AUTHORITY–BASED AND BOTTOM–UP DIFFUSION OF COLLABORATION INFORMATION TECHNOLOGIES: CONSTRAINTS AND ENABLEMENTS

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GLOSSARY

ANT Actor-Network Theory

API Application Programming Interface

APMS Automated Performance Measurement System

B.C. Before Christ

BMW Bayerische Motoren Werke AG

CA Content Analysis

CAD Computer-Aided Design

CAM Computer-Aided Manufacturing

CASE Computer-Aided Software Engineering

CCC Computer Consulting Company

CDSS Computer Decision Support System, Clinical Decision Support Systems

CEO Chief Executive Officer

CF Conceptual Framework

CGM consumer-generated media

CIA Central Intelligence Agency

CIM Computer Integrated Manufacturing

CIO Chief Information Officer

CIS common information spaces

CITs Collaborative Information Technologies – the term 'CIT' is applied in this Thesis as an umbrella term denoting a broad view on various types of computer-based collaborative systems, i.e. CSCW systems, EMS, MSS, GDSS, GSS, Groupware, eCollaboration tools etc.

CMC Computer Mediated Communication

CRM Customer Relationaship Management

CSCW Computer Supported Collaborative Work, Computer Supported Cooperative Work

(I prefer the adjective 'collaborative' for the second individual character 'C' in the term 'CSCW' for the following reasons:

• There is ideology inherent in the term 'cooperative work' which makes it a 'too sweet' label, inadequate to describe the realities of everyday work situations;

• I deem the term 'collaborative work' a more appropriate general and neutral designation of multiple persons working together;

• If we should stick to a neutral and general meaning, we would rather find it in the term 'collaborative work' because – as discussed in Section 3.2. – cooperative work denotes a higher level of collective endeavour).

CSD Customer Support Department

CSS Collaboration Support Software, Communication Support Systems

CVS Concurrent Versions System

CWEs Collaborative Working Environments

DB Database

DBMS Database Management System

DGSS Distributed Group Support Systems

DMS Discussion Moderation System

DoI/DOI Diffusion of Innovation

DSS Decision Support System

DVBN Deutsches Vergabe und Beschaffungsnetz

eCollaboration Electronic Collaboraion

EIS Executive Information System

ELM Elaboration Likelihood Model

EMS Electronic Meeting System

ERP Enterprise Resource Planning

ESS Executive Support System

EST Expert System Technologies

FtF Face to Face

FBI Federal Bureau of Investigation

GCS Groupware Calendar Systems

GCSS Group Communication Support System

GDSS Group Decision Support System

GIB Global Investment Bank

GSS Group Support System

GW Groupware

HDB Housing and Development Board

IAS Intelligent Assistant System

IBIS Issue Based Information System, Internet-based Information System

ICT Information and Communication Technologies

IDD International Distribution Department

IDEF Integrated DEFinition

IDT Innovation Diffusion Theory

IE Information Engineering

IP Internet Protocol

IS Information System

ISPs Internet Service Providers

IT Information Technology

KBS Knowledge-Based Systems

KE Knowledge Exchange

KIT kollaborative Informationstechnologien

KM Knowledge Management

LCCNA Lanark County Communications Network Alliance

MCTs Multi-Organisation Collaboration Teams

MM Mental Map

MMOG Massive Multiplayer Online Games

MOG Multiplayer Online Games

MSS Meeting Support Systems

MUD Multi User Domains

NSA National Security Agency

NSS Negotiation Support Systems

OIS Office Information Systems

OSS Open Source Software

Ph.D. Doctor of Philosophy

PARC Palo Alto Research Center (Xerox PARC)

PC Personal Computer

RA Rapid Appraisal

R&D Research and Development

SARS Severe Acute Respiratory Syndrome

SBS Social Bookmarking Service

SC Structured Case

SCS Supply Chain Systems

SCM Supply Chain Management

SM Social Media

SNS Social Networking Service

SODA Strategic Options Development and Analysis

SS Social Software: user-created and community-driven software, produced by volunteer contributors, and offering high levels of social involvement and participation. Also called user-generated content (UGC) or consumer-generated media (CGM).

Some examples include: blogs (or weblogs) for storytelling, wikis, forums, collaborative software for peer-based planning and management, idea generation (ideation) banks, social networking tools, social bookmarking platforms for tagging and building folksonomies, mashups, podcasts, newsgroups, group message boards, and prediction and forecasting platforms (so called prediction markets).

SSS Social Support System

SW Shared Workspaces

TAM Technology Adoption Model

TRC Technical Research Centre

UK United Kingdom

USA United States of America

UGC user-generated content

VoIP Voice over IP

VTT Virtual Team Technologies

WHO World Health Organisation

WMS/WfMS Workflow Management Systems

WNSS Web-based Negotiation Support Systems

WWW World Wide Web

ZUSAMMENFASSUNG

Diese Dissertation berichtet über den aktuellen Stand der Diffusion von kollaborativen Informationstechnologien (KIT). Die Untersuchung kommt mit großer Gewissheit zu dem Schluss, dass wir heute über einen 'befriedigenden' Diffusionsstand der 'level-A' KIT (hauptsächlich E-Mail, entfernt gefolgt von Audio-Konferenz-Systemen) sowie über einen 'unbefriedigenden' Diffusionsstand der 'higher-level' KIT (d. h. KIT, die einer intensiven Kollaboration und Kooperation zwischen Benutzern bedürfen, wie z. B. Sitzungsunterstützungssysteme, Entscheidungsunterstützungssysteme, usw.) verfügen. Deren potenzieller Nutzen ist aufgrund mangelnder Benutzerakzeptanz noch längst nicht umfassend erkannt. Diese Schlussfolgerung wurde wie folgt schrittweise während des Forschungsablaufs entwickelt:

- Zu Anfang basierte diese Vermutung auf eigenen Erfahrungen sowie auf Aussagen von Mitgliedern meines beruflichen Umfelds.
- Nachfolgend wurde diese Vermutung durch Experteninterviews gestützt (empirische Studie I).
- Bestätigung für die Gültigkeit dieser These vermittelt die Vergleichsanalyse von Fallstudien (empirische Studie II). Dabei habe ich die Beobachtungserfahrungen aus den Entwicklungen und Einführungsversuchen mehrerer Jahrzehnte für KIT zusammengefasst. Auf der Grundlage dieser Resultate bestimme ich eine Reihe ***persistenter Probleme*** sowie häufig auftretende Hindernisse für die Akzeptanz von Kollaborationstechnologien – hauptsächlich 'higher-level' Kollaborationstechnologien.
- Weitere Bestätigung liefert die Inhaltsanalyse von Fachliteratur zu KIT (empirische Studie III). Meine sekundäre (summative) Erkenntnis ist hier, dass alle Studien, die sich bis heute mit den KIT-Diffusionsproblemen beschäftigt haben, einstimmig zum Schluss kamen, dass die diskursiven und instrumentalen KIT noch keine übergreifende Umsetzung und keinen hohen Anwendungsgrad im Geschäftsbereich erreicht haben. Zudem liegt *kein* Nachweis einer schnellen Diffusion der 'higher-level' KIT vor.

In der Praxis bedeutet dies, dass, wenn wir heute eine beliebige Organisation betrachten, wir höchstwahrscheinlich folgendes, typisches Nutzungsmuster kollaborativer Systeme beobachten würden: einige wenige 'level-A' KIT in aktiver Nutzung (in hohem Maße E-Mail, mit großem Abstand gefolgt von Audio-Konferenz-Systemen). Es ist höchst *un*wahrscheinlich, dass wir andere KIT-Typen in aktiver Nutzung sehen würden. Das wahrscheinlich zu beobachtende Nutzungsbild wäre primär charakterisiert durch 'technologische Ablehnung', 'Zweifel', 'Substitution' oder 'Erforschung'. Zudem würden wir beobachten, dass Werkzeuge wie Entscheidungsunterstützungssysteme, Sitzungsunterstützungssysteme, Problembehebungssysteme sowie Diskussionsmoderationssysteme (so genannte 'higher-level' Kollaborationstechnologien) am wenigsten verfügbar und am seltensten genutzt werden. Dies weist darauf hin, dass erhebliche Hindernisse für die Akzeptanz und Nutzung solcher Technologien bestehen.

Eine weitere, unvorhergesehene und recht interessante Erkenntnis aus dieser Studie ist das Stattfinden einer umfangreichen Berichterstattung [meistens Business-Berichterstattung] über zahlreiche, durch Web-2.0-Benutzergemeinschaften bereitgestellte Kollaborationstechnologien (die meisten aus der Kategorie ‘soziale KIT’) sowie deren Weiterentwicklung aus autonomen ‘*Bottom-up*’-Lösungen zu unternehmensgestützten Kommunikationsinfrastrukturen. Folgende Praktiken sind als Beispiele heranzuziehen: Mitarbeiter die am Arbeitsplatz über die Arbeit bloggen, Mitarbeiter die selbst erstellte Wikis oder Mashups für das Projektmanagement verwenden, ohne die Geschäftsleitung darüber zu informieren, Mitarbeiter, die organisatorische ‘Folksonomien’ durch Social Tagging erstellen, die sich mit Kollegen mit ähnlichen Interessen zusammenschließen (und dabei eine eigene ‘Peergroup’ bilden), oder sogar Mitarbeiter, die Multiplayer-Onlinespiele zur Koordination ihrer Aktivitäten und für die virtuelle Zusammenarbeit verwenden. Seit 2006 findet die Anwendung solcher Praktiken sehr häufig Erwähnung in Geschäftberichten, wobei diese Praktiken gegen jede traditionelle Vorstellung korporativer Kommunikation verstoßen, weil 1) diese kollaborative Lösungen, statt unternehmensbestimmt zu sein, selbst ausgewählt und durch Selbstinitiative eingeführt sind; 2) diese Lösungen kein geplanter Teil der organisatorischen IT-Infrastruktur und kein Ergebnis gezielter Investition, sondern gewachsene, ‘De-facto’-Kollaborationssysteme sind. In diesem Sinne entsprechen derartige kollaborative Lösungen dem, was die IS-Fachwelt als ‘Shadow IT’ anerkannt hat (d. h. eine Reihe von IT-Werkzeugen, die für das Ausführen von IT-Funktionen verwendet werden, aber kein Teil der etablierten IT Organisation sind).

Ein weiterer Beitrag dieser Dissertation – ebenfalls nahegelegt durch die empirische Studie I und überprüft durch die empirischen Studien II und III – betrifft die ‘Prozessstruktur’ der KIT-Diffusion. Ich hatte *ab initio* geplant, dass der primäre Schwerpunkt meiner Forschung auf der Innovationsdiffusion liegen sollte. Die Identifikation zweier unterschiedlicher Diffusionswege bot die Motivation und die Gelegenheit, meine Forschung zu restrukturieren. Ich hatte herausgefunden, dass sich Kollaborationstechnologie entlang zweier unterschiedlicher (gegenseitig abhängiger aber orthogonaler) Diffusionswege ausbreitet – *top-down (autoritätsbasiert)* und *bottom-up*. Beim autoritätsbasierten Diffusionsweg erfolgen gezielte Bemühungen, den Mitarbeitern die Technologienutzung aufzuerlegen, wobei die Hauptsorge ist, ob sich die Technologie reibungslos und auf einfache Weise in die organisatorische IT-Infrastruktur integrieren lässt. Verschiedene Erfahrungen haben gezeigt, dass es Unternehmen gelingen kann, die Verwendung von *Transaktionssystemen* bei ihren Mitarbeitern durchzusetzen. In Fällen, in denen gemeinsames *kreatives* Arbeiten durch KIT unterstützt werden soll, zeigen sich autoritätsbasierte Einführungsstrategien jedoch als weniger erfolgreich. Das typische Ergebnis ist entweder ‘Einführung ohne Einsatz’ (nur das Unternehmen akzeptiert die Kollaborationstechnologie, aber nicht die Mitarbeiter) oder skeptische Nutzung. Der Bottom-up-Diffusionsweg scheint dagegen erfolgreich zu sein.

Diese Dissertation erläutert, warum KIT Diffusion so strukturiert ist, d. h. mit zwei orthogonalen Diffusionswegen. Bei der Suche nach der Antwort auf die Frage ‘Warum?’ umreiße ich eine Vielzahl von Faktoren (Eigenschaften des Systems, Eigenschaften der Kooperierenden und Faktoren des Organisatorischen Kontexts) und entwickle begründete Hypothesen dazu, welche Faktoren die Akzeptanz und Diffusion von KIT bestimmen. Die für diese Untersuchung verwendete Forschungsmethodologie ist qualitativ und interpretativ. Ein Untersuchungsergebnis ist ein historischer Rückblick darauf, wie die KIT-Forschungsgemeinschaft sich selbst sowie die KIT-Diffusion in den letzten zehn Jahren konzipiert hat. Der Beitrag dieser Untersuchung kann wie folgt zusammengefasst werden:

(1) Diese Untersuchung vereinigt nahezu alle Forschungsergebnisse über die Akzeptanz und Diffusion von KIT, die die KIT-Forschungsgemeinschaft bis dato publiziert hat. Sie vermittelt somit einen schlüssigen Überblick über den dynamischen Forschungsfokus und die gesammelten Erkenntnisse eines Zeitraums von (mindestens) zehn Jahren.

(2) Diese Arbeit bietet einen sinnvollen Rahmen für die Analyse des verfügbaren Wissensstands und erweitert diese Wissensbasis durch die Identifizierung ***persistenter Probleme*** bei der Akzeptanz, Einführung und Diffusion von Kollaborationstechnologien. Solche Probleme wurden in der Praxis wiederholt beobachtet, ein Muster wurde aber von der Fachgemeinschaft nicht erkannt. Viele dieser Probleme der KIT-Nutzung wurden vor zehn Jahren, vor fünf Jahren, vor drei Jahren beobachtet und treten heute trotz der unbestreitbar schnellen technologischen Entwicklung in derselben strukturellen Form auf. Dies veranlasst mich zu dem Schluss, dass zumindest einige dieser persistenten Probleme der KIT-Diffusion als 'bestimmende Faktoren' angenommen werden können. Mein Beitrag hier ist die Identifikation dieser Faktoren, deren ausführliche Diskussion und eine zeitlich strukturierte Darstellung der Entwicklung der KIT-Diffusion.

(3) Anhand meines obengenannten Beitrags (2) zeige ich eine Diskrepanz zwischen 'Wissen' und 'Handlung' auf dem Gebiet der KIT auf sowie einen potenziellen Lösungsansatz, wie die Fachgemeinschaft diese Diskrepanz überbrücken könnte. Die 'Wissen-Handlung'-Diskrepanz ist, meiner Meinung nach, eine fundamentale Schwäche des Forschungsansatzes zur KIT-Diffusion. Die Diskrepanz kann durch die kognitive Distanz zwischen 'KIT-Wissen' und 'KIT-Handlung' operationalisiert werden. Mein historischer Rückblick zeigt eine fehlende Lernfähigkeit in zweierlei Hinsicht:

(a) fehlendes Lernen aus Jahrzehnten von KIT-Entwicklungen und -Einführungsversuchen;

(b) fehlendes Lernen aus der Theorie (es besteht ein Mangel an der Nutzung von Theorien auf dem Gebiet der KIT und kein Konsens darüber, was KIT-Theorie ist, ob eine solche Theorie erforderlich ist usw.).

Daher mangelt es am inkrementellen Aufbau des KIT-Wissens, das wir benötigen, um Kollaborationstechnologien und organisatorische IS-Strategien zu entwickeln (beispielsweise um Akzeptanz zu wecken).

Meine Forschung zur Geschichte der KIT-Entwicklung hat mich davon überzeugt, dass ein gewisser Grad an 'Bescheidenheit' notwendig ist, um folgende Ziele zu erreichen: a) die Entwicklung real nutzbarer und gut akzeptierter

Kollaborationstechnologien, sowie b) die Umsetzung erfolgreicher organisatorischer KIT-Strategien. Insbesondere der historische Rückblick weist darauf hin, dass Softwareentwickler und IS-Strategen häufig folgende unrealistische Erwartungen pflegen: Softwareentwickler überschätzen oftmals ihre eigene Fähigkeit, sämtliche Nutzungsarten von Kollaborationssystemen vorherzusagen. Gleichermaßen überschätzen IS-Strategen ihre Fähigkeit, vorherzusagen, inwieweit ihre Pläne zur Einführung von Technologien von den Betroffenen akzeptiert und befolgt werden. In dieser Arbeit nehme ich einen Standpunkt gewisser 'Bescheidenheit' ein, indem ich die Erkenntnissen der KIT-Forschung zweier Jahrzehnte nutze und darauf aufbaue. Ich empfehle dabei eine Refokussierung auf Fragen der Akzeptanz und Diffusion multipler KIT-Lösungen innerhalb wechselnder organisatorischer Kontexte basierend auf den Erkenntnissen verschiedener KIT-Entwicklungen und -Einführungsversuche. Mit der Identifizierung der Faktoren, die sich als ***persistent bestimmend*** für die KIT-Diffusion erweisen, trage ich zu den langfristigen Zielen der Entwicklung gut akzeptierter Kollaborationstechnologien sowie der Umsetzung erfolgreicher KIT-Organisationsstrategien bei.

In dieser Dissertation versuche ich, einen tieferen Einblick (tiefer gehend als der eines strikten Konstruktivisten) in die fundamentalen Bedingungen der heutigen Kollaboration zu erlangen, um zu ermitteln, welche kollaborativen Strukturen aufgetreten sind und ***warum*** einige computerbasierte Technologien diese Strukturen gut zu unterstützen scheinen, andere dagegen nicht. Anhand der qualitativen und interpretativen Art meiner Forschung habe ich 'begründete Hypothesen' statt definitiver Aussagen generiert, die in einer zukünftigen Arbeit geprüft werden müssen. Durch meinem Vergleich der beiden unterschiedlichen Diffusionswege (autoritätsbasiert und bottom–up) habe ich versucht, meine Hypothesen zu untermauern und auf diese Weise die Motivation der Fachgemeinschaft zu erhöhen, sich mit ihr zu beschäftigen und sie zu überprüfen. Zusätzlich zur analytischen Auswertung der Historie beider Diffusionswege ist das Endergebnis dieser Dissertation ein konzeptuelles Rahmenwerk, das zur Darstellung der beiden Diffusionswege und deren Determinanten dient. Ich verstehe die Diffusion von Kollaborationstechnologien als einen Prozess intellektueller Transaktionen zwischen der privaten und der professionellen 'sozialen Welt'. Dadurch erachte und anerkenne ich die verschiedenen Kombinationen abhängiger Akzeptanzentscheidungen – vorgeschriebene, konsensbasierte und freiwillige – als möglich. Mit der Auswahl der 'sozialen Welt' als grundlegende KIT-Forschungseinheit schließe ich mich einer Forschungsrichtung an, die eine Ausweitung der KIT über den bisher nahezu exklusiven Einsatzbereich des traditionellen Arbeitsplatzes hinaus propagiert. Im Wesentlichen hoffe ich, zur Stärkung des konzeptuell-theoretischen Systems der KIT-Forschung beizutragen.

SUMMARY

This Thesis contributes by reporting on the current state of diffusion of collaboration information technology (CIT). The investigation concludes, with a high degree of certainty, that today we have a 'satisfactory' diffusion rate of some level-A CITs (mostly e-Mail, distantly followed by Audio Conferencing), and a 'dissatisfactory' diffusion rate of higher-level CITs (i.e. those requiring significant collaboration and cooperation among users, like Meeting Support Systems, Group Decision Support Systems, etc.). The potential benefits of the latter seem to be far from fully realised due to lack of user acceptance. This conclusion has gradually developed along the research cycle, as follows:

- Initially, the assertion was based on my own experience and on testimonies of people from my professional surroundings.
- Then, this assertion was supported by the Expert Talks (Empirical Study I).
- Confidence was added, as to the validity of this assertion, through the Critical Meta-Analysis of Case-Study Reports (Empirical Study II). Here, I have reviewed the observational experience from decades of collaboration-technology developments and adoption trials. Based on this experience, I have identified some ***persistent problems*** and reported persistent barriers to the adoption of, especially discursive, collaboration technologies.
- Additional confidence was added through the Content Analysis of CIT Literature (Empirical Study III). Here my secondary (summative) finding is that all studies to date which have tackled issues of CIT diffusion, have unanimously supported the view that higher-level CITs have not yet reached mass uptake and high utilisation levels within organisations. Meanwhile, there are also *no* existing reports on rapid diffusion of higher-level collaborative solutions.

In practice, this means that if we walk into any organisation today, there is a great probability that we will observe the following, typical pattern of collaborative systems use: a few types of level-A CITs in active use (by far most important being e-Mail, fairly distantly followed by Audio Conferencing). It is highly *un*likely (i.e. exceptional) that we see any other types of CITs in active use. The usage patterns we are likely to observe are 'technological shunning', 'scepticism', 'substitution', or 'exploration'. We will also observe that least available and least frequently used are tools like Group Decision Support Systems, Meeting Support Systems, Issue Based Information Systems, and Discussion Moderation Tools (the so called 'higher-level' collaboration technologies). The latter suggests formidable barriers to their adoption and use.

An additional, unplanned and rather interesting, finding from this study has been the recognition of large [mostly business] reporting on numerous Web 2.0 user-community produced collaboration technologies (most of them belonging to the category of 'social software') and their metamorphosis from autonomous, '*bottom-up*' solutions into enterprise-supported infrastructures. Some examples include the

following reported practices of: employees blogging 'at work about work', employees using self-selected Wikis or Mashups for project management purposes without informing management about it, building organisational 'folksonomies' through social tagging, affiliating with others of similar interests (forming their own peer group), or employees using even Multiplayer Online Games to coordinate their activities and to manage their virtual collaborative work. Since 2006, there has been abundant business reporting on such practices, and these practices actually violate every traditional percept of corporate communication. The latter is true because: 1) instead of being organisation-mandated, these collaborative solutions are adopted by individual employees autonomously, through self-initiative, and they are self-selected; 2) instead of being an intended part of the organisational IT infrastructure, and the result of targeted investment, these solutions are emergent, 'de facto' collaboration systems. In this sense, such collaborative solutions resemble what has been discussed by the IS community as 'shadow IT' (i.e. a set of IT tools used for performing IT functions but not part of the mainstream IT organisation).

Another contribution of this Thesis – again suggested by Empirical Study I, and tested through Empirical Studies II and III – pertains to the 'process structure' of CIT diffusion. It was planned, *ab initio*, that the primary focus of this research would be on diffusion of innovation, but the identification of two distinct diffusion paths offered both the motivation and opportunity to restructure my diffusion research. I had found that collaboration technology has historically diffused following two distinct (interdependent but orthogonal) diffusion paths – *top-down (authority-based)* and *bottom-up*. The authority-based diffusion path seems to be characterised by efforts aimed at 'imposing' technologies on employees, the primary concern being to make sure that technology seamlessly and easily integrates into the organisational IT infrastructure. Experiences have shown that organisations may well be able to impose *transactional* systems on their employees. But in the case of supporting *creative* collective work through CIT, the authority-based adoption strategies have proven to be of limited success. The typical result is either 'adoption but no deployment' (only the organisation adopts the collaboration technology, but not the employees), or sceptical use. On the other hand, the bottom-up diffusion trail seems to be successful.

This Thesis contributes to our understanding of ***why*** CIT diffusion is structured as it is, i.e. with two orthogonal diffusion paths. In seeking answers to the question 'why', I systematically outline a multitude of factors (Attributes of the System, Attributes of the Collaboration, Attributes of the Organisational Context), and evolve a grounded hypothesis of how these factors may determine CIT adoption and diffusion. The research methodology applied in this exploration is qualitative-interpretive, and one deliverable is a historical review of how the CIT research community has conceptualised both the CIT field itself and CIT adoption and diffusion over the last decade. The contribution of this investigation may be summarised as threefold:

(1) This investigation consolidates most of the findings to date, pertaining to CIT adoption and diffusion, which have been produced by the CIT research community. Thus, it tells a coherent story of the dynamics of the community focus and the collective wisdom gathered over a period of (at least) one decade.

(2) This work offers a meaningful framework within which to analyse existing knowledge – and indeed extends that knowledge base by identifying persistent problems of collaboration technology acceptance, adoption and diffusion. These problems have been repeatedly observed in practice, though the pattern does not seem to have been recognised and internalised by the community. Many of these problems have been observed in cases of CIT use one decade ago, five years ago, three years ago, and continue to be observed today in structurally the same form despite what is unarguably 'rapid technological development'. This gives me reason to believe that, at least some of the persistent problems of CIT diffusion can be hypothesised as 'determining factors'. My contribution here is to identify these factors, discuss them in detail, and thus tackle the theme of CIT diffusion through a structured historical narrative.

(3) Through my contribution (2) above, I characterise a 'knowledge-action gap' in the field of CIT and illuminate a potential path through which the research community might hope to bridge this gap. The knowledge-action gap I see as one fundamental weakness of the traditional approach to issues of collaboration technology diffusion. The gap may be operationalised as cognitive distance between CIT 'knowledge' and CIT 'action'. My historical review has revealed an almost missing practice of 'learning':

(a) from decades of CIT developments and adoption trials;

(b) from Theory (there is very scarce use of theory in CIT, no consensus on what CIT theory is and whether it is needed etc.).

Therefore, there seems to be a lack of incremental building on our CIT knowledge to help us in our CIT actions, e.g. the design of collaboration technologies as well as our organisational IS strategies (for stimulating adoption etc.).

My personal research journey through the history of research in the field of CIT has convinced me that a certain amount of humility is desirable in proceeding toward the goals of: a) designing truly useful and highly acceptable collaboration technology, and b) enacting truly successful organisational CIT strategies. In particular, the historical record suggests that there are unrealistic expectations to which software designers and IS strategists are commonly vulnerable: software designers tend to overestimate their ability to predict all the ways in which people will (or, perhaps more arrogantly: *should*) want to use collaborative systems. Analogously, IS strategists tend to overestimate their ability to predict all the ways in which people will (or *should*) want to follow and execute their technology-adoption plans. In this research, I am applying a certain amount of 'humility' by learning from and incrementally building on the wisdom of two decades of CIT research – and by recommending a refocus on questions pertaining to the adoption and diffusion of multiple CIT solutions in a variety of organisational contexts based on the lessons learned from various CIT developments and adoption trials. By identifying those factors which appear ***persistently determinant*** of CIT diffusion, I am contributing toward the long-term goals of designing highly acceptable collaboration technologies and enacting successful CIT organisational strategies.

In this Thesis I have tried to look more deeply (than do strict constructionists) into the fundamental constraints on how collaboration occurs today: the kinds of collaboration structures that have emerged and ***why*** some computer-based technologies are providing adequate support for those structures and others are not. In doing this through an interpretive and primarily qualitative lens, I recognise that I have generated 'grounded hypotheses' rather than definitive statements – and that, in future work, these hypotheses must be tested. Through my comparison of the two distinct diffusion paths – authority-based and bottom-up – by contrasting ***persistent problems*** in these cases – I have attempted to make my resulting hypotheses more persuasive and, thus, to increase the motivation of the community to 'care about' and test them. In addition to the analytic histories of the CIT diffusion paths which form contributions of this Thesis, then, the final contribution is a Conceptual Framework, serving as illustration of the two diffusion paths and their determinants. I view collaboration technology diffusion as a process of intellectual transactions between the private and professional 'social worlds'. Thereby, I consider possible and pay adequate tribute to various permutations of contingent adoption decisions – mandatory, consensus-based or voluntary. By choosing 'social worlds' as the unit of analysis for my CIT investigation, I am aligning with the stream of research which advocates the need for CIT to extend its boundaries and move beyond its current and almost exclusive focus on the traditional workplace. Most importantly, I hope to have contributed toward strengthening the conceptual-theoretical apparatus for the field of CIT as such.

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ERKLÄRUNG

Hiermit erkläre ich gemäß §8 der Promotionsordnung des Fachbereichs 4: Informatik der Universität Koblenz-Landau,

dass ich die vorliegende Dissertation mit dem Titel „AUTHORITY–BASED AND BOTTOM–UP DIFFUSION OF COLLABORATION INFORMATION TECHNOLOGIES: CONSTRAINTS AND ENABLEMENTS“ selbst angefertigt und alle benutzten Hilfsmittel in der Arbeit angegeben habe,

dass ich die Dissertation oder Teile der Dissertation noch nicht als Prüfungsarbeit für eine staatliche oder andere wissenschaftliche Prüfung eingereicht habe,

und dass ich weder diese noch eine andere Abhandlung bei einer anderen Hochschule als Dissertation eingereicht habe.

Koblenz, den 05 Oktober 2009

Elitsa Vasileva Shumarova

Chapter 1

INTRODUCTION

> It is difficult to imagine anything more fascinating than trying to understand collaborative work, and how it can be supported by computers. This Thesis suggests that we are just beginning to comprehend the issue. Progress is necessary as computer support for collaborative work will most probably persist gaining importance for two reasons: the continuing *transformation of the organisation of work* (I shall return to this point in Section 3.4.1), and the rather novel phenomena of *mass collaboration* (I will discuss this point in detail in Section 3.4.2). The way we manage to support our collaborative work with computer-based systems may play a pivotal role during all phases of our lives, and will directly influence the level and scope of our collective achievements as humans.

A number of social-informatics research areas have been concerned with the development – and, by extension, the use of Collaboration Information Technologies (CITs). In addressing the task of designing CITs, the research community has both overestimated and under-estimated the potential benefits of eCollaboration. A short historical retrospective shows constant fluctuations and twists between utopian trust and damaging distrust placed in digitized collaborative work. There is still confusion in discourse between affirmations of eCollaboration and denial of its capabilities.

- Sutherland's Ph.D. thesis (1963) 'essentially marked the beginning of computer graphics as a discipline' (Hewett et al. 1996, p.3) and, with that, laid the basis of the research area of '***Human-Computer Interaction***'. The first CAD/CAM systems were actually the first interactive computing systems for electronic collaboration. A related set of, somewhat utopian, developments were attempts to pursue 'augmentation of human intellect' (Engelbart 1963), and 'man-machine symbiosis' (Licklider 1960).

- Out of this line of development came a number of important building blocks for the research area called '***Office Automation***', which emerged in the early 1980s. This research area was aimed at automating office work through data storage, electronic transfer, and the management of electronic business information. A plethora of office automation projects and installations followed, most of which were designed to match the traditional allocation of tasks in the office and to support structured groupwork. It would take more than two decades for the research community to realise that the nature of groupwork is above and before all unstructured. Suchman (1987) would be the first scholar to emphasise the importance of *situated action* in the context of various problems of human-machine communication by saying that, e.g., 'the mutual intelligibility that we achieve in our everyday interactions – sometimes with apparent effortlessness, sometimes with obvious travail – is always the product of *in situ* collaborative work' (p.180). Not until 2007 would the empirical realisation be made that more than 95% of the problems we have to cope with in our professional capacity are unanticipated problems (Centre for Creative Leadership, in Laff 2007) and that the failure on the part of enterprise IT to provide solutions for *unanticipated problem-solving* (i.e. exception handling) may be the most important challenge. In a special 2007 issue of the CSCW journal, David Randall said that the field of CSCW is still (more or less, with honourable exceptions) 'indifferent to organisational matters' (Randall 2007, p.627). He also pointed out that CSCW continues to see 'the organisation' either as something which exists on a wider scale than CSCW can justifiably be interested in, or as something 'formal', involving plans, rules and procedures which, again, are sometimes seen as not part of CSCW's remit.

- In the early 1980s there was a surge of utopian trust in the potential of CIT to automate *structured* groupwork. The results from the thousands of office automation projects and installations, however, were predominantly disappointing (see Hammer 1984, Skousen 1986, Hedberg et al. 1987, Schmidt 1987, Bannon and Schmidt 1991). The office automation experience was primarily bitter, and 'unequivocally demonstrated that the potentials in terms of productivity, flexibility, product quality, etc. of information technology in the office cannot be realised without a corresponding change in the allocation of tasks among staff' (Bannon and Schmidt 1991, p.369). The office automation project was gradually 'denounced as ludicrous and ultimately abandoned as unattainable' (Bannon and Schmidt 1991, p.358).

- Beginning in the mid-80s, the first noticeable surge of scepticism and distrust placed in digitized collaborative work surfaced as a topic of academic discourse. The reason was because 'during the 80s and 90s many studies showed that investments in IT [including collaborative IT] appeared to have negative or zero impact on productivity growth' (Stanoevska-Slabeva 2009, p.316). The Nobel laureate in economics Robert Solow (1987) coined what would later gain popularity as the 'Solow productivity paradox' with his famous observation that computers were to be seen everywhere except in the productivity statistics. This observation provoked a great deal of research (Oliner and Sichel 2000), and provided the motivation for the emergence of the '***Group Support Systems***' (Nunamaker et al. 1997) research area.

- A 'flood' of GSS experimental studies was carried out in the mid-1990s. Fjermestdad and Hiltz (1999) reviewed 230 papers on experiments with group support systems, published after 1990. The authors located approximately 200 different controlled experiments, published between 1990-1998 in refereed journals and major conference proceedings. The focus of experimental research was predominantly on processes and outcomes in computer-supported groupwork. The results showed that '…the modal outcome for group support systems (GSS) compared with face-to-face (FtF) methods is "no difference", while the overall percentage of positive effects for hypotheses that compare GSS with FtF is a disappointing 16.6%' (Fjermestdad and Hiltz 1999, p.1).

- The '***Computer Supported Collaborative Work***[1]' research area emerged from an invited workshop organised in 1984 by Irene Greif and Paul Cashman that was intended to elaborate 'an identifiable research field focused on the role of the computer in groupwork' (Greif 1988, Crabtree et al. 2005). CSCW has since established itself as a legitimate, distinct field within information systems research, concerned with the development – and, by extension, the use of CITs. CSCW has inherited some of the non-resolved problems of 'older' research domains like Human-Computer Interaction and Office Automation (later in this Thesis, I shall talk about the 'knowledge-action' gap in CIT to illustrate the persistent research practice of core CIT issues and problems remaining non-resolved, while the CIT research domains keep changing rapidly). Bannon and Schmidt (1991) claimed that 'the old problems of fitting technology into the workplace have become acute for CSCW' (p.369). Schmidt and Bannon (1992) noticed that 'studies formerly appearing under the rubric of Office Information Systems or Computer Mediated Communication now appear regularly under the CSCW banner' (p.4). The debate on what constitutes core issues in the field of CSCW is still going on today.

- In the early 2000s there was a noticeable resurge of trust in the potential of CIT to improve e.g. work productivity, efficiency and effectiveness. Fjermestdad and Hiltz (2001) descriptively evaluated 54 CIT case and field studies from 79 papers published between 1994 and 2000. The evaluation yielded the following results: a) 62% (28 out of 54) of the case and field studies suggested that *efficiency* was improved using CIT in comparison to manual or face-to-face methods[2], and b) 89% (39 out of 44) of the studies that measured *effectiveness* reported that effectiveness was improved using CIT in comparison to other (manual or face-to-face) methods (p.122). On a more general level, Brynjolfsson and Hitt (2003) explored the effects of computerisation on productivity and output growth using data from 527 large US firms over 1987-1994. They found that computerisation did make a contribution to measured productivity and output growth, especially *over long periods of time* (using five to seven year differences). The empirical results showing large long-run contribution of computers on productivity proved that the 'Solow productivity paradox' (mentioned above) practically did not exist in the long run.

- In the 21st century, various low-cost collaborative infrastructures are a common part of our collaborative reality – from the Internet to global outsourcing platforms to open source software – which allow masses of people to collaborate in ways that only large corporations could in the past. In 2006 the CIT research

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[1] I prefer the adjective 'collaborative' for the second individual character 'C' in the term 'CSCW' for the following reasons:

1. There is ideology inherent in the term 'cooperative work' which makes it a 'too sweet' label, inadequate to describe the realities of everyday work situations;
2. I deem the term 'collaborative work' a more appropriate general and neutral designation of multiple persons working together;
3. If we should stick to a neutral and general meaning, we would rather find it in the term 'collaborative work' because cooperative work denotes a higher level of collective endeavour.

[2] see Illustrative Example 1.1 – Efficiency Improvements through CIT (Appendix I).

community coined the term '***mass collaboration***' and described it as 'deep changes in the structure and modus operandi of collaboration' (Tapscott and Williams 2006, p.3) based on new collaborative capabilities. The notion of 'mass collaboration' continues to provoke both affirmation and scepticism. On the one hand, mass collaboration provides greater freedom of expression and in general empowers the citizen and the consumer. On the other hand, mass collaboration deluges the citizen with information of doubtful quality, creates anxieties associated with having too many options, allows intrusive freedom of expression to those from whom people may not wish not to hear and so threatens the privacy and civil liberties of the citizen (Bannister and Remenyi 2003). Friedman (2005), in his book 'The World is Flat', blames mass collaboration to be a powerful flattener, and concludes that in a world of open source it is no longer clear who owns what or how companies or individuals will profit from their creations. Some extreme open-source detractors go even further to argue that 'this is latter-day socialism and an attack on the free enterprise and the right to make a profit' (Tapscott and Williams 2006, p.90). Brabazon (2006) theorised that the Internet, Web, Google, blogs and wikis as an artefact, program, medium or matrix, are the *de facto* 'cause of ignorance, mediocrity or conformity' (p.160). According to Brabazon, mass collaboration has brought about anti-intellectual times, in which the lack of rigour, citation or scholarly protocols is framed as an advantage and strength, not an excuse for mediocrity. For example, bloggers link to each other's blog and thus manufacture high Google returns to sites of doubtful quality – the so-called 'Google effect'.

- The CIT research community has criticised most of the above-quoted statements for being rather exaggerated. The community has, however, recognised the existence of the so-called '***social-technical gap***' in computer-supported collaborative work. This gap has been operationalised through the cognitive distance between 'the social requirements of CSCW and its technical mechanisms' (Ackerman 2000, p.180). In this sense, according to Ackerman, the social-technical gap is the divide between what we know we must support socially by means of collaboration-support systems and what we can support technically. 'Exploring, understanding, and hopefully ameliorating this social-technical gap is the central challenge for CSCW as a field and one of the central problems for human-computer interaction' (Ackerman 2000, p.185).

- The boundaries of CIT research are now expanding to include contemporary research trajectories focused on mobile, ambient, pervasive, ubiquitous, wearable computing, virtual and mixed reality, et cetera. This thematic expansion is again provoking both optimism and scepticism – optimism regarding the process freedoms offered, and scepticism in view of the social implications of pervasive and mobile computing. A list of some contemporary CIT research areas includes eWork and mobile work environments (Reichwald et al. 2000), knowledge-centred collaboration environments (e.g. Arundel and Bordoy 2002, Birkinshaw 2002), operational and interactional mobility (Kakihara and Sørensen 2004), inter-organisational collaboration settings (e.g. Fontaine at al. 2004), virtual mobility (Vartiainen 2005), communities of practice, learning communities, community networks, communities of interest, voluntary associations and social collaborative computing, civic networks (Carroll 2007, Farooq et al. 2007, Venkatesh and Chango 2007, Kavanaugh et al. 2007, Reichling et al. 2007, Schafer et al. 2007), CITs in support of the social side of leisure (Counts 2007), etc.

An ever-increasing number of computer-based systems have been developed in the past few decades, with the aim of helping people work together more effectively and more creatively. Despite the thousands of man-years, and millions of dollars, invested in the development of CITs, still little is known about how far they have reached – in terms of adoption, use, and diffusion levels. The few existing empirical studies report dissatisfactory levels of CIT adoption and diffusion (i.e. limited assimilation). Few attempts have been made to identify and classify what factors determine (accelerate or hinder) the adoption and diffusion of CITs.

Olson, Malone, and Smith (2001) formulated two basic questions (those are still open questions today) that the field of CSCW was missioned to seek answers for:

- ‘How will the widespread use of information technology change the ways people work together?’ (p.8);
- Can collaboration support systems ‘help reduce the tiresome details of successful collaboration without leading people to feel overwhelmed by computerised “red tape”?’ (p.158).

Bannon and Schmidt (1991) maintained that CSCW was a research field addressing questions like the following:

- ‘What are the specific characteristics of collaborative work as opposed to work performed by individuals in seclusion?
- What are the reasons for the emergence of cooperative work patterns?
- How can computer-based technology be applied to enhance cooperative-work relations?
- How can computers be applied to alleviate the logistic problems of cooperative work?
- How should designers approach the complex and delicate problems of designing systems that will shape social relationships?’ (p.360).

Bannon and Schmidt (1991) concluded that, what united CSCW was the *support requirements of cooperative work* (p.360). Therefore, the field of CSCW had to be conceived as an endeavour to understand the *nature and characteristics of cooperative work* with the objective of designing adequate computer-based technologies.

What is the general ‘nature’ of our cooperative work today? Recently, we have had exemplary cases of collaborative efforts being successfully supported by computers, like the Collaborative Multicenter Research Project to uncover the SARS virus of 2003, the Human Genome Project completed in 2003, et cetera. Meanwhile there are numerous cases of failed collaborative efforts, despite all of the computing power we possess – for example, the inability of the US intelligence agencies to predict the 9/11 attacks, despite the various pieces of data each of them had available, etc.

If we take a quick look at general history, we shall see that human cooperative work has been both successful and disastrous. Sometimes, people working together have proven able to govern themselves reasonably based on informed debate. In other occasions, they have proven thoroughly unable to take wise collective action. People, in their general history, have been using the opportunities of collaboration in both wise and ridiculous ways. Surowiecki (2004, p.XVI, XVII) referred to a number of early authors who would have scoffed at the idea that groups of people are able to do anything at all together in a reasonable way:

- Charles Mackay published, in 1841, a chronicle of mass manias and collective follies called ‘Extraordinary Popular Delusions and the Madness of Crowds’, and wrote: ‘Men, it has been well said, think in herds. It will be seen that they go mad in herds, while they only recover their senses slowly, and one by one’ (Mackay 1980 in Surowiecki 2004, p.XVI);
- The financial speculator Bernard Baruch taught us an important lesson, which he learned during the Great Depression of 1929: ‘Any one taken as an individual is tolerable, sensible and reasonable – as a member of a crowd, he at once becomes a blockhead’ (Grant 1997 in Surowiecki 2004, p.XVII);
- Friedrich Nietzsche wrote, ‘Madness is the exception in individuals but the rule in groups’ (Nietzsche 2004, Aphorism 156, p.89);
- In a polemical classic of 1895, Gustave Le Bon expressed his deep disdain for groups of all kinds (see Le Bon 2002). Strikingly, for Le Bon, the idea of ‘the crowd’ included not just obvious examples of collective wildness, like lynch mobs or rioters (Surowiecki 2004, p.XVI). It also included just about any kind of group that could make decisions.

In his seminal book ‘The Wisdom of Crowds – Why the Many are Smarter than the Few’ Surowiecki (2004) has proven most of these early authors wrong, at least partially. He has convincingly made the case that, *under certain conditions*, groups of people working together can do a good job, and be smarter than the group’s smartest members (as opposed to degrading down to the level of its lowest members). These ‘certain conditions’ needed for successful groupwork are actually nothing else but the ‘requirements of cooperative work’ which Bannon and Schmidt (1991, p.360) claimed were so pivotal for CSCW to understand and unite around. These ‘requirements of cooperative work’ can be conceived as ‘certain fundamental characteristics common to all cooperative work arrangements, irrespective of the technical facilities available now or in the future’ (Schmidt and Bannon 1992, p.5).

Back in 2001 Olson, Malone, and Smith suggested that the changes characterising modern collaborative work (e.g., ‘mass collaboration’ and the ‘transformation of the organisation of work’, as mentioned above) might lead us ‘across a threshold where entirely new ways of organising human activities become desirable’ (p.8). In the light of that perspective, various entirely new ways of organising human activities have now become common. It is now important for us to understand what kind of collaboration structures have emerged in the electronically connected world to be able to provide the 'adequate' support necessary for them to work well. In summary, we need to look more deeply into the fundamental constraints on how collaboration occurs today.

