and possibility”.

7.6 Summary

This chapter reviews the findings of the two case studies. Both technological and social aspects were discussed to reveal the influential factors in social software adoption. The table below summarised the above-mentioned elements that ensure social software to be social from both technological and social aspects.

Table 7. 3 Summary of social-enabling elements in technological and social dimensions

Dimensions	Elements
Technological	Functionality User-generated content A learning curve
Social	Champions Multiple forms of participation Web-based relationship Social capital as medium and outcomes Corporate IT function
	Cultural maturity Sharing culture Work-in-progress mentality Reward Policy
	Top management support and signal Champions-led Web2.0 experiments

³⁴ Euan Semple’s blog, published on 18th June 2010
<http://euansemple.squarespace.com/theobvious/2010/6/18/why-not-make-the-civil-service-social.html>

Chapter 8 Conclusions

This chapter first describes the major contributions made in the research findings. Next, it identifies the implications of this study for the adoption theory, mixed methodology and for practice. Finally, having taken into consideration the limitations of the study, some recommendations are proposed for further research.

8.1 Summary of main contributions

With the advancements in communication technology, computing power and the Internet, and the rise of the “net generation”, our society is undergoing a revolution (Tapscott & Williams 2006). Enabled by easy-to-use social software, communities and collaborations are appearing on a large scale. Both public and private organisations increasingly feel compelled to change the way they run their businesses in order to meet the new generation’s expectations, both inside and outside organisations. Moreover, businesses want to tap the benefits of self-organised distributed collaboration and use them as source of innovation.

Meanwhile, literature on social software-supported collaboration is still unfolding. The writers believe in the potential value of Web2.0. However, empirical evidence is sparse. Systematic investigation is still absent in the academic writings. These observations and practical experience motivated the researcher to carry out this study.

In this section, the initial research objectives are revisited in order to see how they have been addressed in this study. It will be noted that an interesting implication for further research is that with social software, adoption is determined by the capabilities of actors rather than by the functionality of software.

Objective 1: Develop a systematic understanding of social software-supported collaboration by reviewing different theoretical perspectives in the literature and published empirical studies

This study firstly sought to understand social software-supported collaboration by reviewing relevant theories and empirical studies, and

intended to learn why and how technology is adopted for collaborative tasks. Technology adoption theories and GSS empirical studies suggest that various aspects affect the benefits derived from using technology, including influential factors such as technological characteristics, individuals' perceptions and skills, task characteristics, group characteristics, and other social and contextual factors. Although variable-based theories, such as TAM and TTF, identify the important factors in the adoption of new technology, the performance of the technology varies with the problem context and adoption process. Since the research subject is distributed collaboration, it was decided to use the process-based Adaptive Structuration theory (AST) for investigation because the way members use collaborative technology is commonly deeply embedded in the process, group characteristics, tasks and environments (Zigurs & Khazanchi 2008). AST emphasises the dynamic and emergent nature of the technology adoption process. The theory assumes that group outcomes are determined by a complex and continuous process in which the group appropriates various elements such as technology or task characteristics. However, the original AST is tested on small group interaction in the context of a group decision support system. The problem context of this study is distributed collaboration. It assumes that new knowledge is generated as a result of collaborative efforts. So this study reviewed knowledge management literature to clarify the problem context and the role of technology in collaboration. Social capital appeared to be essential for knowledge creation. A conceptual framework was developed based on AST. The difference between AST and this model is the "context". In AST, context factors are referred to as the organisational environment, such as corporate information, history of task accomplishment, cultural beliefs, modes of conduct, and so on, which provide structures groups can invoke, in addition to advanced information technology (DeSanctis & Poole 1994). In this study, context factors consist of social capital (i.e., structural, relational and cognitive capital), organisational (such as organisational culture and structure, top management support, and training) and wider environmental elements, including norms and values in a particular industry or sector, as well as the growth of the Internet and social networking sites. Moreover, social capital is highlighted in this study because it not only constitutes some aspects of the social structure, but also directly affects collaborative actions. One distinctive feature of social software adoption is social interaction. Individuals are

considered to be social actors, and they are able to learn and adapt with their user experience. The use of a multidimensional framework has allowed for recognition of the contextual conditions for which social software is utilised, and has enabled a better understanding of the extent and quality of social software use.

Objective 2: Induce theoretical insights from empirical evidence

Theoretical insights were induced through research cycles. The conceptual framework proposed in the literature review was used to guide the investigation in both a mandatory and voluntary context. In the first case study, student group blogs, both user-generated data and interview data were collected and analysed. Adoption processes were compared across groups. The case was critically analysed using the concepts in the conceptual framework, and the researcher reviewed the research design and the framework based on the findings.

This second study introduced the adoption of a wiki-based social networking site, TALKnet, in the UK's public sector. The website aims to provide a space for open communication and collaboration across the UK's local government. This study was conducted to answer the question, "to what extent does use of social software affect the nature of collaboration in the voluntary context?" A social network analysis revealed that the TALK network was not well-connected. Interviews were conducted and secondary data was analysed critically based on the revised conceptual framework. The results of two case studies were integrated in the discussion. Some insights were generated.

Firstly, this study identified adaptation and an emergent structure in the social interaction process. These are consistent with the adaptive structuration theory (DeSanctis & Poole 1994) . By using social software, individual actors achieve a better understanding of the social software and its functions, the tasks it supports, and how their own needs can be supported by social software. Secondly, social norm has been considered to be a precursor in the adoption literature (Ajzen 1991; Davis et al. 1989; Goodhue & Thompson 1995). However, this study found that influence from "meta-users", e.g., supervisors and managers, affected both users' use intention and behaviour. Thirdly, task technology fit was found to have little

relevance on performance in both the mandatory and voluntary context. The outcomes were as a result of the adaptation process on both individual and group levels. For example, in the “student group blogs” case, students used communication norm to facilitate discussions on the blog. TALKnet users reported that the website was used in combination with other online and offline platforms. Fourthly, social capital was found to influence the adoption process. Social structures embedded in relationships enable or inhibit users to adopt social software. For example, in the TALKnet study, it was reported that some interviewees hesitated to contribute due to lack of knowledge. Other interviewees contributed because they were invited by the bloggers to comment. Additionally, findings suggest that new connections, or social structures, emerged from online conversations. Finally, both organisational and environmental factors affected the adoption of social software in this study. For example, the support of top management and IT practice in the public sector had an influence on the adoption of TALKnet.