I can find no reason to think that, if no objective answers to the fundamental problems of human collaboration have been found (or if we do not learn from those answers), we could be wise enough to create computer programs to successfully support human collaboration. We must learn from social psychology to be able to design effective collaboration technology. I believe we should make strong efforts toward broadening our intuitions of what computer-supported collaborative work means and what is expected of it. If we hope that the computing power of our machines could alleviate and positively counterbalance some of the fundamental problems of our group practices as humans, we need to understand those practices first. Thus, the focus should be to *understand*, so as to better support, collaborative work.

In summary:

> In order to support human collaborative work, we need to understand it.

Having offered some motivation for my research, I now move to present an overview of the investigation undertaken and reported in this Thesis.

Chapter 2

RESEARCH FOCUS

The focus of this theory-building Thesis is to understand and analyse the process of adoption and diffusion of Collaboration Information Technologies (CITs) over time – i.e. their adoption-diffusion continuum. A focal point of interest is the system of interrelated contextual and longitudinal determinants and user responses influencing the adoption–diffusion continuum of CITs (from Prior Use to Post–adoptive Behaviour). Adequate attention is given to discontinued use and ultimate rejection (i.e. non-Use), as well as situations where adoption and use end up with failed diffusion in order to shed light on the barriers that impede the success of certain types of CITs.

The analysis is supported by illustrative examples and case studies of computer-supported collaborative work that demonstrate different social, behavioural, and motivational aspects of the adoption–diffusion continuum. Thereby – in concurrence with Baker's (1992) definition – I take the term 'collaboration' simply to denote communicating and *working together* within and across organisational boundaries. In concurrence with Coleman's (1996) and Dyson's (1990) description, I identify 'CIT facilities' as related to their capabilities to [potentially] support a high level of interaction, many-to-many communication, information sharing, coordination, collaboration and – ultimately – cooperation across time-geographic boundaries.

The analysis hinges on three dimensions and connotations of 'collaboration' – planned collaboration (a structured phenomenon that can be supported in an orderly fashion), occasional collaboration (anticipated or unanticipated), and emergent collaboration (prompted by a particular situation) (after Karsten 1999). I acknowledge the difference between collaborative work and cooperative work. Unlike the neutral and general meaning of 'collaborative work', 'cooperative work' designates 'a process of give-and-take in a spirit of compromise' (Bowers 1991), and implies 'a particular degree of participation and self-determination on the part of the workers' (Schmidt and Bannon 1992).

In this study, 'adoption' is being examined in the sense of the process through which collaborative technology is acquired within single or multiple social worlds. 'Diffusion' is being examined in the sense of the process through which the acquired collaborative technology becomes assimilated into multiple social worlds (after Lee et al. 1999).

2.1 Purpose of Study

Olson, Malone, and Smith (2001) took the stance that:

'…it is less clear whether the continuing development of new computer applications in this [CIT] area will depend solely on the intuitions of successful designers or whether it will also be guided by a coherent underlying *theory* of how people coordinate their activities now and how they might do so differently with computer support' (p.8).

In line with the above, I formulate the purpose of my research as follows.

The purpose of this theory-building Thesis is to develop and validate a reliable Conceptual Framework to serve as an integrative grounding, reflecting the adoption–diffusion continuum of collaboration information technology (CIT). At a supporting epistemic level, used to aid framework development, two secondary goals of this investigation are as follows:

(1) to identify which factors have had and continue to have significant influence on CIT diffusion, and what role each of these factors has played as diffusion accelerator or diffusion barrier – my goal here is to clearly identify these factors, discuss them in detail, and thus tackle the theme of CIT diffusion through a structured historical narrative;

(2) to report on the current state of diffusion of collaboration information technology (CIT) within organisations.

2.2 Research Questions

The following research questions may be formulated to guide my investigation into the adoption and diffusion of CITs:

(1) What influencing factors (barriers or accelerators) are determinant of CIT adoption and diffusion?

(2) Is it possible to encapsulate the adoption-diffusion continuum of CITs in a reliable Conceptual Framework?

'Adoption' will be examined in the sense of the process through which collaboration technology is acquired by single or multiple social worlds. 'Diffusion' will be examined in the sense of the process through which the acquired collaboration technology becomes assimilated into multiple social worlds.

2.3 Project Contribution

This Thesis contributes by reporting on the current state of diffusion of collaboration information technology (CIT). The investigation concludes, with a high degree of certainty, that today we have a 'satisfactory' diffusion level of some level-A CITs (mostly e-Mail, distantly followed by Audio Conferencing), and a 'dissatisfactory' diffusion level of higher-level CITs (i.e. those requiring significant collaboration and cooperation among users, like Meeting Support Systems, Group Decision Support Systems, etc.). The potential benefits of the latter seem to be far from fully realised due to lack of user acceptance. This conclusion has gradually developed along the research cycle, as follows:

- Initially, the assertion was based on my own experience and on testimonies of people from my professional surroundings.
- Then, this assertion was supported by the Expert Talks (Empirical Study I).
- Confidence was added, as to the validity of this assertion, through the Critical Meta-Analysis of Case-Study Reports (Empirical Study II). Here, I have reviewed the observational experience from decades of collaboration-technology developments and adoption trials. Based on this experience, I have identified some persistent problems and reported persistent barriers to the adoption of, especially discursive, collaboration technologies.
- Additional confidence was added through the Content Analysis of CIT Literature (Empirical Study III). Here my secondary (summative) finding is that all studies to date which have tackled issues of CIT diffusion, have unanimously supported the view that higher-level CITs have not yet reached mass uptake and high utilisation levels within organisations. Meanwhile, there are also no existing reports on rapid diffusion of discursive and instrumental collaborative solutions.

In practice, this means that if we walk into any organisation today, there is a great probability that we will observe the following, typical pattern of collaborative systems use: a few types of level-A CITs in active use (by far most important being e-Mail, fairly distantly followed by Audio Conferencing). It is highly *un*likely (i.e. exceptional) that we see any other types of CITs in active use. The usage patterns we are likely to observe are ‘technological shunning’, ‘scepticism’, ‘substitution’, or ‘exploration’. We will also observe that least available and least frequently used are tools like Group Decision Support Systems, Meeting Support Systems, Issue Based Information Systems, and Discussion Moderation Tools (the so called ‘higher-level’ collaboration technologies). The latter suggests formidable barriers to their adoption and use.

An additional, unplanned and rather interesting, finding from this study has been the recognition of large [mostly business] reporting on numerous Web 2.0 user-community produced collaboration technologies (most of them belonging to the category of ‘social software’) and their metamorphosis from autonomous, ‘*bottom-up*’ solutions into enterprise-supported infrastructures. Some examples include the following reported practices of: employees blogging ‘at work about work’, employees using self-selected Wikis or Mashups for project management purposes without informing management about it, building organisational ‘folksonomies’ through social tagging, affiliating with others of similar interests (forming their own peer group), or employees using even Multiplayer Online Games to coordinate their activities and to manage their virtual collaborative work. Since 2006, there has been abundant business reporting on such practices, and these practices actually violate every traditional percept of corporate communication. The latter is true because: 1) instead of being organisation-mandated, these collaborative solutions are adopted by individual employees autonomously, through self-initiative, and they are self-selected; 2) instead of being an intended part of the organisational IT infrastructure, and the result of targeted investment, these solutions are emergent, ‘de facto’ collaboration systems. In this sense, such collaborative solutions resemble what has been discussed by the IS community as 'shadow IT' (i.e. a set of IT tools used for performing IT functions but not part of the mainstream IT organisation).

Another contribution of this Thesis – again suggested by Empirical Study I, and tested through Empirical Studies II and III – pertains to the 'process structure' of CIT diffusion. It was planned, *ab initio*, that the primary focus of this research would be on diffusion of innovation, but the identification of two distinct diffusion paths offered both the motivation and opportunity to restructure my diffusion research. I had found that collaboration technology has historically diffused following two distinct (interdependent but orthogonal) diffusion paths – *top-down (authority-based)* and *bottom-up*. The authority-based diffusion path seems to be characterised by efforts aimed at 'imposing' technologies on employees, the primary concern being to make sure that technology seamlessly and easily integrates into the organisational IT infrastructure. Experiences have shown that organisations may well be able to impose *transactional* systems on their employees. But in the case of supporting *creative* collective work through CIT, the authority-based adoption strategies have proven to be of limited success. The typical result is either 'adoption but no deployment' (only the organisation adopts the collaboration technology, but not the employees), or sceptical use. On the other hand, the bottom-up diffusion trail seems to be successful.

This Thesis contributes to our understanding of ***why*** CIT diffusion is structured as it is, i.e. with two orthogonal diffusion paths. In seeking answers to the question 'why', I systematically outline a multitude of factors (Attributes of the System, Attributes of the Collaboration, Attributes of the Organisational Context), and evolve a grounded hypothesis of how these factors may determine CIT adoption and diffusion. The research methodology applied in this exploration is qualitative-interpretive, and one deliverable is a historical review of how the CIT research community has conceptualised both the CIT field itself and CIT adoption and diffusion over the last decade. The contribution of this investigation may be summarised as threefold:

(1) This investigation consolidates most of the findings to date, pertaining to CIT adoption and diffusion, which have been produced by the CIT research community. Thus, it tells a coherent story of the dynamics of the community focus and the collective wisdom gathered over a period of (at least) one decade.

(2) This work offers a meaningful framework within which to analyse existing knowledge – and indeed extends that knowledge base by identifying persistent problems of collaboration technology acceptance, adoption and diffusion. These problems have been repeatedly observed in practice, though the pattern does not seem to have been recognised and internalised by the community. Many of these problems have been observed in cases of CIT use one decade ago, five years ago, three years ago, and continue to be observed today in structurally the same form despite what is unarguably 'rapid technological development'. This gives me reason to believe that, at least some of the persistent problems of CIT diffusion can be hypothesised as 'determining factors'. My contribution here is to identify these factors, discuss them in detail, and thus tackle the theme of CIT diffusion through a structured historical narrative.

(3) Through my contribution (2) above, I characterise a 'knowledge-action gap' in the field of CIT and illuminate a potential path through which the research community might hope to bridge this gap. The knowledge-action gap I see as one fundamental weakness of the traditional approach to issues of collaboration technology diffusion. The gap may be operationalised as cognitive distance between CIT 'knowledge' and CIT 'action'. My historical review has revealed an almost missing practice of 'learning':

(a) from decades of CIT developments and adoption trials;

(b) from Theory (there is very scarce use of theory in CIT, no consensus on what CIT theory is and whether it is needed etc.).

Therefore, there seems to be a lack of incremental building on our CIT knowledge to help us in our CIT actions, e.g. the design of collaboration technologies as well as our organisational IS strategies (for stimulating adoption etc.).

In this Thesis I have tried to look more deeply (than do strict constructionists) into the fundamental constraints on how collaboration occurs today: the kinds of collaboration structures that have emerged and ***why*** some computer-based technologies are providing adequate support for those structures and others are not. In doing this through an interpretive and primarily qualitative lens, I recognise that I have generated 'grounded hypotheses' rather than definitive statements – and that, in future work, these hypotheses must be tested. Through my comparison of the two distinct diffusion paths – authority-based and bottom-up – by contrasting ***persistent problems*** in these cases – I have attempted to make my resulting hypotheses more persuasive and, thus, to increase the motivation of the community to 'care about' and test them. In addition to the analytic histories of the CIT diffusion paths which form contributions of this Thesis, then, the final contribution is a Conceptual Framework, serving as illustration of the two diffusion paths and their determinants. I view collaboration technology diffusion as a process of intellectual transactions between the private and professional 'social worlds'. Thereby, I consider possible and pay adequate tribute to various permutations of contingent adoption decisions – mandatory, consensus-based or voluntary. By choosing 'social worlds' as the unit of analysis for my CIT investigation, I am aligning with the stream of research which advocates the need for CIT to extend its boundaries and move beyond its current and almost exclusive focus on the traditional workplace. Most importantly, I hope to have contributed toward strengthening the conceptual-theoretical apparatus for the field of CIT as such.

Chapter 3

THE STUDY CONTEXT – CIT LITERATURE REVIEW

As mentioned above, various social-informatics research areas have been concerned with the development – and, by extension, the use of Collaboration Information Technologies (CITs). One of them – Computer Supported Collaborative Work (CSCW) – has established itself as a legitimate, distinct field within information systems research. Irene Greif, one of the founders of the field, defined CSCW as 'focused on the role of the computer in groupwork' (Greif 1988, Crabtree et al. 2005). Over the following years, arguments ensued as to the adequacy, sufficiency, and applicability of the 'groupwork' conception to describe the type of collaborative work to be supported by computers (see, for example, Schmidt and Bannon 1992, Bannon and Hughes 1993). Gradually, the focus of the field of CSCW tended to crystallize more broadly around 'the possibility of supporting multiple parties working together collaboratively or cooperatively' (Crabtree et al. 2005, pp.217, 218). The shift away from the 'groupwork' conception was motivated primarily by the development of distributed computing systems, and technological advances in distributed computing. The process of embedding distributed computing systems in the workplace showed that the social organisation of collaborative or cooperative work could not be constrained within the 'groupwork' notion. (I shall return to this point later in this work, in Section 4.2 – Unit of Analysis). The section below presents a synthesis of the most established theoretical frameworks for studying computer-supported collaborative work, for CIT design, as well as for CIT evaluation.

3.1 CIT Theoretical Frameworks

Several models and frameworks have been proposed for studying the relatively new and dynamic field of CIT, each trying to direct research toward a different theoretical basis. Generally, the frameworks and models proposed fall into three main categories: a) frameworks and models proposed for studying computer-supported collaborative work, b) frameworks and models proposed for CIT design, and c) frameworks proposed for CIT evaluation.

3.1.1 Frameworks and Models Proposed for Studying CSCW

Among them are the frameworks proposed for studying computer-supported collaborative work by Grief (1988), Johansen (1988) – the 'time and space' taxonomy, also known as the 'time and space matrix', or the 'groupware matrix' (see Table 3.2 below), Ellis et al. (1991), and Schmidt and Bannon (1992). Some of the more socially informed frameworks are those proposed by Kuutti and Arvonen (1992), Winograd (1988), and Suchman (1989).

3.1.2 Frameworks and Models Proposed for CIT Design

In 'The Wisdom of Crowds', James Surowiecki (2004) compared the story of the early days of the U.S. auto industry, to the histories of most new industries, from the railroads to television to personal computers to, most recently, the Internet. In this line of thought, just as in the first decade of the twentieth century there was no firm definition of what a 'car' should look like, and there was a bewildering variety of vehicles – the CIT industry may be exhibiting a similar pattern. The intellectual roots of the CIT discipline are located in the early eighties (Orlikowski 1995), when the research community of computer and social scientists began studying what they called 'computer-supported cooperative work'. CIT may now be 'in its early days business' (Surowiecki 2004), characterised by a profusion of alternatives, many of them dramatically different from each other in design and technology. The evolutionary process of the CIT market winnowing out the winners and losers, and effectively choosing which collaborative technologies will flourish and which will disappear, may just be a matter of time.

Given this confusion, it is a little bit surprising that only three major frameworks for CIT design seem to have been influential – the frameworks proposed by (1) Winograd (1988) and Kuutti (1991), (2) Kuutti and Arvonen (1992), and (3) the one proposed by Oslon et al. (2001). By far the most established seems to be Kuutti and Arvonen's activity-theory design approach. Each of the three major frameworks is centred on a very specific focus.

- ***Focus on Speech Act and Conversation Theory***. Winograd (1988) formulated a conceptual framework for development and design of CITs based on speech act and conversation theory. The underlying theoretical base here was Conversation Analysis (Sacks et al. 1978, Frohlich and Luff 1989, Sacks 1992, Katzenberg and McDermott 1994). The conversation/speech act design approach did not establish, though, and was eventually abandoned by the community as poorly suitable. The reason for this abandonment was, what proved to be, inadequate precision of our ability to predict and prescribe conversational/speech act constructs in various 'situated action' collaborative situations. The fruitful academic debate between Winograd and Suchman brought to light more arguments in favour of Situated Action than in favour of Conversation Analysis (in terms of CIT design). It gradually became obvious – within the course of the academic debate – that every instance of meaningful conversational action must be accounted for separately, with respect to specific, local, contingent determinants of significance. It is, therefore, extremely difficult to produce predefined conversational schemes to slide into CIT design concepts.
- ***Focus on Activity***. Kuutti (1991) and Kuutti and Arvonen (1992) formulated a general conceptual scheme for designing CITs, entirely centred around the idea of the 'activity'. The 'activity' is seen as a prevailing collective phenomenon in the material environment, realised through the conscious and purposeful use of a CIT tool by a knowledgeable actor. The underlying theoretical base here is Activity Theory (Engeström 1987, Kuutti 1996, Nardi 1996, Bardram 1997a, Engeström et al. 1999).
- ***Focus on Coordination Theory***. The applicability of Coordination Theory (Schmidt and Simone 1996, Carstensen and Nielsen 2000) for CIT design has

been advocated by Oslon et al. (2001). In its essence, this approach is a logical continuation of the activity-theory approach, given that ‘coordination’ is viewed as managing dependencies between *activities*.

The field of CIT has come under criticism for being technologically deterministic, with minimalist use of theory. Some authors, e.g. Barley et al. (2004), are still asking if the study of computer-supported collaborative work is ‘ready’ for theory – whether theory is needed to move the field along, or on the contrary, whether the problems and the technology are still too new or are changing too fast to accommodate theory. In an attempt to investigate the extent of and the manner in which theories are used in the field of CIT, Mundkur (2007) performed a content analysis of CIT literature, which revealed the following indicative results: only 14.4% of all content-analysis articles referenced theories. Of these 11.8% referred to Activity Theory[3], 3.4% to Distributed Cognition[4], and 2.5% to Situated Action[5].

There are several plausible explanations for the absence of theory in CIT conference papers and on the pages of CIT journals. One reason may be the success of ethnographers and ***ethnographic methods*** in the field (e.g. Garfinkel 1967, Button 1991, Bentley et al. 1994, Rouncefield et al. 1994, Heath and Luff 1996, Harper 2000, Halverson 2001, Kane and Luz 2009). As pointed out by Barley et al. (2004),

‘Ethnographers take a highly empirical, setting-specific approach to research. Ethnographers do not test derivations from theory but rather observe a setting or settings in systematic detail, sometimes with the active participation of those who will use the technology. Prototypes are evaluated empirically but not theoretically (because there is no generalisable theory to test). The results are perhaps excellent designs but, typically, little sustained work to develop first principles that can be applied elsewhere’ (p.122).

Another plausible reason is that, as a field of interdisciplinary inquiry (Crabtree et al. 2005), CIT has, since its inception, attempted to meld viewpoints from such diverse fields as anthropology and software engineering (Bannon 1992). Working out interdisciplinary differences, and disparity in approaches (Neale et al. 2004) remains one of the greatest problems of CIT. Garner and Mann (2003) argued that ‘CSCW’ was a loose umbrella term, allowing for people to put forward their research traditions to a new audience based on ‘multidisciplinary’ and less ‘interdisciplinary’ grounding. At issue was whether multidisciplinarity was enough, given it involved information, but no interpretation and transformation; it involved exchange of ideas, but no cross-fertilization of solutions etc.

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[3] Activity Theory (Engeström 1987, Kuutti 1996, Nardi 1996, Bardram 1997a, Engeström et al. 1999).

[4] Distributed Cognition Theory (Rogers and Ellis 1994, Hutchins 1995, Ackerman and Halverson 1998).

[5] Situated Action (Suchman 1987, Schiff et al. 1997).

Innovation Diffusion Theory (Rogers 1962) has sporadically been applied for CIT (e.g. Bajwa and Pervan 2004), but has not been very influential due to, inter alia, its contention of technology adoption as a solitary individual decision, which does not apply well to cases where decisions are interdependent (Fichman 1992, Gallivan 2001), networked (Lyytinen and Damsgaard 2001), and coordination intensive (Gallivan 2001). Barley et al. (2004) argued that a few theories have already had small influence in CIT, one of them being Structuration Theory (Giddens 1986) which posits that when new technology is introduced into an organisation, people adapt the technology to their own goals and tasks, and in turn influence the technology implementation. The other two influential theories in CIT – Activity Theory and Distributed Cognition Theory – are both first and foremost ***theories about cognition***. What they can say about group interaction is based on what they say about cognition (Halverson 2001). That may be OK in terms of inferential power, but may be insufficient in terms of descriptive and application power.

Numerous authors have advocated the applicability of Activity Theory[6] for CIT, including Engeström (1987), Kuutti (1996), Nardi (1996), Bardram (1997a), Engeström et al. (1999), Halverson (2002), Fjeld et al. (2002) etc. It is unfamiliar to most Anglo-American readers that Activity Theory originated from Soviet cultural-historical psychology (Vygotsky 1978, Leont'ev 1978, 1981), which in turn is rooted in both eighteenth and nineteenth century classical German philosophy – from Hegel's idealism to the historical materialism of Marx and Engels. In the latter, the concept of activity was extensively elaborated (Kuutti 1996). Fundamental to activity theory is the idea that the use of a tool appropriates the collective experience of humanity embodied in that tool (Leont'ev 1982). As Engeström (1991) puts it, the idea is that humans can control their own behaviour – not 'from the inside', on the basis of biological urges, but from the outside, using and creating artefacts – is fundamental to activity theory.

According to me, Activity Theory posits 'use of a tool' as predetermined, and therefore overrates the meaning of the artefact *per se*. Thus, it accounts only for aspects of 'prescribed technology', while ignoring 'technology-in-use' (Orlikowski 1995) as such. I believe that Activity Theory's focus on the *single* activities creates a somewhat skewed image of human action in general, and may be especially misleading for analysing *collaborative* activities. This is so because collaborative activities are interdependent and comprehensive, and highly contingent on the properties of the context in the long term. When interdependency comes into play, the context becomes a central issue. The history of computer systems development shows that the focus of analysis has been shifted from physical ergonomics, to information processing at the interface, to the broader framework (e.g. Suchman 1987, Neale et al. 2004) of behaviour and interaction rich with complexity.

[6] As mentioned above – one of the most popular CIT-design approaches.

3.1.3 Frameworks Proposed for CIT Evaluation

If IT evaluation is notoriously difficult, it is considerably more difficult for multi-user CIT applications than for single-user IT applications. Grudin (1988) was the first to convincingly make the case that collaborative systems present unique evaluation challenges because a) they represent feature-rich environments, b) their use is distributed over space and time, and c) their contributions are perceived differently by people with varying backgrounds, goals, and priorities (in Haynes et al. 2009, p.332). Haynes et al. (2009, p.331) gave the following example to illustrate the issue: unlike e.g. a manufacturing control system where tangible contributions can be measured by objective metrics such as reduced cost, increased output, or reduced defects, measuring the contribution from collaborative systems requires an understanding of how dynamic work practices are improved through system use. This requires drawing out and reflecting on *user experiences and perceptions that have an inherently tacit dimension*. Ackerman (2000, pp.179-203) argued that effective evaluation of collaborative systems is an elusive goal and a significant challenge. According to Haynes et al. (2009, p.331), what to evaluate, how, and why, are all questions still in need of further investigation in the field of CIT.

The range of approaches proposed for CIT evaluation can be grouped into three major categories – (1) feature-based evaluation approaches, (2) broad ethnographic investigations of system use in context, and (3) hybrid multi-method evaluation approaches. The first two methods approach the problem of CIT evaluation from one of two extremes (focused evaluation of specific system features versus broad ethnographic context investigation). The third is a hybrid alternative framework providing a 'middle ground' between the two extremes, combining their strengths, and thus trying to adequately account for the complex, multi-level consequences of collaborative systems. Each approach may be described as follows.

- ***Feature-based Evaluation Approaches*** are focused on analysis of specific features of collaborative systems using either experts (e.g. designers, cognitive psychologists, usability engineers, etc.) or users as informants (Steves et al. 2001, Nielsen 1994).
    - Some of the most frequently applied feature-based CIT evaluation approaches include questionnaires and experiments. Laboratory CIT ***experiments*** were, in fact, the dominant approach in early CIT research (Bajwa et al. 2005, p.138, Chun and Park 1998, p.313). In the early 90ties the CIT community began to make the realisation that the internal validity of lab experiments with collaboration technologies do not guarantee a sufficient level of external validity. Dennis et al. (1990-91) argued that there were differences between lab and field CIT findings. Sokolov (1999) described this difference as lack of *ecological validity*, i.e. generalisability across varied domains of use.
    - Other feature-based evaluation approaches are various ***adaptations of cognitive walkthroughs*** (Polson et al. 1992). One such method is, for example, the groupware walkthrough method (Pinelle and Gutwin 2002) which uses scenarios decomposed into tasks and sub-tasks as the basis for analysing CIT features. Such cognitive-walkthrough

methods are inexpensive relative to laboratory experiments but are even more limited in terms of CIT-context representation.

- The second major category includes ***Ethnographic Investigations of CIT System Use in Context***. These are ethnographic investigations and field studies. They involve the collection of group transcripts etc. that enable capturing information about the context of use (e.g. Garfinkel 1967, Button 1991, Bentley et al. 1994, Rouncefield et al. 1994, Heath and Luff 1996, Harper 2000, Halverson 2001, Kane and Luz 2009). One disadvantage of ethnographic CIT methods is that their results are often inconclusive and difficult to translate into specific prescriptions for CIT design.
- The third major category includes ***Hybrid Multi-method Evaluation Approaches*** and provides a 'middle ground' between the two extremes (ethnography and feature-based analysis). The hybrid approaches attempt to combine multiple techniques in order to leverage their individual strengths.
  - One such multi-method proposal is Sokolov's (1999) methodology of ***prototype development coupled with field observations and focus groups*** to determine users' needs, followed by post-deployment *surveys* to identify so called 'hot spots' in a given implementation.
  - Another hybrid proposal recommends that any CIT evaluation include ***'illuminative' descriptions*** from the viewpoints of different user roles including line workers, managers, and customers (Blythin et al. 1997).
  - Haynes et al. (2009) proposed a scenario-based evaluation framework attuned to eliciting system contributions: explicit reflections on ***scenarios*** of system use coupled with analysis of the consequences of these use scenarios, represented as claims. The method is derived from and extends the theoretical foundations provided by scenario-based design and claims analysis (Carroll 2000, Carroll and Rosson 1992).

The following section gives an synthesis of what are, in my view, the 'key events' in CIT academic research.

3.2 CIT analysis – 'Key Events' Timeline

The chronological development of the academic analysis of collaboration information technology (CIT), as represented in the literature, may be summarised in a 'key events' timeline as follows.

- **1950-1970**: Research was concentrated on studies of small-group decision making. Two predominant research trajectories were: a) comparing the 'face-to-face' (FtF) condition to the 'computer mediated communication' (CMC) condition; b) comparing the behavioural characteristics and the decision making of individuals to that of groups, whereby exploring and measuring variables related to group effectiveness. This type of research formed a tradition in social psychology. Good reviews of this social psychological stream of research include those by Steiner (1972), Hare (1976), Shaw (1976), and McGrath (1984).

Generally, it was found that small groups, left to their own devices, suffered many process losses (Fjermestdad and Hiltz 1999, p.2).

- **1970s**: During the 1970s, some experiments were performed studying the effects on small-group decision making of two types of media: audio-only (the telephone) or video plus audio (videoconferencing) (e.g. Short et al. 1976).

- **1982**: The Turoff and Hiltz (1982) article 'Computer Support for Group Versus Individual Decisions' presented the first explicit reporting in literature on experiments with group decision support systems.

- **1987**: DeSanctis and Gallupe's (1987) seminal paper 'A Foundation for the Study of Group Decision Support Systems' has been very influential in the field of CIT. The paper was a pioneer attempt to provide a common framework for research on group decision support systems. Therefore, the paper signified the first explicit appearance in the literature of the scientific endeavour toward creating a foundational conceptual-theoretical apparatus for the field of CIT (a foundation which was necessary to, inter alia, legitimise the existence of the field as such). DeSanctis and Gallupe defended a 'contingency theory' approach to help explain why group support systems were not always successful and beneficial; the potential benefits would depend on the type of task to be supported, the type of technological structuring provided and its adequacy for the group size (smaller versus larger), as well as the communication mode (FtF, or 'decision room' versus different place, or dispersed). The authors also 'touched on what would later become Adaptive Structuration Theory' (Fjermestdad and Hiltz 1999, p.3) with the statement that '…the effectiveness of the technology depends on its appropriate design and use by the group' (DeSanctis and Gallupe's 1987, p.589).

- **1988**: Dennis and associates (1988) took over the success factors, identified by DeSanctis and Gallupe (1987), and incorporated them into a three-dimensional (group size, group proximity, and time dispersion) taxonomy of CIT environments. Along the time dispersion axis for example, CMC could be same-time (synchronous) or different-time (asynchronous); accordingly, the effects on group communication could be entirely different.

- **1988-1991**: To aid the design of systems, supporting asynchronous and synchronous CMC (from real-time meetings to non-real-time interactions), Johansen (1988, 1991) and Ellis, Gibbs, and Rein (1991) conceptualised and designed a four-dimensional taxonomy. That taxonomy has gained immense popularity as the 'time and space' taxonomy, with its four outlined modes of computer-mediated interactions: 'same time' (synchronous), and 'different time' (asynchronous), 'same place' (collocated), and 'different place' (remote) (see Table 3.2 below).

- **1990s**: The ‘flood’ of GSS experimental studies was a phenomenon of the mid-1990s. Fjermestdad and Hiltz (1999) reviewed 230 papers on experiments with group support systems, and 90% of them were published in 1990 or later. The positive effects of CIT use, e.g. improved efficiency or effectiveness, were analysed solely in comparison to CIT-unsupported methods like manual or face to face (Fjermestdad and Hiltz 1999, p.7).

  Experimental research generally encompassed laboratory experiments with CIT applications, typically conducted within small groups of participants in isolated environments, like decision rooms (e.g. Aiken et al. 1994, Anson et al. 1995, Beauclair 1989, Clapper et al. 1991, Dennis et al. 1990, Easton et al. 1990, Galegher and Kraut 1994, Hiltz et al. 1986, Iz 1992, Jarvenpaa et al. 1988, Kim et al. 1998, Lim and Benbasat 1997a, Mennecke et al. 1995, Ocker and Fjermestad 1998, Sambamurthy and DeSanctis 1990, Tan et al. 1994, Venkatesh and Wynne 1991, Wilson and Jessup 1995).

- **1995**: Orlikowski (1995) studied the implementation and use of Lotus Notes – ‘a software product representing a class of products that have come to be known as “groupware”’ (p.11) – within a large, multi-national consulting firm. Orlikowski found four patterns of using Lotus Notes – shunning, scepticism, substitution, and exploration. In her theoretical-behavioural analysis of those usage patterns, Orlikowski proposed ‘technology-in-use’ as a concept for analysing technological use in organisations as opposed to ‘technology-as-artefact’. For the first time, collaborative technology (in this case, Lotus Notes) was being interpreted as ‘the situated and patterned interactions of a technological artefact and human action’ (p.ii).

  Different previous approaches to conceptualising technology – *contingency* (e.g. Blau et al. 1976), *social constructivist* (e.g. Pinch and Bijker 1984), *structurational* (e.g. Barley 1986), *sociotechnical* (e.g. Trist et al. 1986), *labor process* (e.g. Knights and Willmott 1988), *network-based* (e.g. Burkhardt and Brass 1994) – had in common the assumption that technology was separable and separate from human action. Thus, for the first time in Orlikowski (1995), collaborative technology was being thought of as having significance only if it were applied or used. The *use* of collaborative technology defined its nature and its influence in human affairs; thereby ‘use’ meant what the actors were actually doing with the technological artefact in practice, and not what their perception or sense-making of the artefact was. The theoretical shift, proposed by Orlikowski for technology in general, had critical research implications for the analysis of CIT. The shift was not simply semantic but actually meant progress toward a deeper level of CIT thinking – from thinking of collaborative technology as physical entity or social construction, toward thinking of it as a set of constraints and enablements realised in practice.

- **1994-2000**: It may be summarised that CIT experiments and case/field studies of the 90ies were characterised by a dominant ‘positivist approach’– focusing on CIT sessions (i.e. experiments) or sterile field implementations (i.e. field studies)

– and scarcity of ‘interpretive approach’ studies which broadened the scope to include contextual considerations as well.

- **2000-2009**: In modern collaborative ensembles, ‘work and the ludic are not mutually exclusive but thoroughly intertwined’ (Crabtree et al. 2005, p.235). Homo Ludens, or ‘the Playing Man’ (Huizinga 1971) is hesitantly but surely beginning to be recognised as a factor in the field of CIT. Contemporary concerns of the computing research community – like mobile, ambient, pervasive, ubiquitous, mixed reality and wearable computing – are accompanied by a movement away from the workplace to focus on diverse settings in everyday life: homes, games, museums, photography, tourism, performances, indeed diverse ‘playful activities’ that generally fall under the conceptual rubric of the ‘ludic’ (Crabtree et al. 2005).

Reference	**Reported Shortcomings of CIT Research**
	Scarcity of research on CIT adoption and diffusion
Parent and Gallupe (2001), p.405	‘A number of research opportunities remain, not the least of which are efforts aimed at addressing questions pertaining to the adoption and diffusion of CITs.’
Nunamaker et al. (1998), p.203	‘Almost nothing is known about CIT adoption and diffusion.’
	Focus of research on a single CIT solution
Bajwa, et al. (2005), p.130	‘Despite the fact that no single medium can support collaboration in different types of tasks, there is a scarcity of research investigating the adoption and use of multiple CIT options across regions.’
Bajwa, et al. (2005), p.131	‘Still, adoption and use of multiple CIT solutions remains largely unexplored.’
DeKoven (2000)	‘The most part, the focus of these investigations has been on a single CIT solution, despite the fact that the business press has emphasized using a variety of tools to collaborate.’
Tung and Turban (1998)	‘The majority of the research efforts have focused on investigations of adoption of a single IT even though collaboration amongst distributed groups is typically supported by a combination of communication technologies.’
	Focus on artificial problems with non-stakeholding participants
Bajwa, et al. (2005), p.138	‘Previous research on CITs has sometimes been criticised for studying artificial problems with non-stakeholding participants in the USA. More research is needed on the adoption and use of CITs by real stakeholders using them to solve real problems.’
Parent and Gallupe (2001), p.405	‘A number of research opportunities remain, including questions pertaining to the adoption and diffusion of CITs by practicing managers.’
	Scarcity of research on a macro-level
Bajwa, et al. (2005), p.131	‘Collective adoption and use of multiple CIT solutions remains largely unexplored at the macrolevel.’
Bajwa, et al. (2005), p.138	‘More research is needed on the adoption and use of CITs in a variety of

	organisational contexts in different countries.'
Mark and Poltrock (2003)	'There are few studies which have focused on large-scale groupware technology adoption in an organisation.'
Tung and Turban (1998)	'Despite the growing trends and the importance of collaboration in modem organisations, there have been no large-scale investigations on the collective patterns of assimilation (acquisition and deployment) of a variety of IT solutions that have the capability to support task-oriented group collaboration.'
	Focus on experimental studies
Bajwa, et al. (2005), p.138	'Previous research on CITs has sometimes been criticised for its focus on laboratory experimental studies of face-to-face CIT-supported environments…'
Chun and Park (1998), p.313	'GDSS research is showing conflicting results. One possible reason is the difference between field experience and many experimental studies. GDSS research over the past years mainly focused on decision rooms.'
	Indifference to organisational matters *Focus on structured collaborative work*
Randall (2007), p.627	'The field of CSCW has been (more or less, with honourable exceptions) indifferent to organizational matters… The result has been that the organisation has been seen either as something which exists on a wider scale than CSCW can justifiably be interested in, or as something "formal", involving plans, rules and procedures which, again, are sometimes seen as not part of our remit.'
	Limited scope of enquiry (domination of technologies for supporting small, remote groups)
Randall (2007), p.627	'A number of commentators have expressed reservations about the limited scope of CSCW's enquiry, noting the domination of technologies for supporting small, remote groups and the assumption that CSCW's basic problem has to do with replicating the interactional richness of face-to-face communication.'

Table 3.1. Reported Shortcomings of CIT Research

Various authors (listed in Table 3.1) have expressed concerns regarding the quality and focus of CIT research. The most frequently reported weaknesses and shortcomings of CIT research include:

1) scarcity of research on CIT adoption and diffusion,

2) focus of research on a single CIT solution,

3) focus on artificial problems with non-stakeholding participants,

4) scarcity of research on a macro-level,

5) focus on experimental studies,

6) indifference to organisational matter,

7) focus on structured collaborative work, and

8) limited scope of enquiry (domination of technologies for supporting small, remote groups) (see Table 3.1).

To prevent such atrophy of analysis from a single-contextual (possibly non-stakeholding) perspective, this Thesis ventures on a holistic route of thought, by encompassing a complex ecology of multiple contexts affecting the adoption-diffusion 'fate' of collaboration technology over time. Thus, various types of computer support for collaborative working are addressed – wherever and whenever they occur. Thereby, adequate notice is paid to the effects of decision 'unstructuredness and noisiness' (Raggad 1996) on CIT adoption and diffusion. The Thesis contributes by making a strong effort to broaden our intuitions concerning CIT adoption-diffusion determinants (barriers or accelerators) – a necessary contribution, given that experiments and field studies in the cooperative work area are notoriously expensive and time-consuming.

The debate on what constitutes core issues in eCollaboration has existed since the inception of the 'CSCW' field in the early eighties (e.g. Bannon and Schmidt 1991, Bannon 1992), and is still going on. The boundaries of eCollaboration are expanding, and the boundaries of CIT research are expanding to include contemporary research trajectories focused on mobile, ambient, pervasive, ubiquitous, wearable computing, virtual and mixed reality, et cetera. CIT terminology is expanding correspondingly. In the following Section, I will look at some basic CIT terminology, its meaning and the implications of its usage.

3.3 CIT Terminology

One of the most influential CIT classifications is the 'time and space' taxonomy (Johansen 1988, Ellis et al. 1991), also known as the 'time and space matrix', or the 'groupware matrix'. The matrix maps the connotations of collaborative work on a two-fold time-space axis, and outlines four types of computer-mediated interactions: 'same time' (synchronous), and 'different time' (asynchronous), 'same place' (collocated), and 'different place' (remote).

As can be seen from Table 3.2, four different modes of collaborative work, depending on the types of computer-mediated interactions, may be outlined as follows:

1. *Same Time/Same Place*: synchronous collaborative work in which participants are physically co-located. For example, a 'boardroom type of meeting where everyone congregates at a table, using pointers, overhead projectors, and handouts as meeting tools' (Olson et al. 2001, p.284).
2. *Same Time/Different Place*: synchronous collaborative work in which participants are individually located and connected to other participants through CIT. For example, a 'teleconferencing system supporting audio and video, allowing the meeting to take place with members in different locations' (Riedl et al. 1993, Watabe et al. 1990).
3. *Different Time/Same Place*: asynchronous collaborative work in which participants are physically co-located. For example, a 'bulletin board in a publicly accessible room used for posting announcements' (Olson et al. 2001, p.284).

4. *Different Time/Different Place*: asynchronous collaborative work in which participants are individually located and connected to other participants through CIT. For example, 'the e-mail systems' (Olson et al. 2001, p.284).

Same Place (co-located)	decision support, CIT augmented meetings, voting, presentation support…	group scheduler, project management, shared computers...
Different Place (remote)	Chat, video conferencing...	e-mail, discussion, workflow…
	Same Time (synchronous)	**Different Time** (asynchronous)

Table 3.2. The Time-Space-Matrix. Source: Johansen (1988), Schulte et al. (1999), Chen and Lou (2002)

Several authors (e.g. Klanac 2005, Eng 2004, Osmonbekov et al. 2002) stress the *degree of formality* of the communication mode as an important additional consideration. Thus, they formulate a fifth 'formal–informal place' dimension, whereby the usage of the word 'place' connotes the venue, virtual or physical, where the collaborative work takes place.

Formal Place/Informal Place: The mode [of communication] can also be formal, which is more structured and connected to organisation, and informal, which is more personalised, spontaneous and non-regularised (Klanac 2005, p.5). Osmonbekov et al. (2002) and Eng (2004) suggest that, e.g. e-mail and website, reduce formality in business relationship and therefore can be classified as more informal modes of communication. Applications like data conferencing (instant messaging and chat), as well as short messaging through mobile and ubiquitous computing devices have also been usually classified as rather informal, and belonging to the so called 'coffee driven collaboration' (Tan 2006, p.3).

The time-and-space CIT matrix may hypothetically be extended. The population of its cells, however, could never be precise or exhaustive. Every attempt to populate the cells with concrete applications is a 'matter of choice', and hence, rather problematic. As can be seen from Table 3.2, the borders of the quadrants are not precisely defined either, such as the association of a particular application with a particular quadrant. The 'co-location' factor, for example, can give us some idea on the work structure (i.e. granularity of task breakdown, possible networks of linked activity-sets, iteration patterns of input seeking, coordination patterns etc.), but it does not imply enough guidance as to what technological application is best suitable to 'illustrate' it.

Johansen's (1988) time-and-space CIT matrix has been used by various authors (e.g. Chen and Lou 2002, Schulte et al. 1999) to populate with different CIT applications depending on the case being studied, the type of project being studied etc. Contrary to this common practice, in this Thesis I will abstain from equating different connotations or facets of collaborative work with concrete CIT applications. An important facet of this Thesis will be the tendency to favour ***behavioural analysis*** of the choice to use or reject collaborative technology in general, rather than functional analysis of single CIT applications. Without excluding or underestimating the importance of the latter, I will focus on the decision of using CIT anywise, and will trust (take 'for granted') the ability of the end user to choose the appropriate single application for himself. Thus, I will distance myself from the so-called 'strict constructionists' in the field, described by Howard (1988) as people, mainly implementers, who are solely interested in building widgets. The analysis of CIT (represented mainly by the field of 'CSCW') has rightfully come under criticism for being technologically deterministic, with minimalist use of theory. As Bannon and Schmidt (1991) pointed out: 'CSCW cannot be defined in terms of the techniques being applied' (p.360).

Having offered a very general glimpse on CIT terminology and my idea of its relevance to this Thesis, I now move on to pay special attention to a broad CIT subclass – one which is especially relevant to this Thesis – the subclass of 'social CIT'.

3.3.1 Emergence of 'Social Collaborative Software'

The term 'social software' emerged in 1994 to illustrate a variety of new types of user-created and community-driven software applications, functioning based on volunteer participation, and offering high levels of social involvement and participation. According to Schuler (1994) social software refers to any type of software that serves as an intermediary for a social relation. Some social-software tools are, for example, social networking portals, blogs, wikis, podcast sites, online personal networks, mashups, social bookmarking tools (also known as social tagging), social news sites, opinion sites, prediction markets etc. The social informatics community initially coined various names for this type of software tools, including 'user-generated content' (UGC) and 'consumer-generated media' (CGM). However we name it, this new type of software is different by its:

(1) ***reach*** – social software, especially web-based social software, enables anyone to reach a global audience;

(2) ***accessibility*** – unlike 'industrial media' (commonly referred to as traditional, broadcast or mass media) where the means of production are typically owned privately or by government – social-software tools are generally available to anyone at little or no cost;

(3) ***simplicity*** – industrially-produced mass media typically requires specialised skills and training, most social-software tools do not;

(4) ***democratic nature*** – at its most basic sense, social software transforms monologue (one to many) into dialog (many to many) and transforms the role of people from content readers into publishers ('democratisation of information').