Table 8. 1 Main findings in two case studies

Dimensions	Main findings in 1st case study	Main findings in 2nd case study
Technology	Writing on blogs was easy, but not many features were used, especially in the small group blogs.	TALK wikis were found not easy to use. Not many Web2.0 features were used. User profiles were important in building a network.
Task	Blogs: Individual learning; discussion; information/knowledge sharing; co-writing, collective learning	Wikis: documentation; slow meeting, co-editing; Blogs: broadcasting; individual learning; information/knowledge transferring, collective learning
Individual	Individual perceptions on task-technology fit; Individuals' knowledge on task and technology	Difference existed in individual openness. Perceived usefulness emerged from use experience.
Group/Social relations	Relationship with other team members; Initial agreement on communication and division of labour; Group size	Similarity in knowledge background, prior history, and geographical similarity encouraged TALKnet use. The networks were dominated by several actors on both individual and organisational levels. Wiki networks were not well-connected while actors on the blogs were connected.
Subjective norm	Influence from the lecturer led to unfaithful use of blogs in some students; Influence from peers on use behaviour.	Influence affected initial acceptance and continual use.
Social interaction	Communication norm was made in physical meetings. Narrative methods helped transfer tacit knowledge. Relationship was developed through online conversations.	Little interactions on wikis; Most wikis were edited by one person. Most users joined one wiki. Offline events affected the development of wiki network. Blog conversations facilitated relationship development in the real world. Narrative methods were useful in transferring knowledge.
Context	Time pressure; evaluation	Top management support; Leaders' own IT competence; Existing communities; IT functions; Public sector culture (e-mail; trust); Sponsorship & financial resources; Diffusion of Web2.0

8.2 Implications for the adoption theory

There are two main streams in technology adoption studies, namely, utilisation-focus and fit-focus. The representative theories are the technology acceptance model (TAM) and the task technology fit (TTF). Although they identify important factors in technology adoption, these essentially variable-based models are not suitable for a discussion of distributed collaboration (Zigurs & Khazanchi 2008). This is because adoption is a dynamic and emergent process in a distributed group.

The findings of this study suggest that both TTF and TAM are inadequate to explain the adoption of social software for collaborative tasks.

Firstly, the results show that initial task-technology fit had little influence on group performance. The findings from the first case study suggest that weblogs supported small group projects when a communication agreement was in place. The second case study found that most of the content on group wikis was entered by individuals. These findings are contradictory to the literature, in which a weblog is regarded as a tool for one-to-many broadcasting, and a Wiki as a perfect tool for the collaborative creation of live documents among a small group of people (Wagner, C 2004; Wagner, C & Bolloju 2005). This study found that the fit between task and technology is subject to the adaptation process on both individual and group levels.

Secondly, TAM was insufficient to study social software adoption. Web2.0 social software is still at the early stage of the technological diffusion process. Although users reported that they found weblogs easy-to-use, this study uncovered that many features were not used. Users learned the tasks the social software supported through actual use. Meanwhile, although social norm is considered to be a precursor to use intention in utilisation-focused theories (Ajzen 1991; Davis et al. 1989), this study found that influence from meta-users affected both users' use intention and behaviour. This finding supports the literature arguing that social influence affects both technology acceptance and use (Asako & Kiyomi 2007; Damianos et al. 2007; Fulk et al. 1990). In addition, perceived usefulness was found to be associated with the capability of other actors. Findings from student blogs and TALKnet studies suggest that other members' expertise, similarity in geographical background, and personal relationship with other members motivated

individuals to adopt social software. Moreover, user's behaviour was also affected by the feedback they received online and offline.

Thirdly, this study extended the context in AST to include the environmental dimension. The TALKnet study identified a number of factors which influenced the website adoption in the wider context. These factors include public sector culture, sponsorship and financial resources, as well as the growth of Web2.0. For example, the dominant approach for collaboration is physical meetings in the public sector. Communities were built through physical meetings. The online network was used for communication among known people. Limited evidence shows that TALKnet was used to extend the personal network. Since the time individuals spend on social networking sites and blogs is increasing rapidly (Nielsen 2010a), it is possible to assume that people will be more familiar with the applications in the future.

Fourthly, social software is different from traditional information and communication technologies. The impact of social software on collaboration is exerted through social capital and user-generated content. Unlike e-mails, individuals can join a conversation at any time and become collaborative partners. Unlike intranets, the content on social software platforms is live and can be updated by authors and readers. A social software application itself forms the space of a temporal collaborative group. There are at least two implications to social software adoption studies, the first of which is the importance of the social aspect. Since social software can potentially be a networking tool, "who writes on it", "what is written" or "who reads it" may affect the decision to participate. The second is that a contingent view of the adoption study is needed because the findings from this study suggest that relationships among members develop with online conversations. Moreover, such online relationship can be extended into real-life and onto different social software platforms.

8.3 Implications for mixed methodology

This study adopts a case study strategy with mixed methodology to achieve the research objectives. According to Mingers(2001), there are two main benefits of using multiple methods. Firstly, mixed methods can be used to overcome the weakness of a single paradigm. Secondly, different research methods tend to be more useful at different stages of the research. However,

researchers have to face at least two challenges when implementing mixed methodology (Van de Ven 2007). The first challenge is to decide the priority of different results in order to develop holistic and integrative explanations. The second is that contradictory information is likely to be received from different sources, and when these contradictions are observed, researchers need to look into the problem domain to find the explanation.

A number of mixed methods research designs have been proposed (Creswell et al. 2003; Mingers 2001). This study adopts Creswell et al.'s sequential transformative design, which is useful for expressing diverse perspectives, advocating for research participants, and providing a better understanding of a phenomenon which may be changing as a result of being studied (Hanson et al. 2005). This study gives priority to the qualitative method: interviews in this study. Quantitative methods, such as social network analysis and statistical data analysis were used to provide subsidiary and complementary support. However, unlike the term "sequential" suggests, the study did not go through a linear process.

One of the research objectives was to generate theoretical insights from case studies. Inducing a theory from qualitative data is adaptive and highly iterative, and involves defining broad research themes, collecting masses of data, and analysing and interpreting it (Carroll & Swatman 2000). Firstly, a conceptual framework was developed from the literature review. In both case studies, data collection and analysis went through an iterative process. Website content was analysed first, which provided the basis for interview analysis. During the data collection, the researcher adjusted the interview questions to incorporate new themes. For example, influence from a third person emerged from the interviews. These adjustments were encouraged because inductive theory building is based on deep understanding (Carroll & Swatman 2000; Eisenhardt 1989). The data analysis was also an ongoing and iterative task, which was guided by the initial conceptual framework. However, the interpretation of the data was not limited to the concepts in the framework. New themes were identified in the first case study and these were added into the model. Moreover, the researcher gained a deep understanding of the data by reading and re-reading the transcripts. In the second case study, after the initial analysis of the interview data, short interviews and an additional social network analysis were carried out for further explanations and confirmation of the identified new themes. For

example, the existence of informal communities was confirmed in the follow-up data collection.