This 'democratisation' has had a profound effect on the nature of collaboration in general and on the nature of computer-supported collaborative work (CSCW). Groupwork has always been 'conversational' in one sense or another. Mass collaboration means, however, that this conversation gets transformed from a 'totalitarian' monologue into a democratic many-to-many dialog. Social collaborative software (***social CIT***) is, in my view, conceptually and structurally different from the 'decision-room' collaborative software of the 80ies. According to me, social CIT is a broad CIT subclass which *deserves special attention* for the following reasons:

(1) social CIT enables deep changes in the modus operandi of collaboration, i.e. transforms small-scale collaboration into mass collaboration;

(2) social CIT has performed a quick transition from the Internet public space into the enterprise private space;

(3) social CIT has penetrated the enterprise primarily ***bottom-up*** (the bottom-up CIT diffusion path will be largely discussed in this Thesis[7]).

One contribution of this Thesis and the result from Phase 1 of this investigation is the identification of two distinct CIT diffusion paths (bottom-up vs. authority-based)[8]. The existence of two distinct diffusion paths is ***immediately obvious through the example of social-CIT diffusion*** (I am describing social-CIT diffusion in detail in this Thesis – e.g. in Section 14.6).

In the spring of 2006 the social informatics community coined the term 'enterprise social software' to illustrate social software's transition into the workspace (from the Internet private space). McAfee (2006a) introduced the term in his article 'Enterprise 2.0: The Dawn of Emergent Collaboration' to illustrate a new wave of business collaboration tools (social CIT) including blogs, wikis, and other social software used in 'enterprise' (business) contexts for collaboration purposes[9]. This type of software differed from incumbent enterprise software through ***network participation*** – enterprise social software requires network participation which is fundamentally different from working on an isolated computer. Enterprise social software also differs by the fact that there are ***no constraints on the type, structure or quantity of user input*** in form of 'content'. By contrast, formal enterprise software tends to impose an artificial form of interaction dictated by rigid structure.

A number of articles followed after McAfee (2006a), offering insights on different characteristics of enterprise social software (e.g. Davenport 2008, Lakhani and McAfee 2007, Singh 2008). In contrast to traditional collaboration software, which imposes ***structure prior to use***, the 'social CIT' generation tends to encourage ***use prior to providing structure***. In the words of Tapscott and Williams (2006, p.254), 'in contrast to complex group collaboration tools, wikis conform naturally to the way

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[7] See e.g. Figure 6.3. Preliminary Conceptual Framework (CFØ), Section 6.5, Section 6.3.1, Figure 6.1.

[8] …illustrated in e.g. Figure 6.3 – Preliminary Conceptual Framework CFØ.

[9] … including social and networked modifications to company intranets etc.

people think and work, and have the flexibility to evolve in a self-organising fashion as the needs and capabilities of the organisation change. This flexibility arises from the fact that at their most basic, wikis are completely unstructured'. To quote Ross Mayfield, CEO and founder of Socialtext (in Tapscott and Williams 2006, p.254):

'The structure [in wikis] is created by demanding active involvement from users in ways of organising and creating their own information architecture'.

As McAfee (2007) pointed out, social CITs allow for ***free-form authoring***, whereby the level of empowerment and freedom of the human 'users' go well beyond the narrow confines imposed by formal CITs:

'Another idea is what I call "free-form authoring" – in other words, once we get more people on these social software platforms, our goal as the proponents of the platforms, should *not* be to try to impose a lot of structure on their interactions or give them a bunch of fields to fill in. The mindset shift that I am perceiving is that, if we want these tools to succeed, our goal should be to get out of the way, and let people do what they want to on them. We really do not know what people want in advance. We also really do not know what they know in advance. Their job title gives us some clues, their position in the Org Chart gives us some clues, but the sources of expertise are widely distributed. Expertise itself is a very multi-dimensional concept, and it is very tough to predict in advance' (McAfee 2007).

McAfee (2007) continued the discussion by:

- referring to the requirements-engineering idea of '***meta-data***' – the data about data – and the orthodox maxim that experts should be thinking in advance of meta-data, and then sliding over content in pre-defined schemes. The recommendation put forth by McAfee is to school our minds against 'meta-data created by experts' – a vision hopelessly limited, in his words, and particularly ***hostile to any nuance of egalitarianism*** in system use. Instead, in the 'enterprise 2.0' employees themselves should be generating the meta-data, and they should be doing it almost as a by-product of their normal work;
- giving an illustrative example of the types of wiki users, as identified by a wiki company – i.e. authors (people who like generating huge amounts of text), editors, copy-editors, organisers, gardeners (a small percentage of people who like taking fairly unstructured blocks of text, and rearranging them) – and the ***practical implausibility of predicting their user behaviour in advance***;
- arguing that the Internet itself – our largest library – has become a much more navigable, and searchable place in the recent years, because we have found good ways (e.g. social tagging) to let structure emerge from the initially ***free-form collaborations***, interactions, and dumping of stuff into online knowledge repositories.

Broadly, McAfee's ideas replicate what the medieval philosopher Spinoza (2002) famously articulated as his 'ceaseless effort not to ridicule, not to bewail, not to scorn human actions, but to understand them'. Another reflection of the ideas invoked here is Orlikowski's (1995) practical conclusion that only some patterns of CIT use realise the 'collaborative intent' of the designers (p.28).

3.3.2 Common CIT Vernacular

Each 'name' we use to describe something carries a plenitude of assumptions that may be implicit in the name. The same applies to the names we use to describe CIT, and therefore it is worth examining the common vernacular used by the CIT research community. Anyone trying to perform a basic CIT literature review would immediately discover that terms are used quite differently by different authors, essentially similar concepts are labelled differently by various researchers, distinctions are made between concepts when there is no (apparently significant) difference between them (e.g. 'electronic meeting systems' and 'group support systems' may functionally mean the same systems, but the terms are used distinctly in literature). It seems to me that conceptualisation within and structuring of the field in the minds of the community has been dynamic and not entirely coherent – an effect exacerbated by the existence of a number of, in practice, distinct (though logically associated) literatures. This section is an attempt to build a brief but useful foundational synthesis for my work.

The social informatics community has produced a diversity of perspectives on IT-supported collaborative work. A vast and continually expanding range of 'names' have been used to describe computer-based tools for eCollaboration, some of which include:

- CIT – Collaborative Information Technologies (e.g. Zhu 2006);
- GSS – Group Support System (e.g. Briggs et al. 2003, Nunamaker et al. 1997, Davison and Briggs 2000, DeSanctis and Gallupe 1987);
- GSS are often also called 'EMS' – Electronic Meeting System (e.g. Bajwa et al. 2005, Dennis et al. 1988) or MSS – Meeting Support Systems;
- Groupware (e.g. Lopez and Skarmeta 2003);
- GDSS – Group Decision Support Systems (e.g. Bal and Foster 2000), etcetera.

The term 'Group Decision Support Systems' has been distinctively applied to refer to systems that focus on facilitation of decision-making. The emphasis on decision-making has enabled the interpretation of the term 'GDSS' as slightly autonomous. Pinsonneault and Kraemer (1990), for example, made a related distinction between GDSS, and GCSS (Group Communication Support Systems), which they observed as having 'similar impacts on some aspects of group processes and outcomes, but opposite impacts on other aspects' (p.143). Olson et al. (2001) made a related distinction between GDSS and GSS, arguing that GSS has come to be used as more general and inclusive than GDSS, which is often used to imply decision room, same-time settings. Tables 3.3 and 3.4 below give an alphabetic list of some basic CIT terminology. Each of the terms, listed in Tables 3.4 and 3.5, has been applied, referred to, and interpreted by the respective authors to describe computer-based tools for eCollaboration. Table 3.3 gives some examples of CIT terminology applied in the 80ies and 90ties, and Table 3.4 gives some examples of CIT terminology applied after 2000. The definitions, listed in both tables, are randomly selected.

Definition	**Author**
CSCW – Computer Supported Cooperative Work	
An identifiable research field focused on the role of the computer in groupwork.	Greif (1988)
A field which covers anything to do with computer support for activities in which more than one person is involved.	Bannon and Schmidt (1991)
EMS – Electronic Meeting System	
An information technology-based environment that supports group meetings, which may be distributed geographically and temporally.	Dennis et al. (1988) [introduced the term]
GSS – Group Support System	
Combining 'communication, computer, and decision technologies to support problem formulation and solution in group meetings' (p.589).	DeSanctis and Gallupe (1987)
Groupware	
Software that supports groups.	Bannon and Schmidt (1991)

Table 3.3. Basic CIT Terminology in the 80ies and 90ties

As can be seen from Table 3.3 above, except from Bannon and Schmidt's definition of CSCW, every other (randomly selected) definition contains the word 'group'. This observation corresponds with the observation made by Bannon and Schmidt (1991) that CSCW had been *equated* with groupware, especially by the strict constructionists in the field:

'We reject the equation of Groupware with CSCW because of its technological focus and its narrowness in the face of the multiplicity of social forms of cooperative work manifested in the world' (Bannon and Schmidt 1991, p.363).

Almost eighteen years after 1991, it seems that CSCW continues to be (more or less, with honourable exceptions) equated with groupware. In 2004, Neale et al. (2004, p.114) noted that group research 'has served as the underlying knowledge base for CSCW systems'. In a special 2007 issue of the CSCW Journal, Randall (2007) pointed out that a number of commentators are still expressing reservations about the limited scope of CSCW's enquiry, noting the domination of technologies for supporting small, remote groups.

'It stands, then, as a timely intervention into CSCW is problematic, especially given the lengthy debate over our future at ECSCW 2003. A number of commentators have expressed reservations about the ***limited scope of CSCW's enquiry***, noting the ***domination of technologies for supporting small, remote groups*** and the assumption that CSCW's basic problem has to do with replicating the interactional richness of face-to-face communication' (Randall 2007, p.627).

In a large part of the CIT literature from the 80ies and 90ies, cooperative work was simply equated to groupwork. For instance, Greif (1988) defined CSCW as 'an identifiable research field focused on the role of the computer in groupwork' (see Table 3.3 above). The focus of the CIT literature from the 90ies has been even narrower in other terms. For example, the term 'GSS' has been applied by the research community as meaning 'a system primarily designed for a "decision room"' (Fjermestdad and Hiltz 1999, p.7). Table 3.4 below shows that CIT's basic terminology does not seem to have changed a lot after 2000.

Definition	**Author**
CIT – Collaboration Information Technologies	
Electronic technologies that support the work of groups of individuals engaged in collaborative tasks, usually in organisations.	Zhu (2006)
CSCW – Computer Supported Cooperative Work	
A generic term, which combines the understanding of the way people work in groups with the enabling technologies of computer networking, and associated hardware, software, services and techniques.	Wilson et al. (2006)
GDSS – Group Decision Support Systems	
Computer and communication technologies configured to maintain data sources, enhance information capacity, and provide decision-making structures for individuals and group.	Bal and Foster (2000)
GSS – Group Support System	
A suite of collaborative software tools that can be used to focus and structure a team's deliberation, while reducing cognitive costs of communication and information access and minimising distraction among teams working collaboratively towards a goal.	Davison and Briggs (2000), Briggs et al. (2003)
Groupware	
The software that runs CSCW systems.	Lopez and Skarmeta (2003)

Table 3.4. Basic CIT Terminology after 2000

The presence of the word 'group' in 'groupware' does matter, as did the presence of the word 'intelligence' in 'artificial intelligence', the word 'expert' in 'expert systems', or the word 'automation' in 'office automation'. As can be seen from Table 3.4 above, every (randomly selected) definition produced by the CIT research community ***after 2000*** again contains the word 'group', with only one (out of five) exceptions (Lopez and Skarmeta's definition of groupware). Although the CIT research community has developed various novel research streams after 2000 – e.g.

focused on ‘communities’, ‘communities of practice’, ‘web of computing’[10], etc. – very little from these developments seems to be visible in the basic terminology/common vernacular of CIT research. The *definitions* commonly applied to analyse collaborative activities and to design CIT tools, are still based on the implicit notion that the ‘group’ is the unit of analysis for CIT. The ‘mass collaboration’ phenomenon (discussed in Section 3.4.2 of this Thesis) also seems to be (with honourable exceptions) neglected by most of today’s CIT/CSCW *definitions*. Collaborative work continues to be, at least terminologically, more or less equated with groupwork.

Equating ‘collaborative work’ with ‘groupwork’ entails a host of problems, the biggest of them being that the attention of CSCW is explicitly limited to ‘groups’. This limited focus can be fraught with problems in terms of appropriate unit of analysis for CSCW. (I shall return to this point later in this Thesis, in Section 4.2). Just as ‘groupwork’ is one of the most overused and misused terms in basic business, the term ‘groupware’ is overused to describe CITs. The terminological sleight, associated with that overuse, is hard to accept. Equating CIT with groupware implicitly means that the goal of research is to design new widgets to support teams or groups. Often the focus is only on supporting particular/individual teams or groups. The latter could be especially misleading, given that the ‘mass collaboration’ of today is conceptually and structurally different from the ‘decision-room collaboration’ of the 80ies.

According to the British sociologist Richard Whitley, a research area can be said to exist when scientists concur on the nature of the uncertainty common to a set of problem situations (Whitley 1974). A literal reading of any of the above-quoted (in Tables 3.3 and 3.4) definitions is susceptible to misinterpretation of the common set of problem situations that should make eCollaboration a distinct research area. A fraction of these ‘set of problem situations’ are actually not new, but are inherited from old rubrics like ‘Office Automation’ or ‘Computer Mediated Communication’ (some of their promises, like the promise to automate office work, have been abandoned as unattainable, but other promises have later been discussed under the CSCW banner). Few authors (e.g. Lee et al. 1999) have taken a very wide view of collaborative systems and technology so as to address all types of computer support for collaborative work wherever and whenever they occur, and to include all those systems which enable ensembles of individuals to work together on co-ordinated tasks, from Group Support Systems (such as Lotus Notes, GroupWise and Group Systems) to Inter-Organisation Systems (such as Electronic Data Interchange and Electronic Brokerage Systems), etc.

For the purposes of this study, I will use a broad categorisation of collaborative systems and technology. I will view collaborative systems and technology as providing computer support for activities ***in which more than one person is***

[10] e.g. communities of practice, learning communities, community networks, communities of interest, voluntary associations and social collaborative computing, civic networks (Carroll 2007, Farooq et al. 2007, Venkatesh and Chango 2007, Kavanaugh et al. 2007, Reichling et al. 2007, Schafer et al. 2007), etc.

involved. I will use the most neutral term **'CIT' (Collaboration Information Technology)** as an umbrella term denoting a broad view on various types of computer-based collaborative systems, i.e. CSCW systems, EMS, MSS, CSS, GCSS, DSS, GDSS, GSS, Groupware, eCollaboration tools, etc.

In summary:

> In this Thesis, I will view collaborative systems and technology as providing computer support for activities in which more than one person is involved. I will use the umbrella term 'CIT' to describe this broad idea.

3.3.3 CIT Terminology Relevant for this Thesis (Scope of Study)

As I have just explained, my understanding of CIT is broad and non-constructivist, with a focus on the fundamental constraints on how collaboration occurs and the fundamental characteristics common to all cooperative work arrangements, irrespective of the technical facilities available now or in the future. I therefore view

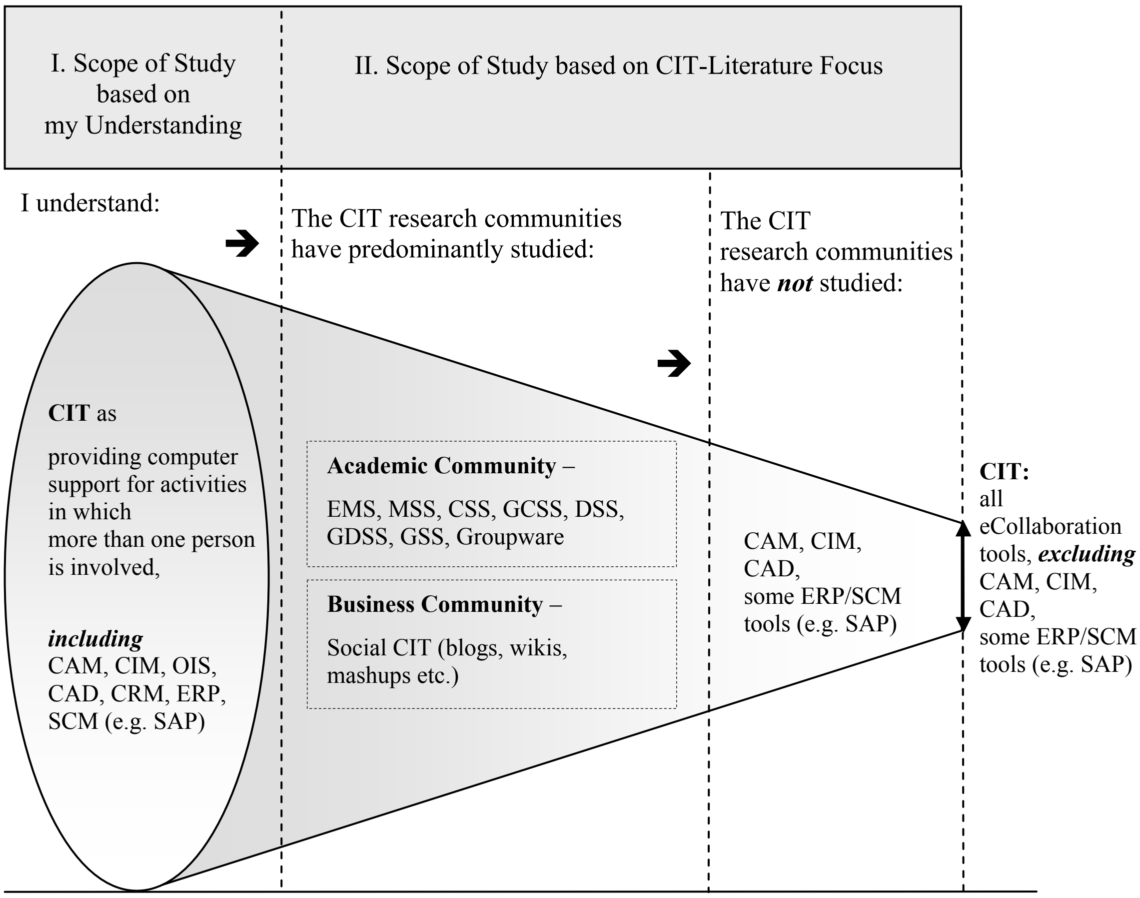

Figure 3.1. Scope of this Study in terms of CIT Types

collaborative systems and technology as providing computer support for activities in which more than one person is involved. I am using the umbrella term 'CIT' to describe this broad idea.

Figure 3.1. above illustrates the scope of this study in terms of CIT types. The final boundaries of the scope of this investigation have crystallised based on two main considerations:

- *Considerstion I* (see Figure 3.1): my understanding of what CIT means (explained above);
- *Considerstion II* (see Figure 3.1): the CIT research community's understanding of what CIT means. The latter represents, in fact, the way in which the CIT research community ***has defined itself***, and can be judged by the scope of CIT literature's thematic focus.

It is important to note that my literature review has revealed the existence of two different CIT research communities: (1) ***academic*** research community, and (2) ***business*** research community. As depicted in Figure 3.1, the academic CIT community has primarily analysed eCollaboration tools like EMS, MSS, CSS, GCSS, DSS, GDSS, GSS, and the so called 'Groupware'. On the other side, the business community has, especially after 2006, produced abundant business reporting on the transition of community-produced social CITs (e.g. blogs, wikis, mashups – see e.g. Table 6.5) from the Internet public space into the enterprise space. (There is some academic reporting on that recently gaining popularity, but it has been preceded by abundant business reporting). In this study, I am analysing both professionally and community-produced eCollaboration tools – i.e. I am taking into account the thematic foci of both the academic, and the business research communities.

The only CIT types that are not considerably discussed in this Thesis are those that have been relatively neglected (i.e. not considerably discussed) by the CIT research communities themselves (see Figure 3.1). Those are CIT subclasses, like, e.g.:

- Computer-Aided Manufacturing (CAM) and Computer Integrated Manufacturing (CIM) – studied mainly by the CAM research community;
- Computer-Aided Design (CAD) – in the focus of the CAD research community;
- some Enterprise Resource Planning (ERP)[11] and Supply Chain Management software tools (e.g. SAP) – in the focus of the SCM/eProcurement/ERP research communities.

As depicted in Figure 3.1 above, 'CIT' is discussed in this Thesis in terms of all eCollaboration tools, *excluding* CAM, CIM, CAD[12], and some ERP/SCM tools (e.g. SAP). It is important to note that this exclusion is not conceptually-founded but is only a consequence of the 'secondary' nature of Empirical Studies II and III of this Thesis. Both the Critical Meta-Analysis of CIT Case-Study Reports (Empirical Study

[11] ERP tools are only 'mentioned' later in this Thesis.

[12] CAD/CAM systems are mentioned in Case 50 of Empirical Study II.

II) and the Content Analysis (Empirical Study III) are examples of 'secondary research' – they consolidate and critically analyse the primary data provided by the CIT research communities. Hence, these empirical studies rely on what has been defined as 'scope boundaries' by the primary sources. The exclusion of CIT subclasses like CAM, CIM, CAD, ERP (e.g. SAP) has been neither my intention, nor my belief, but only a consequence of the biased primary data.

I actually can find no reason to think why CAM, CIM, CAD, SCM/ERP (e.g. SAP) tools should not be part of CIT research. CSCW is interdisciplinary, and therefore CIT research should be interdisciplinary too. As I have mentioned above in this Thesis, the first CAD/CAM systems were actually the first interactive computing systems for electronic collaboration. Back in 1992, Schmidt and Bannon advocated the view that established research and development fields such as, for example, CAM, CIM, CAD, ERP, SCM should be deemed legitimate and necessary parts of CSCW as domains of inquiry. Schmidt and Bannon's argument seems to me to ring even truer today.

3.4 Nature of Modern Collaborative Work

As we saw in Table 3.2 above, collaborative work can be synchronous or asynchronous (performed at the same or different time), co-located or remote (performed at the same or different place), and – according to Bannon and Schmidt (1991), it can also be direct and indirect (performed by means of interpersonal communication, or mediated by the changing state of a transformation process). Various modes of human-to-human interaction can be observed and analysed. What is more important, though, is to filter out which of those are characteristic of modern collaborative work. Based on what recent CSCW literature has produced, as well as on the crystallised wisdom received from organisational science over the past decade, we can argue that modern collaborative work has been qualified as: a) distributed, b) mostly asynchronous, c) virtual, and d) playful (ludic). In the following Section I will explain how each of these epithets has been claimed by literature to be attributable to modern collaborative work.

'DISTRIBUTED'

If, in the organisation of sixties, individuals belonged to work groups in the sense of logical proper parts (like legs to a table), in present-day highly distributed organisations, people often are members of multiple collaborations (Mark and Poltrock 2004), assuming different roles in each. McGrath (1984)'s definition of 'groups' as 'fuzzy sets' is applicable for modern collaboration arenas, together with the fuzzy definition of group membership. One may argue that the notion of collaborative work has always encompassed a rich and complex reality. Even in the industrial plants of the sixties, the group was not the specific unit of cooperation, as pointed out by Popitz and associates (1957). Collaboration was mediated by complex machine systems, and often did not involve direct communication between agents. The difference is this: if groups had a quasi-permanent character in the sixties, now they are transient and ephemeral, emerging only to handle a particular problem (e.g. project) after which they usually dissolve.

Collaborative work is, in principle, distributed in terms of the unique situations and contingencies it is faced with locally (Schmidt and Bannon 1992). In the present-day business environment, however, specialisation and outsourcing rule (e.g. Tapscott and Williams 2006, Beise, Niederman et al. 2004, Malone 2004). To say it in other words, we have witnessed a transfer from simple value chain management to 'business componentisation' (business landscape changes), accompanied by a transfer from 'localised systems' to 'global digital infrastructure' (technology landscape changes) (Straeten 2007). BMW cars, for example, are not made by BMW anymore, but by suppliers who make most of the components, and increasingly they assemble the final vehicle while BMW focuses on marketing, partnering, and customer relationships. Companies, like Nike and Cisco Systems, have handed over almost all of their production to subcontractors. Thereby, collaborative work not only crosses corporate boundaries, but is predominantly performed through peer networks with indeterminate number of participants, distributed geographically, and logically. Membership is almost a fiction here, since semi-autonomous partners have all the information necessary to form and pursue their own change-adapting strategies in their partial work. As Bannon and Schmidt (1991) so aptly put it, 'cooperative ensembles typically intersect'. In the contemporary turbulent business environment, they intersect more than ever.

'ASYNCHRONOUS'

According to Kreijns et al. (2003), computer-mediated world-wide networks have enabled a shift from contiguous working teams to asynchronous distributed teams utilising computer-supported collaborative environments. Bitter-Rijpkema et al. (2002) suggested that the growing complexity and dynamics of professional work increasingly required teamwork. In this context, they claimed, asynchronous collaboration becomes more common.

'VIRTUAL'

There is a huge amount of literature written on 'virtual teams'. Good reviews of the literature on virtual teams include those by Powell et al. (2004), and Riemer and Vehring (2008). According to Powell et al. (2004), information technology is providing the infrastructure necessary to support the development of new organisational forms, one such form being that of virtual teams. Their existence could 'provide organisations with unprecedented levels of flexibility and responsiveness' (p.6). Some authors (e.g. Bitter-Rijpkema et al. 2002) have simply equated virtual teams to 'non-collocated' teams. No common definition of virtual teams has been agreed upon. Authors like Bajwa et al. (2005) have preferred to use a different phrase, i.e. 'virtual team arrangements'.

In her introduction to a keynote at the 2005 Collaborative Technologies Conference in Boston, Melanie Turk gave an outline of her empirical research on the magnitude and scale of virtual collaborative work in the United States at that time. Turk made a clear distinction between 'remote' and 'virtual' workers, as follows.

- In 2005, from 60 to 90% of U.S. employees were working away from a headquarters' location. These were the 'remote' workers.
- 'Virtual' workers were those working in a location that was separate from their manager's, and their co-workers. In 2005, about two thirds of U.S. companies were defining themselves as virtual workspaces (Turk 2005).

Turk (2005) interpreted the fact that businesses are becoming increasingly virtual as one of the main driving forces for the usage of collaborative technologies. She claimed that technology was now expected to solve the problems created by technology – CITs had enabled the remote workplace, and had made it difficult for us to collaborate in an ad-hoc fashion easily, the way we used to do, for example, twenty years ago; now it was only technology that could bring us back together in a virtual world. Other authors, like Crampton (2001) and Mark (2001) have stressed the negative impacts and considerable challenges posed by the virtual environment on effective communication. Some of these challenges include time delays in sending feedback, lack of a common frame of reference for all members, differences in salience and interpretation of written text, and assurance of participation from virtual team members.

'PLAYFUL' (LUDIC)

In modern collaborative ensembles, 'work and the ludic are not mutually exclusive but thoroughly intertwined' (Crabtree et al. 2005). Homo Ludens, or 'the playing man' (Huizinga 1971) is hesitantly but surely beginning to be recognised as a factor in the field of CIT. Contemporary concerns of the computing research community – like mobile, ambient, pervasive, ubiquitous, mixed reality and wearable computing – are accompanied by a movement away from the workplace to focus on diverse settings in everyday life: homes, games, museums, photography, tourism, performances, indeed diverse 'playful activities' that generally fall under the conceptual rubric of the 'ludic' (Crabtree et al. 2005, special 2007 edition of the Computer Supported Cooperative Work Journal on 'leisure and CSCW').

3.4.1 Transformation of the Organisation of Work

As mentioned above, in order to support collaborative work through computer-based systems, we need to understand collaborative work. The organisation of work has been changing throughout history and – according to Malone (2004) – has been following the pattern of societal change. Schmidt and Bannon (1992) regarded the change process as 'transformation of the organisation of work' (p.15). Over the last two hundred years, for instance, that transformation has been characterised by three distinct phases: 1) small, informally organised businesses, 2) large, centralised corporate hierarchies, 3) decentralised business networks. The transformation of the organisation of work has effected a whole new regime of demands and constraints, all of which are important for CIT. Now I will list – in a highly simplified form – the sequence of changes that have occurred in work-organisation structures over the long way throughout history to the increasingly networked, decentralised organisations of today.

- **Throughout most of history up until 3.000 B.C.: face-to-face communication, co-located and synchronous collaboration, decentralised decision-making**

  For most of the time humans lived on this planet (from two million years ago with the earliest protohumans, and about 100.000 years ago with the biologically modern humans), they supported themselves by hunting and gathering, and they lived in small, decentralised, egalitarian groups that anthropologists call ‘bands’. That is the way most people lived for most of recorded human history (Malone 2005). The only way our hunter-gatherer ancestors could communicate with one another was face-to-face. Everyone [in the band] was involved in decision-making, i.e. the decision-making process was decentralised and egalitarian. Our ancestors left the first tangible evidence of our predisposition to social cooperation (Tapscott and Williams 2006, p.63) sixty to seventy thousand years ago in the cave paintings and primitive tools left behind by hunter-gatherer communities.

- **The technology of writing of 3.000 B.C.: distant communication, remote and asynchronous collaboration, centralised decision-making**

  Sometime around 3.000 B.C. humanity made a profoundly important invention: the technology of writing. Some authors like Malone (2004), regard writing as ‘the first information technology’, and the key distinction between civilisation and all other forms of human society. The birth of the technology of writing meant, at the same time, the emergence of distant communication. For the first time, people could communicate over long distances without meeting face-to-face. Remote and asynchronous collaboration became possible for the first time. By writing our ancestors were able to form larger and larger societies like kingdoms and empires. But it was no longer possible, in those large societies, to have everyone involved in decision-making, as it was in the days that bands had gathers (Malone 2004, 2005). Thus, decentralised and egalitarian decision-making was replaced by centralised decision-making.

- **The printing press of 1450: one-to-many communication**

  In about 1450, Gutenberg developed the first movable type-printing press. For the first time in history, it was economically possible for huge numbers of people, spread out over vast distances, to receive essentially the same message in relatively short amounts of time (Malone 2004). That practically meant that one-to-many communication and collaboration were now economically possible. But even though books and newspapers transformed political communication, they were rarely used for business communication. With the exception of advertising, most business communication up until the 1800s still occurred through one-to-one media: face-to-face conversations, letters, memos, telegrams, and telephone calls. Arguably, businesses did not truly begin to make significant use of one-to-many communication vehicles until after the Xerox machine became popular in the 1960s (Malone 2004).

- **Up until the 1800s: small, informally organised businesses**

  Up until about 1800, most businesses in the world were small family affairs, which were – according to Malone (2004) – similar in many ways to the early bands of hunters and gatherers. Small partnerships and family businesses dominated commerce even in cities (Chandler 2000). The organisation and coordination of work in a merchant’s office of about 1800 could easily be arranged in a personal daily conversation (Malone 2004).

- **1800s: emerging corporate hierarchies**

  In the centuries before 1800s, the hierarchical form of organisation was almost exclusively governmental. Only few nongovernmental organisations developed centralised hierarchies, e.g. the Phoenician traders of the eight century B.C., the Catholic Church, and the Hudson Bay Company. But it was not until the 1800s that this hierarchical form of organisation began to become common in business (Malone 2004).

- **1900s: centralised corporate hierarchies**

  Scientific management as a discipline was born in the twentieth century. In one of the first scientific management books of 1911 – 'Principles of Scientific Management' – Frederick Taylor (1911, 1991) studied the most productive ways to shovel coal, which was 'evidence not only of an obsessive mind, but of a missionary zeal for multiplying the value of human effort' (Hamel 2007, p.38). Since scientific management discovered the advantages of 'economies of scale', big companies made use of their amazing material benefits. Thus, the main characteristic of the organisation of business in the twentieth century was centralisation.

- **Mid-1990s: shrinking companies, decentralisation, many-to-many communication**

  Very different trends appeared in the mid-1990s. In highly simplified form, they can be summarised in three key phrases: 'shrinking companies', 'flattening hierarchies', and 'many-to-many communication'. Brynjolfsson et al. (1994) found evidence that the average size of firms in many U.S. industries was actually declining, and that their hierarchical structure was flattening. There are two main reasons why companies shrink, and why they become decentralised: 1) through increased outsourcing, 2) through increased freelancing. From yet another perspective, the 1990s have seen an explosion of one-to-many and many-to-many media for business communication (Malone 2004), like e-mail, conference calls, the Web and so forth.

- **21st-century: flattening hierarchies, informal alliances, communities**

  In a detailed study of three hundred large U.S. firms, Rajan and Wulf (2002) found substantial evidence that hierarchies were flattening and *lower level managers were treated more like owners*. The modern collaborative ensemble has been given diverse names by researchers, like: (a) informal, ever-shifting alliance of people and firms – variously called virtual organisation, networked organisation, business web, and corporate kieretsu (Malone 2004); (b) high-trust, low-fear organisation (Hamel 2007, p.89); (c) multi-centred functionally differentiated spatial organisation (Kling et al. 2000, Kling 1996, Kling et al. 1995, Kling and Iacono 1994, Kling 1992a). The 21st-century management challenge reflects in the following related trends: modern collaborative ensembles are performing more and more of the work that used to be done inside large organisations [13] (Malone 2004); command-and-control management is becoming less common, which practically means 'giving fewer orders, worrying less about alignment, and spending less time checking up on folks' (Hamel 2007, p.60). Thus, the modern company '*feels less like a hierarchy and more like a community*' (Hamel 2007, p.63). The old monolithic, self-contained, inwardly focused corporation is dead (Tapscott and Williams 2006, p.290). Winning companies today have open and porous boundaries and compete by reaching outside their walls to harness external knowledge, resources, and capabilities. At the same time, the nature of work itself has changed. Work has become more cognitively complex, more team-based and collaborative, more dependant on social skills, more time-pressured, more reliant on technological competence, more mobile, and less dependant on geography (Tapscott and Williams 2006, p.214, p.246) (see Illustrative Example 3.1 – Google's Decentralised Business Model – Appendix I).

In summary:

> The organisation of work has undergone transformation from small, informally organised businesses to large, centralised corporate hierarchies, and decentralised business networks. The modes of communication have been transformed by technology from face-to-face to remote, and from one-to-one to one-to-many, and many-to-many. We need to take the transformation of the organisation of work into consideration with the objective of designing adequate CITs and improving CIT diffusion rates.

3.4.2 Mass Collaboration

The first thing that comes to mind to most of us when we hear the word 'collaboration' is an image of people working together productively and happily. Google CEO Eric Schmidt said,

'When you say "collaboration", the average forty-five-year-old thinks they know what you are talking about – teams sitting down, having a nice conversation with nice objectives and a nice attitude. That's what collaboration means to all people' (in Tapscott and Williams 2006, p.18).

Today's collaboration, however, is dramatically different. While in the past, collaboration was mostly small-scale, today's collaboration is mass-scale. Low-cost collaborative infrastructures – from the Internet to global outsourcing platforms to open source software – allow masses of people to collaborate in ways that only large corporations could in the past. Thus, masses of people at one time can now

[13] In the personal computer industry, for example, Intel and Microsoft form the nucleus of a complex ecology of computer hardware makers, software developers, and professional services firms. Just thirty years ago, the functions performed by this complex web of companies would have been carried out entirely within the walls of IBM. Some large industrial companies like Asea Brown Bovery and British Petroleum have even broken themselves into scores of independent units that conduct business with one another almost as if they were separate companies (Malone 2004).

collaborate and actively participate in innovation, wealth creation, and social development. Massive online communities such as MySpace, Facebook, InnoCentive, flickr, Second Life, YouTube, 34 Things, Technocrati, del.icio.us, the Human Genome Project, Linux, and Wikipedia – are just a few exemplars of today's mass collaboration. Authors like Tapscott and Williams (2006) and Howe (2008) elaborated broadly on mass collaboration, saying that '***we are talking about deep changes in the structure and modus operandi of collaboration***' (Tapscott and Williams 2006, p.3), based on new collaborative capabilities. Some of those capabilities can be outlined as follows: a) peer-to-peer networking, b) open platforms, c) prosumer communities.

Peer-to-peer Networking

According to Tapscott and Williams (2006), peer-to-peer networks represent new models of production based on community, collaboration, and self-organisation rather than on hierarchy and control. Peer producers are characterised by applying open source principles to create products by combining resources embodied within broad horizontal networks of participants (Tapscott and Williams 2006, p.18), and running cohesive yet decentralised operations by linking employees in virtual teams and communities of practice (p.246) (see Illustrative Example 3.2 – Peer-to-peer Networking – Appendix I).

Open Platforms

With open platforms, a company creates a broader stage upon which various partners can build new businesses or simply add new value to the platform (Tapscott and Williams 2006, p.184). In this sense, open platforms are highly synergistic ecosystems for participation. The emergence of open platforms has been prompted by the need for combinatorial innovation. CITs can play the role of environments where such open business webs are built (see Illustrative Example 3.3 – Open Platforms – Appendix I).

Prosumer Communities

Prosumer communities are different from the open platforms discussed above. A broad and relaxed definition of prosumer community would be 'a community of customers who are cocreating company products'. Rather than simply consuming the end product, customers become 'prosumers' by cocreating goods and services. The term 'prosumption' was introduced by Don Tapscott in his 1996 book 'The Digital Economy'. In the emerging prosumption paradigm, a person can seamlessly shift from consumer to contributor and creator (Tapscott and Williams 2006, p.143). The latter is a consequence of the fact that 'most businesses today can barely manage to research the fundamental disciplines that contribute to their products, let alone retain the field's most talented people within their boundaries' (p.21). So, to ensure they remain competitive, companies must increasingly look for global talent outside their walls (see Illustrative Example 3.4 – InnoCentive Network – Appendix I).

Mass collaboration is being praised by some and feared by others because of its 'capacity to alter democracy for ill or well' (Norris 2003), as well as its pervasiveness and 'totality' (Tripp 2004). Needless to say, mass collaboration's facets, characteristics, and social impact need to be taken into consideration for the design of CIT systems and CIT strategies.

In summary:

> Mass collaboration is transforming modern business into an increasingly open endeavour characterised by: (1) peer-to-peer networks running cohesive yet decentralised operations by applying open source principles and linking employees in communities of practice; (2) open platforms upon which various partners can build new businesses or simply add value to the product; and (3) active prosumer communities. When we think about CIT, it is useful to examine our approach carefully with this in mind.

3.4.3 The Collaboration Claim

The *collaboration claim* (e.g. Dyson 1990, Jirotka et al. 1992, Papows 1998, Adhikari 1998, Kiely 1993, Coleman 1996, Fjermestad and Hiltz 1999, 2001) states that collaborative information technology should enhance (foster, engender, etc.) collaboration in organisations and among them, because these technologies have been designed specifically for this purpose (Karsten 1999, p.44); and because controlled experiments, examining processes and outcomes in computer-supported small-group decision making, have shown that efficiency was improved over manual or face-to-face methods (Fjermestad and Hiltz 1999, 2001). The strongest form of the collaboration claim says that – in one way or another – CIT 'causes' collaboration (Karsten 1999, p.45). For example, Vandenbosch and Ginzberg (1997) observed that '…many organisations believe that introducing Lotus Notes and similar technologies will impact collaboration and problem-solving behaviour no matter what' (p.68). The collaboration claim was found problematic in several respects. Orlikowski (1995) found that four patterns of using Lotus Notes – shunning, scepticism, substitution, and exploration – were evident in the empirical studies of two different organisations. In the light of the results of eighteen case studies of Lotus Notes use, Karsten (1999) found that only in the case of extensive and engaged use of Notes were there significant changes towards more collaboration.

'If we get the technology right, then cooperative working will follow' (see e.g. Ehn and Kyng 1987, Kyng 1988, Bødker et al. 1988) – the above statement may be classified as one of the 'most over-emphasised' within the CIT research community. Regrettably, nothing could be further from the truth. Although CIT environments can theoretically support collaboration, both research and field observations are not always positive about their working. This discrepancy may be attributed to a variety of factors. 'Taking for granted that participants will socially interact simply because the environment makes it possible' (Kreijns et al. 2003) is one impeding factor.

As Turk (2005) aptly put it, before we slip comfortably into the easy assumption of the 'collaboration claim' – i.e. that computer support will [unconditionally] aid collaborative work – it is worth asking ourselves the following questions:

(1) How do we justify the use of collaboration technology?

(2) How do we justify collaboration in the first place? Do we always need to collaborate? Is collaborative work necessarily preferable to individual work?

There is *overhead* involved in collaboration, as pointed out by numerous authors including Strauss et al. (1985), Gerson and Star (1986), Strauss (1988), Schmidt and Bannon (1992), Brooks (1995), and Neale et al. (2004). Compared with individual work, collaborative work implies overhead costs in terms of: a) cost of articulating (dividing, allocating, scheduling, meshing, interrelating) individual activities, and b) cost of coordinating individual activities. The overhead or operating costs involved in coordination is referred to as process loss (Sproull and Kiesler 1991), and distributed process loss is much more costly. So costly, in fact, that groups often do not recover from its effects (Neale et al. 2004). Brooks (1995) described how the effort was increasing by a factor of n(n-1)/2 for each task that had to be separately coordinated, and this could actually counteract the collaborative efforts resulting in a net decrease in performance.

The mostly quoted reason for the emergence of cooperative work formations is, of course, that collectively we expect to accomplish more than we could individually. However, there is no 'obvious' justification for incurring the overhead cost of collaboration, unless at least one of the following improvements are granted, e.g.: diversifying, combining, and multiplying the specialised knowledge of multiple individuals; serving the function of balancing the individual biases ('bias discount', in the words of Cyert and March 1963), etcetera. Collaborative work is not necessarily preferable to individual work. Performing collaborative work through the medium of the computer can be an extremely trying and unpleasant experience. Instead of helping, the computer can, in the worst case, even disrupt the collaborative activity that is already going on (after Schmidt and Bannon 1992 and Surowiecki 2004).

In summary:

> What we have to be concerned about in thinking of CIT is not the 'collaboration claim', but first of all ensuring that the computer does not disrupt the existing level of collaboration.

Chapter 4

THE PROBLEM DOMAIN – CIT ADOPTION AND DIFFUSION

This chapter provides a brief summary of the academic debate surrounding the issue of CIT adoption and diffusion, which is the problem domain of this study.

4.1 Collective Adoption

As Kling (1987) observed, one reported reason for the failure of management systems is the difficulty of getting everyone to use them. According to Ehrlich (1987), ‘a critical mass of users is essential for the success of any communication system’. Similarly, CIT applications are meant to be used by multiple individuals and critical mass is essential for their adoption. It is not far-fetched to say the following: the difficulty of getting a critical mass of individuals to use a CIT application is one of the biggest challenges of collaborative technology adoption. And a facet that makes it truly unique. For example, electronic calendars can be used for meeting scheduling purposes only if a substantial number of people maintain them.

> *Illustrative Example – Electronic Calendars*
>
> Where electronic calendars are in use on a large or networked system, an automatic meeting scheduling feature is often provided (e.g. Ehrlich 1987a, 1987b). The concept that underlies automatic meeting scheduling is simple: the person scheduling the meeting specifies a distribution list and the system checks the calendar for each person, finding a time convenient for all. The system then notifies all involved of the tentative schedule. For automatic meeting scheduling to work efficiently, everyone involved must maintain a personal calendar and be willing to let the computer schedule their free time more often than not. Data reported by Ehrlich (1987a, 1987b) suggest that neither of these requirements is generally satisfied. Unauthorised scheduling of a manager’s apparently open time can be sufficient motivation for total rejection of the system by the manager. In order to take full advantage of an electronic calendar, all members of a group must commit to using this medium (Ehrlich 1987b).