8.4 Implications for practice

Although the literature suggests that Web2.0 social software has the potential to support collaborative tasks, there lacks of empirical evidence. This study addresses this concern by conducting case studies in both mandatory and voluntary settings. The findings suggest that social software applications, such as weblogs and wikis, could support idea-generation and problem-solving. However, to realise these benefits on a large-scale, organisations have to be both technological and socially ready.

For organisations, the purpose of using social software is to mobilise the knowledge locked in a person's mind, a project group, a division, or an organisation, in order to enable collaborative innovation. Social software supports informal conversation and facilitates the development of an informal network. The findings from this study imply that a virtual network is not meant to replace physical networking events. Instead, it helps to maintain weak ties and makes it easy for strong ties to communicate with each other. In other words, a virtual network is an extension of the real network. Moreover, a web-based informal network is complementary to the existing hierarchical structure. One interviewee commented that online social networks have "humanised dehumanised organisation". In his words,

"Organisation, in terms of bureaucratic model, for actually quite positive reasons, depersonalizes the organisation into roles. Like line managers, you have responsibilities, you have job descriptions and circumstances specifications, and output targets, and appraisal, and reporting chains, and budgets, and human resource organisational charts and so on. In terms of human achievement, depersonalize is to contradict the results you have actually got as human beings. Social networking has the capacity to re-humanize as oppose to dehumanize. And it's only by people being able to get that balance: between mechanisms by which they are accountable for what they do within the organisation and means by which they can remain being who they are and growing and developing, and not plodding but striding. That reassurance and finding people, who will

take some time out, share and nurture, and grow the organisation in a human sense rather than in a formal bureaucratic sense. It's probably a task that technology enables you to actually do."

The above quote also implies the challenges that social software imposes on organisations. Some of the practical implications gained from this study are presented below.

Firstly, since social software is a new technology, employees need to be given opportunities to explore social software applications and learn how to use them productively through experience. Findings from the TALKnet study suggest that, in the public sector, IT departments need to put a social software-enabled IT infrastructure in place. Some local officers believe this is inevitable. For example, the Business Support Manager of Rochdale Metropolitan Borough Council, Ken Usman-Smith, said on one occasion.

"Nothing pokes holes in the membrane better than blogs and Facebook type interaction. And that is happening despite management blocks on Web2.0 social computing channels."

People have to be able to try new technologies and realise their value through use. According to Orlikowski (2000), collaborative technology, such as social software, can be "radically tailorable" and integrated into complex configurations with other tools. The nature of technology changes with its use, and social structures emerge with the recurrent use of technology (ibid.). One interviewee used text messages as an analogy to describe the learning curve involved in using social software.

"The analogy is the capability of doing text messages was very early on into mobile technology. But nobody for one moment thought it would take off as the way it has because young people grasped it and realized the power of using it without having to talk to somebody, without having to leave a voice mail, you can just text it. If somebody responded it, they work. It has been hugely successful...if you said to people 20 years ago, if you had the capability of texting, how would you use it? They wouldn't have a clue."

Secondly, in addition to practice, changes in individuals' mentality are also required for users to be encouraged to generate content. There are two kinds

of user-generated content on social networking sites, one of which is personal information in a user profile. The other is the entries on weblogs and wikis. In the work context, the personal information attached to the names can be useful. However, online social networks can be just a list of names without much personal information. This study found that local officers tend to find experts through their existing personal network. Also, local officers interviewed confirmed that knowledge or expertise is the main criteria they use to choose collaborative partners. On one hand, this finding highlights the importance of the completeness of user profiles. One possible solution is to install software which provides auto-generated information, similar to the activities updates on the Facebook "Wall". The purpose of installing such software is to help users to connect names with expertise. However, the recent Facebook privacy scandal suggests that such an intrusive feature needs to be implemented with caution.

On the other hand, this finding implies that existing networks can be a barrier for implementing social networking sites. The social capital theory suggests that a network with close ties can hinder innovation (Burt 2000). A representative of this type of network is the Communities of Practice (CoP). CoP members have formed strong interpersonal ties through direct and continuous interaction in small communities, and membership in those communities tends to be stable (Lave & Wenger 1991; Wenger 1998). So members of a CoP tend to have conversations inside the community instead of reaching out to external experts. Nevertheless, further evidence is needed in order to make a claim. In terms of the second type of user-generated content, this study found that wikis were used to publish announcements and store documents. This finding suggests that users tend to publish the finished works rather than work-in-progress articles.

Thirdly, there are multiple forms of participation on social networking sites. Apart from content creation, the research findings suggest that people also participate by commenting on what creators produce, or by reading it without leaving any mark on the websites. Content creators are not the most important people. People who help to categorise, rate, comment and forward the content are more important in the sense of building an informal-learning network. Thus, it becomes important that social software websites have the capability of capturing these multiple forms of participation. For example, a survey conducted by TypePad (typepad.com) suggests that a

“Facebook-like” function increases referral traffic to blogs by 50%(Indvik 2010). Although the report does not provide sufficient information about research methods, the evidence suggests that the role of readers is important.

Fourthly, social software will not be adopted equally. Evidence of Power-law distribution was found in both case studies. However, as mentioned in the third point, there are multiple forms of participation, although some forms may not be visible on the websites. The ultimate goal of professional social networks is to encourage learning and the transfer of knowledge. However, there is a risk of relying on a few people to contribute to the content. Policy is needed to reward contribution and encourage information/knowledge receivers to share, in order to reduce the burden on experts and ensure that they have time to perform their own jobs (Cross et al. 2006). Nevertheless, performance measurements have to be thought through carefully. The results of the first case study suggest that the risk of evaluating participation in a social software platform is that people may do what measures rather than contributing genuinely.

8.5 Limitations and Future Work

Since social software adoption is still in the early stages of research, a case study appears to be a suitable strategy to achieve the purpose of this research. However, the case study approach and qualitative methods have a number of potential limitations, which must be considered. The limitations are outlined below, together with some debate about their nature and some possible ways to overcome them.

Firstly, most of the findings of this study came from a single case study in the public sector. The first case study of student groups was carried out to formulate the problems. Although the case was in a mandatory setting, its results informed the researcher of the limitations of the research design and the conceptual framework. Then, the second case study was chosen in a voluntary setting. Despite the difference in research settings, the two studies produced some similar research findings. However, more emphasis was placed on the second case study because it was more suitable for addressing the research questions. According to positivists, theory which is derived from a case study is not generalisable beyond the particular site.

However, transferability is sought by this study rather than generalisability. It is acknowledged that the results of the TALKnet study demonstrate the great influence public sector characteristics have on social software adoption. For example, some local authorities limited or banned access to social networking sites in the work place. The prevailing practice of seeking collaborative partners is by means of personal networks, and e-mail is still the dominant communication channel. All of these characteristics distinguish the public sector from the private sector. These findings can provide insights to another study in the public sector, while other findings have a more general implication. For example, limited features of perceived easy-to-use social software applications were used. Social relationships were both structures and resources for adoption. Social norm from meta-user affected users' use intention and behaviour. The theoretical insights generated from this single study provide a basis for future theory building.

In order to build theory, multiple studies in similar settings must be selected for future research. The theory-building process needs to follow a spiral process, which is essentially the interplay between the conceptual framework and the research cycle. The initial framework is based on the researcher's understanding at the beginning, which guides the first research cycle. The conceptual framework is updated with understanding gained as a result of the previous cycle. The new framework then guides the next research cycle (Carroll & Swatman 2000). Similarly, Eisenhardt (1989) indicates that an accumulation of both theory-building and theory-testing empirical studies are required to build a grand theory.

Secondly, in qualitative studies, the researcher is one of the instruments. In this study, the researcher was aware of the possible influence of her own behaviour and perceptions, and thus, deliberately kept a distance between herself and the studied network. In other words, she chose not to be an active member on TALKnet, so that she could ensure that her observation was objective. Also, the subject area on TALKnet was not the researcher's area of expertise, and this also restrained her from participating. Thus, when one interviewee reported that he did not contribute to TALKnet due to lack of confidence, the researcher was able to associate with her own experience. This is an interesting reflection. For future research, using online participative observation (similar to digital ethnography) as a complementary method perhaps can be considered, and this approach may enable the

researcher to gain a greater understanding of social software adoption by standing in the user's shoes (Masten & Plowman 2003).

Another potential problem relating to the researcher is in the data analysis. Qualitative data analysis research runs the risk of being biased by the researcher's own preconceptions and interpretations, and this study is no exception. Although the researcher used a number of tactics to reduce this risk, it is possible that bias remains. For example, initially, the researcher assumed that TALKnet had brought benefits, and the analysis focused on positive outcomes. Having had this problem pointed out by another researcher, the data analysis was then viewed from a different angle.

Thirdly, it is important to note that this study was conducted in the UK, which may use social software differently from other countries. In fact, the first case study suggests that there is national cultural difference in the use of social software, and this factor needs to be considered when studying globally-distributed collaboration.

Increasingly, social software is influential, both as a new class of information systems, but also as a modification of existing classes. Faced with the complexity of the web and cloud applications (e.g., Google Docs), social software is being deployed as a means of bringing order to otherwise over-complicated systems (Shirky 2005b). This means that it is important as an architectural element across information systems, and the suggestion that adoption is determined more by actors than functionality is especially pertinent. In this limited way, perhaps software is evolving beyond TAM and TTF type frameworks and into one where networked actors constantly arbitrate over solutions and their value. This is for further research.

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Appendices

Appendix 1. A summary of theoretical perspectives in IT research

The theoretical perspectives are reviewed in order to set the premise for the following discussion.

Three theories have been applied in information technology studies. They are social-determined theory, technology-determined theory and interaction theory. The first theory assumes a person's (group's) behaviour is determined internally, and the second assumes that behaviour is determined externally by the environment or by technology. Interaction theory assumes characteristics related to the people interact with characteristics related to the system. Different responses to technology may be given by the same group of users in different settings (Markus 2005). Social software falls into the category of collaborative technology. Collaborative technology is often "radically tailorable" and integrated into complex configuration with other tools (Orlikowski 2000, p. 424). Interaction theory is more relevant to a study of collaborative technology. Thus, an emphasis is put on interaction theory in the review.

In order to develop the tool view for research on e-collaboration technologies, Markus (2005) revisit the analysis of IT conceptualization by Orlikowski and Iacono (2001) and propose a new perspective- technology shaping perspective. We combine Markus's review with Orlikowski and Iacono's original article and summarize these views under three general types of IS theories (Table A.1).

Table A.1 Conceptualization of IT artifacts for e-collaboration research

General theories	Perspectives	Theories related to e-collaboration	Authors	Key idea	Objectives	Examples
Social-determined	IT features may be listed, but a person's (group's) behaviour is determined internally					
	the nominal view		Orlikowski & Iacono, 2001	IT artifacts are not described, conceptualized or theorized. Technology is essentially absent.	Technology is referred in passing as the context, motivation, or background against which to set examinations of phenomena.	Beath and Orlikowski (1994)
Interaction	There is an interaction between characteristics of the people and characteristics of the system. The same group of users can have different responses to technology in different settings.					
	Ensemble view	Structuration theory	Orlikowski, 1992; DeSanctis & Poole, 1994	A view account for the power of social practices without ignoring the potency of advanced technologies for shaping interaction. Key concepts are technology properties (structural features and spirit) and technology uses (appropriations).	Theorists aim to demonstrate that technology does not have impacts (or that technology effects differ substantially from those predicted by technology determinists). Studies are likely to review how the same technology is used in different ways owing to different contexts, institutional arrangements, local motivations, etc.	Gopal, Bostrom and Chin (1992, 1993); Chin et al. (1997); Chudoba (1999); Salisbury, Chin, Gopal and Newsted (2002)
		Social construction theory	Griffith & Northcraft, 1994; Griffith, 1999	Features are objective and psychosocial characteristics of communication media that result from designers' and users' choices		Griffith & Northcraft, 1994
		Practice theory	Orlikowski, 2000	The nature of technology changes during technology use, social structures emerge during the recurrent use of technology. Key concepts are technology-in-practice (technology use) and technology artifact.		Orlikowski, 2000
	Tool view	Technology shaping perspective	Markus 2005	Further development of the tool view with insights gained from ensemble view; Key concepts include technology features, technology-use patterns, and social impacts.	Researchers try to understand and explain technologies' "effects" or "impacts".	Palen & Grudin, 2002; Markus, 2004
Technology-determined	A given system be accepted or resisted in every setting because of its design features.					
	Tool view		Orlikowski & Iacono, 2001	Technical features and their effects on tool-using humans and organizations.		George, Easton, Nunamaker and Northcraft, 1990.

Ensemble view of technology

The "ensemble" view defined by Orlikowski and Iacono(2001) regards technology as only one element in a package of resources. Within this perspective, there are at least three streams.

Structuration theory

Structuration theory places an emphasis on the power of social practices without ignoring the potential of advanced technologies for shaping interaction (DeSanctis & Poole 1994).

Orlikowski (1992) reconceptualises technology and its relationship with organizations. Based on Orlikowski's (1992) work, DeSanctis and Poole (1994) develop Adaptive Structuration Theory (AST) in order to account for "the power of social practices without ignoring the potency of advanced technologies for shaping interaction".

Key concepts of structuration theory are technology properties (structural features and spirit) and technology uses (appropriations). IT features are viewed as the material nature of technology and the human activities that design or use those artefacts.