To state the obvious, collaborative information technologies are multi-user applications, and thus they are fundamentally different from single-user applications. The latter, although unmistakable, has often escaped adequate notice as part of the debate surrounding CIT adoption and diffusion due to ‘a natural but ultimately misleading analogy: the analogy between multi-user applications and single-user applications’ (Grudin 1988, p.85). Our experience with technology and the skills we have acquired are generally based on single-user applications. Our ‘intuition’ regarding technology is also generally formed by single-user applications. That intuition will inevitably fail when it comes to the intricate dynamics of collaborative technology adoption. A typical CIT application is meant to be used by a range of user types – people with different backgrounds, different attitudes, different motivations, and different skills, all of whom may have to participate for the application to be successfully adopted. Therefore, adoption-diffusion analysis is considerably more difficult for CIT applications than for single-user applications. Malone (1985) was one the first to convincingly make the case that *different* motivational, economic, and political factors are likely to affect CIT applications compared to single-user applications. For instance, an individual's success with a particular spreadsheet or word processor is not likely to be affected by the backgrounds of other group members or by administrative or personality dynamics within the group. These factors, however, come to the fore when applications are intended to support an entire group. Grudin (1988) concurred with Malone (1985), arguing that 'a single-user application may get away with appealing to a kind of lowest common denominator; CIT applications will often have to appeal to every possible denominator' (p.88). Table 4.1 below describes the main differences between collaborative information technologies and single-user applications that, according to me, need to be taken into account.

Single-User Applications	**Collaborative Information Technologies**
Single user Individual adoption Critical mass is important but not necessarily crucial	Range of users Collective adoption Critical mass is crucial

Table 4.1. Characteristics of Collaboration Information Technologies versus Single-user Applications

In summary:

> CIT adoption is collective. When we think about CIT applications, it is useful to examine our approach carefully with this in mind. Adequate notice should be paid to the fact that the skills, intuitions, and outlooks gathered with single-user applications are no determinants of adoption in the different domain of CIT.

4.2 Unit of Analysis

Scholars such as Neale et al. (2004) and Olson and Olson (1997) point out that several different levels of evaluation and analysis are possible and common in the field of CSCW: the individual, group (team), organisation, and industry level. The individual, group, and organisational levels allow for collecting behavioural data that maps relatively well to cognitive, rational, and social bands of human activity (Neale et al. 2004). Gross et al. (2005) argued that the unit of analysis in CSCW should be chosen in line with the corresponding 'category of awareness', the latter being 'group', 'social', and 'workplace' awareness. Table 4.2 below shows that the 'workplace awareness' category in CSCW corresponds to the 'situation awareness' category in social sciences.

CSCW – Corresponding Category of Awareness	Social Sciences – Corresponding Category of Awareness
Group awareness Social awareness Workspace awareness	Group awareness Social awareness Situation awareness
Note. CSCW = computer-supported collaborative work	

Table 4.2 Corresponding Categories of Awareness. Source: Gross et al. (2005)

As far as technology adoption and diffusion *in general* are concerned, Mark and Poltrock (2004) have given examples of different models and studies, using the individual, the work unit, the organisation as the unit of analysis (see Table 4.3). It is worth noting that the hybrid models in Table 4.3 deserve special attention, as they assume that adoption occurs at different levels of an organisation, in a stage process.

Individual	Work Unit	Organisation	Hybrid Models
DOI : Rogers (1995), TAM : Davis (1989), Davis et al. (1989), Mathieson et al. (2001)	Brabston (1993), Umanath and Campbell (1994), Kwon (1990)	Adaptive Structuration Theory: Barley (1986), Orlokowski (1992), Poole and DeSanctis (1990), Orlikowski (1993b), Majchrzak et al. (2000)	Zaltman et al. (1973), Gallivan (2001)

Table 4.3. Examples of different models and studies of technology adoption, using the individual, the work unit, the organisation, and hybrid models, as the locus of impact. Source: Mark and Poltrock (2004)

Most of these models have in common the assumption that technology adoption operates top-down, i.e. the firm makes an adoption decision and employees subsequently decide whether to use the technology. Zaltman, Duncan, and Holbeck (1973), for instance, explained adoption first by a decision made at the firm level, and then at the individual level. Gallivan (2001), again, proposed a two-stage model where first a decision of adoption is made at a higher organisational [management] level, and then by an individual. Table 4.4 below gives a list of some conceptual ideas that have been commonly applied as units of analysis for technology adoption and diffusion in general, and explains why they are – allegedly and reportedly – not suitable for CIT systems (if applied in seclusion).

Conceptual Idea / Unit of Analysis	Allegedly 'not suitable' for studying CIT adoption because:	Author
Individual Considers adoption a solitary individual decision.	• … does not apply well to cases where decisions are coordination intensive, interdependent, and networked; • does not take into account that a single CIT user's decision is dependent on others' choices;	Mark and Poltrock (2004), Gallivan (2001), Lyytinen and Damsgaard (2001), Rai and Patnayakuni (1996),

	• assumes that persons' roles in an organisation are fixed and enacted by 'an individual occupying a given position' (Rogers 1995, p.376); • generally assumes a homogeneous diffusion arena.	Fichman (1992)
Work Unit Assumes that work-unit climate, relationships and history, are profound and determinate enough to explain adoption.	• … does not propose that work units may be interdependent, as in the case of adopting collaborative technologies to support work between units; • even though the word 'work' in CSCW's name might seem to exclude non-work concerns, it increasingly includes leisure concerns;	Crabtree et al. (2005), Mark and Poltrock (2004), Umanath and Campbell (1994), Brabston (1993), Kwon (1990), Huizinga (1971), Brown and Barkhuus (2007)
Workplace Considers the 'workplace' monolithic and physical.	• there are fewer and fewer convincing reasons to organize stable workplaces to which employees report on a daily basis; • monolithic physical workplaces are gradually being replaced by ad hoc and self-organised workplaces, cutting across organisational hierarchies and boundaries; • not only 'work' but also leisure is saturated with collaborative technology.	Tapscott and Williams (2006), Brown and Barkhuus (2007)
Team Teaming is conceived of as assigning people to a stable corporate team.	… overlooks the 'self-organised approach to teaming', i.e., forming cross-functional cooperative ensembles.	Tapscott and Williams (2006), Neale et al. (2004), Aoki (1988), Harrington (1979)
Organisation 'Traditional' organisation, for example in terms of horizontal (departments) and vertical division (hierarchy).	• is misleading as groupware-mediated collaboration transcends the organisational boundaries; • the assumptions of homogeneity and stability prove inappropriate.	Mark and Poltrock (2004), Törpel et al. (2003), Pipek and Wulf (1999), Orlikowski (1996), Orlikowski (1992), Bullen and Bennett (1990), Poole and DeSanctis (1990), Barley (1986)
Group Meant is a small, stable, egalitarian, homogeneous, and harmonious ensemble of people – a 'group'.	… tends to ignore the support of cooperative work arrangements that are characterised by a large and maybe indeterminate number of participants, incommensurate conceptualisations, incompatible strategies, and conflicting goals and motives.	Schmidt and Bannon (1992), Bannon and Schmidt (1991), Popitz et al. (1957)
Communities of Practice A community of practice is defined by three aspects: people's mutual	• … the concept makes strong assumptions about members' involvement; • the boundaries of communities of practice do not necessarily match those of the	Mark and Poltrock (2004), Wenger (1998)

engagement, their joint pursuits, and a shared repertoire.	adoption units.	
Social Networks People's inter-connectedness in social networks has been examined in relation to power structure, information transfer and adoption decisions.	… social network studies generally focus on a person's 'ego network' which is more likely to be a collection of individuals as opposed to a distributed work group with unique properties.	Mark and Poltrock (2004), Rogers (1995), Valente (1994), Burkhardt and Brass (1994), Rogers and Kincaid (1981), Granovetter (1973), Coleman (1966)
Web of Computing Views computing as an arena of actors with intersecting interests.	… of the drawbacks of Actor-Network Theory, its excessive emphasis on actors: • the actors and the technology are treated with equal weight; • that adoption is considered to occur as a result of the decisions of actors who constitute a network; • diffusion is exclusively associated with chains of actors.	Mark and Poltrock (2004), Pickering and King (1992), Callon (1987), Kling and Scacchi (1982), Kling (1980), Granovetter (1973)

Table 4.4. Units of Analysis and their Applicability for CIT as reported in Literature

The sections below present detailed argumentation supportive of the assertions made in Table 4.4.

4.2.1 Individual

The individual level of analysis is the most widely applied to technology adoption and diffusion in general. At this level, the focus is on the individual as the unit of adoption (e.g. DOI: Rogers 1995; TAM: Davis 1989, Davis et al. 1989; extended TAM: Mathieson et al. 2001). The models of individual adoption principally consider adoption as a *solitary* individual decision, which (on its own) does not apply well to CIT analysis. Mark and Poltrock (2004) took the stance that the individual level of analysis does not directly and entirely apply to CIT because:

- it is not valid for cases where decisions are coordination intensive (Gallivan 2001), interdependent (Fichman 1992, Gallivan 2001), and networked (Lyytinen and Damsgaard 2001);
- it does not take into account that a single CIT user's decision is dependent on others' choices;
- it assumes that persons' roles in an organisation are fixed and enacted by 'an individual occupying a given position' (Rogers 1995, p.376);
- it generally assumes a homogeneous diffusion arena.

As mentioned in Chapter 3, in present-day highly distributed organisations collaborative work not only crosses corporate boundaries, but is predominantly performed through peer networks with indeterminate number of participants. Collaborative work encompasses a rich and complex multiple-context reality. Modern cooperative ensembles typically intersect, which makes membership in them non-stable, non-durable, and often even non-determinable.

It nonetheless remains that the individual level of analysis is *partially* applicable to CIT. Each adoption or rejection decision is ultimately individual, especially when it comes to rejection. Mark and Poltrock (2004) concurred, arguing that 'technology diffuses through social worlds, often "seeded" by an individual' (p.300). (Figure 4.1 below illustrates the process). They considered a social world as the unit for adoption of groupware in a distributed organisation (p.299).

Social worlds are 'seeded' by one member who has adopted the technology. That individual – the champion – is usually technically savvy, more knowledgeable about new technologies and more open to trying them. People learn about the technology in one of their social worlds, and as they are members of multiple social worlds, they introduce it into another of their worlds (Mark and Poltrock 2004). Individual technology championship has been widely recognised as an important push factor stimulating adoption (i.e. ever since Roger's 'early adopters'). Scholars such as Rai and Patnayakuni (1996) have empirically proven that 'technology championship has a direct (positive) effect on adoption behaviour' (p.214).

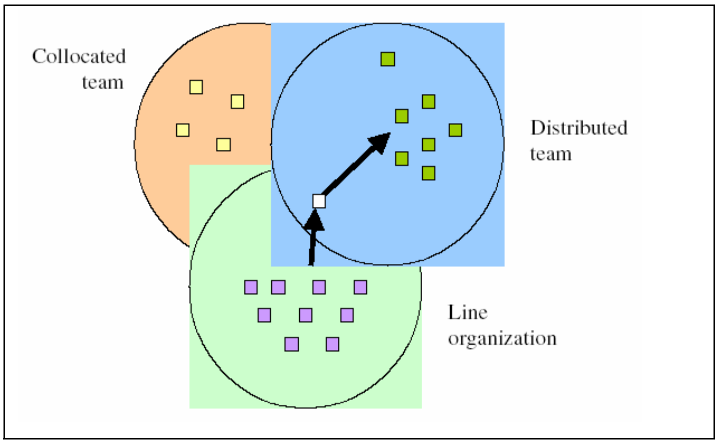

Figure 4.1. A diagram showing how technology diffuses through social worlds, often 'seeded' by an individual. Source: Mark and Poltrock (2004).

4.2.2 Work Unit

Another broadly applied level of analysis for technology adoption and diffusion in general is the 'work unit' level. The assumption used in considering the work unit as the locus of impact is that differences at this level, e.g. work-unit climate, relationships and history, are profound and determinate enough to explain adoption (Brabston 1993, Kwon 1990, Umanath and Campbell 1994). However, as pointed out by Mark and Poltrock (2004), 'none of these studies proposes that such work units may be interdependent, as in the case of adopting collaborative technologies to support work between units' (p.301).

CSCW is hesitantly but surely purchasing the idea that there is a need for the field to extend its boundaries. As Crabtree et al. (2005) rightfully observed, researchers have argued that approaches and concepts developed to support workplace design are inadequate for purposes of understanding and developing systems to support what are often characterised as 'ludic pursuits' (see 'Homo Ludens', or 'the playing man' – Huizinga 1971). Crabtree and associates also demanded that 'there is a need for CSCW to extend its boundaries and move beyond its current and almost exclusive focus on the traditional workplace' (p.247).

4.2.2.1 Workplace

As reported in literature, in present-day organisational settings there is no isolated, single workplace, rather there is a networked 'workspace' where distributed functionality and ubiquitous information are bringing about higher levels of task fragmentation. Tapscott and Williams (2006) have convincingly argued that the monolithic physical 'workplace' is slowly but surely disappearing from today's business reality – this is demonstrably true, mainly against the background of examples such as:

- more than 40% of IBM's employees do not work in traditional offices – they work from home or on the road (p.265);
- some companies have even done away with specific desks for employees (p.258), etcetera.

So, while workplaces are not likely to disappear, there are fewer and fewer convincing reasons to organise stable workplaces to which employees report on a daily basis. Tapscott and Williams (2006) asserted that monolithic physical workplaces are gradually being replaced by, what they called, 'wiki workplaces' (p.265) – ad hoc and self-organised workplaces that are cutting across organisational hierarchies and boundaries in all kinds of unorthodox ways.

4.2.2.2 Team

Tapscott and Williams (2006) elaborated on a recent trend of, what they called, 'self-organised approach to teaming' (p.258) that was operating bottom-up, and was dictated by an empowered, real-time workforce. In contrast to the old days, when people were assigned to a corporate team, and had to stay there, present-day employees are developing their own self-organised interconnections and forming cross-functional cooperative ensembles capable of unifying discordant motives and incommensurate perspectives. In a similar vein, Neale et al. (2004) observed that the complexity of work has increased, demanding that more frequently distributed work participation be dealt with, with emphasis on long-term distributed collaboration. This trend actually began far back in the early nineties with the emergence of just-in-time production, and advanced manufacturing systems. The very essence of an advanced manufacturing enterprise was the ability to react 'simultaneously and cooperatively' to dynamic markets (Harrington 1979), and the very essence of the just-in-time production principle was the semi-horizontal coordination mechanism for rapid adaptation of manufacturing operations in complex environments (Aoki 1988).

4.2.2.3 Organisation

Models where the organisation is the locus of impact – e.g., Barley (1986), Orlikowski (1992), Poole and DeSanctis (1990) – are concerned with how adoption changes the structure or processes of the organisation, or conversely, how the organisation's policies and structures affect adoption (Mark and Poltrock 2004). In a study of the evolving use of organisation-wide groupware in a service network, Törpel et al. (2003) made some valuable observations as to the applicability and validity of 'organisation' as the unit of analysis for CIT, as follows:

- A view focused on 'the' organisation is misleading as groupware-mediated collaboration with customers or in inter-organisational projects transcends the organisational boundaries and is beyond such narrow view. When 'the' organisation is the social unit of the analysis, 'important issues related to the multiplicity of approaches on the individual or subgroup level easily escape the analytical focus'.
- Sometimes under the label of 'organisation' only a certain type of organisation is regarded, such as organisations of a certain size, with a special division of labour or with institutionalised structures of negotiation between capital/management and labour. With expectations only justified for certain organisations, issues in other organisations cannot be addressed.
- Many of the organisations which served as cases for the observation of long-term groupware use in the literature seem to be 'traditional', for example in terms of horizontal (departments) and vertical division (hierarchy) of labour (cf. Orlikowski 1996, Pipek and Wulf 1999, for an early overview cf. Bullen and Bennett, 1990).
- Even though 'the' organisation has existed as a legal entity, the assumptions of homogeneity and stability proved inappropriate for the organisation as well as for the units and projects under its umbrella.
- Even though organisation-wide groupware had been introduced, other groupware systems have had local and organisation-wide impact (Törpel et al. 2003, p.382).

4.2.2.4 Group

As I mentioned in Chapter 3, a variety of arguments have ensued as to the adequacy, sufficiency, and applicability of the 'groupwork' conception to describe the type of cooperative work to be supported by computers. The shift away from the 'groupwork' conception was motivated primarily by the process of embedding distributed computing systems in the workplace, which showed that the social organisation of collaborative work could not be constrained within the notion of a 'group'.

Back in 1957, Popitz and associates pointed out that the 'group' was *not* the specific unit of cooperation even in the industrial plants of the sixties, as work was mediated by complex machine systems, and often did not involve direct communication between agents. The big challenges of the 'groupwork' conception, however, emerged in the early nineties, and were not merely academic but posed by ongoing practical efforts in CIM, OIS, CAD, CASE etc. To quote Schmidt and Bannon (1992):

'… it has – implicitly or explicitly – been the underlying assumption in most of the CSCW oriented research thus far that the cooperative work arrangement to be supported by a computer artefact is a small, stable, egalitarian, homogeneous, and harmonious ensemble of people – a "group". This conceptualisation of CSCW will tend to ignore or even dismiss the major challenges posed by the design of systems that support cooperative work arrangements that are characterised by a large and maybe indeterminate number of participants, incommensurate conceptualisations, incompatible strategies, conflicting goals and motives, etcetera' (Schmidt and Bannon 1992, p.9, 11, 12).

Even the more relaxed concepts of 'group' and 'groupwork' designate specific types of cooperative relations characterised by shared responsibilities. While such situations of shared responsibilities do belong to the problem situations addressed by CIT, 'we certainly do not want to restrict the scope of CSCW to those cases where the responsibility of performing a task has been allocated to or assumed by a relatively closed and fixed collective' (Bannon and Schmidt 1991, p.361).

As I noted in Section 3.3.2 above, almost eighteen years after 1991, it seems that CSCW continues to be (more or less, with honourable exceptions) equated with groupware. In 2004, Neale et al. (2004, p.114) lamented that group research 'has served as the underlying knowledge base for CSCW systems'. In a special 2007 issue of the CSCW Journal, Randall (2007) pointed out that a number of commentators are still expressing reservations about the limited scope of CSCW's enquiry, noting the domination of technologies for supporting small, remote groups.

4.2.3 Communities of Practice

Wenger (1998) defined a 'community of practice' by three aspects: people's mutual engagement, their joint pursuits, and a shared repertoire. Although, according to that description, a community of practice is not synonymous with group, team, or network, it does make strong assumptions about members' involvement. Those assumptions can be inaccurate for cases when collaboration technology is introduced to people outside of one's community of practice. As Mark and Poltrock (2004) so reasonably put it,

'… communities of practice are not the most suitable locus of impact for studying distributed organisational diffusion as the boundaries of communities of practice do not necessarily match those of the adoption units' (p.305).

4.2.4 Social Networks

The concept of social networks examines people's interconnectedness in relation to power structure, information transfer and adoption decisions (e.g. Burkhardt and Brass 1994, Coleman 1966, Granovetter 1973, Rogers 1995, Rogers and Kincaid 1981, Valente 1994). However, as pointed out by Mark and Poltrock (2004), social network studies:

- generally focus on a person's 'ego network' which is more likely to be a collection of individuals as opposed to a distributed work group with unique properties;
- suggest that social networks can describe how people learn about technology, but they do not explain particular characteristics that distinguish different networks (e.g. resources, task, or experience) that can affect an adoption decision (p.305).

4.2.5 Web of Computing

The notion of 'the web of computing' (Kling and Scacchi 1982) takes a symbolic interactionist view on computing as an arena of factors with intersecting interests (e.g. Kling 1980), with an emphasis on hard and weak ties across organisational boundaries (Granovetter 1973, Pickering and King 1992). Thus, it draws upon Actor-Network Theory (ANT) (Callon 1987), in which the actors and the technology are treated with equal weight. The applicability of 'the web of computing' notion to CIT adoption and diffusion is questionable and problematic due to ANT's excessive emphasis on actors. In ANT, the adoption decision and transformation of a technology is associated with actors. The latter is unhelpful for the case of distributed teams where the boundaries of collaborative work can span distance, as noted by Mark and Poltrock (2004).

4.2.6 Summary

Zacklad (2003) lamented that most current theories about collective cognitive activities in groups were applied to 'structurally closed cooperative situations' (p.190). Meanwhile, a framework was missing that would take account of the intellectual transactions describing CIT used in more structurally open situations. Mark and Poltrock (2004) concurred, arguing that although studies of groupware adoption have focused on decisions made at the individual, group, or organisational level, those levels of analysis, when applied *in seclusion*, could not adequately capture adoption decisions made by distributed teams. New units of analysis were needed to understand how collaborative technology diffuses. Back in 1992, Schmidt and Bannon made some viable observations about the future of real-world cooperative work that remain valid and ring even truer today:

- '…cooperative ensembles are either large, or they are embedded within larger ensembles;
- cooperative ensembles are often transient formations, emerging to handle a particular situation after which they dissolve;
- membership of cooperative ensembles is not stable and often even non-determinable;
- cooperative ensembles typically intersect;
- the pattern of interaction in cooperative work changes dynamically with the requirements and constraints of the situation;
- cooperative work is distributed physically, in time and space, and logically, in terms of control, in the sense that agents are semi-autonomous in their partial work;
- cooperative work involves incommensurate perspectives (professions, specialties, work functions, responsibilities) as well as incongruent strategies and discordant motives' (Schmidt and Bannon 1992, p.9).

All this being said, the question naturally emerges of what new units of analysis would be suitable to understand how collaborative technology diffuses. Deliberately designed social aggregations (McGrath 1984), like organisations, sub-organisations, and work units obviously do not suit when applied in seclusion; less deliberately designed social units, like associations or friendship groups are too boundless, dimensionless, and indefinite to be applied for this purpose.

Mark and Poltrock (2004) proposed 'social worlds' as a way to understand how collaborative technology diffuses. Social World Theory (Strauss 1978, Clarke 1991) assumes that people are commonly members of multiple social worlds, and they act as bridges between their social worlds. The following are the reasons why Mark and Poltrock (2004) argued that the concept of social worlds is useful for explaining collaborative technology diffusion in a distributed organisation. First, in contrast to most organisational theory, the structure of social worlds is fluid; second, the boundaries of social worlds are based on work practice and communication, and not on geographical location (Shibutani 1955 and Strauss 1993). Through this lens of analysis, distributed organisations may be interpreted as a collection of heterogeneous social worlds with unique cultures and practices, which allows for multi-contextual perspective on collaborative technology adoption. I deem the conceptual apparatus offered by Social World Theory applicable for the purposes of addressing all types of computer support for collaborative work wherever and whenever they occur, and therefore suitable for this Thesis. (Social World Theory will be discussed in more detail in Section 6.6 below).

In summary:

> In this Thesis, I will view the adoption and diffusion of collaborative technology through a multiple – individual *as well as* organisational unit of analysis – where people belong to different 'social worlds' in their private and

professional lives. I will view CIT adoption and diffusion as a *stage process* of intellectual transactions between the private and professional social worlds.

The following Chapter presents the research methodology and research design applied for this investigation.

Chapter 5

RESEARCH METHODOLOGY AND DESIGN

This Thesis utilises a qualitative-interpretive theoretical approach with a triangulation of empirical study methods. According to Benbasat (1984) and Benbasat et al. (1987), the selection of a research methodology is determined by the goals of the researcher and the nature of the research[14]. As I mentioned in Chapter 2 (Section 2.1), the purpose of this theory-building Thesis is to develop and validate a reliable Conceptual Framework, reflecting the adoption–diffusion continuum of collaborative information technology. Therefore, the research methodology has been selected to serve the purposes of theory building. The following subsections give details on the general research approach and the empirical-study methodology.

5.1 Qualitative-Interpretive Approach

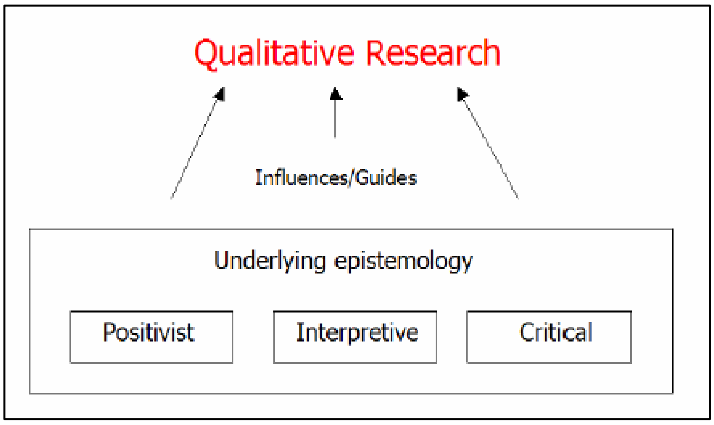

Figure 5.1. Underlying Epistemology for Qualitative Research. Source: Myers (1997, p.4), based on Orlikowski and Baroudi (1991)

The underlying research approach of this Thesis is qualitative-interpretive. The selection of the qualitative-interpretive research approach has been directed by Orlikowski and Baroudi's (1991) classification (see Figure 5.1 above). This is a three-fold classification that distinguishes the main epistemological influences guiding qualitative research as positivist, interpretive and critical.

The selection of the interpretive epistemological grounding is justified in Section 5.3.2 below.

[14] A good taxonomy of IS research approaches is provided by Galliers and Land (1987).

5.2 Triangulation of Empirical Study Techniques

The empirical part of this Thesis utilises a triangulation of three research methods: Rapid Appraisal, Structured Case, and Content Analysis (see Figure 5.2 below). Section 5.5 below presents my justification for the selection of each of these methods. I will start by justifying my choice of 'triangulation'.

The process of 'triangulation' refers to cross-checking data by collecting it from more than one source through a combination of multiple research methods in one study. It has been introduced by Kaplan and Duchon (1988), and recommended by Yin (1994) and Bloor (1997). Bloor (1997) has elaborated on 'data, method and construct triangulation'. Yin (1994, p.1010) has described 'analytical triangulation' (Patton 1990) as similar to the 'inter-coder reliability method' (Miles and Huberman 1994). Based on a literature review on 'triangulation', Krueger (2006) claimed that 'triangulation asks for more than one type of information source for validation, and thus improves accuracy of information and gives a better understanding of context, conflict and divergent perspectives' (p.92). Thus, triangulation falls within the 'paradigmatic pluralism' approach (Goles and Hirschheim 2000) as a way of capturing as much of reality as possible (Wilson and Vlosky 1997).

It is a well-accepted view in IS research that the weaknesses of one empirical method can frequently be compensated by the strength of another (see Gable 1994, and Greene et al. 2001). For example, Gable (1994, p.114) argued that the strengths of the case study method – high discoverability, and high representability – may be applied to compensate the weaknesses of other methods; while the [alleged] weaknesses of the case study method – low controllability, deductibility, repeatability, and generalisability – may be compensated by other methods. Some of the benefits of the triangulation process have been described in detail by Greene et al. (2001). Of primary importance for this study is one benefit of triangulation, pointed out by Yin (1994, p.1012), namely:

- '[… triangulation is] a stepwise process to aid in the development and refinement of constructs which had been previously identified, but not well defined;
- a triangulation process aids a researcher in gaining different interpretation of data through successive iterations of analysis, discussion and refinement'.

The latter benefit of triangulation has been especially important for this theory-building Thesis, the aim of which, as previously mentioned, has been to develop a conceptual model of the adoption–diffusion continuum of collaboration technology. The secondary (supporting) goals (see Chapter 2/Section 2.1) – i.e. to identify which factors have had and continue to have significant influence on CIT diffusion, and to report on the current state of diffusion of collaboration information technology within organisations – have also been largely aided by the 'construct-refinement' capability of triangulation.

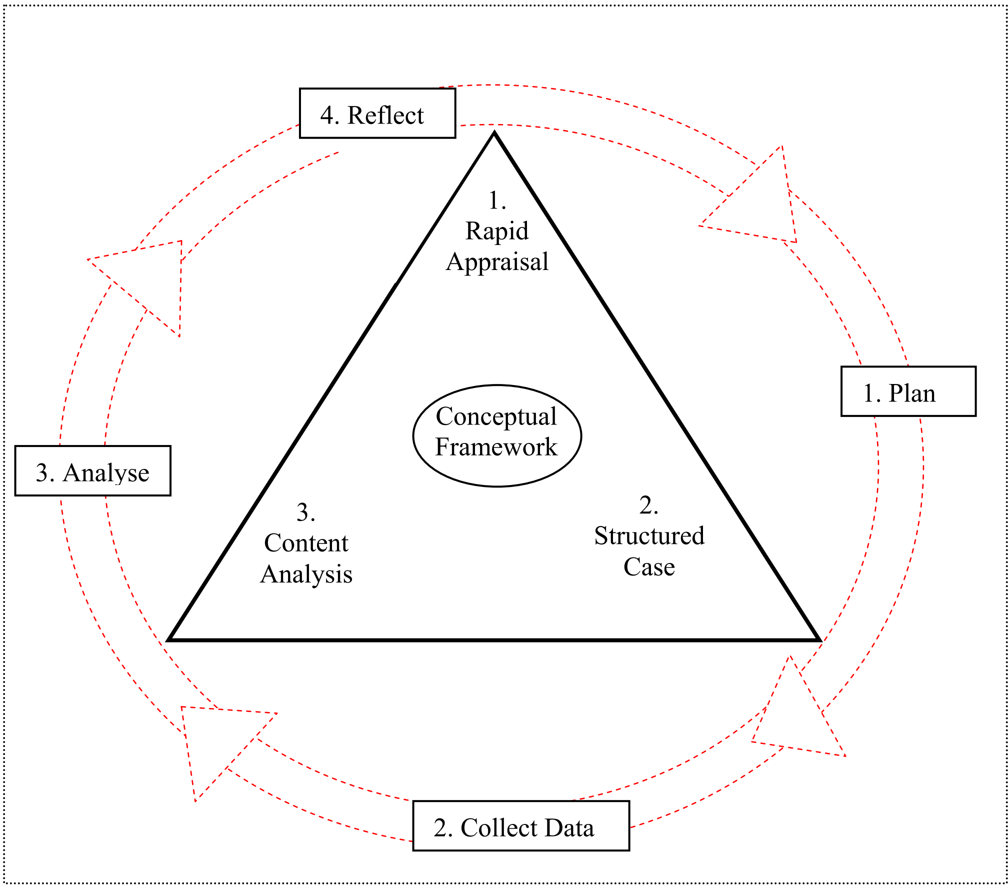

Figure 5.2. Triangulation of Empirical Study Techniques

Phases One of the empirical part of this study (see Figure 5.2 above) has utilised the Rapid Appraisal methodology (Grandstaff and Grandstaff 1985, Kashyap 1992, Beebe 1995, 2001). In Empirical Study I, I have observed and analysed a series of Interviews (‘*Expert Talks*’). Phases Two of the empirical part of this study has utilised the Structured Case method (Carroll and Swatman 2000). In Empirical Study II, I have performed an in-depth *Critical Meta-Analysis of Case-Study Reports*.

Thus, I have used the Expert Talks (Empirical Study I) to obtain a broad understanding of the area under study, and have then extended this rough outline by means of meta-analysis of case study reports (Empirical Study II). The third empirical-study Phase – that of *Content Analysis* of CIT literature – has enabled the full utilisation of the benefits from ‘triangulation’ by allowing for the RA/case-study methodological weaknesses, such as low repeatability, and low generalisability, to be compensated.

The Expert Talks were a scene-setting for the in-depth analysis that was to follow. Subsequently, I constructed a database of multiple (comparative) case-study reports, and maintained a chain of evidence to link information and outline unanswered questions. The Critical Meta-Analysis of Case-Study Reports deepened my understanding of CIT adoption and diffusion, and I identified many of the fundamental determinants that were driving it. Thus, while the Expert Talks had shaped my ‘idea’ of the conceptual framework, the in-depth meta-analysis of comparative case-study reports allowed me to construct ‘the’ conceptual framework in a relatively complete and exhaustive manner. Finally, the framework was validated by means of content analysis of CIT literature. The rigour and validity of the framework was enhanced by the benefits of triangulation – a combination of multiple sources of evidence, and comparison of converging lines of inquiry.

Ng-Kruelle (2005) asserted that the ‘social systems’ domain [i.e. the domain of socially-pervasive information technology, like collaborative technology] is pluralistic and complex. Multi-view analysis is suitable for it, as no single approach ‘explicitly addresses the role and impact of socially-pervasive IT on society’, and ‘there exists little practical guidance for the elicitation of requirements from the real world stakeholders especially when they consist of loosely inter-related entities that are not legally bonded together’ (Ng-Kruelle 2005, p.65). Triangulation is a multi-view analytical process, and therefore is applicable for analysing CIT because of the latter quoted reason. And also, for a reason which Neale et al. (2004) described as the ‘longitudinal’ nature of IT-mediated collaborative work (p.113), with its following aspects:

- activities mediated by collaborative technologies have a ‘long-term temporal structure’ (McGrath 1990);
- collaborative ensembles typically involve interdependent and comprehensive ongoing activities, spanning in time from weeks to years, like information sharing, planning, acting, scheduling, role taking, synchronisation, allocation of resources, and adaptation to iterative re-planning based on temporally-changing objectives and circumstances.

To state the obvious, long-term activities require longitudinal analysis. The process of triangulation is longitudinal by nature, since it allows for cross-fertilisation of different sources of evidence and converging lines of inquiry over time (see process of planning, collecting data, analysing and reflecting in Figure 5.2 above). Hence, triangulation increases the potential validity of the empirical enquiry on IT-mediated collaborative work.

5.3 Justification for Selected Methodology

The following chapter presents my justification for the selected research methodology. The following questions will be answered: (i) why did I choose a qualitative approach?, (ii) why did I venture on an interpretive locus of analysis?

5.3.1 Why Qualitative?

The qualitative research methods such as case study, action research, and ethnography, were developed in the social sciences to enable researchers to study social and cultural phenomena – which can be lost when textual data are quantified (Kaplan and Maxwell 1994). There is now widespread acknowledgement of qualitative research as a valuable and valid research approach (Markus 1997, Avison et al. 1999). Qualitative techniques are generally employed in IS research to achieve deeper understanding particularly when the phenomenon under scrutiny is complex and deeply embedded in its context (Lacity and Janson 1994, Orlikowski and Hofman 1997, Boudreau and Robey et al. 1999).

Neale et al. (2004) distinguished two broad categories that characterise different approaches to CIT evaluation – i.e. the '*quantitative* and *qualitative* paradigms' (p.114), whereby the quantitative paradigm is referred to as empiricist or positivist and the qualitative paradigm is referred to as constructivist or naturalistic. According to Arrow et al. (2000), the dominant methodological paradigm of group research has been from the positivist perspective [i.e. quantitative paradigm]. According to Neale et al. (2004, p.114), group research 'has served as the underlying knowledge base for CSCW systems'.

Grudin (1988) pointed out that 'evaluation of CSCW applications requires a very different approach, based on the methodologies of social psychology and anthropology' (p.87). In addition, CSCW observation must extend over a longer period of time. For example, while a person's use of a spreadsheet might be observed in a single hour, collective collaborative interactions typically unfold over days or weeks. Scholars such as Lucas (1976), Gaffney (1985), White (1985), and Ehrlich (1987) have observed that evaluation of groupware 'in the field' is remarkably complex due to the number of people to observe at each site, the wide variability that may be found in group composition, and the range of environmental factors that play a role in determining acceptance, such as management buy-in, vendor follow-through, and user training.

The history of computer systems development shows that the focus of analysis has generally been shifted (e.g. Suchman 1987, Neale et al. 2004) from physical ergonomics, to information processing at the interface, and to the broader framework of behaviour and interaction rich with complexity. There is now widespread acceptance in IS research of the idea that adding qualitative techniques to the researcher's repertoire can improve the effectiveness of IS implementations (Andersen et al. 2003). According to many observers, including Arrow et al. (2000), Neale et al. (2004) and Randall (2007), the dominant methodological paradigm of group research has been quantitative, and group research (especially small group research) has served as the underlying knowledge base for CSCW systems. The latter is problematic because:

- as is it stands, it seems that the field of CSCW is following a least-haste route of technological determinism. My impression is that the only contextual factor that seems to have received adequate research attention is the factor of 'awareness'. In the same time, I think, many adoption/diffusion contextual factors remain under-researched. By 'contextual factors' I mean, for example, what Sheil (1983) called the 'grapevine' of collaborative work – i.e. emergent structure of collaborative work stemming from the existence of informal networks of communication, and of informal groups that affect organisational activity;

- as pointed out by Neale et al. (2004), this type of contextual information only gets shared informally and in the subtlest of ways, and trying to represent it quantitatively is not only difficult, but may also render it useless, and unappealing.

In this sense, the qualitative approach adopted in this study is applicable for gathering contextual CIT information in a sensible and, I hope, appealing way.

5.3.2 Why Interpretive?

For reasons similar to the above, I believe that an interpretive approach is suitable for this study. The basic distinction between *scientific* and *interpretive* research approaches (Galliers and Land 1987, Galliers 1992) claims that: a) the scientific approach assumes that phenomena can be observed objectively and rigorously where good research is often 'legitimated' with the virtues of repeatability, reductionism and refutability (Checkland 1981, Checkland and Holwell 1988); b) the interpretive approach on the other hand, because of the emphasis placed on human involvement, recognises that different stakeholders (including the researcher) can interpret a situation in different ways (Ng-Kruelle 2005)[15].

In the centre of interpretive research lies the fundamental principle of ***contextualisation*** (Klein 1999). For example, Garrick (1999) emphasised the need for research to be contextually framed in view of the dialectical interactions of the context and the actors. Interpretive IS research in general is 'aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context' (Walsham 1993, pp.4, 5). According to Candy (1991, p.432), one common assumption shared by interpretive researchers includes that of the extreme difficulty in attaining complete objectivity, especially in observing actions explainable in terms of multiple interacting factors, events and processes[16].

The latter is especially relevant for computer-supported collaborative work, which is deeply embedded in its context. This is so because collaborative activities are interdependent and comprehensive, and highly contingent on the properties of the context in the long term. When interdependency comes into play, the context becomes a central issue. As stressed by various authors (e.g. Neale et al. 2004), distributed CIT systems usually fracture background contextual information

[15] The rise of interpretive research has occurred because scientific research (positivism) historically has failed to adequately represent the social world (Ng-Kruelle 2005). The failure can be attributed to the assumptions of positivism. Positivist assumptions include for example that of 'repeatability, reductionism and refutability' (Checkland 1981, p.13), and the other of 'determinacy' (the truth is out there), 'rationality' (the more objective and less subjective the better) and 'prediction' (the usage of knowledge claims in the form of generalisations) (Usher 1996, Garrick 1999).

[16] Good discussions on the pros and cons of interpretive research include those by Candy (1991), Kaplan and Maxwell (1994), Klein and Myers (1999), Garrick (1999), Goulding (1999), Goles and Hirschheim (2000), and Stahl (2005).

significantly, especially contextual information that is temporally removed from immediate interaction. ‘And this information is for the most part totally unsupported with current technologies’ (Neale et al. 2004, p.115). *Temporally-embedded contextual change* is the main reason for the so called ‘altering shared context’ of CIT system usage. The latter has been theorised as ‘the single most significant reason for the failure of distributed [collaborative] system adoption and use’ (Neale et al. 2004, p.116). Shared context is the common ground of beliefs held by group members. Thence, temporal breakdowns caused by contextual developments may be especially frustrating to users of CIT systems.

5.4 Thesis Outline

The project deliverable of this investigation is a Conceptual Framework, developed iteratively in different versions, and serving as illustration of different CIT adoption-diffusion paths/influencing factors. The Model is validated and checked against existing models and theoretical perspectives on technology adoption and diffusion. The Model hinges on two interdependent focal points of interest: 1) illustrating two distinctive paths of CIT diffusion – authority-based and bottom-up, 2) respectively identifying and systematically classifying the types of *determinants* (influencing factors – constraints or enablements) characterising each of those diffusion paths.

The determinants investigated are of contextual, longitudinal, and behavioural nature. The analysis is supported by *illustrative examples and case studies* from the field of computer supported collaborative work that demonstrate different social, behavioural, and motivational aspects of the CIT adoption-diffusion continuum.

Figure 5.3 below presents a Thesis Outline by reiterating the empirical research components of my overall research design, illustrating how the three phases fitted together and flowed logically from the initial model, and into the final theory-building stage.

As mentioned above, this Thesis utilises a qualitative-interpretive approach with a triangulation of empirical study methods – a combination of multiple sources of evidence, and comparison of converging lines of inquiry. The overall research design, reflected in the Thesis, can be divided into four Phases. Figure 5.3 shows a schematic representation of the four Phases and the relationships between the research elements.

Phase 1 is devoted to development of a preliminary Conceptual Framework. The phase begins with an extensive literature review of the field of CIT, which is presented and discussed in Chapter 3, and Chapter 4. Chapter 4 gives a well-grounded introduction into the problem domain under investigation. This literature review aids the selection of the research methodology used – presented in Chapter 5. Chapter 6 summarises the results of Empirical Study I – the Interviews (Expert Talks) performed by means of the Rapid Appraisal methodology. Based on the

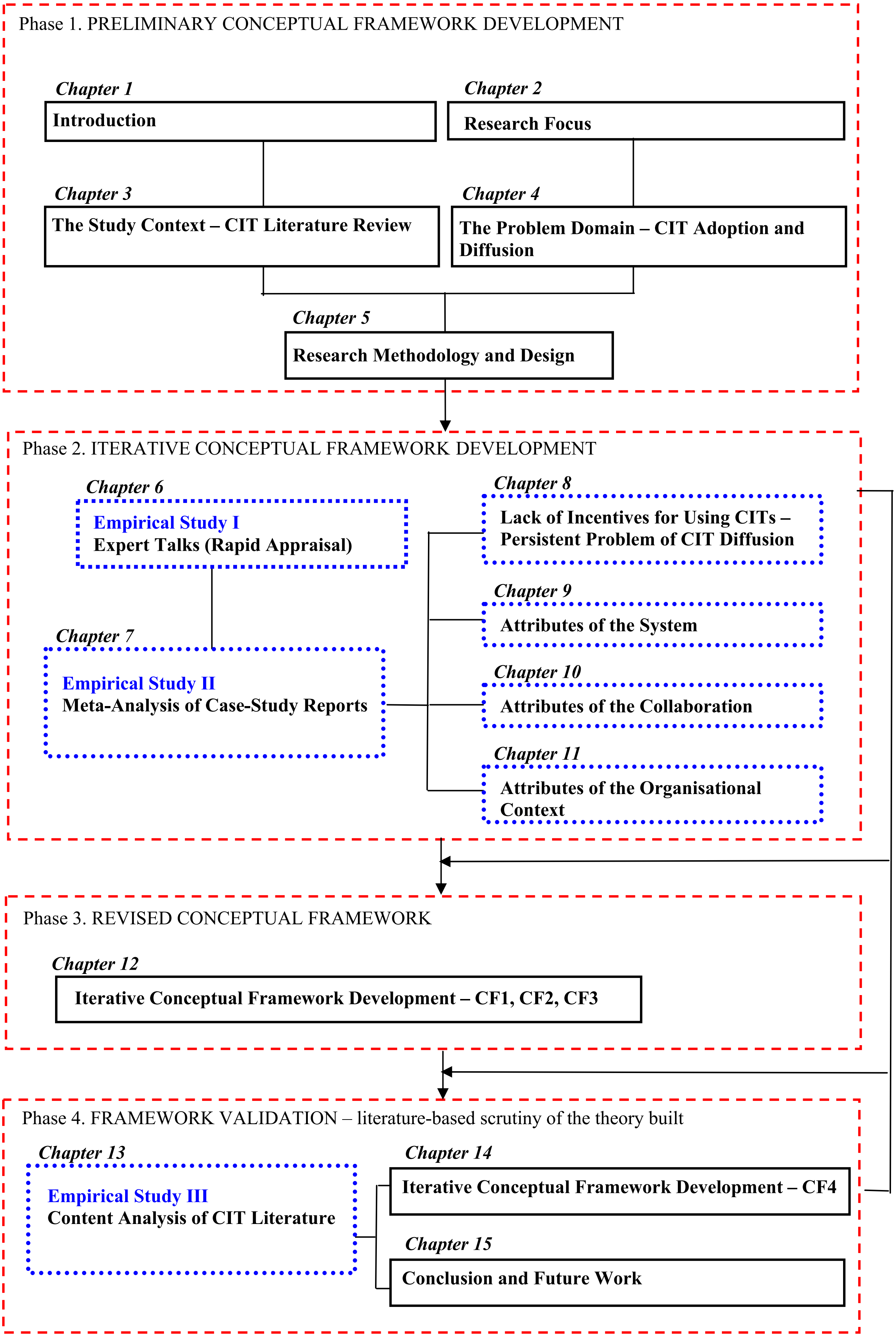

Figure 5.3. Thesis Outline

literature review as well as on the results of Empirical Study I, a preliminary Conceptual Framework is developed at the end of *Phase 1* (Chapter 6).