Social construction theory

The key argument of the social construction of technology (SCOT) is that "artefacts are socially constructed by social groups" and the process of interaction among these 'relevant social groups' gives the meanings to technological artefacts (Pinch and Bijker 1984 in Howcroft et al. 2004, p. 334).

As key figures in this stream, Griffith & Northcraft (1994) argue that features are both objective and psychosocial characteristics of communication media that result from designers' and users' choices. Later, Griffith (1999) inquires about the

conditions under which features would be noticed. Drawing on prior literature in cognitive psychology, Griffith identified three such conditions: novelty, discrepancy (relative to expectations, schemas or frames) and deliberate initiative (when the user is provoked by external events to think). Griffith also differentiated features on two dimensions with hypothesized links to novelty, discrepancy and initiative--whether the features were concrete or abstract and whether the features were core or tangential to the technology. Griffith generated a set of propositions to the effect that "concrete, core technology features are most likely to trigger sense-making" (Markus 2005, p. 483).

Although Griffith argued that users can create new features during the social construction and use of a technology, Markus (2005) identifies several issues with noticed features. The issues are: whether users could only notice features "as designed" into a technology; whether users might also perceive and make sense of features that are not "really" there; whether only noticed features are available for appropriation and/or creations into new features? (Markus 2005, p. 474)

Practice theory

Theorists who believe in practice hold the view that the nature of technology changes during technology use, social structures emerge during the recurrent use of technology (Orlikowski 2000). Key concepts of this theory are technology-in-practice (technology use) and technology artefact.

'Increasing use of e-collaboration technologies creates new challenges for research on technology use and effects: e-collaboration technology is often "radically tailorable" and integrated into complex configurations with other tools (Orlikowski 2000, p. 424).'

The material properties of e-collaboration technologies are not solely those initially created by designers; they also are the product of users' actions. Users can change their technologies by downloading plug-ins, developing (or commissioning

development of) specialized applications or modifying how features work through customization. Because “the nature of technology changes during technology use, social structures are not embedded in technology, but only emerge when ‘people interact recurrently with whatever properties [features] of the technology are at hand, whether these were built in, added on, modified or invented on the fly ” (Orlikowski 2000, p. 407).

The key strength of this practice perspective is its ability to explain how, where and why "slippage" occurs between the intentions of designers and the practices of users. Although this premise undoubtedly applies to most types of IT, it is particularly important for the specific case of e-collaboration technologies (Markus 2005)

Technology shaping view of technology

Technology shaping perspective can be viewed complementary to ensemble perspective as this view includes the insights gained from ensemble view with a focus on “tools”. Key concepts include technology features, technology-use patterns, and social impacts (Markus 2005).

It can be summarized as follows: Technologies pose problems for users who want to use them to accomplish particular goals; the solutions users create for those problems during recurrent use may exhibit certain regularities across different contexts. Consequently, small differences in the features of apparently similar tools could be associated with big differences in usage patterns and social outcomes. This hypothesis of a link between features and uses or outcomes is not deterministic. It allows for the possibility of choice, not just by implementers, but also by users. It merely asserts that although the ensemble view is useful (if not essential) for explaining differences that occur when one technology is used in different settings, at the aggregate level, differences in technology features might explain variations in usage patterns (Markus 2005).

The aim of a technology-shaping research agenda (a type of "tool view," Orlikowski & Iacono, 2001) is to learn whether, when, how and why the features of e-collaboration tools shape technology-use practices and social outcomes. The hypothesis guiding this agenda is that focusing directly on two concepts (features and patterns of use) that have largely been controlled in prior e-collaboration research might lead to a better understanding of technology effects.

The main challenges of adopting technology shaping perspective are to define and to operationalise technology features by answering the questions "What are features?" "How finely features need to be categorized?" (Markus 2005)

Technology features can be conceptualized and operationalised as designers' intentions, users' perceptions, material properties (structural features), researchers' assessment of spirit (DeSanctis & Poole, 1994) or the interplay among them (Markus 2005). Actors may not notice features when technology use is skilled behaviour (Markus 2004, 2005).

Another related methodological challenge is deciding (and controlling) the level of feature granularity (i.e., how finely one needs to categorize features) (DeSanctis & Poole, 1994; Griffith & Northcraft, 1994; Markus 2005). Markus (2005) has offered a few suggestions: one could start with a priori theoretical interests, such as decision making; one could start by looking at the technologies of a type and seeing where they differ most; another place to start is in the level and type of integration of various packages. Therefore, researchers will need to develop ways to characterize features, to cluster variations into manageable categories and to be explicit about the dynamic nature and temporal boundedness of their subject matter (Orlikowski & Iacono, 2001).

In summary, researchers with ensemble view and those with tool view have different research objectives (Table). Traditionally, theorists with ensemble view try to demonstrate that technology does not have impacts (or effects are less than predicted by technology determinists) while those with tool view attempt to

understand and explain technologies' "effects" or "impacts". Technology shaping perspective and ensemble view share the common ground on general theory (interaction) and key sets of concepts (technology features and technology uses), although researchers from different perspective tend to differ in the way of operationalising these concepts, for examples, how features are defined and whether technology features or uses is emphasized. If social-determined and technology determined perspectives can be assumed to be at two opposite edges of a spectrum, social-emphasized ensemble view and technology-emphasized tool view are closing the gap between these two opposite general theories. In other words, ensemble view and tool view together paint a full picture of how technology relates to its users in certain context.

Appendix 2. Interview guide – student group blogs

PLEASE RECALL YOUR LATEST GROUP BLOG EXPERIENCE

1. What was this group blog used for?
2. Can you please tell me about how the group blog is used for the assignment?

Social interaction

3. Did you know other members before?
4. Why did you contribute to the group blog for this assignment?
5. How did you use the group blog?
6. Did you have a team leader?
7. How often did you have team meetings?
8. How do you think your participation in the group affected what happened?
9. Did you make most of your contribution through the blog or in the meeting?
10. How did your group use the blog?
11. If we view your group as a person, how will you describe this person?

Intervention

12. Was your group blog open to anyone outside your group? If so, did the openness influence how you use the blog?

Task performance

13. How did you think you perform on the blog before knowing the results?
14. How did you think your group perform on the blog before knowing the results?

Perceptions after use

15. Was the blog useful in carrying out the group assignment?
16. For this assignment, did you enjoy using group blogs in general? Why?
17. For you, what are the benefits of using the group blog?
18. For your group, what are the benefits of using this group blog?
19. Given what you have described in the interview, what do you think about using blog for group assignment in the future?

Prior experience

20. Do you like to experiment with new Web tools?
21. Have you used group blogs before this assignment?
22. Did you spend time on learning how to use this blog?

Appendix 3. Assessment of student groups' blog content and report

Group Nr	Blog Post Quality				Total Nr of Entries	Group Report Mark
	A	B	C	D*		
1	9	22	2	7	40	21
2	20	43	13	42	118	20
3	15	13	5	18	51	17
4	4	12	6	24	46	15
5	10	25	8	21	64	17
6	4	11	6	18	39	17
7	12	42	11	49	114	18
8	14	24	5	21	64	12
9	8	19	3	17	47	14
10	11	18	3	17	49	19
11	12	29	5	23	69	18
12	8	19	13	7	47	28
13	13	22		3	38	18
14	5	15	2	5	27	20
15	9	27	3	16	55	17
16	7	8	7	19	41	14
17	8	12	14	38	72	19
18	9	9	1	11	30	18
19	5	18	6	9	38	18

* D would be given when the post was about group meeting schedule, acknowledgement, notification, information such as structure of report, marking scheme or any content unrelated to the case study discussion.

Appendix 4. Interview guide – TALKnet

BACKGROUND QUESTIONS: Please provide some basic information about you and your employer. Your answers will help us to understand TALK use and impact.

1. Please tell us briefly about your organisation's business?
2. How many employees does your organization have? Please select (highlight) from one below:

- | | |
|--|---|
| <input type="checkbox"/> 0-10 employees | <input type="checkbox"/> 500-999 employees |
| <input type="checkbox"/> 11-49 employees | <input type="checkbox"/> 1,000-2,499 employees |
| <input type="checkbox"/> 50-99 employees | <input type="checkbox"/> 2,500-4,999 employees |
| <input type="checkbox"/> 100-249 employees | <input type="checkbox"/> 5,000-9,999 employees |
| <input type="checkbox"/> 250-499 employees | <input type="checkbox"/> 10,000 or more employees |

3. What is your job title?
4. Can you briefly tell us what your main responsibilities are?
5. Can you please name UP TO THREE persons who you collaborate with most often and fill in the table below with their job roles, location and frequency of contact?

	Job role of the person you collaborate with most often	Inside your organisation (tick if applicable)	Outside your organisation (tick if applicable)	Average number of times PER WEEK you contact your collaborator
1				
2				
3				

6. Do you use technologies to collaborate with colleagues?
 - a. If so, what methods do you use MOST FREQUENTLY for collaboration (please RANK TOP THREE In order of frequency from the list below)?

<input type="checkbox"/> Face-to-face meeting	<input type="checkbox"/> Video Conference
<input type="checkbox"/> Personal Telephone Call /Voice Mail	<input type="checkbox"/> Shared Web space (including discussion forum; group weblog; group wiki)
<input type="checkbox"/> E-mail	<input type="checkbox"/> Commercial Groupware (e.g. Microsoft SharePoint; IBM Lotus Notes®)
<input type="checkbox"/> Instant Messaging	<input type="checkbox"/> Other (Please specify) _____
<input type="checkbox"/> Group Telephone Conference	

7. Personal profile

Employment status (e.g. part/full time) _____

Internet experience (year) ____

Age _____

Social media experience (year) ____

Nationality _____

Work experience (year) ____

INTERVIEW QUESTIONS: The following questions are to explore why and how you use social media for collaboration.

PART I. TALK COMMUNITY QUESTIONS

1. Why did you join the TALK community?
2. Is there anything special about TALK that makes it different from other communities, such as Communities of Practice for Local Government (IDeA)?
 - a) If so, please tell us both technological and social reasons.
 - b) If not, what TALK does NOT deliver what you are hoping for?
3. As a TALK member, how did/do you contribute to the community? And why do you do so?
4. Has TALK helped you in any of the following ways (please verify with examples):
 - a) To communicate with colleagues in the same organisation
 - b) To communicate with colleagues outside the organisation
 - c) To find new collaborators
5. Has TALK helped you in your work? If so, can you give examples of this?
6. What would make you to continue to use or use TALK more in the future?

PART II. TASK CHARACTERISTICS QUESTIONS

7. What types of tasks do you use collaborative technologies (incl. email, blogs, wikis, SN sites) for?
 - a) Can you describe any **examples** of where these technologies are especially useful?
 - b) When you make your choice of collaborative technologies, are there any **restrictions** that you have to consider?

PART III. TECHNOLOGY QUESTIONS

8. As well as TALK, what other technologies do you use to collaborate with people both inside and outside your organisation?
9. From a technological perspective, what issues are important when deciding whether or not to use a certain technology for collaboration?

ease of use	previous experience
usefulness	influence from others
privacy	other
personal innovativeness	

10. Did you find social networking site like TALK is difficult to use? (blog, wiki)
11. Which of the following functional features are **important** for you when choosing collaborative technologies (Please select **as many as you want** from the list)?

<input type="checkbox"/> Automatic email notification about updates or Really Simple Syndication (RSS)	<input type="checkbox"/> Being able to edit a document
<input type="checkbox"/> User profiles	<input type="checkbox"/> Being able to view online/offline status of colleagues
<input type="checkbox"/> Privacy settings (e.g. Access control)	<input type="checkbox"/> video, webcast and multimedia
<input type="checkbox"/> Search engine	<input type="checkbox"/> Being able to see the total number of the viewers
<input type="checkbox"/> Being able to comment	<input type="checkbox"/> Other (please specify)_____
12. For an average week, what proportion of your time do you spend on technology? F2F meeting?
13. Is there anything else you would like to add?

THANK YOU VERY MUCH FOR YOUR TIME

Appendix 5. Review of some Web-based GSS studies

5.1 Web-based Group Support Systems: A Descriptive Evaluation of Case and Field Studies – Methods

Authors	Technology/Media Used	Theory/Data Collection Methods	Organisational Context/Nation	Groups	Task	Sessions
Alavi, Marakas, Youngjin 2002	Two technology-supported distributed learning environment: One employed a simple e-mail and listserv, the other use sophisticated GSS(Beta system) – Tools: e-mail, media centre, discussion board, workflow management, coordination; F2F & Asynchronous; Training	Quasi-experimental field study: questionnaire; e-mail and Beta systems electronic messages	University	206 students of executive development programme; 121 males & 85 females with average age 49 and various educational backgrounds. Students are separated into four cohorts with 50-53 individuals each. Each cohort was split into small groups (7-10people)	Real-life task: a complex community planning and development project for a town of 35,000 people	10 weeks of distributed learning after 2 weeks of residential course
Chan et al. 2004	Community systems: Yahoo! Groups	Case study: qualitative survey and interviews via electronic means	A virtual community on academic dress initiated by one person	more than 300 members	Exchange information on academic study on dress	Since 1999
Dennis & Garfield 2003	GSS: GroupSystems, Level 2, Decision room; e-mail; Facilitator; Anonymity?	Comparative case study; Observation, interview, transcripts, and questionnaires; Complement qualitative data with small N of quantitative survey data	Department of Nursing in American Medical Centre(AMC) and American Physicians Corporation (APC)	Six project teams- half the teams used a GSS while the other half used traditional processes; directors and managers in five directorates in AMC and APC; Teams ranged from six to eight members & predominantly female; Leaders chaired the meetings. Emergent leadership and assumed leadership (the highest ranking person); Not all	To write a proposal to improve satisfaction of four customer groups: patients, families, physicians, and nurses within AMC	Seven weeks; Multiple sessions in each team