Phase 2 is devoted to a process of iterative, cyclical framework development realised through the Structured Case method. The necessary information is drawn from Empirical Study II (Critical Meta-Analysis of Case-Study Reports, Chapters 7). The results of *Phase 2* are three-fold: 1) validation of the preliminary Conceptual Framework, 2) synthesis of the emergent corrections and amendments to the Conceptual Framework to be made, 3) development of two further refined versions of the Conceptual Framework.

Phase 3 performs further revision and refinement of the Conceptual Framework. This research phase investigates multiple contexts within which the adoption and diffusion of CIT occur by addressing various types of computer support for collaborative working, and evaluating various CIT system types. Special emphasis is laid upon the distinction between 'authority-based' and 'bottom-up' CIT diffusion paths. In that sense, this third research phase:

1) investigates the nature of the context within which the adoption and diffusion of CITs occur;
2) evaluates determinants of the acceptability, adoption and diffusion of CIT by identifying which factors have had and continue to have significant influence on CIT diffusion, and what role each of these factors has played as diffusion accelerator or diffusion barrier.

Phase 4 presents a literature-based scrutiny of the theory built, in search of agreement or conflict between the project findings and the literature. The Conceptual Framework is further validated against 'enfolding literature' (Eisenhardt 1989, Carroll and Swatman 2000[17]). The necessary information is drawn from Empirical Study III (Content Analysis of CIT literature, Chapters 13). This research phase re-examines and double-checks all research findings comparing them to a wide selection of existing models of technology adoption and diffusion. Chapter 13 consolidates most of the findings to date, pertaining to CIT adoption and diffusion, which have been produced by the CIT research community. Thus, it tells a coherent story of the dynamics of the community focus and the collective wisdom gathered over a period of (at least) one decade. Thus, the Content Analysis presented in Chapter 13 contributes by reporting on the current state of diffusion of collaboration information technology (CIT). The latter allows for further revision and refinement of the Conceptual Framework (Chapter 14). Chapter 15 presents some perspectives for future research for the CIT community and recommends a variety of strategic steps to enhance CIT user acceptance.

[17] For more on this, see Carrol and Swatman (2000).

5.5 Thesis Structure

This section presents the structure of the Thesis, as distributed within the fifteen Chapters.

Phase/Description	**Data Treatment/Analysis**	**Objective**
Chapter 1, 2 • Introduction • Research Focus	• Literature Review	• Conceptual Framework development CFØ
Chapters 3, 4, 5 • CIT Literature Review • The Problem Domain • Research Methodology and Design		
Chapter 6 • Empirical Study I – Expert Talks	• Rapid Appraisal	
Chapter 7, 8, 9, 10, 11 • Empirical Study II – Critical Meta-Analysis of Case-Study Reports	• Structured Case	• Validation of CFØ: Cycle 1 • Resulting in the Conceptual Framework development of CF1 • Synthesis
Chapter 12 • Summary of Findings and Conceptual Framework Development		• Validation of CF1 • Resulting in the Conceptual Framework development of CF2 and CF3: Cycle 2
Chapter 13, 14 • Empirical Study III – Content Analysis of CIT Literature • Enfolding Literature	• Content analysis Source: CIT academic and business literature	• Validation of CF2 and CF3 • Resulting in the Conceptual Framework development of CF4: Cycle 3
Chapter 15 • Future Research	• Inductive Reasoning (Synthesis)	• Outlining of directions for future research • Recommending strategic steps to enhance CIT user acceptance

Table 5.1. Thesis Structure

Table 5.1 describes each Chapter with its objective, phases, and applied methodology of data treatment and analysis.

- The objective of Chapters 3-6 is the development of the preliminary Conceptual Framework – CFØ. Two data treatment methodologies are applied: Literature Review (Chapters 3 and 4), and Rapid Appraisal (Chapter 6, Empirical Study I).

- Chapter 7 presents the Empirical Study II (Critical Meta-Analysis of Case-Study Reports). The data treatment methodology applied is 'Structured Case' (Carroll and Swatman 2000). The objective of Chapters 7-11 are three-fold: (1) completing Cycle 1 of the validation of the preliminary conceptual framework (CFØ); (2) synthesis of the emergent corrections and amendments of the framework to be made in the next cycle; (3) completing Cycle 2 of the conceptual framework development. The Structured Case methodology has allowed for cyclical, iterative framework validation, whereby at every cycle new information and knowledge were accumulated to enrich the next stage. The (secondary) information was extracted from a database of 53 different case-study reports.
- The result from Chapters 7-11 – CF1 – is then used as input for the third iteration cycle, in Chapter 12. In purpose of this Chapter is to derive a systematic and thorough Synthesis of the findings from the previous chapters and – through comparison of converging lines of inquiry – to validate CF1, resulting in the development of CF2 and CF3.
- Chapter 13 (Content Analysis of CIT literature) consolidates most of the findings to date, pertaining to CIT adoption and diffusion, which have been produced by the CIT research community, and reports on the current state of diffusion of CIT.
- Chapter 14 – the project deliverable is the 'good enough' CIT Adoption-Diffusion Framework (CF4).

An outline of directions for future research is provided in Chapter 15. This chapter also presents a synthesis of all findings derived and hypotheses developed in the Thesis. A variety of strategic steps to enhance CIT user acceptance are recommended correspondingly.

The next Sections of this Chapter present the Rapid Appraisal, Structured Case, and Content Analysis methods and justify my selection of each of them for this study. Finally, I present the overall research design of this Thesis.

5.5.1 Justification for 'Rapid Appraisal'

As previously mentioned, I have applied the 'Rapid Appraisal' data-treatment methodology in Empirical Study I (Chapter 6). Empirical Study I includes observation, and rapid evaluation of Interviews (Expert Talks). When I originally designed this research project, I expected that the initial CIT literature review would provide me with enough knowledge on CIT adoption and diffusion to sufficiently inform my following analysis. However, I almost immediately realised that this supposition was too optimistic and did not match with the reality. After reviewing numerous CIT academic papers – stemming from refereed journals and conferences, like Computer Supported Cooperative Work (CSCW), ACM Conference on CSCW, Group Decision and Negotiation, European Conference on CSCW – I discovered an abundance of case and field studies dealing with different adoption, usage or implementation issues concerning CITs. However, I also discovered that very few papers existed which were tackling issues of CIT adoption and diffusion *directly*. I found only three studies that empirically measured CIT adoption and diffusion – Bajwa et al. (2004), Bajwa et al. (2005), and Bajwa et al. (2007). The studies Bajwa et al. (2004) and Bajwa et al. (2005) were measuring 'adoption' (acquisition) and 'use' (deployment) of CIT, and the study Bajwa (2007) was measuring 'organisational assimilation' (a function of availability and utilisation). This outcome of the literature review made it clear to me just how little information was available concerning the current stage of CIT adoption and diffusion, and what limited number of studies were there relating to it. In addition, it was also impossible to find a description of the key players and stakeholders in the process of CIT diffusion, and what their problems or success stories were.

It became clear that, in order to set the scene for my major empirical work, I had to obtain background information from an additional source, different from Literature Review. Therefore, I decided to make an amendment to the initial research design by including a preliminary scene-setting stage of 'Expert Talks'. In other words, I decided to first talk to senior and experienced people, knowledgeable in the field of CIT, before embarking on an in-depth empirical investigation. These 'Expert Talks' (presented in the following Chapter 6) are, in fact, preliminary case studies of major stakeholders in the field of CIT. Chapter 6 presents the details on the implementation and results from this stage. Here I will describe which data-treatment methodology I have selected, and why it is suitable.

The purpose of the Expert Talks was to build a 'mental map' of the major issues surrounding CIT diffusion, at a 'grassroots level'. Therefore, I needed a methodology that was time-efficient, and less costly than formal methods (e.g. formal questionnaire-based surveys, in-depth case studies). I considered the Rapid Appraisal (RA) methodology (Grandstaff and Grandstaff 1985, Kashyap 1992, Beebe 1995, 2001) for this purpose, and I soon realised that this technique was exactly what I needed to form a foundation for subsequent, more intensive, research.

According to Crawford (1997), the methodology of RA has been 'developed in response to the disadvantages of more traditional research methods, including: the time taken to produce results, the high cost of formal surveys and the low levels of data reliability due to non-sampling errors' (p.1). Dunn (1994) asserts that RA is a fast and cost-effective method, especially useful in the approach to problems 'in which "people factors" are prominent' (p.1). Sweetser (1996) concurs, arguing that RA is fast and flexible, but rigorous. Beebe (1995, 2001) notes that RA supplements in-depth case studies, when the goal of the investigation is to generate suggestions or recommendations, and to enable the identification of factors that were not known (or not known in detail) prior to the start of the review. Chambers (2002) pointed out that RA data-collection procedures should be informed by the question: 'How do I find out what I do not know that I need to know?'.

RA originated in agricultural science and has, more recently, become accepted and widely adopted in fields as diverse as community nursing, forestry, marine management and urban planning (Beebe 2001), and has also been (e.g. Kashyap 1992) adapted to IS research (Grandstaff and Grandstaff 1985). Various authors (e.g. Beebe 2001, Kashyap 1992) stress the requirement that RA activities need to be undertaken before in-depth field investigations. Dunn (1994) defined some key principles of RA as follows:

1) 'Particular *variation* is sought, not averages.
2) Accepting the notion of *appropriate imprecision* ensures that resources are not wasted on "accuracy" when it is not clear what the problem is.
3) The idea of *optimal ignorance* reminds the research team of the importance of what's not worth knowing.
4) *Triangulation* refers to the process of cross-checking data by collecting it from more than one source.
5) RA is *exploratory and iterative*. Hypotheses and research questions can be rapidly changed as learning occurs.
6) *The context of the data is as important as the data itself.* Key variables and questions of interest exist in an environment which is itself important to observe.
7) *Learning from and with the community* is stressed. Listening skills are stressed over telling skills' (pp.6,7).

All of the above-quoted principles provide sufficient argumentation in favour of the applicability of the RA technique in this study: i.e. the field of CIT is highly context-dependent, rapidly changing, and with numerous respondents. The *conversational* style[18] of interview that RA stipulates is not suitable for hypothesis testing but is sufficient for problem definition. The RA concept of 'optimal ignorance' (Dunn 1994 – see above) encourages the researcher to limit data gathering to what is needed. 'Appropriate imprecision' requires the researcher to measure only as accurately as is necessary (Chambers 2002).

5.5.2 Justification for 'Structured Case'

After the scene-setting stage of 'Expert Talks', during which a mental map of the major issues surrounding CIT diffusion at a grassroots level was obtained, an additional empirical study was needed to sharpen the focus of the gained picture. Empirical Study II (Chapter 7) serves the purpose of 'sharpening the focus' by presenting a Critical Meta-Analysis of Case-Study Reports.

I have applied the ***'Structured Case' data-treatment methodology*** for Empirical Study II to evaluate a set of comparative case-study reports. The 'Structured Case' (SC) methodology was introduced by Carroll and Swatman (2000) as an interpretive

[18] This style of interview is similar to data-gathering techniques like Focus Groups and Semi-Structured Interviews (Lichtenstein and Swatman 2002).

approach for inducing theory from qualitative data in a highly adaptive and highly iterative way. 'Case' is used in the broad sense of what is being studied, while 'structured' refers to the use of a formal process model (see Figure 5.4) comprising three structural components:

1) a conceptual framework – includes constructing and progressively articulating a [preliminary] conceptual framework. This guarantees 'the discovery through chance by a *prepared mind* of new findings that were not looked for' (Merton 1968, p.ix);
2) a pre-defined research cycle – planning, collecting and analysing data, and reflecting on the outcomes;
3) a literature-based scrutiny of the research findings, to assist the researcher in theory building.

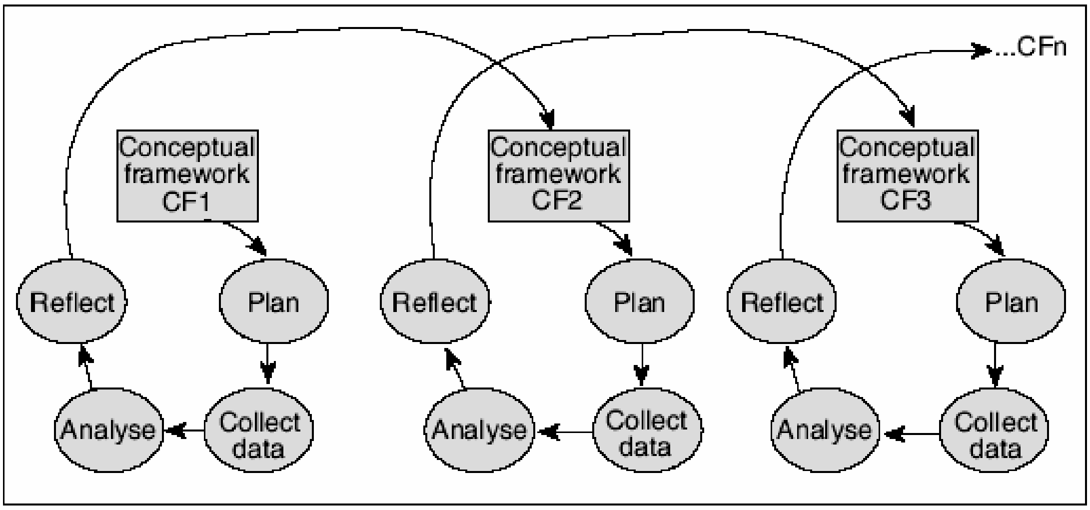

Figure 5.4. 'Structured Case' Spiral Towards Understanding. Source: Carroll and Swatman (2000)

In Structured Case, there is a continuing process of constructing meaning (Boland 1985) by an ongoing, cyclical adjustment and refinement of the conceptual framework according to the collected data. The research cycles produce a series of conceptual frameworks CF1, CF2, CF3 … CFn, where CFn – the most recent framework – represents the latest version of the theory built to date. This iterative process displays a 'spiral towards understanding' (Carroll and Swatman 2000) (Figure 5.4).

The conceptual framework is defined not only at the start of the research project. At the end of each research cycle, it is critically examined and revised to incorporate understanding gained about the research themes. It then forms the basis of a subsequent research cycle that will further refine understanding of the research themes. Therefore, the conceptual framework is a series of evolving models that are reviewed and refined over the life of the research project (Carroll and Swatman 2000).

I have applied the methodology of Structured Case for this study of adoption and diffusion of CIT mainly because of the highly adaptive and highly iterative way of theory building it provides, as well as for the following reasons.

- The methodology is not only inductive (moving from the data to theory) but also 'tightly interrelated with practice' (Carroll and Swatman 2000, p.239): this is especially relevant for CIT, a practical field requiring that the theory developed reflects the actions, problems and issues facing practitioners.
- The methodology 'enables the provision of rich and convincing explanations of findings' (Carroll and Swatman 2000, p.239) that are well-documented and grounded in the collected data, thus meeting the definition of rigor as 'equivalent to grounding, evidence, and persuasiveness' (Keen 1991).
- As an interpretivist (rather than positivist) paradigm[19], Structured Case does not stipulate the application of statistical comparisons between data collected through standardised protocols. Regardless of that, the methodology is powerful in theory building based on deep understanding. Rigour and validity through pattern matching and exclusion of contradiction are part of the spiral towards understanding. The latter guarantees levels of generalisability and representability that are sufficient to meet positivist standards.

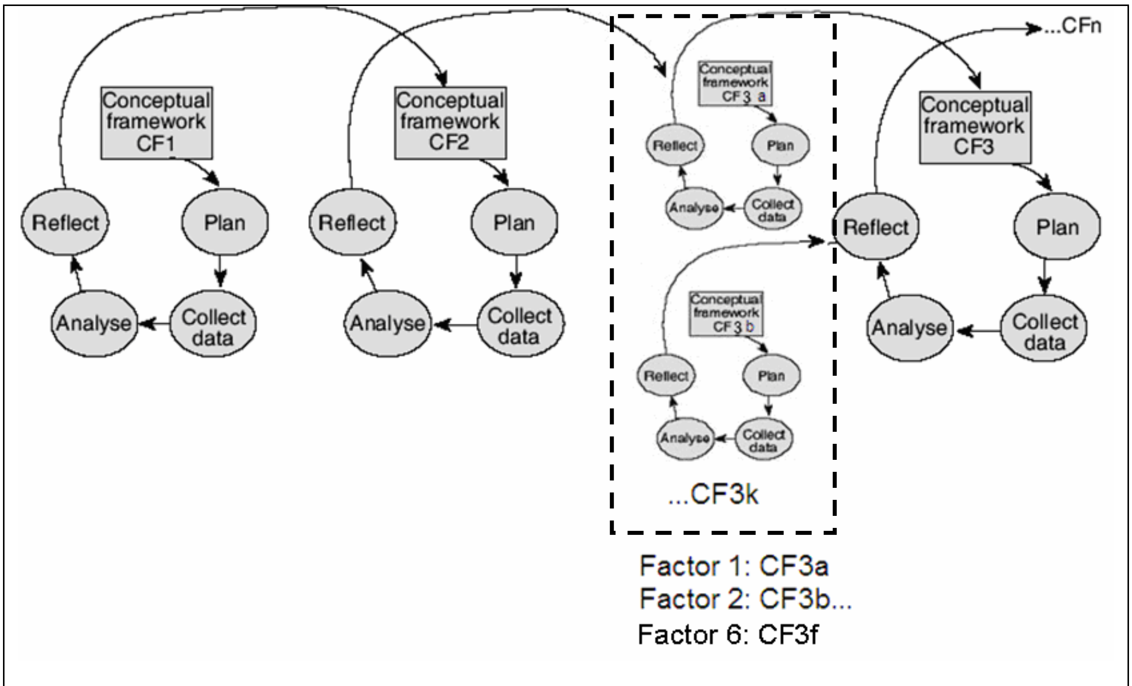

Figure 5.5. Structured Case Methodology applied in Empirical Study II: iterative development of CF1, CF2, and CF3

[19] Criteria for performing rigorous IS case studies using positivist and interpretivist paradigms have been presented in the literature: positivist (Benbasat et al. 1987, Lee 1989) and interpretivist (Walsham 1995, Klein and Myers 1998).

By critically comparing multiple case-study reports – and guided by the principles of Structured Case – I develop three consecutive versions of the Conceptual Framework (CF1, CF2, and CF3) in Empirical Study II. Figure 5.5 illustrates how the Structured Case methodology is applied in Empirical Study II. First, CF1 and CF2 are consecutively developed. Then follows a preparatory phase aimed at developing CF3. In this preparatory phase, a number of 'partial' conceptual frameworks are developed, each of which is concentrated on one factor only (11 factors[20] are identified and 6 partial conceptual frameworks are developed to illustrate each of the factors – CF3a, CF3b, CF3c, CF3d, CF3e, CF3f). The 'missing' five factors are the ones for which the number of cases for each diffusion path (top-down or bottom-up) is less than 4 – i.e. the ones for which the source data has not been enough in quantity. The next 'complete' conceptual framework (CF3) is simply a summation of the partial conceptual frameworks (CF3a to CF3f).

The subsection below presents some thoughts on case-study research in general – this justification is important for this Thesis because the primary data for Empirical Study II is a collection of 53 different case-study reports.

5.5.2.1 Some Thoughts on Case-Study Research

Fry et al. (1999) describe case studies as complex examples, which give an insight into the *context* of a problem as well as illustrating the main point. According to Morra and Friedlander (2005), a case study is a method for learning about a complex instance, based on a comprehensive understanding of that instance obtained through extensive description and analysis of that instance taken as a whole and in its *context*[21]. The case study research method is particularly well-suited for 'sticky, practice-based problems where the experiences of the actors are important and the *context* of actions is critical' (Bonoma 1983, Benbasat et al. 1987). Obviously, the case study method produces a type of 'context-dependent knowledge' (Flyvbjerg 2006, p.222). The latter is especially adequate for the investigation of social problems, as 'in the study of human affairs, there appears to exist only context-dependent knowledge, which, thus, rules out the possibility of epistemic theoretical construction' (Flyvbjerg 2006, p.224)[22].

Flyvbjerg's (2006) article 'Five Misunderstandings about Case Study Research' explains and corrects some popular misunderstandings about case study research, among which are the following two:

- *Misunderstanding 1*: one cannot generalise from a single case, therefore, the single-case study cannot contribute to scientific development;

[20] 'factors' – factors identified as influencing CIT diffusion (determinants).

[21] Many definitions of 'case study' exist – see, for example, Stone (1978), Benbasat (1984), Bonoma (1985), Kaplan (1985), Yin (2002). A comprehensive coverage on the operational use of case study method is provided in Dubé and Paré (2003).

[22] The full argument behind these two points can be found in Flyvbjerg (2001, Chaps. 2-4).

- *Misunderstanding 2*: the case study is most useful for generating hypotheses; that is, in the first stage of a total research process, whereas other methods are more suitable for hypotheses testing and theory building.

To correct *Misunderstanding 1*, Flyvbjerg (2006) presented the following argumentation. The view that one cannot generalise on the basis of a single case is usually considered to be devastating to the case study as a scientific method. This first misunderstanding about the case study is typical among proponents of the natural science ideal within the social sciences. Researchers who are not associated with this ideal may be strong proponents of the case study method (e.g. Campbell 1975). For example, Eysenck (1976) rightfully observed that:

'…sometimes we simply have to keep our eyes open and look carefully at individual cases – not in the hope of proving anything, but rather in the hope of learning something!' (p.9).

'Scientific development' is usually seen as 'search of proof', but is 'proof' possible in social sciences? Flyvbjerg (2006) emphasised that 'proof is hard to come by in social science because of the absence of "hard" theory, whereas learning is certainly possible' (p.224). As noted by Carrol and Swatman (2000), 'the tendency of researchers to note only confirmatory evidence can be lessened through "introspection and reflection" (Babbie 1989)'. In Germanic languages, the word 'science' (Wissenschaft) literally means 'to create knowledge' (Wissen schaffen). Formal generalisation is by far not the only way by which people can gain and accumulate knowledge. 'That knowledge cannot be formally generalised does not mean that it cannot enter into the collective process of knowledge accumulation in a given field or in a society' (Flyvbjerg 2006, p.227). According to Anthony Giddens (1984), for example,

'…Research which is geared primarily to hermeneutic problems may be of generalised importance in so far as it serves to elucidate the nature of agents' knowledgeability, and thereby their reasons for action, across a wide range of action-contexts. Pieces of ethnographic research like … say, the traditional small-scale community research of fieldwork anthropology – are not in themselves generalising studies. But they can easily become so if carried out *in some numbers*, so that judgements of their typicality can justifiably be made' (p.328).

To satisfy the requirement that observations need to be 'carried out in some numbers', and 'across a wide range', I have applied a methodology of *cumulative, comparative case studies*, where *cumulative* stands for aggregating information from several sites collected at different times (Mann 2006), and *comparative* stands for similar cases across different entities, countries or cultures (Rawsthorne 2008). Thus, I have enhanced rigour and validity through 'pattern matching' and 'exclusion of contradiction'.

Regardless of that, the requirement of observations being 'carried out in some numbers', and 'across a wide range', is by no means a mandatory requirement for case study research to be representative. As Flyvbjerg (2006) pointed out, it is correct that one can generalise in the ways Giddens described (see above), but 'it would be incorrect to assert that this is the only way to work, just as it is incorrect to conclude that one cannot generalise from a single case. It depends on the case one is speaking of and how it is chosen' (p.225)[23].

In a similar manner, Flyvbjerg (2006) did not mince words when he relegated the second misunderstanding (*Misunderstanding 2* – see above). While it is correct to use case studies 'in the preliminary stages of an investigation' to generate hypotheses, it would be 'misleading to see the case study as a pilot method to be used only in preparing the real study's larger surveys, systematic hypotheses testing, and theory building' (p.220). Eckstein (1975) goes so far as to argue that case studies are better for testing hypotheses than for producing them:

'… case studies are valuable at all stages of the theory-building process, but most valuable at that stage of theory-building where least value is generally attached to them: the stage at which candidate theories are tested' (p.80).

5.5.3 Justification for 'Content Analysis'

As previously mentioned, I have applied the 'Content Analysis' data-treatment methodology in Empirical Study III (Chapter 13). Empirical Study III is an exhaustive evaluation of CIT academic and business literature. Content Analysis is a research methodology 'used to determine the presence of certain words or concepts within texts or sets of texts' (Ng-Kruelle 2005, p.172). After quantifying and analysing the presence, meaning and relationships of such words and concepts, researchers then make inferences about the messages within the texts. Initially used as early as 1910 by sociologist Max Weber to examine press coverage of political issues in Germany, the Content Analysis methodology was substantially enriched and improved by Abraham Kaplan (1943) who broadened its focus beyond statistical semantics toward qualitative analysis of its symbolic meaning (semiotics) (Kaplan 1943). By the mid-1950's researchers were applying a limited 'version' of the method in terms of text examinations for the frequency of the occurrence of identified terms (word counts). After 1950, Content Analysis started focusing on 'concepts rather than simply words', and on 'semantic relationships rather than just presence' (de Sola 1959). I have applied this methodology for the purpose of gathering, classifying, end extracting the lessons learned from more than two decades of academic research in the field of CIT. The following section briefly describes the overall research design of this Thesis.

[23] This applies to the natural sciences as well as to the study of human affairs (see also Platt 1992, Ragin and Becker 1992). For example, Galileo's rejection of Aristotle's law of gravity was not based on observations 'across a wide range', and the observations were not 'carried out in some numbers'. The rejection consisted primarily of a conceptual experiment and later on of a practical one. These experiments, with the benefit of hindsight, are self-evident (Flyvbjerg 2006, p.225).

5.5.4 Overall Research Design – 'Spiral Toward Understanding'

In developing Structured Case, Carroll and Swatman (2000) drew on the multi-phase structure of Action Research with its cycles of evolutionary learning leading to an evolving/spiralling understanding of the subject of interest – but argued that *participation* in the action and goal alignment with the actors as required by Action Research was, while potentially appropriate, unnecessary. In this Thesis, I am taking this idea one stage further. I have replaced 'case studies undertaken by an embedded researcher' with a combination of:

- Rapid Appraisal interviews (in Empirical Study I);
- a set of case-study reports ('pure' Structured Case in Empirical Study II), and
- Content-analysis findings – in the form of a critical-historical review of the domain literature (in Empirical Study III). This is actually a literature-based scrutiny of the theory built – the end phase of 'the spiral towards understanding' as required by Structured Case (see Figure 5.2 above).

In this manner, I am representing a '*spiral towards understanding in the broad*' rather than the more traditional 'scientific' serial independent treatment of sub-problems. Although somewhat radical, this is, in my view, absolutely valid for the kind of exploration undertaken here. Moreover, according to Carroll and Swatman (2000), 'case' in Structured Case is used in the broad sense of what is being studied. The practical extension of the Structured Case methodology I am venturing on here is a small, but hopefully not entirely insignificant, contribution to the debate on research methodology in Information Systems. Such a contribution may be necessary, especially considering the fact that the major CIT-evaluation approaches can be grouped (more or less, with honourable exceptions) into two extremes – (1) narrow-focused feature-based evaluation approaches, (2) broad ethnographic investigations of system use in context (see Section 3.1.3 - Frameworks Proposed for CIT Evaluation).

The 'spiral toward understanding' – the conceptual core of the 'Structured Case' methodology – has enabled a cyclical overall research design and an iterative, repetitive refinement of the Conceptual Framework versions produced in this Thesis. The latter has enabled this Thesis to become, in its essence, a *longitudinal* study:

1) the 'constant comparison of data' envisioned by the spiral toward understanding allowed for emerging themes or categories that needed further refinement to be identified;

2) the results from the empirical studies were iteratively fed into the next cycle of research, followed by constant refinement of the Conceptual Framework version at the end of each cycle.

Thus, the longitudinal time-span of this analysis covers a time period of around a decade (the time-span of e.g. the Content Analysis of academic literature). In this sense, the 'consideration of change' (Orlikowski 1993a) has partially been met. But not entirely and not 'ad infinitum' – and this is one of the ***limitations of the study***. The limitation lies in 'what cannot be found in the actual data at the time of the study' (Strauss and Corbin 1994, Chiovitti and Piran 2003).

Like every model, the conceptual model developed in this Thesis (in its different versions) includes an implicit *ceteris paribus* clause, and may be closed with an implicit *etcetera* clause (after Suchman 1987). However, the application of the Structured Case methodology has guaranteed a minimum sufficient level of 'consideration of change' through the non-exclusion of 'the temporal granularity required to understand CSCW dynamics' (Grudin 1988, p.92).

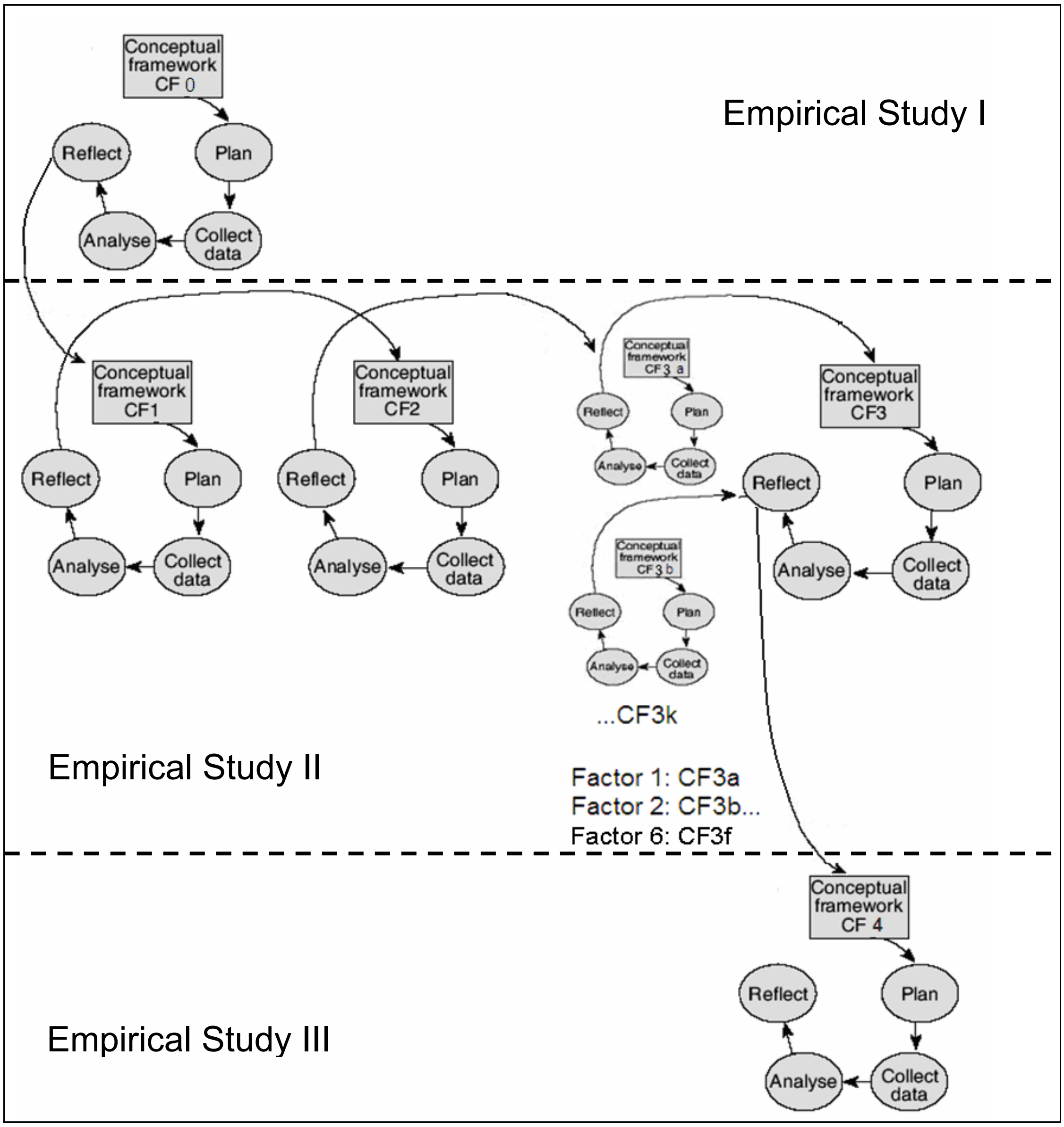

Figure 5.6. 'Spiral toward Understanding' – an Overall Research Design Structure

Figure 5.6 illustrates how the 'spiral toward understanding' is applied in this Thesis as an overall research-design structure. CFØ is developed in Empirical Study I, then – CF1, CF2 and CF3 are developed in Empirical Study II. The development of CF3 is preceded by a number of ‘partial’ conceptual frameworks, each of which is concentrated on one the identified factors of interest. Finally, CF4 is developed in Empirical Study III.

Chapter 6

THE 'EXPERT TALKS': EMPIRICAL STUDY I

This Chapter presents the Expert Talks (Interviews), the purpose of which has been to build a 'mental map' of the major issues surrounding CIT diffusion, at a 'grassroots level'. The Rapid Appraisal (RA) methodology (Grandstaff and Grandstaff 1985, Kashyap 1992, Beebe 1995, 2001) has been applied for data treatment. This methodology, and its applicability for this study, was described in detail in the previous Chapter 5. The conversational RA style of interviewing has rendered a sufficient level of problem definition to allow the question 'How do I find out what I do not know that I need to know?' (Chambers 2002) to be answered. The principles of the RA (Dunn 1994) methodology have been followed strictly, as described below.

RA Principle 1: 'Particular *variation* is sought, not averages' (Dunn 1994, p.6).

The aim of the Expert Talks has been *not* to build a completely representative response, but rather to gain an overall understanding of the field of CIT. The latter is in harmony with RA Principle 1. Table 6.1 below summarises the participants in this Empirical Study, a closer look at which reveals a slight overrepresentation of German firms in the 'expert group'. While I endeavoured to perform the interviews in as many countries as possible, there was a need to understand the background information quickly. Regardless of the slight overrepresentation of German firms, sufficient level of variation was achieved owing to the 'Stakeholder Type' diversity, i.e. from CIT Developer to CIT End User, and to CIT Retailer (see Table 6.1 below).

RA Principle 2: 'Accepting the notion of *appropriate imprecision* ensures that resources are not wasted on "accuracy" when it is not clear what the problem is' (Dunn 1994, p.6). It requires the researcher to measure only as accurately as is necessary (Chambers 2002). *RA Principle 3*: 'The idea of "optimal ignorance" reminds the research team of the importance of "what's not worth knowing", and encourages the researcher to limit data gathering to what is needed' (Dunn 1994, p.6).

As can be inferred from the type of data-treatment methodology (i.e. Rapid Appraisal), and in correspondence with RA Principles 2 and 3, these Expert Talks were not detailed: they did not involve detailed analysis of corporate documents (except for IBM's Technology Adoption Program and KPMG's white papers), nor did they involve time spent observing corporate activities. Rather, the style of interviewing was open-ended and conversational. Therefore, the results of the Rapid Appraisal – summarised in Figures 6.1 and 6.2 below – are structured on the basis of content, rather than provider. I have not attempted to identify information with the company providing it – the goal of this empirical study was not to study the companies per se, but to use the expertise available within those companies to provide an outline of the challenges in the adoption and diffusion of CITs.

RA Principle 4: '*Triangulation* refers to the process of cross-checking data by collecting it from more than one source' (Dunn 1994, p.6).

In accordance with RA Principle 4, the data collected were cross-checked against:

a) the theoretical basis laid in the literature review (Chapters 3 and 4);

b) the systematic characterisation of the 'Nature of Modern Collaborative Work' as reviewed based on literature in Chapter 3 (Section 3.4);

c) the characterisation of actors in 'Mass Collaboration' (as reviewed based on literature in Chapter 3, Section 3.4.2).

Apart from that, I also regularly checked the data collected against the companies' Web sites: their contents, the changes I found there, and the companies' own publications. Finally, the way I analysed the data was also in accordance with RA Principle 4 – I compared and contrasted the input from the various interviewees and identified similarities, differences and patterns among the cases.

RA Principle 5: 'RA is *exploratory and iterative*. Hypotheses and research questions can be rapidly changed as learning occurs' (Dunn 1994, p.6).

In harmony with RA Principle 5, I compared and contrasted the input collected from the various interviewees through an *exploratory, iterative cycle* of identifying similarities, differences and patterns among the cases. I kept changing and updating the interview questions as I was learning more about the situation.

RA Principle 6: '*The context of the data is as important as the data itself.* Key variables and questions of interest exist in an environment which is itself important to observe' (Dunn 1994, p.6). *RA Principle 7*: '*Learning from and with the community* is stressed; listening skills are stressed over telling skills' (Dunn 1994, p.7).

I was learning with the community, trying to apply my listening skills in order to understand as much as possible about the environment, and get a realistic feeling about the context. My approach was to treat the *testimony* of the actors as in important evidence about the context. As Giddens (1993, p.92) noted, '... given that [an actor] is not dissimulating, her or his *testimony* as to the purpose and reasons for her or his conduct is the most important, if not necessarily conclusive, source of evidence about it'.

I held face-to-face and telephone discussions with a total of 12 executives from 12 companies, located in 6 countries (mostly in Germany). I held the interviews in four languages – German, English, Russian, and Bulgarian. The interviews were held in the time period 2007-09. The contents were saved in audio format. The recordings were transcribed word for word, and the following analysis is based on those transcriptions. The interview questions were open-ended and tackled wide-ranging information on the issues (i.e. strengths, weaknesses, opportunities and threats) associated with CIT adoption and diffusion. Table 6.1 below summarises the Expert Talks participants, identifying the companies which were involved, the role each company played in the field of CIT (Stakeholder Type), and the roles of the actual respondents (the names of respondents have been withheld). As Table 6.1 makes clear, the respondents were senior employees of their companies. These executives were not only able to provide information on operational details of their daily business interactions with collaboration technology, but could also discuss strategic issues related to the adoption and diffusion of collaboration technology. The organisations I talked to can be split into three major categories: CIT Developer, CIT End User, and CIT Retailer (see Table 6.1 below). Most of the companies fulfilled the conditions of acting as CIT Developer and CIT End User simultaneously.

	Country	**Company[24] /Profile[25]**	**Stakeholder Type**	**Respondent Role**
1	Germany	IBM Deutschland GmbH Profile: IBM is the IT-company with the most broadly diversified experience: founded almost a hundred years ago. IBM is one of the world's largest suppliers in the field of Information Technology.	CIT Developer/ End User	IBM Distinguished Engineer, Member of IBM Academy of Technology, Member of the IBM Germany Global Technology Services Chief Technology Office
2	Germany	SAP AG Profile: SAP AG is a leading supplier of corporate software applications. Its headquarters are in Walldorf (Germany). The company has marketing and development branches in 50 countries around the globe.	CIT Developer/ End User	Member of the Board of Directors and Leader of the 'Research and Breakthrough Innovation' Division of SAP AG
3	Germany	KPMG DTG AG Profile: KPMG is one of the leading providers of business and IT advisory services in Germany and has around 8,000 employees at more than 20	Technology Consultant	Partner, Technology

[24] Please, note that the experts' citations (presented in the text below) are personal to the individuals and do not necessarily represent the companies' overall positions, strategies or opinions.

[25] The companies' profiles are quotations from their own Websites, last updated in 2009, except for DVBN'd profile (last updated in 2007).

		locations.		
4	Germany	Robert BOSCH GmbH Profile: Robert Bosch is a leading international Technology and Service Provider. The Bosch-Group in Germany has around 71 000 employees.	CIT End User	Information Technology Department Manager
5	Bulgaria	Microsoft Bulgaria Profile: Microsoft Bulgaria is a foreign subsidiary of the Microsoft Corporation. It is responsible for the marketing and sales of the Microsoft products in Bulgaria.	CIT Developer/ End User	Project Manager
6	Germany	Google Deutschland GmbH Profile: Google is the developer of a prize-winning search engine, offering its users access to more than 8 billion URLs, which makes it the biggest WWW search engine.	CIT Developer/ End User	Associate Product Manager
7	USA	GroupSystems Profile: global leader in team collaboration for innovation, decision-making, leadership and a pioneer in the Group Intelligence segment.	CIT Developer/ End User	Customer Support Manager
8	Russia	Hewlett-Packard AO Profile: Hewlett-Packard AO, known as Hewlett-Packard Russia, provides a broad selection of technology products, as well as a wide range of IT services. Hewlett-Packard Russia primarily serves retailers and corporate customers. The subsidiary's US parent began operations in the former Soviet Union in 1968.	CIT End User	HP Russia blog team member (freelance analyst)
9	Estonia	Skype Limited Profile: Skype offers a piece of software that makes communicating with people around the world easy and fun. If users are at Skype, it's free. Skype generates revenue through its premium offerings such as making and receiving calls to and from landline and mobile phones, as well as voice-mail and call forwarding. Skype, based in Luxembourg, has relationships with a growing network of hardware and software providers and is an eBay company.	CIT Developer/ End User	General Manager

10	UK	Socialtext Profile: As the Business Social Software leader, Socialtext applies next-generation Web 2.0 technologies to the critical challenges facing businesses. Socialtext wiki-centric social software solutions are designed for any organisation. Today, over 4 000 organisations use Socialtext.	CIT Developer/ End User	Sales Executive
11	Germany	DVBN – Deutsches Vergabe und Beschaffungsnetz Profile: Represents one of the largest eBusiness projects in Germany. Offers a pervasive, neutral and open IT-infrastructure for electronic procurement. Seeks to unite German construction businesses through eCollaboration[26].	CIT Retailer	Chief Marketing Manager
12	USA	Sun Microsystems Inc. Profile: Leading supplier of Hardware, Software and Service for Network Computing.	CIT Developer/ End User	Sun Learning Services Delivery Manager

Table 6.1. Expert Talks – Participants

6.1 Raw Data – the Interviews

This Section presents the Expert Talks' raw data – selected excerpts from the interviews[27]. I have compared the interview excerpts through manual thematic coding by 'pattern matching'. My 'pattern matching' efforts consisted of finding out whether the interview transcripts had similarities, and whether they could be grouped according to some of these dimensions. With this focus, two broad thematic categories (correlations) emerged. These themes were:

(1) expert opinions/observations pertaining to CIT characteristics;

(2) expert opinions/observations pertaining to CIT adoption.

On a second coding level, the expert opinions/observations pertaining to CIT characteristics could be classified into three thematic subcategories:

a) pertaining to ***IT infrastructure***;
b) pertaining to ***CIT content***;
c) pertaining to system ***degree of formality***.