Authors	Technology/Media Used	Theory/Data Collection Methods	Organisational Context/Nation	Groups	Task	Sessions
				members participated each meeting		
Gasson 2004	F2F; ICT tools were not reported.	Longitudinal field study: participative observation, semi-structured interviews, group workshops	NTEL Ltd: a mid-sized UK engineering firm, specialized in the design, manufacture & sales of products to the telecommunications industry	7 managers: Led by the IS manager and the Process Improvement Manager; other group members are representatives of five main divisions of the company: marketing, finance, engineering, operations and commerce.	High-level co-design of business processes and IT systems for an internal business process that spanned organisational boundaries: responding to customer invitations to bid for new business	over 15 months
Geib et al. 2004	Community systems: 1. Learning network: IBM Lotus Notes/Domino, Lotus Team Workplace (Quickplace3.0) and Lotus Sametime3.0; Tools: course support, teamwork, communication, member profiles, content administration. 2. Expert network: IBM Lotus Teamwork, Lotus Sametime3.0. Tools: content display, online collaborative workspace, archive, chat, support functions	Case study : discussions with community members; Web log analysis	1. University; 2. University & Six major Swiss and German financial services companies	2 virtual communities: a learning network of postgraduate students and an interorganizational expert network consisting of experts from different companies working in the areas of customer relationship management (CRM) and knowledge management (KM). Network size was not reported.	1. Learning network(BEC): support executive MBA education; 2. Expert network (CKP-Net): to develop knowledge in the areas of customer-oriented knowledge management and knowledge-enabled customer relationship management with a focus on performance management	Not reported

Authors	Technology/Media Used	Theory/Data Collection Methods	Organisational Context/Nation	Groups	Task	Sessions
Mlhotra, Majchrzak, Carman, & Lott 2001	Knowledge portal technology, "Internet Notebook" and Project Vault, and teleconferencing; Level 2, asynchronous & synchronous; Tools: secure access from anywhere; to create, comment on, reference-link, search, sort entries; and an electronic whiteboard that allowed for near-instantaneous access to the same entry. The Project Vault allowed secure common file storage & transfer. Technology facilitator; Training	Case study: ethnographic observation, panel questionnaire surveys, interviews, "lessons learned" group meetings, weekly logs of collaborative technology usage	Three organisations: Boeing-Rocketdyne; Raytheon, MacNeal-Schwendler Corporation	One; VC3 team(Virtual Cross-value-chain, Creative Collaborative Teams): 8 experts from different background who had never worked together; formal leadership	Radical innovation: Design SLICE (Simple Low-cost Innovative Concepts Engine)	10 months, with no team member devoting >15 % of his or her time; 86 virtual meetings (or about 2.5 hours per week)
Paul & McDaniel 2004	Healthcare delivery system. No further details provided.	Comparative case study: semi-structured interviews with 74 healthcare professional	Three telemedicine networks located in the USA. Each of the networks had at its hub a university-affiliated health sciences centre (HSC) and the spokes of the networks in rural areas.	Established groups; 10 telemedicine projects in 3 types: Two of the five teleconsultation projects involved multiple specialities; distance learning involved HSC specialists and residents; Teleradiology projects involved HSC radiologists and rural primary care physicians;	Projects involving 5 teleconsultation, 3 distance learning, and 2 teleradiology telemedicine activities	4 months - 2 years
Watson-Ma nheim & Belanger 2002*	All electronic communication means: incl. e-mail, voice mail, teleconferencing, instant messenger, intranet and a variety of groupware etc.	Case study: semi-structured Interviews; documents, observations	The sales divisions of two major (Fortune 100) companies in the	Intra-organisation distributed work teams; Firm A: 16 professionals, 4 managers from sales and technical sides; Firm B: 14 professional,	Communication-based work	Not reported

Authors	Technology/Media Used	Theory/Data Collection Methods	Organisational Context/Nation	Groups	Task	Sessions
			information technology industry. Both companies are global in scope.	6 managers from four functional areas, i.e., service managers, product specialists, client managers, and off-site services.		
Wierba, Finholt, Steves 2002	Desktop conferencing application: Microsoft NetMeeting for synchronous document transfer & MS Outlook (unofficially) for calendar sharing; email ; presence awareness tool (proposed); 15 members received training	Case study; two-round web-based surveys (pre-intervention and follow up) ; 24 semi-structured interviews	an US-based, automobile parts manufacturing company	A product development group of app. 50 experts from different business units across multiple time-zones. The team comprised several distributed sub-teams. The business units worked together for the first time.	develop a new system	One year
Zhang & Faerman 2004	Knowledge portal technology: MARCOS system, which is a Lotus Notes based application powered by InterTrac software. Tools: management of contacts, documents, correspondences, projects, workflow, and knowledge base; Facilitators	Case study: semi-structured interviews with 19 participants; observation; documents and archival data	the Division of Municipal Affairs (MA) of the New York Office of the State Comptroller (OSC), regional officers, local governments	8 MA regional offices and its central office; 3200 local governments in New York State	Building a knowledge repository, the Multi-Purpose Access for Customer Relations & Operational Support (MACROS) System to streamline the collection, organisation and distribution of financial and other information	Since 1998

5.2 Web-based Group Support Systems: A Descriptive Evaluation of Case and Field Studies – Results

Authors	Results	Conclusions
Alavi, Marakas, Youngjin 2002	The learning outcome of the e-mail environment was higher than the learning outcome of the more sophisticated GSS environment. The post-hoc analysis of the electronic messages indicated that the students in groups using the e-mail system exchanged higher percentage of messages related to the learning task. The Beta system users exchanged a higher level of technology sense-making messages. No significant difference was observed in the students' satisfaction with the learning process under the two DL environments.	
Chan et al. 2004	<ul style="list-style-type: none"> - Informants share their expertise because it makes them feel self-efficacious and boosts their self-esteem. Furthermore, this study also shows that participation is influenced by the informants' perception of self-efficacy on the topic in discussion. - Contradicting to existing theory, this study has found that providing an identity to the members encourages their participation. -It was found that tangible recognition affirms one's status in the virtual community. 	<ul style="list-style-type: none"> - The effects of these forms of recognition (i.e., identification, expertise and tangible recognition) include sense of community, obligation, self-efficacy and self-esteem. - These effects in turn encourage participation through the moderation of time and interest on the topic of discussion.
Dennis & Garfield 2003	<ul style="list-style-type: none"> - The traditional teams produced projects that focused on improving physician satisfaction. Only one project received a good reception and was partially implemented. - The projects developed by the GSS teams focused on the participants themselves - the nurses - rather than on the physicians. Two GSS projects were received and implemented within two years. 	<ul style="list-style-type: none"> - Three GSS features were seen as important: meeting memory; the facilitator; parallelism, while two were significantly less important (meeting planning and anonymity). - GSS use enables teams to turn more equal participation into more participative processes and outcomes that better reflect the interests of all members, not just those of the leaders. - Many of the lessons learned and critical success factors from prior special-event (one-off) research failed in this setting. Project teams have different needs for GSS tools than those designed for special event uses and that significantly more field research is needed on GSS project teams.
Gasson 2004	The project was delayed severely. It could not realize the radical change they expected due to lack of cooperation from the Marketing division. Project closure was achieved in a rush of delegation.	<ul style="list-style-type: none"> - Knowledge as embedded within a social community of practice - by applying an analysis of how different types of knowledge interacted to produce collective learning and understanding, we have exposed the nature of such knowledge creation as socially-shared or distributed, rather than as individual or shared. - With increasing design experience, the group focus shifted to managing distributed knowledge. - The role of representational forms, or genres, in mobilizing a move from one mode of knowledge-manipulation to another may be significant in managing distributed knowledge.

Authors	Results	Conclusions
Geib et al. 2004	<ul style="list-style-type: none"> - Functions that support structured user processes with clear user requirements are preferably used. - Personal information on community members is frequently viewed. - Most synchronous and asynchronous communication functions are rarely used. - Community users make few own contributions. - Functions that implement potentially redundant functions are rarely used. 	<ul style="list-style-type: none"> - The implemented functions should be customised to support user processes associated with the specific community. If the functions do not directly support user processes, or support tasks that are already supported by other systems (e.g., calendaring), this will result in a lack of utilization. - The system has to offer the opportunity to publish the personal and work contexts of the community members in order to facilitate mutual exchange.
Mlhotra, Majchrzak, Carman, & Lott 2001	<p>Successfully designed high quality low cost engine within budget, within 10 months, with >50% reduction in total engineering hours compared to traditional teams</p>	<ul style="list-style-type: none"> - The technology needed to be in place before the work starts. The team needed the ability to modify the technology. However, the issues of speedy knowledge retrieval had never been solved. The team members never used the tool's powerful navigation and search functionalities. - The success of such teams will require not just provision of technology but more importantly formulation of appropriate inter-organisational strategy and structuring of conducive inter-organisational work processes and dramatic reassessments of current business contracts, practices and processes. - Further, all three-technology, strategy, and work processes - will have to be flexible enough to be moulded to the requirements of each of these teams.
Paul & McDaniel 2004	<ul style="list-style-type: none"> - Interpersonal trust is a primary determinant as to whether virtual collaborative relationships (VCRs) can address complex situations. - It extended prior research by examining the roles four types of interpersonal trust play, and providing strong support for the hypothesis that there is a positive association between integrated interpersonal trust and VCR performance. A neutral or positive assessment of the other party's competence is a necessary but not sufficient condition if a VCR's performance is to be positive. Calculative trust plays an accentuating role, implying that it tends to sharpen the differentiation delineated by competence trust. In contrast, relational trust plays an attenuating role where it tends to temper the differentiation delineated by the other types of trust. - Managers of virtual collaborative processes in both the project design phase and the management of the project must pay attention to all of the types of interpersonal trust to enhance their adoption; - IT professionals need to focus more on the social context in which the technologies exist. 	
Watson-Manheim & Belanger 2002	<ul style="list-style-type: none"> - In two divisions, e-mail, voice-mail, teleconferencing, and pagers were heavily used. Employees in Firm B used mobile phone significantly more than in Firm A. - Instant messenger usage seems dependent on employee preference. - In Firm B, a variety of groupware were used on a limited basis, primarily as knowledge repository for the 	<ul style="list-style-type: none"> - The findings highlight the importance of culture in media choice, even for tasks that would otherwise not be appropriate (conflict resolution). Other factors also influence media choice, such as urgency of communication. - The lack of training affects significantly technology use because overworked individuals do not take the time to learn new tools, even when their own firms makes or sells this technology! - The type of team impacts the perceived effectiveness of the team, but that this

Authors	Results	Conclusions
	division. - In both organisations, there was wide-spread use of intranets for information dissemination and knowledge-sharing. - Desktop video conferencing, Personal Digital Assistants, project tracking tools use not widely used.	relationship is often due to the lack of co-presence and the reliance on communication technologies for accomplishing team objectives. - Relationship development in the organisation was linked to successful information gathering and knowledge sharing. - Different communication-based work process required different communication modes. e.g. knowledge sharing occurred in formal and informal meetings, and through the use of intranets, groupware and listservs. Yet, there are conflict resolutions.
Wierba, Finholt, Steves 2002	- The calendar tool adopted much more broadly than NetMeeting and the presence awareness tool. - A desktop conferencing tool appeals mainly to the workers who must collaborate with distant colleagues in real-time. - Some reductions in coordination difficulties and frequency of delay - desktop conferencing improved synchronous interactions in the CAR team	- Doing research in the field, within actual engineering teams, requires enormous cooperation and compromise. E.g. Researchers wanted to introduce three collaborative tools, but only one, NetMeeting, was allowed to be formally introduced because of Auto1 legal and operational concerns. - It is difficult to overcome inertia in organisational settings. There seems to be a threshold of benefit assessed by individuals before adoption takes place, which is experienced both in terms of frequency and magnitude of the perceived value added by the candidate tool. New collaborative tools must be clearly superior to existing practices to merit the effort of deployment.
Zhang & Faerman 2004	- Not only has the MARCOS Project developed an information technology mediated knowledge-base whereby knowledge can be systematically collected, organized, augmented, and distributed, MARCOS has been a stimulus and catalyst for learning and learning-oriented organisational changes. - Knowledge sharing has been institutionalized through the information system as well as through the newly created or enhanced frameworks, norms, routines and networks, and become a driving force for continuous learning and positive behaviour changes.	- The nature of knowledge was an important influence on the success of the MACROS project in that it moderated the relationship between the organisational and technological factors and the knowledge sharing processes. - The modifying effects occurred along three dimensions-codifiability, context-embeddedness, and practice-embeddedness. - The level of codifiability appeared to dictate the implementation strategy; reduced context-embeddedness allowed for more effective group coordination; reduced context-embeddedness also enhanced trust; codified knowledge is more effective than uncoded knowledge in demonstrating concrete incentives; and technology interacts with context-embeddedness and practice-embeddedness.