[26] Company's Profile – last updated in 2007.

[27] Please, note that the experts' interview quotations (presented in the text below) are personal to the individuals and do not necessarily represent the companies' positions and strategies.

On the other hand, the expert opinions/observations pertaining to CIT adoption could be classified into two thematic subcategories:

a) describing the ***transition of community-produced CITs*** (SNS and Social Media) ***into the enterprise***;
b) indicating ***dissatisfactory levels of diffusion of formal CITs***.

Table 6.2 below presents an overview of the thematic categories and subcategories derived from the Expert Talks.

Observations Pertaining to CIT Characteristics
IT Infrastructure
CIT Contents
Degree of Formality
Observations Pertaining to CIT Adoption
Transition of Community-produced CITs (SNS and Social Media) into the Enterprise
Dissatisfactory Levels of Diffusion of Formal CITs

Table 6.2. Expert Talk Results – Derived Thematic Categories

The following Section presents some interview quotations classified in these two broad thematic categories.

6.2 Results pertaining to CIT Characteristics

Here I will present some expert opinions/observations pertaining to CIT characteristics, and the three thematic subcategories (IT Infrastructure, CIT Contents, Degree of Formality) – as depicted in Table 6.3.

Observations Pertaining to CIT Characteristics
IT Infrastructure **CIT Contents** **Degree of Formality**
Observations Pertaining to CIT Adoption
Transition of Community-produced CITs (SNS and Social Media) into the Enterprise
Dissatisfactory Levels of Diffusion of Formal CITs

Table 6.3. Thematic Focus of this Section

6.2.1 IT Infrastructure – Enterprise and Autonomous CITs

Some interview statements were indicative of an existence of two classes of CITs, regarding whether or not they were part of the organisational ***IT infrastructure***:

- *formal CITs* – organisation-mandated, an intended part of the organisational IT infrastructure, and the result of targeted investment;
- *autonomous CITs* – self-selected, often self-created, adopted by individual employees autonomously, through self-initiative; not part of the organisational IT infrastructure.

In this sense, the *autonomous CITs* resemble what has been discussed by the IS community as 'shadow IT', i.e. a set of IT tools used for performing IT functions but not part of the mainstream IT organisation (e.g. Raden 2005).

Here are some excerpts from my interview with the Sun Microsystems executive, in which he described a series of developments within his company.

> *'Back in 2005, a great number of our high-tech employees started writing public blogs at work, about work. They were typically seeking to obtain technical types of feedback about work-related problems from peers outside the enterprise. Their initiative was completely self-regulated, and violated every traditional percept of corporate communication. Writing public blogs at work, about work, was new not only for Sun… Initially this practice was seen by some managers as problematic.*
>
> *However, wee soon realised that a few honest public blogs could be worth a thousand press releases, and that this blogging chatter could actually add up to better business. So we gradually decided to accept and adopt blogging for our corporate communication purposes. As a very innovative company in every aspect, we were one of the first to make blogging (internal and public) part of our mainstream collaborative infrastructure' (Sun Microsystems executive).*

Obviously, blogging emerged within Sun Microsystems as an *autonomous* (shadow) CIT – self-selected and adopted by individual employees autonomously, through self-initiative. It was only owing to the company's innovative corporate culture that blogging was made a formal part of the mainstream IT infrastructure.

The Chief Marketing Manager of DVBN (Deutsches Vergabe und Beschaffungsnetz – the company representing one of the biggest eBussines projects in Germany in 2006/07) drew a similar picture. In his interview, he contrasted the formal enterprise CIT to the tools that were actually used by the sales people for doing their job.

> *'DVBN offers an open platform for electronic procurement and seeks to unite German construction businesses through eCollaboration. Therefore, our sales people do not have a stable workplace, but constantly travel throughout the*

country and need to stay in touch – with their colleagues as well as with customers and contract providers.

When I started managing DVBN's marketing department, I noticed a curious situation – the sales people were required to write detailed reports on each sale they made or initiated, the people they contacted etc., and save the report on the CRM system. Some of them did that now and then, but most of them were trying to circumvent the CRM despite all formal requirements. Instead, they were using the MSN messenger to communicate with each other, to exchange contact information etc. The sales people especially liked the time-saving capabilities of instant messaging – so sorely lacking in the CRM system which was demanding from them to write long project reports instead of sending a line of text. So, during a management meeting, I proposed to accept the MSN Messenger officially, as part of our enterprise communication tools. After some discussion, and despite some opposition, it was accepted. For archiving purposes, we started using the permanent-chat feature' (DVBN executive).

The Google executive shared the following thoughts.

'It is easy to try to impose collaboration technologies on employees, the question is – does it actually work, and, more importantly, does it add any value in the long run? Only in rare cases do Steering Committees ask the end users if they actually like what is being planned. The question usually comes post factum, if at all: "Do you, guys, like what we are doing? Good, good, cause we're doing it".

At the same time, there are numerous examples of consumer-created applications – like instant messaging, wikis, blogs – that have diffused into organisations bottom-up. We ought to have learned the lesson by now. With the convergence of work and private life, the expectations about how work can be supported by computers are being set by the consumer world. Consumer applications are not only entering the enterprise, but becoming the staples of what we now refer to as modern enterprise technology.

A consumer on the Internet, and an employee at the enterprise is actually the same person. And so, the tools I use in my expectations about my work life start to be strongly influenced by the experiences I have in my personal life online. The challenge is how do we translate this crazy experience that our employees have on the Internet, and now they have these expectations of "I should have that experience as I am at work", how do we tell them that that is the wrong thing? My answer is: that is actually the right thing' (Google executive).

The IBM executive stressed that the CIT strategic policy of IBM was not to impose systems on employees but to let them have freedom of choice. Here are some excerpts from my interview with the IBM executive.

'IBM's strategy is to give options – we are not in search of the one and only communication tool, or communication platform. We know that this is not possible. In a big project there are different people coming together: an IT architect, a project manager, a sales person. Each of them is bringing his/her preferred way of communication. What happens is, they come together and say: how do we communicate in this specific project? Let us discuss this from the very beginning. Basic things like e-mail and instant messaging are typically always there. But typically they also say, for example: "I suggest using this wiki I know in this project". So the team is picking up the right subset of platforms for this specific project. It is project-related. And all the time you see best practices: for example, the client says "I have done this type of project two times already, it was suitable to use this or that mechanism". All additional tools are chosen project-based or dictated by the client.

Sometimes the client needs to be in the communication path, because the client communicates requirements, or changes in the requirements. How do you integrate the client's communication channels in this project? How do you distribute what the client said at a Steering Board Meeting? How do you keep minutes? How do you track from the minutes if somebody had an action item about doing something in order to avoid surprises? Three weeks later you see nothing has happened and the customer does not like the result. So you need a kind of a tracking system. At IBM the various professional communities have specific means of communication among themselves, and of communication within projects. This is why it is important that they themselves pick and chose the mechanism they think is most useful.

Our overall strategy has been to let our employees chose their communication mechanisms autonomously, in a bottom-up fashion. Over time, we started recommending communication mechanisms to our employees to reduce the variations of technologies being applied for collaboration purposes' (IBM executive) [28].

The IBM executive mentioned numerous examples of bottom-up (rather than authority-based) adoption and diffusion of collaborative technologies within IBM, like for example:

- instant messaging was available and widely adopted within IBM almost ten years before people outside IBM started using tools like Yahoo-Messenger or AOL-Messenger. It emerged as a seemingly 'small' innovation in a 'small' team. That team offered it for use to the whole company, and so it gradually diffused;
- all types of amendments and additional features to instant messaging – like, for example, VoIP, drag and drop file function, broadcast support (instant polls with immediate question responses through instant messaging company-wide) – have actually emerged bottom-up.

[28] Please note that the IBM executive's citations in this document are personal to the individual and do not necessarily represent IBM's overall positions, strategies or opinions as a company.

6.2.2 Content – Professional and User-Generated

Some interview statements were indicative of an existence of two classes of CITs, in terms of ***CIT content*** and where it stems from – professional content (produced by professionals) or user/community contribution, i.e.:

- *produced by professionals* – CITs designed and created by IT professionals;
- *user-generated CITs* – created by the user community.

The Google executive stressed the increasing importance of user-generated CITs.

> *'Businesses usually refer to them as user-generated content or consumer-generated media. I prefer to call them "modern enterprise technology". Consumer applications are becoming the staples of what we now refer to as modern enterprise technology' (Google executive).*

The Google executive gave the following two illustrative examples from the corporate history of Google.

> *'Our PageRank technology – the unique technology which initially gave our company huge competitive advantage over other search engines – partially relies on user contribution. PageRank prioritises search results by the number of external sites that are linking to a document – the number of 'votes' that a document receives from the network. What the Google search engine automatically initiates every time are actually instant 'polls' in which the votes of all web members are gathered.*
>
> *We recently decided to open up our mapping application (Google Maps) and make its API publicly available for free use. That decision stimulated a wave of new Web services. Collaborative mapping emerged as a combination of our professional API, and user-generated input. Almost all collaborative mapping applications now employ Google Maps as their API. Some examples are 'mashup' websites like bikely.com and wikimapia.org' (Google executive).*

The Microsoft executive was more in favour of professionally-generated CIT content.

> *'In a world of open source, it is no longer clear how IT professionals will profit from the results of their creative work. This is my personal opinion, but I do think that this is actually an attack on the ability to make profit in the software industry. This is no free enterprise, but latter-day communism…' (Microsoft executive).*

In pondering the rise of web-based CITs, the GroupSystems executive touched on the advantages of mass collaboration – i.e. the tremendous externalities offered by user-generated Web content.

> *'One limitation of the early GroupSystems was that it lacked Web externalities. Some people thought that tools like GroupSystems were for the "suits" and were controlled by the "suits", while web-based tools were for the rest of "us" – an illusive and misleading belief... With web-based tools each individual user, more or less, decides who he wants to network with, when, and how often. In 2004, we released GroupSystems II, an Internet-native collaboration suite that had been optimised for geographically distributed teams, and was perfectly capable of harnessing the externalities offered by the Web. Now we have transformed the paradigm of our innovation yet again. With the release of ThinkTank®, group collaboration is now based on the premise of embedded functionality with webparts, widgets or plug-ins to connect different levels of action in important ways' (GroupSystems executive).*

As pointed out by the IBM executive, the principles of 'open innovation' dictate that the boundaries between professional and user-generated content become less important – more important is the 'social capital' generated through peer production. One example the IBM executive gave was the *Eclipse* software platform.

> *'Eclipse was developed by IBM internally, first as a software platform comprising extensible application tools, frameworks, and a runtime library for software development and management. As it was written to provide an integrated development environment to software developers and administrators on a large scale, the only way to make it successful was to get large-scale support for it. Although it was developed within IBM internally, we soon decided to give it away voluntarily to an open source community' (IBM executive).*

Another example he gave was IBM's involvement in the Linux community.

> *'Our decision to get involved in open source, and eventually in Linux, was rather unconventional. In 1998 we joined the Apache community, released our code under open source rules, and started participating much like any other contributor. By most measures, giving up so much control – granting the Apache community royalty-free access to our patents – was very bold, to say the least. But it has definitely been a win-win scenario – we have been able to harvest some of the value created in mass collaboration' (IBM executive).*

6.2.3 Degree of Formality – Restrictive or Semi-formal CITs

Some interview statements were indicative of an existence of two classes of CITs, in terms of the ***degree of formality*** – restrictive or semi-formal:

- *restrictive CITs* – impose structure prior to use;
- *semi-formal CITs* – encourage use prior to providing structure.

Here are some excerpts from my interview with the IBM executive.

‘There are very restrictive systems which are applicable for situations where there is no room for creativity, e.g. a financial department where work consists of auditable, provable steps. On the other hand, less restrictive systems are more applicable for situations where creativity is a first priority – for example, an R&D department’ (IBM executive).

The Socialtext executive stressed the advantages offered by his company’s collaborative software – most importantly, the level of user empowerment and freedom that went well beyond the narrow confines imposed by restrictive CITs.

‘As the Business Social Software leader, Socialtext applies next-generation Web 2.0 technologies to the critical challenges facing businesses. Socialtext wiki-centric social software solutions are designed for any organisation. Today, over 4000 organisations use Socialtext.

One reason Socialtext is popular is that it is completely unstructured. Structure emerges and evolves in a bottom-up, self-organising fashion, in accordance with the evolving needs and capabilities of the organisation. We are not trying to impose a lot of structure on user interactions. Instead, we let structure emerge from free-form authoring and dumping of stuff into shared databases’ (Socialtext executive).

Skype Limited is another emblematic company which has harnessed the benefits of social collaboration. Its business model is based on complementary services (e.g. voice-mail, call forwarding, land-line and mobile Skype circuit points), while speaking via the Internet is free of charge. The Skype peer networks are self-sustaining phone systems that require no central capital investment. According to the Skype executive, one of the reasons Skype is so popular is that it is completely non-restrictive.

‘Skype has an advantage – it is light-weight and completely non-restrictive. It can be experimented with and tested easily, in ways that more formal systems can’t’ (Skype executive).

6.3 Results pertaining to CIT Adoption

Observations Pertaining to CIT Characteristics
IT Infrastructure CIT Contents Degree of Formality
Observations Pertaining to CIT Adoption
Transition of Community-produced CITs (SNS and Social Media) into the Enterprise
Dissatisfactory Levels of Diffusion of Formal CITs

Table 6.4. Thematic Focus of this Section

Here I will present the expert opinions/observations pertaining to CIT adoption, and the two thematic subcategories (Transition of Community-produced CITs into the Enterprise and Dissatisfactory Levels of Diffusion of Formal CITs) – as depicted in Table 6.4.

6.3.1 Transition of Community-Produced CITs (SNS and Social Media) into the Enterprise

Some interview statements were indicative of an ongoing process of transition of community-produced CITs – mostly Social Networking tools and Social Media like blogs, wikis, forums etc. – from the Internet public sphere into the enterprise.

As we saw above, the Sun Microsystems executive mentioned that his company was one of the first to make blogging (internal and public) part of their mainstream collaborative infrastructure. Here is what he also said regarding this issue.

> *'Since we started our blog programme, more than 3000 of our employees have created their public blogs. We additionally host internal blogs available only to Sun employees. There is a further set of blogs that is accessible only to selected workgroups. Our company's internal blogs attract thousands of visitors per day. One of our most prominent public blogs belongs to our CEO and president Jonathan Schwartz (http://blogs.sun.com/jonathan/). That blog is visited by about 5000 people per day on average' (Sun Microsystems executive).*

Here are some excerpts from my interview with the SAP executive, in which he stressed the importance of collaborative networking with customer participation and the use of social media for business purposes.

> *'The transformation of business into a network of specialised, collaborating firms, is fully under way. This is true for large, middle, and small firms. IT is an essential change agent in this process. The customer demands more than what one single company can offer. To satisfy the customer, we need collaborative partners and social networks, we need open innovation based on symbiosis and cooperation. We need to innovate quickly, in a people-centric, ad-hoc process. We therefore need inter-organisational collaborative networks. In the present business environment, we not only need to create customer value, but we also need to achieve customer intimacy. We therefore need flexible collaborative networks with customer participation.*
>
> *The latter raises a legitimate question: can we apply Web 2.0 for business purposes? For example, blogs are conversational tools for constant "talk" on the Internet. The question is – can we instrumentalise this type of "customer talk" in order to build a community and offer collaborative services to this community (instead of bare information)?*

Can we use the potential of Web 2.0 to get a better idea of what kind of services our customer community wants, to be able to offer holistic solutions in the form of SaaS (Software as a Service)' (SAP executive).

According to the KPMG executive, social collaboration technology provides for a special type of communication mechanism that strikes 'right to the heart of collaboration'. The IBM executive was also in favour of the transition of community-produced CITs (SNS and Social Media) into the enterprise.

'Social networking enhances creativity through the exchange of diverse opinions it allows for… In fact, we made use of social networking in September 2006 by inviting our employees from more than 160 countries – along with their business partners, clients, and even family members – to join in a wide-open, massive brainstorming session we called the "Innovation Jam"…

Social software is capable of contributing toward resolving the so called "decision-expertise gap" – the problem of important decisions being taken by stakeholders who do not necessarily possess the best of expertise on the topic. In such situations, social software is capable of playing the role of a bypass mechanism to make good ideas visible to senior management, especially when local management may be ignoring them for some reasons.

Altogether, the type of social networking offered by social media allows for teams to become more diverse (rather than homogenous), and to subsequently improve the quality of teamwork' (IBM executive).

However, the IBM executive did mention that *public* blogging was regulated for IBM employees. For example, employees should identify themselves when they blog about IBM or IBM-related matters, they should use a disclaimer etc.

'We have put our blog policy in writing in the same fashion we do with other personnel issues' (IBM executive).

The BOSCH executive was, on the contrary, sceptical about the prospect of community-produced CITs becoming mainstream technology in the automotive-industry enterprise sphere.

'Some of our departments are actually not allowing the usage of social networking tools at the workplace, especially Internet-based public tools. Even if the Internet is be available, those sites will usually be blocked (inaccessible) for most employees. One concern is that the usage of such services may leak sensitive information inadvertently. More importantly, such services are rightfully seen as a time suck for our employees.

Recently, there were some innovative ideas aimed at adopting social software for internal communication purposes. However, there are concerns that Web

2.0 technologies might destroy the best of what we already have in Web 1.0 by replacing it with unmanageable trash. Another criticism is that the proposed change is no real innovation but "old wine in new bottles"' (BOSCH executive).

6.3.2 Dissatisfactory Level of Diffusion of Formal CITs

Some interview statements were indicative of a dissatisfactory level of diffusion of some formal (organisation-mandated) CITs.

For example, DVBN's manager admitted that the modern video-conferencing facility his company possessed was actually used very infrequently.

> *'We do have a video-conferencing facility shared with our department in northern Germany. The intention was to communicate with them through video conferencing. It is almost never used though…' (DVBN executive).*

Microsoft's executive expressed his concerns regarding his efforts to introduce an intra-departmental MSS – efforts that did not bear much fruit.

> *'I tried to introduce a Meeting Support System for the face-to-face meetings of our department, but the system usage was sceptical from the very beginning. I soon realised that this particular system actually conflicted with our country's overall culture [smiles]. Business in this country [Bulgaria] is based on relationships, and that is not always a bad thing. Some of the most useful ideas are created socially – typically in non-work situations, over lunch, during coffee breaks etc. Electronic support for our meetings seems to take away all the "fun" of it – it cannot be compared to a challenging meeting where people struggle and succeed. Whether people have fun or not while working seems to be just as important as efficiency…' (Microsoft executive).*

Later on in his interview, the Microsoft executive suggested that people often acted as 'stalled' users of collaboration technology (and no 'rejectors') – i.e. they were not exactly rejecting some kinds of technologies, but simply discontinuing their usage with the intention to resume it sometime in the future. People were also using collaboration technology 'heedfully' – i.e. paying much attention to what others in the organisation were doing.

> *'I have never heard any of my subordinates openly reject any kind of collaboration software that is available to him or her. Every time I have asked why my colleagues are using so much of e-mail, and so little of shared calendars, planning tools, project-management tools etc., they would give me an answer like: "I'm thinking about using it again, but haven't had time", or "I'm just waiting for the right moment to come". I don't know if people are doing this consciously or it is just the environment that makes them react like this.*

People are also very much influenced by what others are doing – if a lot of colleagues are using the shared calendar, for example, they are inclined to use it too. For collaboration tools, that actually makes a lot of sense' (Microsoft executive).

Google's executive I interviewed thought that enterprise collaborative applications in general did not deliver enough value to the end user, and were therefore unlikely to diffuse massively into organisations.

'Enterprise technologies – such that are built by experts for experts – have historically evolved to become less user-friendly, instead of more user-friendly. They are lagging very far behind the Internet and the consumer world' (Google executive).

The Socialtext executive expressed a similar concern.

'Enterprise collaboration systems are typically designed and implemented from the top down and serve in many ways as instruments of control. They usually consist of rigid workflow structures, formal business rules, and ontologies that users must fit themselves into.

The problem is that people don't really like using those kinds of tools, and what they end up doing is trying to circumvent them. That is one reason why ninety percent of collaboration still exists in e-mails' (Socialtext executive).

6.4 Discussion

As can be inferred from the Interviews, two broad thematic categories (correlations) emerged. These themes were:

(1) expert opinions/observations pertaining to CIT characteristics;

(2) expert opinions/observations pertaining to CIT adoption.

Within the context of the first thematic category – CIT characteristics – I have been able to produce the first Mental Map (MM1, Figure 6.1).

In Figure 6.1, CITs are characterised based on a three dimensional scale, with:

- Arrow 1 – pertaining to ***IT infrastructure*** (whether CITs are part or not of the mainstream organisational IT infrastructure, i.e. enterprise and autonomous CITs);
- Arrow 2 – pertaining to ***CIT content*** (whether CIT content is produced by professionals or user-generated);
- Arrow 3 – pertaining to the system ***degree of formality*** (whether CITs are restrictive or semi-formal).

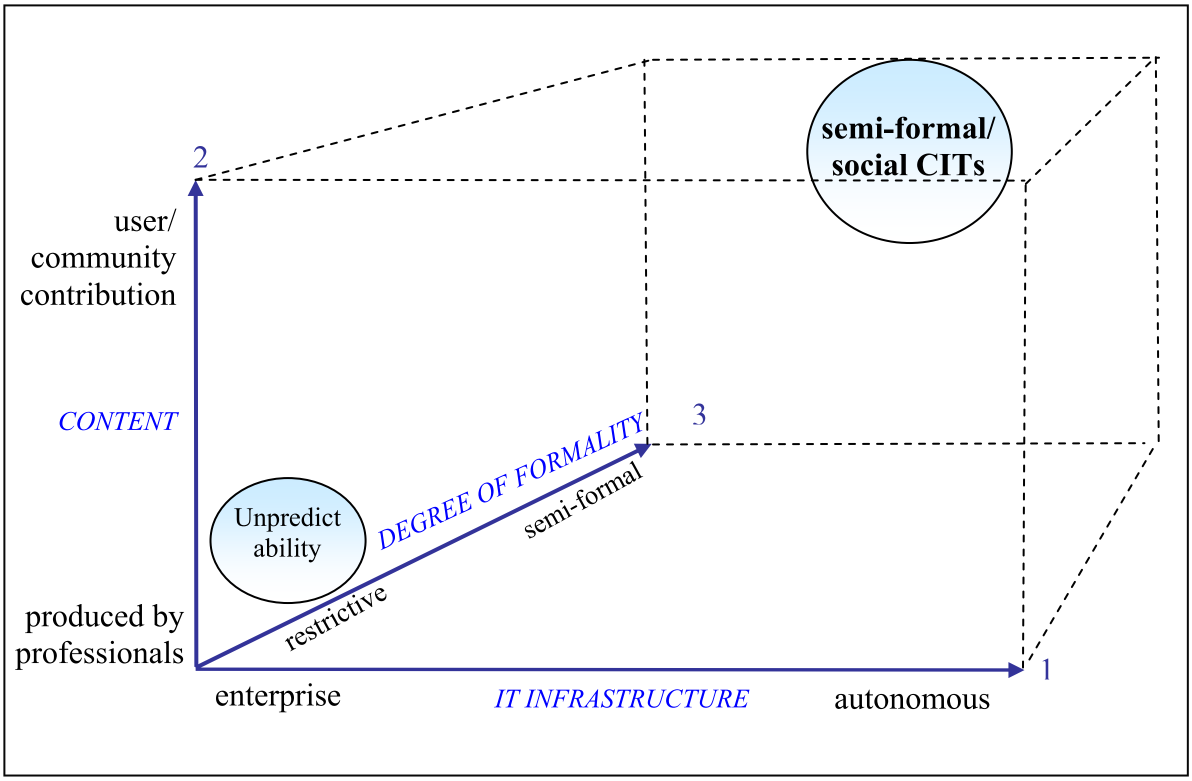

Figure 6.1. CIT Characteristics – a Mental Map Produced Based on the Expert Talks (MM1)

Within the context of the second thematic category – CIT Adoption – I have been able to produce the second Mental Map (MM2, Figure 6.2). In Figure 6.2, two distinct adoption-diffusion paths are mapped – of formal CITs and of semi-formal/social CITs. The horizontal axis represents time, and the vertical axis represents the hypothesised (suggested by the interviews) level of diffusion (from limited assimilation to pervasive assimilation).

Based on the expert opinions, I have been able to [tentatively and hypothetically] identify an overall ***dissatisfactory level of diffusion of formal CITs***, with a diffusion trajectory spanning along the following basic levels:

- adoption but no deployment;
- sceptical/heedful use;
- limited/lagging assimilation;
- stalled use (see Figure 6.2).

As far as semi-formal/social CITs are concerned, I was able to [tentatively and hypothetically] identify a tendency that they were starting to penetrate companies. Community-produced CITs (mostly SNS and Social Media) seemed to be

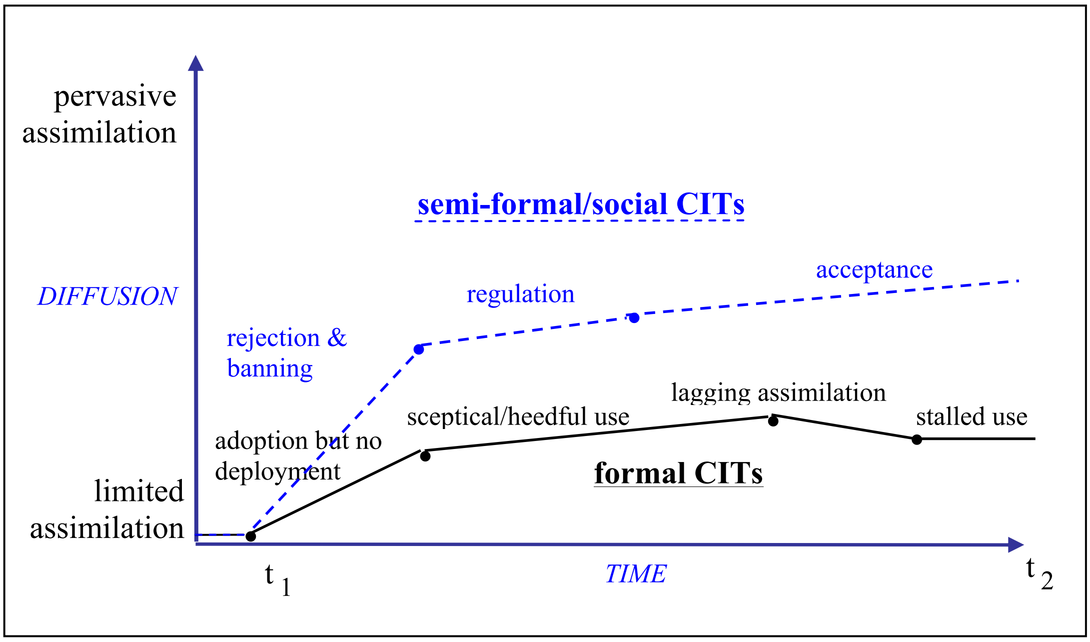

Figure 6.2. Hypothesised CIT Adoption Pattern – a Mental Map Produced Based on the Expert Talks (MM2)[29]

performing a smooth transition from the Internet public space into the enterprise. That transition was developing along a diffusion trajectory containing the following consecutive stages:

- rejection and banning (of social/semiformal CITs within organisations due to various concerns);
- regulation (in case the first stage of rejection is overcome – regulating the adoption and usage of social/semiformal CITs within organisations);
- acceptance (applicable for companies which understand the business benefits from social networking) (see Figure 6.2).

The idea that software could be used as an inherently social tool is actually fairly new. Companies seem to be getting acquainted to and starting to pay adequate tribute to the fairly innovative notion that software, even corporate software, can be used for social purposes – i.e. for putting people in touch with each other, for letting them interact, and build their own networks of colleagues or peers. Social CITs are inherently different from incumbent collaboration systems (like e.g. Scheduling Systems, Lotus Notes traditional pack, as well as CRM, ERP, Supply Chain Systems or spreadsheets used for collaboration). One major difference is that social CITs cannot be used in front of an isolated PC. A mandatory prerequisite for the use of social CIT is 'network participation' – one has to be part of a social network to build his/her own social world.

[29] Please, note that the diffusion trajectories presented in the graph are rough and approximate.

Social-Software Type	Software Providers	Corporate Adopters
Blog an individual's online journal	TypePad© Blogger (Google service) WordPress (free software) Movable Type©	Greneral Motors Hitachi Infosys Intel Macromedia Novell Sun Microsystems
Wiki users create and edit content	MediaWiki TWiki Kwiki PMWiki Socialtext	Dresdner Kleinwort Microsoft Nokia SAP
RSS really simple syndication	RSS feed reader RSS specifications HexaMail	Amazon Cisco *The Wall Street Journal*
Tagging the use of keywords to track content	ConnectBeam	Honeywell IBM Sony-BMG
Social Networking use of the Internet to build and maintain relationships	Humsubka Jhoom Linkedin© Minglebox	Cisco Dresdner Kleinwort Microsoft Nike Salary.com
Mashup Web site or Web application that combines programming and content from more than one source	Greasemonkey	Amazon Dun & Bradstreet E*Trade Google IBM JDS Uniphase Siemens Société Générale
Prediction Markets speculative markets created to improve forecasting		Google HP Microsoft Yahoo!

Table 6.5. Social Software Types, Providers, and Corporate Adopters. Source: Matuszak (2008), KPMG

For example, social CITs have recently been in the focus of the KPMG technology consultancy services. This can be seen in some of the latest KPMG website publications. Gary Matuszak, the Global Chair of Information, Communication and Entertainment of KPMG, has expressed his optimistic views on the potential business role of social software platforms (Matuszak 2008). Table 6.5 describes some of the social software types, providers, and corporate adopters referred to by KPMG.

In addition, some ideas defended by the company executives supported my literature-review observations on 'Mass Collaboration' (Chapter 3, Section 3.4.2). As I have mentioned, the changing technology environment has brought about new types of R&D networks (e.g. Open Source networks). The widely recognised issue of exponentially increasing product complexity is of immense significance indeed. Products are too complex to be successfully designed and created by one person, one group or even one big corporation completely independently from others. Companies are differentiating their products by higher-quality implementation and service, rather than proprietary design. The era of competition based on rigorously controlled proprietary innovation is being replaced by the era of 'mass collaboration'. The speed and richness of incoming information is so great that there is no possible way even the largest corporation could deploy sufficient in-house creative power to compete with the creativity in the world at large. Organisations, then, are being forced to leverage external creativity by connecting thinkers from different companies, and opening up the innovation effort. The very meaning of 'collaboration' is being transformed into 'open co-creation'.

6.5 The Problem Boundaries

As described in Section 6.2.1 above, the ideas defended by some of my interviewees were indicative of an existence of two classes of CITs, regarding whether or not they were part of the organisational IT infrastructure:

- formal CITs – organisation-mandated, an intended part of the organisational IT infrastructure, and the result of targeted investment;
- autonomous CITs – self-selected, often self-created, adopted by individual employees autonomously, through self-initiative; not part of the organisational IT infrastructure.

As stated in the interviews, formal CITs were diffusing ***top-down***. Their authority-based diffusion path was generally characterised by practices of *imposing* technologies on employees, the primary concern being to make sure that technology seamlessly and easily integrates into the enterprise's IT infrastructure. On the other hand, autonomous CITs were diffusing ***bottom-up***. Their diffusion was happening in the most natural way – through social networking. Their transition into the enterprise was a response to 'absorption' – a kind of social osmosis – of pressing events in the consumer Internet world, the strategic significance of which was not initially recognised in the enterprise world.

Grudin (1988) first tackled the problem of imposing technologies on employees – i.e. 'can a CSCW application be made to succeed by mandating that those who need to do the extra work do so?' (p.86). Can managers be successful in mandating the usage of collaborative technologies in organisations? Can they achieve full appropriation or faithful use by making CITs compulsory? The results from a couple of decades of research in the field have shown that compulsory usage is not necessarily extensive and engaged, but may also be ironical, sceptical, limited etc. (see e.g. Orlikowski 1995). Organisations may well be able to impose *transactional* systems on their employees, but in the case of fostering *creative* cooperative work (the ultimate goal of CSCW), mandating CIT usage has proven to be of limited success.

The top-down approach of imposing CITs on employees has been widely used when CIT systems are introduced (Chems 1980, Rowe 1985). Ever since the eighties, for example, Word processing skills have been a job requirement for secretaries. However, as Grudin (1988) rightfully observed, this cannot be done for each CIT application that arrives – the cost will outweigh the benefit. Maintaining a personal calendar in order to support automatic meeting scheduling is unlikely to become a job requirement. Therefore, it seems neither worthwhile nor practical for management to mandate participation in new CIT systems unless the collective benefit is very evident. The proof of 'evident benefit' is especially difficult, given that '… the costs of coordination are so much reduced, that it is now possible for huge numbers of people, even in large organisations, to have enough information so that they can make sensible decisions for themselves, instead of just following orders from someone above them in a hierarchy' (Malone 2005). John Seely Brown, former chief scientist at Xerox and director of its PARC, says,

'A lot of corporations are using wikis without top management even knowing it. It's a bottom-up phenomenon. The CIO may not get it, but the people actually doing the work see the need for them' (Tapscott and Williams 2006, p.253).

One example, described by Tapscott and Williams (2006), is especially emblematic of the bottom-up diffusion path of social/semi-formal CITs. This is the story of how the Geek Squad company employees started using online multiplayer games to stay in touch as the organisation grew from 60 to 12000 employees in just three years. While management was preparing the adoption of an incumbent CIT system to manage the virtual distributed work, they were aghast when they first learned that all of their employees played Battlefield 2 online. With each Battlefield 2 server you could have 128 people simultaneously fighting each other in a virtual environment. The employees, while running along with rifles in their hands, were saying, 'Yeah, we just hit our revenue to budget', or, 'Hey, how do you reset the password on a Lynksys router?'. So, while management had their heads down preparing the adoption of an incumbent CIT system, the employees had self-organised online in probably the most effective and efficient collaborative tool that was already out there (Tapscott and Williams 2006, pp. 240, 242, 243).

This pattern of bottom-up technology adoption is not particularly new – as mentioned above, we have seen it with instant messaging. We have also seen it with e-mail, and wikis – technologies that many organisations found threatening to their status quo in the beginning. Now these technologies are part of the standards in what we refer to as enterprise systems. This is a lesson we ought to have learned by now, according to Tim Bray at Sun Microsystems,

'…the technologies that come along and change the world are the simple, unplanned ones that emerge from the grassroots rather than ones that come out of the corner offices of corporate strategists' (Tapscott and Williams 2006, p.253).

Gallivan (2001) introduced a taxonomy of two-stage innovation adoption types (see Table 6.6 below) in the context of the adoption of complex technological innovations. This taxonomy serves as a classification scheme for different organisational adoption categories, as follows:

- **Authority-based** Innovation Adoption (top-left cell) – both the organisation and the employees adopt the innovation;
- **Bottom-Up** Adoption (top-right cell) – only the employees adopt the innovation;
- **Adoption but No Deployment** (bottom-left cell) – only the organisation adopts the innovation;
- **Non-adoption** (bottom-right cell) – neither the organisation nor the employees adopt the innovation.

Table 6.6 shows that the organisational adoption decision does not guarantee that the innovation will actually be adopted or implemented by the targeted users (bottom-left cell). Research around this vein of thought has considered the notion of the 'assimilation gap' (Fichman and Kemerer 1999), i.e. the difference between adoption and deployment. According to Gallivan (2001, p.54), '… researchers have shown that the most common pattern within organisations is a consensus-based[30] primary adoption decision (at the management level), followed by authority-based secondary adoption – that is, mandated adoption at the [individual] user level (Rogers 1983, Cooper and Zmud 1990, Lucas et al. 1990)'.

		Does the Organisation Adopt the Innovation?	
Do Employees in the Organisation Adopt the Innovation?		Yes	No
	Yes	Authority-based Innovation Adoption	Bottom-Up Adoption
	No	Adoption but No Deployment	Non-adoption

Table 6.6. A Taxonomy of Two-Stage Innovation Adoption Types, Source: Gallivan (2001)

Although this may be, allegedly, the 'most common pattern' of technology-innovation adoption (as per Gallivan 2001), in this Thesis I will pay adequate tribute to other possible permutations of contingent adoption decisions – mandatory, consensus-based or voluntary. Scenarios of adoption being both voluntary and consensus-based have been described by Markus (1981, 1983) and Orlikowski (1993a). Gallivan (2001) admits that,

[30] a decision taken based on *consensus* reached during e.g. a management meeting among the participants in the meeting (i.e. managers).

‘Clearly, innovation in organisations does not always occur top-down, but may instead emerge as a grass roots or bottom-up initiative’ (p.54) (top-right cell – see Table 6.6 above).

6.6 Preliminary Conceptual Framework – CFØ

Figure 6.3 below presents my Preliminary Conceptual Framework (CFØ). The Framework is developed based on the results (manual coding of interview data) of the Expert Talks, in agreement with the observations from the Literature Review (Chapters 3 and 4).

The Preliminary Conceptual Framework (CFØ) makes use of four graphical elements:

- *arrows* – illustrating the two different CIT diffusion paths (top-down and bottom-up),
- an *ellipse* – illustrating different communities, parts of the professional and/or private social worlds,
- a graphical image illustrating collocated people,
- a graphical image illustrating people in different locations (see Figure 6.3).

The Preliminary Conceptual Framework (CFØ) has been derived as follows:

(1) initially, the assertion that two CIT diffusion paths exist – top-down and bottom-up – was based on my own experience and on testimonies of people from my professional surroundings;

(2) then, this assertion was supported by the Literature Review (Chapter 3/ Sections 3.3.1, 3.4.1, 3.4.2, and 3.4.3);

(3) confidence was added, as to the validity of this assertion, through the Expert Talks (Empirical Study I). Based on the expert interviews, I have identified two different diffusion paths of collaboration technology – *top-down* (authority-based) and *bottom-up*. In Section 6.2.1, I identified the existence of autonomous CITs, resembling what has been discussed by the IS community as ‘shadow IT’ (see e.g. Sun Microsystems executive’s statement in Section 6.2.1). CFØ illustrates the transition of ‘shadow CIT’ into the enterprise by means of the bottom-up arrow (see Figure 6.3). I also found out that formal CITs[31] were usually diffusing based on authority (see e.g. Google executive’s statement in Section 6.2.1 etc.). CFØ illustrates the authority-based diffusion path by means of the top-down arrow.

[31] As mentioned above, by ‘formal CITs’ I mean organisation-mandated CITs that are an intended part of the organisational IT infrastructure, and the result of targeted investment (see Section 6.2.1 – ‘Enterprise and Autonomous CITs’).

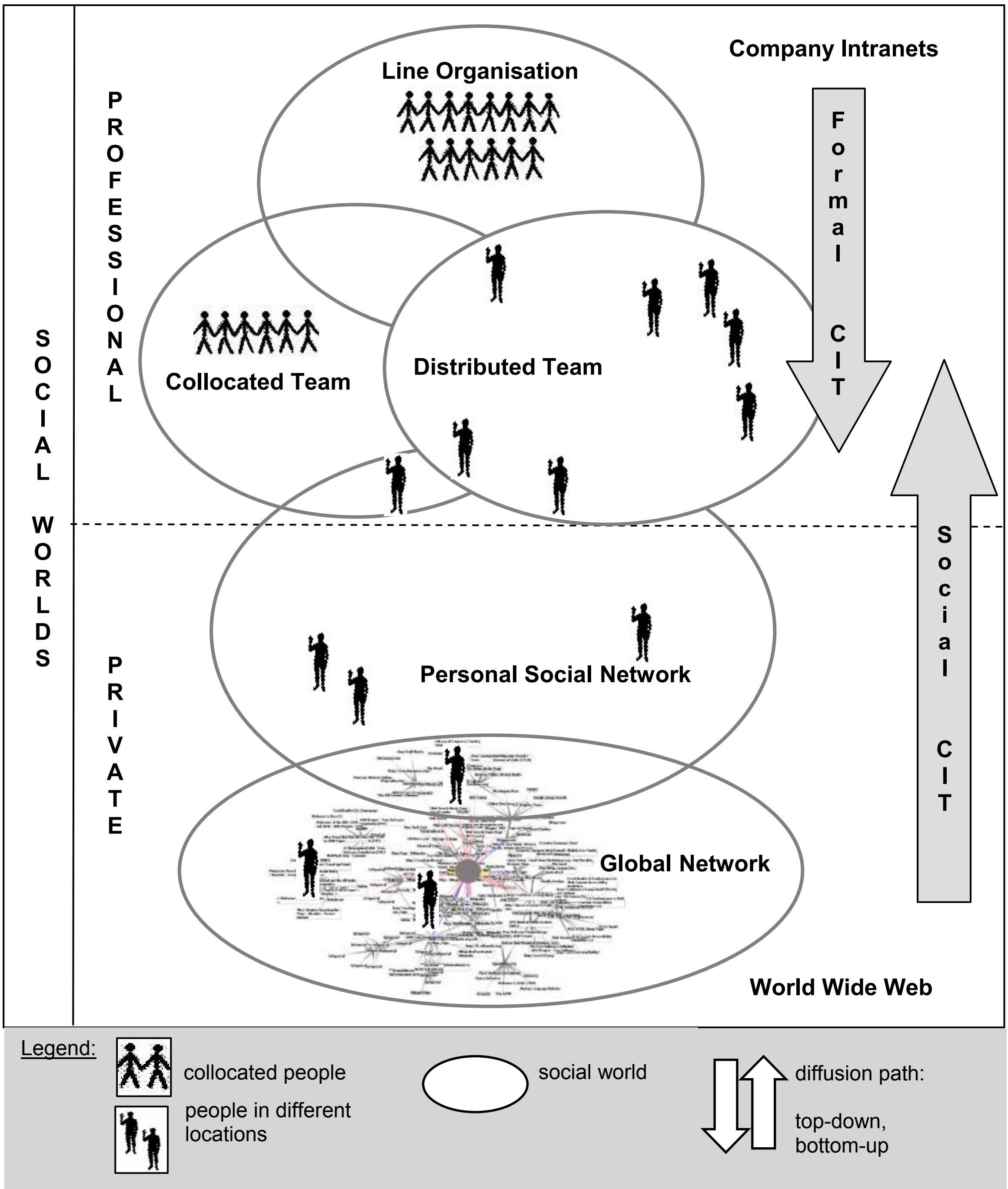

Figure 6.3. Preliminary Conceptual Framework (CFØ): Top-down versus Bottom-Up Diffusion Path of Collaboration Technology

As derived from the Literature Review (Chapters 3 and 4) and the RA interviews (Sections 6.2 and 6.3 above), formal CITs are usually diffusing top-down, the main concern being that they seamlessly integrate into the company's IT infrastructure. Therefore, in Figure 6.3, the arrow depicting top-down diffusion is marked as pertaining to 'formal CIT'. On the other hand – as we saw in the Expert Talks – the type of technologies that are diffusing bottom-up seem to be mainly community-produced CITs (e.g. SNS and Social Media – here I am calling them 'social CIT[32]').

[32] In Section 3.3.1 I described in detail what is meant by 'social CIT'.

As discussed above, social CITs have performed an un-steered transition from the Internet into the enterprise. This diffusion path is illustrated in Figure 6.3 through the bottom-up arrow. It is important to note the following: other CIT types may also be diffusing bottom-up in some isolated cases but bottom-up diffusion is directly obvious/mainly characterised through the example of social-CIT.

CFØ depicts two diffusion levels of collaboration technology – *professional* and *private* social worlds. The adoption-diffusion process of CIT is illustrated as contingent between these social worlds. This resonates with the selected 'unit of analysis' (as outlined in Chapter 4, Section 4.2). In this sense, CFØ adopts and extends parts of Mark and Poltrock's (2004) framework (see Figure 4.1 above – a diagram showing how technology diffuses through social worlds, often 'seeded' by an individual). I am transferring Mark and Poltrock's modelling logic from 'technology adoption' in general into the field of CIT. While Mark and Poltrock's model is focused on a professional setting exclusively, here I am taking into consideration the private setting as well. The following 'social worlds' are depicted in CFØ (Figure 6.3):

- *professional social worlds* (company intranets): line organisation, collocated team, distributed team;
- *private social worlds* (World Wide Web): personal social network, global network.

The latter is in harmony with one of the postulates (here called 'Postulate 1') of Social World Theory (Strauss 1978, Clarke 1991).

Social World Theory Postulate 1. Social worlds are diverse. Each working sphere has a unique constellation of colleagues, collective experience, organisational and environmental conditions, and tasks. Distributed organisations are a collection of heterogeneous social worlds with unique cultures and practices (cf. Schein 1985 in Mark and Poltrock 2004, p.303).

As mentioned above, the private social worlds (in CFØ) are depicted in the form of 'networks' – i.e. personal social network and global network. The latter is in harmony with Social World Theory for the following reason: the concept of social networks 'is related to social world theory in that people in a social world are networked together' (Mark and Poltrock 2004, p.305).

As stated by the Google executive in his interview (see Section 6.2.1 above), a consumer on the Internet, and an employee at the enterprise is actually the same person. And so, the tools we use in our expectations about our work life start to be strongly influenced by the experiences we have in our personal lives online. Ng-Kruelle (2005) introduced the term '*motivational cross-contamination*' (p.238) to describe the transfer of attitude and behaviour across private and business IT use, resulting from technology use by the individual acting in different societal roles. Ng-

Kruelle's concept may be extended within CIT context. Taking into account the nature of modern collaborative work (discussed in Section 3.4 above), I may argue that the multitude and diversity of societal roles (within multiple collaborations) has become greater than it used to be e.g. a decade ago. Therefore, I believe it is not far-fetched to say that the *chances for transfer* of collaborative experience have become greater correspondingly. As we saw in Section 4.2 (Unit of Analysis), cooperative ensembles typically intersect. In the contemporary turbulent business environment, they tend to intersect more than ever.

CFØ (Figure 6.3) depicts *intersecting* professional and private social worlds. The framework is an attempt to sketch the intertwined nature of the gradual translation of influence across private and business use of collaborative tools. This is in harmony with another postulates of Social World Theory (here called 'Postulate 2').

Social World Theory Postulate 2. Social worlds intersect with each other and have fluid boundaries. The boundaries of social worlds are based on work practice and communication, and not on geographical location (Strauss 1993, Mark and Poltrock 2004, p.303).

As we saw in Sections 6.3.1 above, some RA interview statements were indicative of an ongoing process of transition of community-produced CITs – mostly social CIT – from the Internet public sphere into the enterprise. CFØ illustrates this process of transition by means of the bottom-up arrow (see Figure 6.3). In other words, the bottom-up arrow in CFØ illustrates the 'metamorphoses' of social CIT from employee-autonomous, sporadically-used background solutions (shadow CITs) into enterprise-supported infrastructures. The general picture which CFØ is meant to transmit is the following – contrary to the common view that technology diffusion is a rational, top-down, well-planned process, CIT diffusion is in fact, a messy process.

In situations of 'planned collaboration' (Karsten 1999, p.57), as well as in 'occasional collaboration situations' (p.58), the collaborating actors are all the same people. Only the platforms they choose for collaboration are different. The global platform of the World Wide Web, for example, offers a bewildering variety of 'social CITs' [33] that are easily accessible. All these provide forums for collaborative activities that constitute our collaborative reality in our personal lives, and increasingly in our professional lives. The transition of social CIT into the enterprise may be understood as a consequence of *experience transfer* of personal collaborative experience from cyber-life to professional life.

Experience transfer across private and business use (as depicted in CFØ) is not new in the historical development of information systems. The history of the Personal Computer (PC) is an example showing that throughout the 1970s and 1980s, home computers were developed for household use. Somewhat larger and more expensive

[33] see Section 3.3.1.

systems were developed, aimed for office and small business use. As a consequence of, inter alia, experience transfer across private and business use, the focus of mass uptake of PC diffusion shifted from ‘home’ toward ‘the enterprise’. Eventually the two market segments lost any technical distinction.

This experience transfer is depicted in CFØ (Figure 6.3) as happening between social worlds. The individuals who are part of intersecting social worlds (i.e. members of two or three social worlds and living on the boundary between them) illustrate how collaborative technology diffuses through social worlds, often ‘seeded’ by individuals. These individuals play the role of ‘experience intermediaries’ that are acting as boundary change agents between the private and professional social worlds. This is in harmony with another postulate of Social World Theory (here called ‘Postulate 3’).

Social World Theory Postulate 3. A social world is a unit of collective action. People typically are members of multiple social worlds in the workplace, and they act as bridges between their social worlds. Technology diffuses as individuals introduce it into their other working spheres. A social world’s behaviour and decisions are influenced by the characteristics of its members: their experiences, values, and knowledge. Individuals who are technically savvy might be expected to be more knowledgeable about new technologies and more open to trying them. A social world’s collective shared knowledge, skills, and history affect the nature of its discussion and decisions (Strauss 1978, Mark and Poltrock 2004, pp.299, 300).

In summary:

> Further analysis will be devoted to validation and refinement of the Preliminary Conceptual Framework (CFØ), hinging on the assumption that two distinct diffusion paths of collaboration technology exist – authority-based and bottom-up.

Chapter 7

CRITICAL META-ANALYSIS OF CASE-STUDY REPORTS: EMPIRICAL STUDY II

After the scene-setting stage of 'Expert Talks' (Empirical Study I, Chapter 6), in this chapter I am presenting Empirical Study II – a comparative evaluation/meta-analysis of case-study reports. The case study method (as well as the 'Structured Case' evaluation technique) were presented and explained in Section 5.5.2. As pointed out there, I have applied a methodology of cumulative, comparative case studies, where *cumulative* stands for aggregating information from several sites collected at different times (Mann 2006), and *comparative* stands for similar cases across different entities, countries and cultures (Rawsthorne 2008). One advantage offered by the methodology of comparative case studies (also known as 'cross-case analysis') is the ability to 'identify complex correlations among the influencing factors as well as their basic logical argumentation' (Richter and Koch 2009, p.853) (see also e.g. Eisenhardt 1989, Yin 2002).

7.1 Source Data, Sampling and Basic Coding

I have gathered from literature *fifty-three* major case-study reports discussing implementation and use of CITs (collaborative information technologies) in organisational and work context. The quantity of the case-study reports satisfies the requirement that observations need to be 'carried out in some numbers' (Giddens 1984). The case-study reports are gathered from scholarly journals, conferences and books. They were published between 1992-2009 (three case studies are from 2009, seven case studies are from 2006, three are from 2005) and represent a large portion of reported empirical work. The cases represent all possible 'organisational types' – government organisations, trade/business organisations (companies), and non-government organisations. Each case is presented according to the study describing it, and, sporadically, according to additional sources such as commercial press (e.g. Case 46). The studies are compared based on 'secondary information' – a comprehensive understanding of each reported instance obtained through 'relying on' the reported description and analysis of that instance. Most of the case-study reports describe collaboration-technology adoption trials.

To locate these case-study reports, I have performed a search on the SCOPUS database, applying a keyword set of 'case study' combined with different term-variations for CIT – i.e. computer supported collaborative work (CSCW), group support systems (GSS), groupware (GW), collaboration support software (CSS), group communication support systems (GCSS). The meta-analysis data comprised a final data set of 53 case-study reports published between 1992-2009. (A detailed description of the reports is presented in Appendix II. Table 7.1 below gives an overview of the naming, numbering, and publishing year of the reports). The final data set was derived after refinement of the search results, including filtering and selection, as follows:

a) The original search results produced more than 200 report titles.
b) ***Filtering***: the search results were filtered using the SOPUS 'cited by' filtering feature, whereby frequently cited reports were ordered on an upper position.
c) ***Selection 1**:* the reports were selected based on relevance of 'title' and year of publishing. After that selection, a sample of 60 reports were downloaded.
d) ***Selection 2**:* the reports were selected based on relevance of content, i.e. the focus of reporting. 7 reports were removed as irrelevant. The removed reports were those which were not discussing clearly CIT topics or which were discussing 'design' instead of implementation and use of CITs (see Figure 7.1 below).

Sources of the 53 relevant case-studies finally were more than 20 different refereed journals and conferences, among them: Database for Advances in Information Systems – 10 downloaded reports, Group Decision and Negotiation Journal – 5 downloaded reports, European Conference on Information Systems – 5 downloaded reports, Journal of Management Information Systems – 3 downloaded reports, ACM Conference on Computer Supported Cooperative Work – 3 downloaded reports, Scandinavian Journal of Information Systems – 3 downloaded reports, CSCW Journal – 2 downloaded reports, Groupware and Teamwork – 2 downloaded reports, Journal of Information Technology – 2 downloaded reports, European Conference on Computer Supported Cooperative Work, Technology Review, Information Technology and People, Decision Support Systems, Communications of the ACM, Information Systems and Qualitative Research, Academy of Management Conference, The Information Society, Organisation Science – 1 downloaded report each, etc.

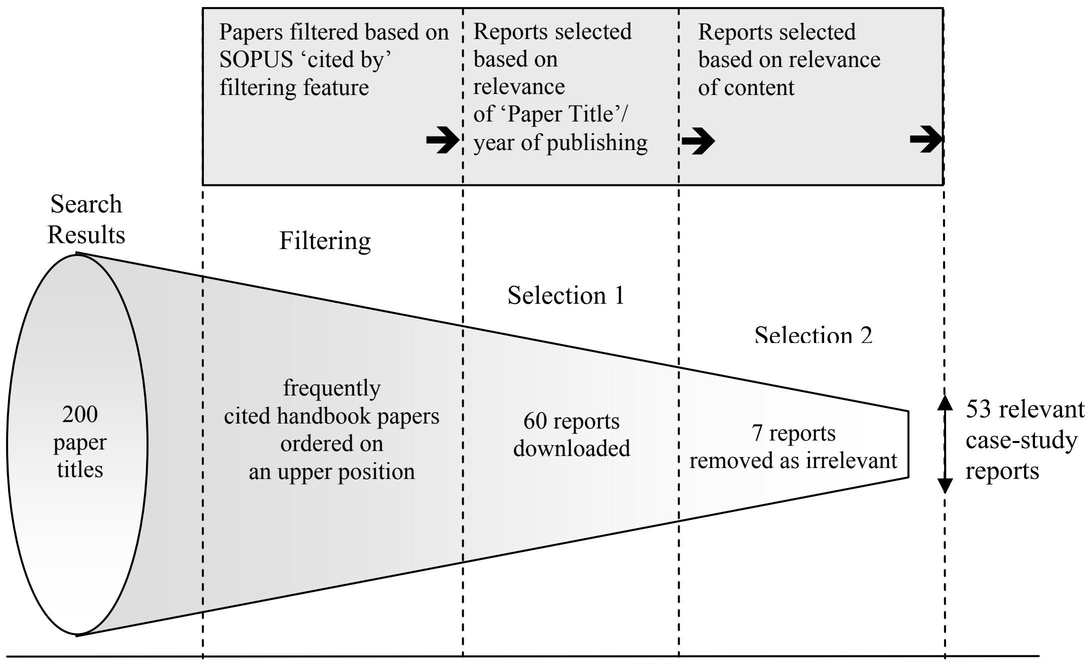

Figure 7.1. Meta-Analysis of Case-Study Reports – Filtering and Selection

All studies were categorised and coded by me and then put into a database that uses the 'factor' as the unit of analysis. By 'factor' I mean an influencing driver/parameter determinant of CIT adoption and diffusion[34]. Thus, the 'factor' information was stored in the database in the form of categaory pairings, where the categories represented the factor classes (Table 7.2 presents the classes of factors identified). Table 7.1 below gives an overview of the naming, numbering, and year of the cases. A detailed description of the cases is presented in Appendix II – each single case is described with detailed background information and a citation back to the paper in which I found it.

Case No	**Case Name**	**Year**
1	Social Networking at Accenture	2009
2	IBM's SNS 'Bluepages'	2009
3	SAP's SNS 'Harmony'	2009
4	Geek Squad Company	2006
5	Open Source Software Development	2006
6	ComNotes	2006
7	Procom	2006
8	Comtech	2006
9	Chemhouse	2006
10	Blogging	2006
11	SODA: North Ayr Partnership in Europe	2005
12	Strategic Choice: Whitbread Partnership in Europe	2005
13	GroupSystems: Lanark County Communications Network Alliance in North America	2005
14	ThinkLets	2003
15	OptionFinder	2003
16	SIGMA	2003
17	GSS Market in the Netherlands	2002
18	Alpha Alliance	2001
19	BABBLE	1999
20	CCC	1999
21	Ministerial Strategy Development	1999
22	Optimisation of Waste-Recycling Chains	1999
23	Inter-municipal Cooperation	1999
24	Oil and Gas Supply Industry	1999
25	Strategy Development University Board	1999
26	Environmental Law Enforcement	1999
27	National Physical Planning	1999
28	Provincial Working Procedures	1999
29	Prison Privatisation	1999
30	Process Industries	1998
31	Statoil	1998
32	Eiger	1998
33	Global Investment Bank	1997

[34] I have performed the meta-analysis guided by one of the research questions (as formulated in Section 2.2), i.e. 'What influencing factors (barriers or accelerators) are determinant of CIT adoption and diffusion?'.

34	Valmet	1997
35	Midwest Insurance	1997
36	SH	1997
37	HDB	1997
38	THC	1997
39	Unilever	1996
40	Fortune 500 Company	1996
41	EDF	1996
42	Insurance	1996
43	Roche	1996
44	Consulting Firm	1995
45	Zeta	1995
46	Technical Research Centre (TRC)	1995
47	Petro	1995
48	Plywood Plant	1994
49	Small Government Agency's Deployment of Groupware	1994
50	Implementation of CADCAM	1994
51	Implementation of Information Engineering	1994
52	Alpha	1993
53	Implementing Lotus Notes in a large Services Organisation	1992

Table 7.1. Case-Study Reports – Number, Name, Year

Table. 7.2 below gives an overview of the CIT types ('generic type' or application type) discussed in the reports. Each CIT type is taken directly as 'named' in the report. Table AIII.1 in Appendix III gives detailed information (*factor-wise*) on the CIT types/applications as discussed in the case-study reports.

CIT Type/Application as in Report	**Number of Case-Study Reports**	**%**
Lotus Notes	25	47
GSS/EMS/MSS	18	34
Social CIT	5	9
CASE Tools	2	4
Chat-like System	1	2
CAD/CAM System	1	2
various CITs	1	2
Total	53	100

Table 7.2. CIT Types/Applications Discussed in the Case-Study Reports

As can be seen from Table 7.2, the following CIT types/applications are discussed in the case-study reports:

- 47% of the cases (25 case-study reports) are discussing implementation and use of Lotus Notes;
- 34% of the cases (18 case-study reports) are discussing GSS (also called EMS or MSS) – meant are information systems for supporting meetings;

- 9% of the cases (5 case-study reports) are discussing social CIT – mostly SNS (three cases), MMOG (one case), and blogs (one case);
- 4% of the cases (2 case-study reports) are discussing CASE tools;
- 1 case-study report is discussing a chat-like system;
- 1 case-study report is discussing a CAD/CAM system;
- 1 case-study report is discussing various CITs – i.e. the evolving use of various CIT applications in a service network of freelancers.

In the sample of case-study reports, there is a noticeable preponderance of reports on Lotus Notes (47% – 25 case-study reports) and GSS (34% – 18 case-study reports). It is important to note that this 'bias' is a consequence of the secondary nature of Empirical Study II – the study consolidates and critically analyses the primary data provided by the CIT research community. In terms of the 'collaboration types' discussed in the reports, there is a 'bias' in the primary data with respect to business and governmental organisations. Table. 7.3 below gives an overview of the latter.

Collaboration Type	**Number of Case-Study Reports**	**%**
business organisation e.g. company, business alliance, corporation etc.	37	70
governmental organisation e.g. town council, national cabinet, rural county, ministry, municipality, EU commission, governmental department, national development board, government agency etc.	12	22
non-governmental organisation e.g. university board, research center etc.	2	4
community e.g. Web.02 Community, freelance network	2	4
Total	53	100

Table 7.3. Collaboration Types Discussed in the Case-Study Reports

As can be seen from Table 7.3, the following collaboration types are discussed in the case-study reports:

- business organisations (companies, business alliances, corporations etc.) – studied in 37 cases or 70%;
- governmental organisations (e.g. a town council, a national cabinet, a rural county, a ministry, a municipality, the EU commission, a governmental department, a national development board, a government agency etc.) – studied in 12 cases or 22%;
- non-governmental organisations (e.g. a university board, a research center etc.) – studied in 2 cases;
- communities (e.g. Web.02 community, a freelance network) – studied in 2 cases.

The next section presents an overview of the meta-analysis results.

7.2 Results – Overview

I have performed the detailed comparative meta-analysis of the 53 case-study reports (a cross-case comparison) through manual thematic coding by 'pattern matching' and 'exclusion of contradiction'. As pointed out by Carroll and Swatman (2000), coding is one of the most common approaches to qualitative data analysis. Manual coding is relatively time-consuming but allows for in-depth precise interpretation of data (unlike 'automatic' coding done through various software tools). I have done the comparative pattern matching guided by one of the research questions (as formulated in Section 2.2), i.e. 'What influencing factors (barriers or accelerators) are determinant of CIT adoption and diffusion?'.

My 'pattern matching' efforts consisted of finding out whether the case studies had similarities, and whether they could be grouped according to some of these dimensions. With this focus, three broad thematic categories (correlations) emerged. These themes were:

1. CIT adoption-diffusion factors (discussed in the case studies) pertaining to attribute of the CIT tool in question (i.e. ***Attributes of the System***);
2. factors pertaining to attributes of the collaborative ensemble (i.e. ***Attributes of the Collaboration***);
3. contextual factors (i.e. ***Attributes of the Organisational Context***).

Thus, I arranged the factors into these three groups – Attributes of the System, Attributes of the Collaboration, and Attributes of the Organisational Context. Table 7.4 below presents a sketch of the factors, as well as their 'availability' in the cases – i.e. 'availability' meaning what percentage of the cases were dealing with each factor in question.

Factor	% Availability in Cases	Number of Cases
Attributes of the System		
CIT Identity	30	16
System Customisation	28	15
Attributes of the Collaboration		
Mediator Role	36	19
Number of System Users	17	9
Support of a Champion	9	5
Affective Reward	9	5
Size of the Collaborative Ensembles	9	5
Collaboration History	6	3
Attributes of the Organisational Context		
Incentives for Using CITs	55	29
Power-Structure Change	21	11
Long-term Unpredictability	4	2

Table 7.4. CIT-Diffusion Factors Identified and their Availability in the Cases

In the first group, the case studies discussed *Attributes of the System* influencing CIT diffusion, specifically:

- issues of socially-constructed (from the interaction between the CIT and human agents) 'CIT Identity' – I found that this factor was discussed in 16 different case studies (30% of all);
- practices of 'System Customisation' (i.e. practices of 'tailoring' the collaboration systems to suit specific user needs) – I found that this factor was discussed in 15 different case studies (28% of all).

The cases were also reporting on *Attributes of the Collaboration*, specifically pertaining to:

- 'Mediator Role' (the influence of mediators such as managers, trainers, or facilitators on CIT user acceptance) – I found that this factor was discussed in 19 different case studies (36% of all);
- 'Number of System Users' (the number of users of a CIT tool) – I found that this factor was discussed in 9 different case studies (17% of all);
- 'Support of a Champion' (the types of support, e.g. training, help, that early adopters of technology provide in order to facilitate the acceptance of a technological artefact) – I found that this factor was discussed in 5 different case studies (9% of all);
- 'Affective Reward' (the experience of extracting pleasure or happiness from CIT usage) – I found that this factor was discussed in 5 different case studies (9% of all);
- 'Size of the Collaborative Ensembles' (number of people/members of the cooperative ensembles) – I found that this factor was discussed in 5 different case studies (9% of all);
- 'Collaboration History' (the history of working and social relationships during which coordination rules are established) – I found that this factor was discussed in 3 different case studies (6% of all).

The third group consisted of *Attributes of the Organisational Context* influencing CIT diffusion. Specifically, the following contextual factors were discussed:

- the most dominant factor of 'Incentives for Using CITs' (incentives offered to end users by management, the peer community etc. as a reward for their efforts of working with a collaboration technology artefact) – I found that this factor was discussed in 29 different case studies (55% of all);
- 'Power-Structure Change' (dispersion or distribution of functions and powers from a central authority to regional and local authorities, e.g. within a company hierarchy, or vice versa, as a consequence of CIT usage) – I found that this factor was discussed in 11 different case studies (21% of all);

- ‘Long-term Unpredictability’ (the longitudinal nature of collaborative work which is highly contingent on the properties of the context in the long term and therefore – highly unpredictable) – I found that this factor was discussed in 2 different case studies (4% of all).

Table 7.5 below presents a detailed picture of all factors pertaining to ‘Attributes of the Collaboration’ and their availability in the cases.

	Attributes of the Collaboration					
Factor / Case	Mediator Role	Number of System Users	Support of a Champion	Affective Reward	Size of the Collaborative Ensembles	Collaboration History
1	-	+	+	-	-	-
2	-	+	-	+	-	-
3	-	+	-	+	-	-
4	-	-	-	+	-	-
5	-	+	-	+	-	-
6	+	-	-	-	+	-
7	+	-	-	-	+	-
8	+	-	-	-	+	-
9	+	-	-	-	+	-
10	-	+	-	-	-	-
11	+	-	-	-	-	+
12	+	-	-	-	-	+
13	+	-	-	-	-	+
14	+	-	-	-	-	-
15	+	-	+	-	+	-
16	-	+	-	-	-	-
17	-	-	-	-	-	-
18	+	-	-	-	-	-
19	-	+	-	-	-	-
20	-	-	-	-	-	-
21	+	-	-	-	-	-
22	+	-	-	-	-	-
23	+	-	-	-	-	-
24	+	-	-	-	-	-
25	+	-	-	-	-	-
26	+	-	-	-	-	-
27	+	-	-	-	-	-
28	+	-	-	-	-	-
29	+	-	-	-	-	-
30	-	-	-	-	-	-
31	-	-	+	-	-	-
32	-	-	-	-	-	-
33	-	-	-	-	-	-
34	-	-	+	-	-	-
35	-	+	-	-	-	-
36	-	-	-	-	-	-
37	-	-	+	-	-	-
38	-	-	-	-	-	-
39	-	-	-	-	-	-
40	-	-	-	+	-	-

41	-	-	-	-	-	-
42	-	-	-	-	-	-
43	-	-	-	-	-	-
44	-	-	-	-	-	-
45	-	-	-	-	-	-
46	-	-	-	-	-	-
47	-	-	-	-	-	-
48	-	-	-	-	-	-
49	-	-	-	-	-	-
50	-	-	-	-	-	-
51	-	+	-	-	-	-
52	-	-	-	-	-	-
53	-	-	-	-	-	-
	% +	**% +**	**% +**	**% +**	**% +**	**% +**
	36	**17**	**9**	**9**	**9**	**6**

Legend: +: available, -: not available

Table 7.5. Attributes of the Collaboration and their Availability in the Cases

Table 7.6 below presents a detailed picture of all factors pertaining to 'Attributes of the System' and 'Attributes of the Organisational Context' and their availability in the cases.

	Attributes of the System		**Attributes of the Organisational Context**		
Factor / Case	**CIT Identity**	**System Customisation**	**Incentives for using CITs**	**Power-Structure Change**	**Long-term Unpredictability**
1	+	-	+	+	-
2	+	-	+	-	-
3	+	-	+	-	-
4	-	-	-	+	-
5	-	+	+	+	-
6	+	-	-	-	-
7	+	-	-	-	-
8	+	-	-	-	-
9	+	-	-	-	-
10	-	-	+	+	-
11	-	-	+	-	-
12	-	-	+	-	-
13	-	-	+	-	-
14	-	+	-	-	-
15	-	+	-	-	-
16	-	+	+	+	+
17	-	-	-	-	-
18	-	-	-	-	-
19	-	+	-	-	-
20	-	+	-	-	-
21	-	-	+	-	-
22	-	-	+	-	-
23	-	-	+	-	-
24	-	-	+	-	-
25	-	-	+	-	-
26	-	-	+	-	-
27	-	-	+	-	-

28	-	-	+	-	-
29	-	-	+	-	-
30	-	-	-	+	-
31	-	-	-	+	-
32	-	+	+	+	-
33	+	-	-	-	-
34	-	+	-	-	-
35	+	-	+	-	-
36	-	-	+	-	-
37	-	+	+	-	-
38	-	+	-	+	-
39	+	+	+	-	-
40	-	-	-	-	-
41	+	-	-	-	-
42	-	-	-	-	-
43	+	-	-	-	-
44	-	+	+	+	+
45	-	+	+	+	-
46	+	-	-	-	-
47	-	+	-	-	-
48	-	-	-	-	-
49	-	-	+	-	-
50	+	-	+	-	-
51	+	+	+	-	-
52	+	-	-	-	-
53	-	-	+	-	-
	% +	**% +**	**% +**	**% +**	**% +**
	30	**28**	55	**21**	**4**

Legend: +: available, -: not available

Table 7.6. Attributes of the System/Attributes of the Organisational Context and their Availability in the Cases

In summary:

> In this Chapter, I have briefly presented Empirical Study II – a comparative meta-analysis of case-study reports. I have described the source data, sampling and basic coding. Then, I have given details on the CIT types and collaboration types discussed in the case-study reports. Finally, I have identified 11 factors influencing CIT diffusion and shown their availability in the cases. The factors were grouped into three classes: 1) attributes of the system, 2) attributes of the collaboration, 3) attributes of the organisational context.

Having offered an overview of the results from the comparative case-study reports, I now move to offer details on each of the identified factors (as sketched in Table 7.4 above). The following chapters present the detailed results from Empirical Study II (Critical Meta-Analysis of Case-Study Reports) – i.e. a detailed comparative analysis of the practices observed and lessons learned from the 53 case-study reports.

LACK OF INCENTIVES FOR USING CITs – PERSISTENT PROBLEM OF CIT DIFFUSION

This Chapter presents part of the detailed results from Empirical Study II (Critical Meta-Analysis of Case-Study Reports) – the part pertaining to 'Incentives for Using CITs'. By 'Incentives for Using CITs' I mean:

> **incentives offered to end users (by management, the peer community etc.) as a reward for their efforts of working with a collaboration technology artefact.**

Table 8.1 below depicts the thematic focus of this Chapter.

Factor	% Availability in Cases	Number of Cases
Attributes of the System		
CIT Identity	30	16
System Customisation	28	15
Attributes of the Collaboration		
Mediator Role	36	19
Number of System Users	17	9
Support of a Champion	9	5
Affective Reward	9	5
Size of the Collaborative Ensembles	9	5
Collaboration History	6	3
Attributes of the Organisational Context		
Incentives for Using CITs	**55**	**29**
Power-Structure Change	21	11
Long-term Unpredictability	4	2

Table 8.1. Thematic Focus of this Chapter

The 53 different CIT case-study reports that I have analysed and compared were presented in the previous Chapter 7. As mentioned there, I have performed the cross-case comparison guided by one of the research questions (see Section 2.2), i.e. 'What influencing factors (barriers or accelerators) are determinant of CIT adoption and diffusion?'

While seeking an answer to this question, I have compared the case-study reports (through manual coding and matching of similarities, as described in the previous Chapter 7), and based on that, I have discovered the following:

> the factor coded as 'Incentives for Using CITs' is present and discussed in the role of a 'determinant' (accelerator or barrier, predominantly barrier) of CIT diffusion in 55% of all case studies. These are 29 different case studies of CIT adoption trials spanning right the way through the years 1994-2009. In most of

the cases, ***lacking incentives*** for using CITs have played the role of a ***diffusion barrier***. My cross-case comparison has shown that the 'incentives' factor has been ***repeatedly observed*** as influencing CIT diffusion in structurally the same form in 29 different case studies. Some cases have been observed and described in 2009, others in 2006, 2005, 2003, 1999, 1998, 1997, 1995, and 1994. What is particularly interesting is that researchers have expressed the same surprise over this factor in 2009 that they were expressing in 1994.

Since the factor of 'Incentives for Using CITs' has been identified as available in the greatest relative proportion of all case studies (55% – see Table 8.1 above), it may be classified as ***most dominant*** factor. The section below presents details on what exactly has been observed and described in each of the 29 case studies.

8.1 Incentives for Using CITs

I was able to extract the following 'lessons learned' from the *Consulting Firm* case study (***Case 44*** – see Appendix I[35]):

a) The company's ***culture of competitive individualism*** hampered the adoption and diffusion of Lotus Notes. The employees (consultants) had no material or moral incentives for using Notes. Therefore, they were reluctant to give away information they relied on for their career. Consultants believed that their use of Lotus Notes would hurt their chances of promotion;

b) *Power* in the consultancy firm was built on individual's client base and technical ability. The prevailing feeling was that if you put all this information in a public Notes database, you would lose power;

c) A tendency toward *reluctance to share information* was dominant among employees. The consultants were reluctant to share information because of, inter alia, fear that some of their colleagues may rely on that information to take action. In cases where the information might turn out to be misleading, that might reflect badly on the source;

d) There were doubts about the value of Lotus Notes in the work of the consultants. Hence, they were reluctant to invest *time* to read or enter information in Notes. In addition, they were not paid for their hours of working with Notes.

In the case of *Implementing Lotus Notes in a large Services Organisation* (***Case 53***) there were two major factors that influenced Notes' adoption: (1) how people perceived their work, and (2) the organisation's existing policies, procedures and *incentives for use*. As far as the propagation of the Notes use was concerned, there was ***a disregard for the intrinsic reward structures and incentives*** of the firm. Because the users had no motivation to share information, Notes was not put to good use readily.

[35] Background information on the cases is provided in Appendix II.

The lessons learned from the case of the *Small Government Agency* (***Case 49***) which deployed groupware, show a similar picture. Many problems occurred when the government agency implemented groupware, such as debates concerning the sharing and ownership of information. Therefore, to reduce user resistance, incentives for sharing and ownership of information needed to be provided.

In the highly differentiated and political environment of *CADCAM Implementation* (***Case 50***), incentives for contributing to CIT active use were needed as well. As I saw in the *Implementation of Information Engineering* case (***Case 51***), CIT users generally felt a lack of 'ownership' of the tools, a sentiment which was reiterated by many users when asked about their attitude towards collaborative technology in general. The 'lack of ownership' feeling was directly related to lack of incentives for CIT usage.

Cases 21 to ***29*** revealed some popular *myths (assumptions)* pertaining to the general motivation of people to contribute to CIT-supported collaborative efforts, i.e. their natural 'incentives for using CITs':

a) People are cooperative by nature with respect to each other and the meeting process;
b) People with individual backgrounds, expertise, and reasons for attending a meeting will work together to reduce unfamiliarity and uncertainty within a problem domain;
c) People will synthesise their ideas with those of others, whenever they are confronted with the ideas of others;
d) If not identified, people will contribute honestly and openly;
e) If not identified, people will not be afraid to contribute ideas;
f) People are willing to express their ideas in writing.

Cases 11 to ***13*** advocated a stance that the foundation for the use of GroupSystems and its methodology was grounded in the importance of the *incentives* for using it. Those were interpreted in terms of the Theory of Group Process Losses and Gains (Shaw 1981). This theory maintains that collaborative work involves process gains (e.g. two heads are better than one) and process losses (e.g. evaluation apprehension and production blocking). The following incentive-related topics, extracted from the three cases, could be outlined:

a) Multi-organisational collaborations often suffer from *internal conflict*, and mixed performance in regards to the *incentives* to use shared information systems. ***Because of the lack of incentives to use CITs, collaborative ventures frequently end in frustration and failure.***
b) Individual organisations typically have *conflicting goals* (some of which maybe incongruent), although they may agree on the general purpose of the collaboration. Thus, the role of CITs may be that of facilitating the development of a common set of meta-goals.

c) One major obstacle to CIT adoption arises out of issues concerned *with power and politics*. Collaboration implies ‘power sharing’. Therefore, the existence of strong power asymmetries among collaborators may be a critical factor in extracting the intended advantages from CIT usage.

d) A crucial aspect of CIT usage is that of group membership. A related issue is to distinguish the *multiple roles* that organisational constituencies play in the pattern of CIT usage.

e) A significant factor of the success of GSS interventions is the factor of ‘who the client is’: the relationship between the CIT ‘interventionist’ (acting as CIT consultant or facilitator) and the client. *The incentives for use need to be designed accordingly*.

f) It has been shown that there need to be clear ***demonstrable benefits*** from GSS/EMS meeting sessions – *‘quick wins’* – so as to engage participants and encourage them to continue using the CIT.

g) The incentives for CIT usage have to be in unison with the principles of *rationality and fairness of the process* and the meaning of partnering.

At *Midwest Insurance* (***Case 35***) perceived efficiency gains in communication played the role of incentives for using Lotus Notes. The *Unilever* case (***Case 39***) showed a slightly different pattern. Initially there was free access to all project info to everybody. This soon proved to be too extensive and threatening the independence of the project. In particular, there were no incentives for employees to give free project info away to everybody. Therefore, the database was subsequently divided into public and private [project] areas.

At *SH* (the small consulting company) (***Case 36***) perceived efficiency gains in productivity and information sharing played the role of incentives for using Lotus Notes. At *HDB* (the Housing and Development Board of Singapore) (***Case 37***) perceived high return on investment and clear efficiency gains were the ‘de facto’ incentives for using Lotus Notes. CIT usage at *Eiger* (***Case 32***) led to increased lateral communications and that gradually led to distribution of the hierarchy. The power shift caused by the CIT changed the configuration of the incentives for CIT usage.

The case of *Zeta* (***Case 45***) was quite different. In this organisation, substantial incentives for using CITs were available. The Notes artefact was specifically deployed to mediate the type of work at the customer support department. Thus, Notes was explicitly tied to the work practices. Motivated by that, the employees were using Notes actively, and were even improvising with Notes beyond the uses intended by management. The level of collaboration improved because of:

a) the employees’ belief in long-term benefits achieved by keeping track of work done, showcasing good work, and reusing knowledge;

b) stimulated cooperative culture through information sharing;

c) unanticipated advantages from dealing with unexpected problems or taking advantage of unanticipated opportunities by reusing knowledge;

d) open atmosphere of work created through the use of the knowledge management system.

The *Blogging* case study (***Case 10***) showed a more dismal picture. The adoption of ‘blogging’ as collaborative technology at Sun Microsystems was stimulated by the need for information sharing (high-tech employees needed to obtain technical types of feedback on code writing), as well as by the ***lack of incentives*** for collaboration. The individual competitive culture in the company gave rise to the belief that public blogging was the best way to seek advice outside the enterprise (in an atmosphere where seeking advice inside the company was sometimes counter-productive).

The (experimental) use of the CIT at the *SIGMA* freelance network (***Case 16***) was exercised without well-defined incentives, gains and losses, and that led to:

a) *reluctance to share information* – here again, there were ***no incentives for sharing information***. Meanwhile, there was no option to restrict information access to a smaller group of users without the assistance of experts (SysHouse);

b) *stakeholder power shift* – to neutralise the first consequence, stakeholders split the common information space into two parts: ‘stakeholder’ forum, and a forum for the rest of the network members (SigSys II Business and SigSys II Basic);

c) formation of *informal power structures* – informal power structures developed within the network of freelancers – partially as a consequence of the CIT usage;

d) the promise of *quick gains* during the initiation of CIT implementation – anticipated but still imaginary new use options were objectified for purposes assumed relevant, especially during initiation. That corresponded with the ‘quick gains’ culture of the network – SIGMA members had experienced enormous economic pressure, and that had enhanced a tendency toward decisions for immediate individual gains, also from CIT use.

The opportunity to integrate *Accenture*’s ‘People Pages’ (***Case 1***) with familiar CIT applications was an important incentive for its use. A lot of pre-launch advertising efforts were made to clarify the user-advantages of different deployment scenarios. Similarly, *IBM’s Bluepages’* (***Case 2***) user-advantages were well clarified, and could readily be ‘named’ by IBM employees at any time. New IBM employers were advised on the potential value of using the Bluepages, i.e. on what kind of value they could extract from the system. IBM’s open company culture positively influenced the usage pattern of the Bluepages. Most employees shared their knowledge through Bluepages readily, although they knew that many questions from their colleagues would follow.

No incentives for use of *SAP’s SNS ‘Harmony’* (***Case 3***) were offered. That was one reason why Harmony did not reach critical mass of users and mass uptake within SAP. Almost all members of the Harmony network were using it rather sceptically:

they were visiting it more or less regularly, but they saw no value added in its usage. Many users were not creating complete and truthful personal profiles. One reason the users pointed out was their reluctance to share information. That reluctance was not motivated by any data-privacy considerations but by a 'worry' that complete profile information could be misinterpreted by management.

The case of *Open Source Software Development* (***Case 5***) was very illustrative in terms of what kinds of incentives the 'movement' offered for contributing to the common collaboration space. First of all, unlike the lack (or disparity) of use-incentives typical for most authority-supported CITs, the OSS collaboration environment was based on reciprocity of incentives. In the case of OSS development teams, a system of ***intangible rewards*** was inactive of subjective reciprocity, and that led to tangible rewards. In addition, unlike companies' typical individualistic culture, the OSS movement had developed a community value of sharing knowledge – thinking time of other programmers was deemed precious – so much so that it is almost a moral duty to give solutions away just so other programmers could solve new problems instead of having to perpetually re-address old ones.

Table 8.2 below presents a short description of 'what happened' in each case, and how the lacking or available 'incentives' were influencing CIT diffusion. Thus, Table 8.2 gives an overview of the factor's representation in the case studies.

Factor / Case	Incentives for Using CITs
Case 1. Social Networking at Accenture	The opportunity to integrate Accenture's 'People Pages' with familiar CIT applications was an important incentive for its use. A lot of pre-launch advertising efforts were made to clarify the user-advantages of different deployment scenarios.
Case 2. IBM's SNS 'Bluepages'	The user-advantages offered by 'Bluepages' were well clarified. New IBM employers were advised on the potential value of using the Bluepages. IBM's open company culture positively influenced the usage pattern of the Bluepages. Most employees shared their knowledge through Bluepages readily.
Case 3. SAP's SNS 'Harmony'	No *incentives* for system use were offered. That was one reason why 'Harmony' did not reach critical mass of users or mass uptake within SAP. Instead – sceptical use of 'Harmony'. Reluctance of employees to share information.

Case 5. Open Source Software Development	The OSS collaboration system is based on reciprocity of *incentives*. A system of informative signals/intangible rewards is inactive of subjective reciprocity, and that leads to tangible rewards. The OSS movement has developed a community's value of sharing knowledge.
Case 10. Blogging	*Lack of incentives* for collaboration inside the company. Sun Microsystems' competitive company culture gave rise to the belief that the best way to seek advice was *outside* the enterprise, by public blogging (in atmosphere where seeking advice inside the company was sometimes counterproductive).
Case 11. SODA: North Ayr Partnership in Europe ***Case 12.*** Strategic Choice: Whitbread Partnership in Europe ***Case 13.*** GroupSystems: Lanark County Communications Network Alliance in North America	GroupSystems diffused depending on the *incentives for its use*. Because of the lack of *incentives* to using CITs, collaborative ventures frequently ended in frustration and failure. Individual organisations had conflicting goals. The existence of strong power asymmetries among collaborators was a critical factor in extracting the intended advantages from CIT usage. Lessons learned: 1. The incentives for use must be designed according to the factor of '*who the client is*'. 2. There need to be clear demonstrable benefits from CIT use – *'quick wins'*. 3. The incentives for CIT usage have to be in unison with the principles of *rationality and fairness* of the collaborative process.
Case 16. SIGMA	The (experimental) use of the CIT without well-defined *incentives*, gains and losses, led to: 1. reluctance to share information; 2. stakeholder power shift; 3. the promise of quick gains during the initiation of CIT adoption.
Case 21. Ministerial Strategy Development ***Case 22.*** Optimisation of Waste-Recycling Chains	Following myths (assumptions), pertaining to *incentives* for using CITs, were proven wrong: • People are cooperative by nature with respect to each

Case 23. Inter-municipal Cooperation ***Case 24.*** Oil and Gas Supply Industry ***Case 25.*** Strategy Development University Board ***Case 26.*** Environmental Law Enforcement ***Case 27.*** National Physical Planning ***Case 28.*** Provincial Working Procedures ***Case 29.*** Prison Privatisation	other and the meeting process; • People will work together to reduce unfamiliarity and uncertainty with a problem domain; • People will synthesise their ideas with those of others, whenever they are confronted with the ideas of others; • If not identified, people will contribute honestly and openly; • If not identified, people will not be afraid to contribute ideas; • People are willing to express their ideas in writing.
Case 32. Eiger	The power shift caused by the CIT changed the pattern of the *incentives* for its usage.
Case 35. Midwest Insurance	Perceived efficiency gains in communication played the role of *incentives* for using Lotus Notes.
Case 36. SH	Perceived efficiency gains in productivity and information sharing played the role of *incentives* for using Lotus Notes.
Case 37. HDB	Perceived high return on investment, and clear efficiency gains played the role of *incentives* for using Lotus Notes.
Case 39. Unilever	There were no *incentives* for giving free project information away to everybody. Therefore, the database was divided into public and project areas.
Case 44. Consulting Firm	Culture of competitive individualism: employees (consultants) had no material or moral *incentives* for using Lotus Notes. Therefore, they were reluctant to give away information they relied on for their career. Consultants believed that their use of Lotus Notes would hurt their chances of promotion.
Case 45. Zeta	Substantial *incentives* for using CITs were available. The level of collaboration was improved because of: • *belief in long-term benefits* achieved by reusing knowledge; • *stimulated cooperative culture* through information sharing; • *unanticipated advantages* from reusing knowledge; • *open atmosphere* of work created through the knowledge management system.
Case 49. Small Government Agency's	Many potential problems occurred when the government agency implemented the CIT, such as debates concerning

Deployment of Groupware	the *sharing and ownership of information*.
Case 50. Implementation of CADCAM	In the highly differentiated and political environment, *incentives* for contributing to CIT active use were needed.
Case 51. Implementation of Information Engineering	CIT users generally felt a lack of 'ownership' of the CIT tools. The 'lack of ownership' feeling was directly related to lack of *incentives* for CIT usage.
Case 53. Implementing Lotus Notes in a large Services Organisation	Two major factors influencing Notes' adoption: 1. how people perceived their work, 2. the organisation's existing policies, procedures and *incentives for use*. Because of lack of user *incentives* to share information, Notes was not put to good use readily.

Table 8.2. 'Incentives for Using CITs' in the Case Studies

8.1.1 'Incentives for Using CITs' – Diffusion Barrier or Accelerator?

The historical review of CIT diffusion, executed through detailed analysis of 53 case-study reports of CIT diffusion (Empirical Study II), has shown the following: the factor of 'Incentives for Using CITs' has been ***repeatedly observed*** as playing the role of a 'determinant' (accelerator or barrier) of CIT diffusion in 29 different case studies. These 29 different cases were observed and described by different authors, in different years, from 1994 right the way through 2009. These are ***Cases 1***, ***2***, ***3***, ***5***, ***10***, ***11***, ***12***, ***13***, ***16***, ***21***, ***22***, ***23***, ***24***, ***25***, ***26***, ***27***, ***28***, ***29***, ***32***, ***35***, ***36***, ***37***, ***39***, ***44***, ***45***, ***49***, ***50***, and ***51*** (see Appendix II).

Incentives for using CITs were ***lacking*** in most of the cases. Users were not motivated to contribute to the collaborative effort, and therefore they used the CIT tools sceptically and infrequently. The lack of incentives for use hampered the adoption and diffusion of the collaborative tools.

Based on the 29 different case studies of CIT diffusion which stem from different years between 1994 and 2009, and in which the 'incentives' factor is present, I may summarise that:

> the factor of 'Incentives for Using CITs' has been repeatedly observed as influencing the process of CIT diffusion in important ways, all through the years 1994-2009. That means that this factor has historically been ***persistently influencing*** CIT diffusion in structurally the same form. In most of the cases, ***lacking*** incentives for use have been a ***persistent problem*** for CIT diffusion.

As we saw above (e.g. Table 8.2), I found the factor of ‘Incentives for Using CITs’ to be ‘most dominant’ – i.e. discussed in 55% of the case studies. Based on that, I may hypothesise that:

Hypothesis 8.1. Whether organisational incentives for using CITs are provided or not has the greatest relevant influence on the process of CIT diffusion.

I recognise that this is a grounded hypothesis, rather than a definitive statement – and that, in future work, this hypothesis must be tested[36].

Figure 8.1 below represents the proportional availability in the case studies of the ‘Incentives for Using CITs’ factor, discussed as:

- accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process;
- barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process.

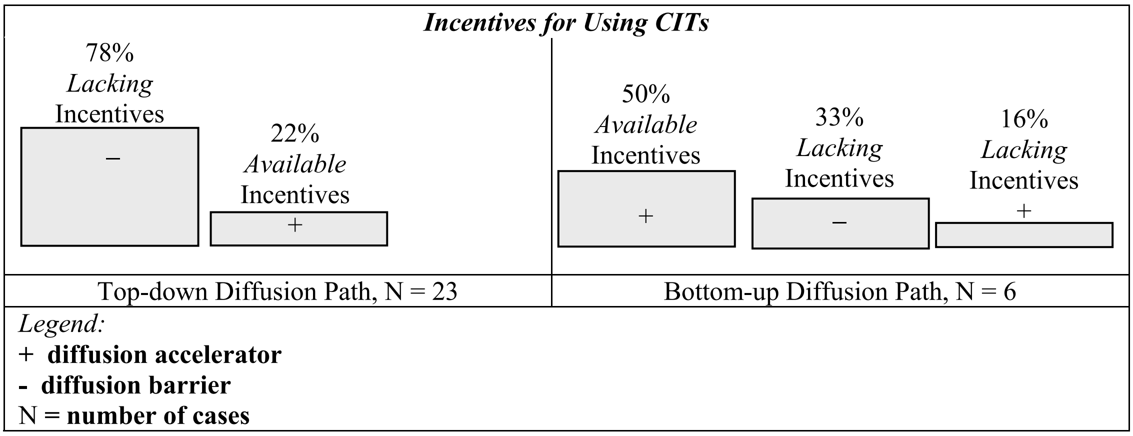

Figure 8.1.‘Accelerator’ or ‘Barrier’ Role of the ‘Incentives’ Factor pertaining to CIT Diffusion: Proportional Availability in Cases

Figure 8.1 also takes account of the ***process structure*** of CIT diffusion:

- Top-down Diffusion Path – the cases in which CITs have diffused top-down (authority-based) – this is a total of 23 cases;
- Bottom-up Diffusion Path – the cases in which CITs have diffused bottom-up (initiated by employees) – this is a total of 6 cases.

Here is some information extracted from the critical meta-analysis of case-study reports.

[36] The same is true for all other Hypotheses generated in this Thesis.

I. Top-down Diffusion Path

a) Only in 22% of the (top-down) cases (5 cases altogether), incentives for using CITs have been available. Their availability has played the role of a diffusion accelerator. The nature of the incentives has been prevailingly utilitarian, e.g. perceived efficiency gains in productivity and information sharing (*SH* – ***Case 36***), perceived efficiency gains in communication (*Midwest Insurance* – ***Case 35***), efficiency gains and perceived high return on investment (*HDB* – ***Case 37***), belief in long-term benefits achieved by keeping track of work done (*Zeta* – ***Case 45***).

b) In 78% of the cases (18 cases altogether), incentives for using CITs have been lacking. The lack of incentives for using CITs has played the role of a barrier for their diffusion in all of these cases (see Figure 8.1 above).

II. Bottom-up Diffusion Path

a) In 50% of the cases (3 cases altogether), incentives for using CITs have been available. Their availability has played the role of a diffusion accelerator. The nature of the incentives has been prevailingly intangible and intrinsic. Especially illustrative in this respect is the case of OSS development. *Intrinsic value* has been an important incentive for using the OSS collaborative platform, in the form of: theoretical value (just-in-case learning), hedonic value (fun in IT usage/creation), emotional value, self-fulfilling value (reputation communicated to others), political value (ethics), aesthetic value (novelty) (see Table 8.4 below). Furthermore, the OSS community has been characterised by reciprocity of intangible rewards (unlike the misbalance of tangible rewards typical for most authority-supported CITs), intensive information sharing (instead of reluctant information sharing), hedonic and self-fulfilling value (instead of economic value), culture of generosity (instead of unbridled mercantilism), peer esteem and 'ego boost' (instead of lacking recognition of collaborative effort), emotional value (instead of impersonality), political value (instead of lacking social and moral goals) (see Table 8.3 below).

b) In 33% of the cases (only 2 cases altogether), incentives for using CITs have been lacking. The lack of incentives for using CITs has played the role of a barrier for their diffusion.

c) In 16% of the cases (only 1 case), the lack of incentives for using CITs has played the role of a diffusion accelerator. This is a rather interesting case. One example is the adoption of public, internet-based blogging at Sun Microsystems. The employees were lacking incentives for using CITs. The individual competitive culture in the company gave rise to the belief that public blogging was the best way to seek advice outside the enterprise (in atmosphere where seeking advice inside the company could be counterproductive). In this case, the lacking incentives for CIT usage inside the company stimulated the adoption of an *external* (public, internet-based) collaborative platform (see Figure 8.1).

Based on all of the above, I may now hypothesise that:

Hypothesis 8.2. Lacking incentives for use play the role of CIT diffusion barrier.

Hypothesis 8.3. The top-down (authority-based) CIT diffusion path is characterised by prevailingly lacking incentives for using CITs.

Hypothesis 8.4. When incentives for use are available for authority-supported CITs, they are prevailingly utilitarian.

Hypothesis 8.5. The bottom-up diffusion path is characterised by prevailingly intangible and intrinsic incentives for CIT use.

Figure 8.2 below presents the first 'partial' conceptual framework – here called Conceptual Framework 3a (CF3a)[37]. The Conceptual Framework depicts the hypothesised influence of the 'incentives' factor on CIT diffusion. The representation takes account of the process structure of CIT diffusion with the two identified diffusion paths – top-down and bottom-up. The identification of two distinct diffusion paths was suggested by the Literature Review (Chapter 3/ Sections 3.3.1, 3.4.1, 3.4.2, and 3.4.3) and was supported by the Expert Talks (Empirical Study I). The existence of two distinct diffusion paths was first depicted in the Preliminary Conceptual Framework (Figure 6.3). The findings from Empirical Study II have supported/confirmed the assertion of existence of two diffusion paths – CF3a is, therefore, a logical extension of CFØ.

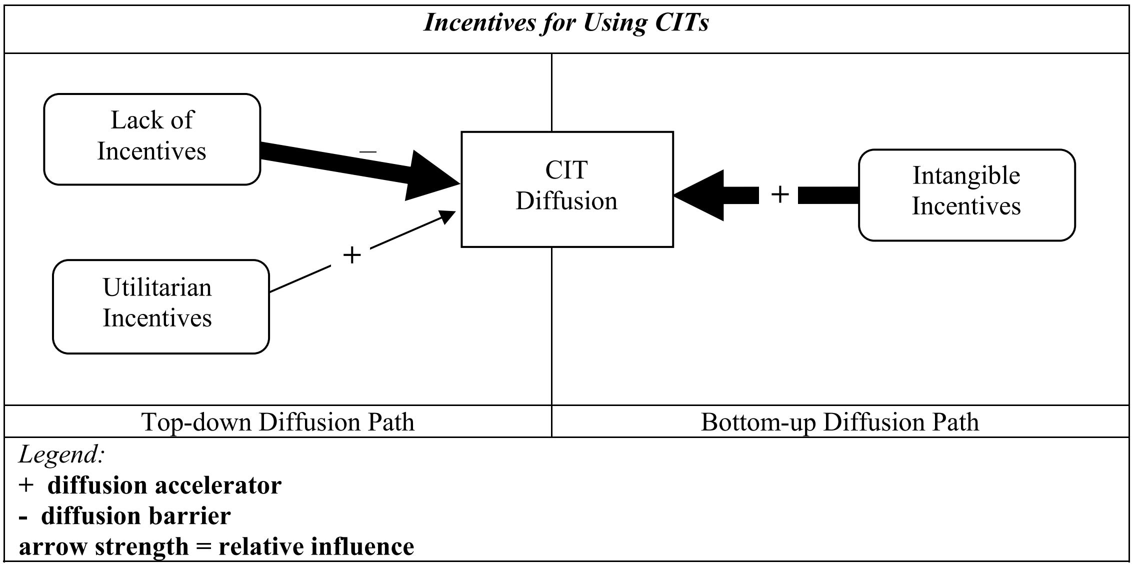

Figure 8.2. Hypothesised Influence of the 'Incentives' Factor on CIT Diffusion (Conceptual Framework 3a)

The 'Incentives for Using CITs' factor is depicted in Figure 8.2 as: a) accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process; b) barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process. Various line-strength of the arrows in Figure 8.2 is applied to illustrate the level/weight of relative influence

[37] Conceptual Frameworks 1 and 2, as well as the complete Conceptual Framework 3, will be presented in Chapter 12.

of the factor on CIT diffusion. Conceptual Framework 3a (Figure 8.2) has been derived as follows:

- as mentioned above, CF3a is a logical extension of the Preliminary Conceptual Framework, CFØ (see Figure 6.3);
- CF3a is based on the summary of findings from Empirical Study II (pertaining to the factor in question) which were presented in Figure 8.1.

Conceptual Framework 3a (Figure 8.2) visually represents some of the Hypotheses generated in this Chapter. The thick arrow on the left-hand side in Figure 8.2 visually represents two of the generated Hypotheses: Hypothesis 8.2 and Hypothesis 8.3 (see above). Those two Hypotheses were derived from the observations – based on the case-study reports – that the top-down (authority-based) CIT diffusion path is characterised by prevailingly lacking incentives for using CITs, and that lacking incentives for use predominantly play the role of CIT diffusion barrier (see Figure 8.1).

The thin arrow on the left-hand side in Figure 8.2 visually represents one of the generated Hypotheses: Hypothesis 8.4 (see above). This Hypothesis was derived from the observation – based on the case-study reports – that when incentives for use are available for authority-supported CITs, they are prevailingly utilitarian (see Figure 8.1).

The thick arrow on the right-hand side in Figure 8.2 visually represents one of the generated Hypotheses: Hypothesis 8.5 (see above). This Hypothesis was derived from the observation – based on the case-study reports – that the bottom-up diffusion path is characterised by prevailingly intangible and intrinsic incentives for CIT use (see Figure 8.1).

The following section discusses the findings from the Empirical Study II (Critical Meta-Analysis of Case-Study Reports) pertaining to 'Incentives for Using CITs' in detail and compares them with observations from literature.

8.1.2 Discussion

The literal meaning of collaboration denotes 'working jointly with others or together especially in an intellectual endeavour', while the literal meaning of cooperation denotes 'associating with others for *mutual benefit*' (Merriam-Webster Online Dictionary). According to Surowiecki (2004, p.117), 'people who repeatedly deal with each other over time *recognise the benefits* of cooperation, and they do not try to locate advantage of each other, because they know if they do, the other person will be able to punish them'. For example, economic exchange theory views people as trying to extract a subjective value (utility) from interactions (or from choices) in what they perceive to be their own interest (Ng Krülle 2005, p.30).

This *benefit recognition*, however, does not come automatically. There are *overhead costs* involved in collaboration, as pointed out by numerous authors like Strauss et al. (1985), Gerson and Star (1986), Strauss (1988), Schmidt and Bannon (1992), Brooks (1995), and Neale et al. (2004). As I mentioned in Section 3.4.3, collaborative work implies overhead costs in terms of: a) cost of articulating (dividing, allocating, scheduling, meshing, interrelating) individual activities, and b) cost of coordinating individual activities. There is no 'obvious' justification for incurring the overhead cost of collaboration, at least in the short term. Therefore, in my opinion, some *incentives for using CITs* – in terms of 'quick gains' offered to end users (by management etc.) as a reward for their efforts of working with a collaboration technology artefact – are necessary for successful adoption. Such incentives are needed to serve the function of balancing the individual biases (the 'bias discount', in the words of Cyert and March 1963) associated with cooperation.

Grudin (1988) was the first scholar to tackle the issue of 'bias discount' in computer-supported collaborative work. In his seminal paper 'Why CSCW Applications Fail: Problems in the Design and Evaluation of Organisational Interfaces', Grudin elaborated on the misbalance between the 'collective benefit' a CIT artefact might provide to a group or organisation, as seen by management, and the 'reward' or 'payoff' that each individual user might extract from the CIT artefact. After examining several CIT application areas, Grudin established a common dynamic: collaborative applications failed because of the disparity between those ***who will benefit from them and those who must do additional work to support them***. CIT applications failed because they required that some people do additional work, while those people were not the ones who received a direct benefit from the use of the application. Therefore, those people had no incentives for using collaborative applications. Decision-makers saw the potential benefits for people similar to themselves, but did not see the implications of the fact that extra work will be required of others. Grudin warned that CIT applications were destined to fail if doing the extra work was left to individual discretion. He recommended that some incentives for usage should be provided to *all* contributors to a computer-supported collaborative effort:

'…the best solution is to try to insure that *everyone benefits directly* from using the application. This may mean building in additional features. It certainly means eliminating or minimising the extra work required of anyone, or ***rewarding*** them for doing it. […] This is a substantial undertaking, but there may be no other option' (Grudin 1988, p.87).

Markus and Connolly (1990) extended Grudin's (1988) insights about the incentives to use collaborative systems. They systematically analysed how the payoffs to individual users depended on how many other people are using the system. They did this by applying an economic model from Schelling (1978). Olson, Malone, Smith (2001) elaborated on the application of Schelling's model by pointing out that, 'unfortunately, the equilibrium state of a system like this [a collaboration support system] is for no one to ever contribute anything' (p.33). For instance, group calendars involve 'discretionary databases' which users can view or update to their discretion. Each individual user can obtain his benefits of viewing the database without contributing anything. Thus, it is often in his interests to use the database without making the additional effort required to contribute to it. By reflecting on this situation, Grudin (1994b) and Kling (1980) took the stance that group calendars had a political economy of effort that could make it hard for those who did most of the record keeping to feel that they have gained proportional value.

In this sense, the *Consulting Firm* case study (***Case 44*** – see Appendix I) which we discussed above was an empirical illustration of profound inconsistencies between the intended uses of the collaboration system and the actual incentives in the organisation. The company's culture of competitive individualism (like in many other companies) was one in which people were rewarded and promoted for being the 'expert' on certain fields – for knowing things that were secret to others, for withholding precious information. Should we be surprised, therefore, that the consultants were reluctant to share information through the Lotus Notes database? What we can learn from the *Blogging* case study (***Case 10***) is that – because people were promoted for being the 'expert' on certain fields – they were reluctant to openly admit that they were no experts on some tasks of code writing. Every time high-tech employees needed to obtain technical types of feedback on code writing, they preferred to do so *outside* the company, through public blogging, in an atmosphere where seeking advice inside the company could be counter-productive. By the same token, the *SIGMA* freelance network members (***Case 16***) were reluctant to spend much effort putting the things they knew into the 'public' forum where everyone else, including non-stakeholders, could easily see them. On the background of similar observations, Olson, Malone, Smith (2001) summarised that:

'… we must sometimes be sensitive to very subtle issues about things like incentives and organisational culture in order to obtain the full benefits of such [collaboration] systems. For instance, it might be desirable … to include, as part of an employee's performance appraisal, a record of how often their contributions to the collaboration database were used by other people in the organisation' (p.33).

Based on their experience with *Accenture*'s SNS 'People Pages' (***Case 1***), Koch and Richter (2009) recommended that adequate advertising efforts be made preceding the launch of a SNS. These adequate advertising efforts should clarify the degree and nature of value creation achieved through the innovative SNS – both for the individual, and for the entire company. The latter necessitates, inter alia, the distribution of user-oriented documentation containing descriptions and orientation help concerning the new SNS. Various deployment scenarios should be described in order to clarify […] what *user-advantages* may be brought about by which deployment scenario (Koch and Richter 2009, p.80).

There is one economic theory – Mechanism Design Theory (Myerson 1981) – which analyses how to provide incentives for actors to reveal precious information they possess, even when they have conflicting interests. This theory can be borrowed from the economic science for the purposes of theory-building in CIT. The theory could be useful for designing adequate incentives for successful CIT implementation. Another applicable theory in this respect would be Agency Theory (Jensen und Meckling 1976) – also known as Principal-Agency Theory – which focuses on how to create incentives for some actors (agents) to act in a way that advances the interests of other actors (principals) even when the principals cannot observe everything their agents are doing (Ross 1973). One finding of this theory is that there are some situations where no incentives can motivate an agent to perform optimally from the principal's point of view (Jensen and Meckling 1976).

One example which Olson, Malone, and Smith (2001) gave with regards to the role of technology in coordination was the *cash register* example. This example is of particular interest from the perspective of what type of incentives should be designed in order to increase the acceptability of CIT tools.

> *Illustrative Example: The Cash Register*
>
> In the pre-cash register era the proprietors of retail establishments (e.g. bars) found themselves in direct conflict with their employees who handled money. At the end of the day the bartender, having collected payment for so many drinks, was expected to tender the money to the proprietor, but in fact very often kept some share of it. In the long term the proprietor would determine that the bartender was holding back, because the inventory of liquor would decrease more rapidly than was consistent with the reported rate of sales. But in the short run the proprietor had no way to detect and counteract the theft (Olson, Malone, Smith 2001, p.664). Exactly this situation led to the invention and subsequent refinement of the cash register (Marcosson 1945).

As pointed out by Olson, Malone, and Smith (2001, p.664), 'the root of the conflict was the sharply differing *values* for the two participants of states in which the cashier turns over all proceeds (high intrinsic value for the proprietor and low for the bartender) and states in which the cashier holds back (low intrinsic value for the proprietor and high for the bartender)'. The function of the original cash register, devised to improve this situation, was to change the tactical value of some of the hold-back states. The first cash register had a bell fitted which sounded when a sale was registered (the origin of the phrase 'ring up a sale'), so that a proprietor in another area of the establishment could hear if the register was being used or not.

Olson, Malone, Smith (2001) rightfully observed that – although a simple device – the cash register actually profoundly altered the landscape of states that participants in retail transactions traversed. It changed the likely response by the proprietor to actions of the clerk, and thereby imposed negative *tactical values* on otherwise attractive states for the clerk.

These remarks raise a penetrating question – do we not need a system of incentives in CIT, shaped after the example of the cash register, in order to promote harmonious working between principal (manager or IT strategist) and agent (employee)? A 'cash register' system of incentives that would 'ring up a contribution' (similar to 'ringing up a sale') in order to send a signal that the individual contributor's efforts have been recognised. CIT unquestionably needs a *system of incentives*, artfully designed in order to weave together the values of principal and customer to create a space in which stable harmony is likely. I suggest that the cash register exemplifies a potentially valuable alternative that offers a new role for CI technology in promoting harmony in the presence of value conflicts.

As pointed out by Kling and Iacono (1989), when an IT system becomes sufficiently large in scope (involving numerous groups), it can be seen as a social and economic institution. Therefore, the state of harmony or conflict imposed by a CIT system may sometimes grow into institutional harmony or conflict over time. Scholars such as Kling (1993), Kling (1992b), as well as Beuschel and Kling (1992) have noticed that, e.g. purely technological theories of coordination, tend to overestimate the ability of human agents to work in harmony smoothly. Special attention has to be paid, in my view, to situations where a possibility of conflicting preferences, interests, or values occur during CIT use. Another helpful example to learn from, in this respect, is a well-known experiment from behavioural economics, called 'The Ultimatum Game'.

> *Illustrative Example: The Ultimatum Game*
>
> The explanation for people's behaviour might have something to do with an experiment called the 'ultimatum game', which is perhaps the most well-known experiment in behavioural economics. The rules of the game are simple. The experimenter pairs two people with each other. They can communicate with each other, but otherwise they are anonymous to each other. They are given \$10 to divide between them, according to this rule: one person (the proposer) decides, on his own, what the split should be (fifty-fifty, seventy-thirty, or whatever). He then makes a take-it-or-leave-it offer to the other person (the responder). The responder can either accept the offer, in which case both players pocket their respective shares of the cash, or reject it, in which case both players walk away empty-handed (Surowiecki 2004, p.112).

As Surowiecki (2004) asserts, if both players are rational, the proposer will keep \$9 for himself and offer the responder \$1, and the responder will take it. After all, whatever the offer, the responder should accept it, since if he accepts he gets some money and if he rejects, he gets none. In practice, though, this rarely happens. Instead, lowball offers – anything below \$2 are routinely rejected. This literary means that people would rather have nothing than let their 'partners' walk away with too much of the lot. In other words, people are offended by unfair treatment. Humans, then, seem to care whether rewards are, in some sense, 'fair[38]. For CIT

[38] 'It isn't just humans who act this way, either. In a study that was fortuitously released the day Richard Grasso stepped down, primatologists Sarah F. Brosnan and Frans B. M. de Waal showed that female capuchin monkeys are also offended by unfair treatment. The capuchins had been trained to give Brosnan a granite pebble in exchange for food. The pay, as it were, was a slice of cucumber. The monkeys worked in pairs, and when they were both rewarded with cucumbers, they exchanged rock for food 95 per cent of the time. This idyllic market economy was disrupted, though, when the scientists changed the rules, giving one capuchin a delicious grape as a reward while still giving the other a cucumber slice. Confronted with this injustice, the

designers/strategists that should mean that not only should they build incentives to reward user effort into their systems/strategies, but those rewards should also be *fair*.

For example, Wagner (1996) found one intriguing challenge when she tried to design surgical calendar system for surgical teams that were composed of (typically) male surgeons and (typically) female nurses. She noted that 'if women's (nurses) voices are not heard, the resulting rules and regulations will reflect a one-sided tendency to protect primarily the needs and interests of surgeons'(pp. 891-892), hereby imposing *unfair rewards* for system usage that could create organisational problems in a work situation characterised by strong dependencies.

In summary:

> CIT use incites a specific set of response-sequences which aid in the preferential selection of CIT artefacts (valuative function). The state of harmony or conflict imposed by a CIT system may sometimes grow into institutional harmony or conflict over time. People are sensitive about whether incentives to reward their CIT-contribution efforts are provided, and whether those rewards are fair.

Based on all of the above that, I may now hypothesise that:

Hypothesis 8.6. To facilitate CIT acceptance and diffusion, we need to artfully design fair strategies of incentives for use. These strategies should be shaped in such a way as to bring the potentially conflicting values of CIT contributors into alignment. Not only should CIT designers and strategists build incentives to reward user effort, but those rewards should also be fair.

8.1.3 Open Source Software Development – an Illustrative Case

In this section, I will discuss in detail one of the cases from Empirical Study II – the *Open Source Software Development* case (***Case 5*** – see Appendix II). I have chosen to discuss this particular case in great detail because I deem it especially illustrative, and especially contrasting on the background of most other cases.

In Table 8.3 below, I have compared the system of incentives offered by the OSS collaborative environment to the system of incentives discussed in some of the other cases. The case of *Open Source Software Development (**Case 5**)* is very illustrative in terms of what kinds of incentives the 'movement' offers for contributing to the

put-upon capuchins often refused to eat their cucumbers, and 40 percent of the time stopped trading entirely. Things only got worse when one monkey was given a grape in exchange for doing nothing at all. In that case, the other monkey often tossed away her pebble, and trades took place only 20 percent of the time. In other words, the capuchins were willing to give up cheap food – after all, a cucumber slice for a pebble seems like a good deal—simply to express their displeasure at their comrades' unearned riches. Capuchins and humans alike, then, seem to care whether rewards are, in some sense, fair' (Surowiecki 2004, p. 113, 114).

common collaboration space. The OSS collaboration system is based on *strong reciprocity* of incentives (*intangible* rewards), unlike the misbalance of tangible rewards typical for most authority-supported CITs (e.g. in the cases of *CADCAM Implementation* – ***Case 50***, *Implementation of Information Engineering* – ***Case 51***, *Unilever* – ***Case 39***, *Consulting Firm* – ***Case 44***, as well as the ***Cases 8*** to ***10***). Bowles and Gintis (1987) posited 'strong reciprocity' as a type of prosocial behaviour because it pushed people to transcend a narrow definition of self-interest and do things that end up serving the common good. In the case of OSS development teams, a system of informative signals and intangible rewards is inactive of strong subjective reciprocity (see Table 8.3).

Incentives for Using CITs	
OSS case	**Other Cases**
Reciprocity of **intangible** rewards	Misbalance of **tangible** rewards
Intensive information sharing ('Just in case' learning)	No motivation to share information
Hedonic value and Self–fulfilling value Culture of generosity	Economic value Unbridled mercantilism
Status (peer esteem) Reputation communicated to others	No recognition of collaborative effort
Emotional value (derived from trust relations)	Impersonality
Political value (ideology)	Lack of social and moral goals

Table 8.3. Incentives for Using CITs – OSS Case versus Others

Some authors (e.g. Barbrook 2005) compare the *Open Source Software Development* case to the 'high–tech gift economy' (Iannacci 2006, Barbrook 2005, Veale 2003, Surman and Wershler–Henry 2002, Raymond 1998a, Raymond 1998b) – a metaphor describing an economic system where no monetary transactions are taking place. The high–tech gift economy is thus similar to the tribal gift economy (prefigured in the tribal past, where tribes in Polynesia organised themselves around the circulation of gifts), proving that individuals could successfully live together without needing the market. Veale (2003) outlined three fundamental principles as describing the path in which gifts 'flow' through the gift economy:

1) exchange in the Internet gift economy facilitates reciprocity;
2) reciprocity in the form of intangible rewards;
3) intangible rewards leading to tangible rewards[39].

[39] The gift economy is based on non-monetary transactions. The concept of enhanced cost efficiency is unquestionable only if monetary transactions are implicitly assumed to be taking place. Reality shows, however, that millions of people daily use electronic applications to collaborate with each other without the direct mediation of money – they send e-mail, take part in listservs, contribute to newsgroups, participate within on–line conferences, produce Web sites, i.e. engage in 'interactive creativity' (Barbrook 2005) without performing any monetary transactions. Apart from that, thousands of people today give away information free over the Web – their success secret is simple: win people's attention first, and then rip the benefits in the form of version–software sales or advertising and sponsorship (based on Gauntlett 2000). The Internet is a mix of the 'free and the fee', though it still remains 'free' in its great part.

The system of incentives within the OSS development community is a unique manifestation of hi-tech gift economy principles. OSS projects are built on the idea that everybody puts in whatever they can – and that the sum of a lot of small effort is a really good system (Torvalds 1998). The Open Source movement is a gift culture based on altruistic motives whereby programmers are willing to make free contributions (Raymond 1998b) because of the unstated obligation of other programmers to repay the gift at some future time.

Iannacci (2006) challenged the gift-economy metaphor and cautioned the argument that OSS programmers are driven by purely altruistic motives. He argued that the path in which value flowed through this community was far from being the result of gifts of anonymous benefactors, but the outcome of a *conveyance of informative signals*. These signals – in the form of intangible rewards – were valuative and inactive of subjective reciprocity leading to tangible rewards. The end result of this signalling process was an extreme form of distributed joined effort resembling the concept of market economy[40].

As depicted in Table 8.3 and Figure 8.1 above, in the majority of other cases (e.g. *Small Government Agency* – ***Case 49***, *Implementing Lotus Notes in a large Services Organisation* – ***Case 53***, as well as ***Cases 11*** to ***13***) employees had no motivation to share information with others through CIT. Quite on the contrary, the OSS case has demonstrated that the movement has developed a community's value of sharing knowledge – the perception that thinking time of other programmers is precious – so much so that it is almost a moral duty to give solutions away just so other programmers can solve new problems instead of having to perpetually re-address old ones (Stewart and Gosain 2006).

This phenomenon has been an overreaching topic of discussion in the recent years and has given rise to a metaphor called the 'high–tech gift economy' (see Iannacci 2006, Barbrook 2005, Veale 2003, Surman & Wershler–Henry 2002, Raymond 1998a, Raymond 1998b). Some authors (e.g. Barbrook 2005) compare the 'high–tech gift economy' to the tribal gift economy (prefigured in the tribal past, where tribes in Polynesia organised themselves around the circulation of gifts), proving that individuals could successfully live together without needing the market. Similarly, in the hi–tech gift economy of today, money–commodity and gift relations are not just in conflict with each other, but also co–exist in developing symbiosis, where the gift is supposedly about to replace the commodity (Barbrook 2005).

Another major consideration in this context touches upon the notoriously low (close to zero) marginal costs of reproduction, typical for all electronic commodities and services. In classical economics terms, something is considered to be valuable in the degree to which it is scarce, therefore an unlimited resource has very limited value. In this case, as any sequence of bits can be copied any number of times (i.e. one can duplicate the output indefinitely, so that many people get the benefits for little or no extra costs), we may be tempted to conclude that all digital products have very limited value. Of course, we may claim nothing of the sort. According to some authors, this contradiction can only be resolved by abandoning the idea that scarcity is the only measure of value (— 2001). By reflecting on this proposition, Surman and Wershler–Henry (2002) saw working gift economies as adaptations not to scarcity but to abundance 'with a general, intangible expectation of return from the broader community' (p.2).

[40] Indisputable for Iannacci, however, remained the fact that the price mechanism could not operate efficiently within this community because the contributions were not measurable in monetary terms. Hence the need to find a substitute for the price system, which he saw in the physical instantiation of posting or updating on–line source codes.

Scholars such as Olson, Malone and Smith (2001) have pointed out that few firms are willing to treat their employees 'as less of a commodity' (p.519), and to make non-contractible investments in their labour force, such as training and education. Typically, firms do not encourage learning for its own sake ('just in case' learning), thus relying solely on 'just in time' learning by employees done according to the needs of a situation. The *Open Source Software Development* case (***Case 5***) is entirely different in this respect. Stewart and Gosain (2006) described learning within OSS development teams as 'learning for its own sake' (p.295). They based their observation on an illustrative quote from an Open Source narrative, saying that:

'[A hacker is] a person who enjoys exploring the details of programmable systems and how to stretch their capabilities, as opposed to most users, who prefer to learn only the minimum necessary' (Raymond 2003).

'OSS community members perform behaviours that are evaluated by others as indicative of competence and ability. When team members adhere to the values of attaining technical knowledge, learning, and enhancing their reputations, they will act in ways that will increase their knowledge and competence. When they also adhere to the values of helping, sharing, and cooperating, they will provide to each other evidence of that knowledge and competence' (Stewart and Gosain 2006).

The practice of 'just in case' learning (which places value on learning for its own sake) performed voluntarily by OSS community members is tightly connected with the established culture of intensive information sharing and readiness to give away knowledge in order to help peers. 'Just in time learning' is exactly the opposite – the result of extrinsic motivation to learn, as it is driven by the urgency of the situation. The construct of *theoretical value* (see Table 8.4 below) may be adopted from Spranger's (1928, 1966) typology[41] in order to illustrate 'just in case learning' within the OSS community. Iannacci (2006) explained the propensity of the OSS movement to encourage learning for its own sake as well as the willingness of OSS team members to learn just for the sake of learning as follows. OSS contributors typically use web-based CIT tools[42] to collaborate in a highly distributed and asynchronous manner. The use of CIT tools implies that some 'a priori' knowledge must be possessed by the contributors even though they do not regularly need it because it permits to make sense of the knowledge of other contributors. The existence of 'a priori' knowledge and 'just in case' learning habits thus compensates the lack of face-to-face communication.

As depicted in Table 8.3 above, the OSS case differs in terms of its systems of incentives from many others by the presence of motivational drivers like *hedonic*

[41] Spranger (1928/1966) formulated a six–fold typology of ideal values, where *theoretical value* was seen as 'concern with the discovery of truth and knowledge' (see Brand 2006, p.32). Pursuit of theoretical value was associated with human curiosity – a strong behavioural motivator, exhibited through interest in learning and problem solving.

[42] O'Reilly (1999) stressed that the open–source model heavily relies on hardware, software and infoware tools instead of face–to–face communications.

value and *self-fulfilling* value. Many illustrative quotes from Open Source narratives illustrate the fact that hedonism is a self-declared motivation for many developers. Linus Torvalds, the developer who wrote the core of Linux, said in an interview that programming was his job, but long before it was his job it was his pleasure, similar to other programming people who were willing to do it just for 'fun'. Raymond (1998a) observed that too often software developers spend their days grinding away for pay at programs they neither need nor love. But not in the Linux world – which may explain why the average quality of software originated in the Linux community is so high. One part of the system of incentives within the OSS community may be hypothesised to be exhibited through pursuit of self–fulfilling and hedonic value. The terms 'self–fulfilling value' and 'hedonic value' (Heijden 2004, pp. 696, 698) may be contrasted to instrumental value. Heijden (2004) suggested that hedonic value – i.e. fun in IT usage or creation (see Table 8.4) – can play a pivotal role to increase acceptance of otherwise utilitarian information systems (p.701)[43].

Raymond (1998b) maintained that OSS settings did not have as their principal purpose redistributive goals because of their very resource abundance. Distribution was easy in an environment where there was no serious shortage of survival necessities like disk space, network bandwidth, computing power, etc. Iannacci (2006) reformulated Raymond's concept from 'no resource scarcity' into 'limited resource scarcity'. He saw the only occurrence of resource scarcity within the OSS community in terms of coding talent[44]. Therefore, according to Iannacci, the OSS movement has developed *allocative signalling mechanisms*, which are there to aid saving programmer's time and limited attention. This is consistent with the community's value of sharing knowledge – thinking time of other hackers is precious – so much so that it's almost a moral duty to give solutions away just so other hackers can solve new problems instead of having to perpetually re-address old ones (Stewart and Gosain 2006). Thus, additional value is created collectively by enabling 'learning curve time savings' as well as 'reduced effort'.

The system of incentives in the virtual environment of the OSS movement may be seen as a substitute of the 'price mechanism' in economic market terms. Iannacci (2006) claimed that the physical instantiation of posting or updating on-line source codes was a system alternative to the price mechanism. It may further be hypothesised that the symbolic instantiation of 'reputation communicated to others[45]'

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[43] Illustrative in this respect are behavioural stereotypes of 'getting value back' from involvement with any project on the Internet. Experience shows that getting instrumental value back is not the first consideration of involvement with any Web project. Researchers into collective intentionality and sociality speculate that the hi–tech gift economy may have serious implications on attitude formation within Web communities. Franck (1999) suggests that if the way out of materialism is not found in mass abstinence (lack of motivation to contribute, because of absent material stimuli/devaluation of money on the Web), then it must be sought in hedonism (doing things for 'fun'). Thus, in a state of mass abstinence within the Web community, self–oriented hedonic eValue may be seen as an important predictor of behavioural intention to (pro–)use.

[44] The fact that the larger the number of open–source projects, the smaller the programmer pool did imply an overall problem of resource scarcity in terms of coding talent.

[45] Metaphorically speaking, what is meant under 'reputation' in an eCommunity in general is the 'cyberspatial reputation capital' stored in the minds of the eNetwork members. Reputation capital is based on 'the wealth of attention' that a subject or an IT artefact is able to attract. According to Golghaber (1997), in the new economy attention itself is property. It is located in the minds of those who have paid attention (to the IT artefact) in the past. Thus, attention wealth can decline, only to revive later, but is rarely entirely lost.

(self–fulfilling intrinsic value) is being exchanged for 'status' in the form of peer esteem (self–fulfilling extrinsic value) (see Table 8.4 below). That exchange may play the role of an additional price-mechanism substitute, given the fact that the contributions of the community members are not measurable in monetary terms. 'Status' is of extrinsic nature, as peer esteem (honour or prestige) is being attached to one's position in the community.

Malone (2004) tackled the same issue, saying that many programmers cherished the recognition and status of having their contributions included in the Linux system. There was even a word for this in the technical community: egoboo. Short for 'ego boost', egoboo was the satisfaction you get from being praised for a job well done. Malone (2004) went so far as to argue that egoboo has always motivated people in their work, but many centralised hierarchies vastly underestimate its power (Malone 2004).

As depicted in Table 8.3 above, many centralised hierarchies base their relationships with their employees on 'impersonality' instead of any kind of emotional or ideological values. According to Surowiecki (2004, p.123), 'the ***impersonality*** of capitalism is usually seen as one of its unfortunate, if inescapable, costs'. In place of relationships founded on emotion or affection (what sociologists call 'thick relationships'), capitalism – according to Surowiecki – creates relationships founded solely on what Marx called the 'money nexus'. As pointed out by Malone (2004), even though money is very good at satisfying basic needs, it isn't always effective at satisfying our needs for things like friendship, recognition, challenge, and purpose. Ultimately, businesses do not always give people a sense of meaning in their lives. To quote Hamel (2007), if you sit in on a typical management meeting – to discuss strategy, budgets, employees, or anything – not only will you observe 'a distinct lack of right-brain thinking, you'll also hear virtually nothing that suggests the participants have hearts' (p.64).

Opposite to this culture of impersonality, in the OSS community all relationships may be described as 'thick relationships'. Actions are motivated through *trust*[46], and the *emotional value* derived from them (see Table 8.4 below). The latter are strengthened by OSS ideology. OSS norms, beliefs, and values support the predictability of behaviour that will be beneficial to team members and the assessment of others as competent. Norms are designed to protect developers' interests by assuring they get credit for their work (named credit norm) and maximizing the value of that work (forking norm). The forking norm minimises the hazard of competing versions of projects, which may reduce reputational benefits to contributors by decreasing the audience for each fork (Kogut and Metiu 2001).

Torvalds (1998) considered 'trusted networks of people' to be 'property holders' of cyberspatial reputation capital. This capital remains *banked* within the networks of people, and only small amounts need to be converted to dollars, while the greater part brings cyberspatial earnings over time (Torvalds 1998).

[46] Cognitive trust relies on rational assessments of competence and behaviour and may develop through the prediction process when a trustor is able to forecast that a target will behave in a desirable fashion (Doney and Cannon 1997).

Scholars such as Markus et al. (2000), Bonaccorsi and Rossi (2004), and Stewart and Gosain (2006) have suggested that the *ideology* associated with OSS development is a lynchpin in enabling OSS efforts. In particular, firms emphasise economic and technological reasons for entering and contributing to collaborative efforts, and do not subscribe to many idealistic motivations that are, by contrast, typical of the OSS movement. Bonaccorsi and Rossi (2004) summarised OSS ideology in terms of the social values, as expressed by the OSS software developers themselves. When asked why they contributed, they gave the following answers:

- 'Because of the personal exchange with other software developers',
- 'Because we want to place our source code and skills at the disposal of the free software community and hope that others will do the same',
- 'Because we think that software should not be a proprietary asset',
- 'Because code should be free'.

eValue		**Intrinsic**
Self–oriented	**Active**	**Theoretical Value** 'Just in case' learning Reaction against boredom
		Hedonic Value Fun in IT usage/creation
	Reactive	**Emotional Value** Value derived from self–preservation Value derived from emotion–focused coping
Other–oriented	**Active**	**Self–fulfilling Value** Reputation communicated to others
	Reactive	**Political Value** Ethics
		Aesthetic Value Novelty (fashion)

Table 8.4. eValue Anthology – Intrinsic Incentives for IT Usage[47]

[47] For a complete and detailed elaboration on this Table, please see Shumarova and Swatman (2007). Here, I have only presented and explained the parts pertaining to the *Open Source Software Development* case.

In summary:

In this Chapter, I have presented a part of the detailed results from Empirical Study II – the part pertaining to 'Incentives for Using CITs'. I have identified this factor as available in the greatest relative proportion of all case-study reports (55% or 29 cases), and have therefore classified it as most dominant factor. Then, I have given some details on what exactly has been observed and described in each of the 29 case-study reports. I have illustrated (and then discussed) the proportional availability in the cases of the 'Incentives for Using CITs' factor, as either 'accelerator' or 'barrier' of CIT diffusion. Based on these findings (as well as on findings from previous chapters), I have then generated grounded Hypotheses and derived Conceptual Framework 3a (CF3a).

ATTRIBUTES OF THE SYSTEM

This Chapter presents part of the detailed results from Empirical Study II (Critical Meta-Analysis of Case-Study Reports) – the part pertaining to 'attributes of the system', i.e. characteristics of the CIT system.

Factor	% Availability in Cases	Number of Cases
Attributes of the System		
CIT Identity	**30**	**16**
System Customisation	**28**	**15**
Attributes of the Collaboration		
Mediator Role	36	19
Number of System Users	17	9
Support of a Champion	9	5
Affective Reward	9	5
Size of the Collaborative Ensembles	9	5
Collaboration History	6	3
Attributes of the Organisational Context		
Incentives for Using CITs	55	29
Power-Structure Change	21	11
Long-term Unpredictability	4	2

Table 9.1. Thematic Focus of this Chapter

The 53 different CIT case study reports that I have analysed and compared were presented in Chapter 7. Background information on the cases is available in Appendix I. The sections below discuss two factors (system attributes) which – based on the case studies – I identified as influencing the process of CIT diffusion: 'CIT Identity' and 'System Customisation' (see Table 9.1).

9.1 CIT Identity

By 'CIT Identity' I mean:

the plausible image of a CIT – adaptive to its context – socially constructed from the interaction between the CIT and human agents[48].

As mentioned in Chapter 7, I have performed the cross-case comparison (Empirical Study II – Critical Meta-Analysis of Case-Study Reports) guided by one of the research questions (see Section 2.2), i.e. 'What influencing factors (barriers or accelerators) are determinant of CIT adoption and diffusion?'.

[48] after Panyasorn et al. (2006), will be discussed later, in Section 9.1.2.

While seeking an answer to this question, I have compared the case-study reports (through manual coding and matching of similarities, as described in Chapter 7), and based on that, I have discovered the following:

> the factor coded as ‘CIT Identity’ is present and discussed in the role of a ‘determinant’ (accelerator or barrier) of CIT diffusion in 30% of all case studies. These are 16 different case studies of CIT adoption trials spanning right the way through the years 1993-2009. Generally, the case studies have shown that in most of the cases CIT identity was blurred – the ‘image’ of each CIT in the minds of its users was not clear (the tool was confused with other tools, companies were utilising an inappropriate ‘root definition’ of the tool etc.) and that hampered its diffusion. My cross-case comparison has shown that the ‘identity’ factor has been ***repeatedly observed*** as influencing CIT diffusion in structurally the same form in 16 different case studies. Some cases have been observed and described in 2009, others in 2006, 1997, etc. What is particularly interesting is that researchers have expressed the same surprise over this factor in 2009 that they were expressing in 1993.

The term ‘IT Identity’ was introduced by Panyasorn et al. (2006) to denote a plausible image – adaptive to its context – socially constructed from the interaction between IT and human agents. The *Global Investment Bank* case study (***Case 33***) revealed the story of a blurred IT identity of Lotus Notes. The senior management of the Global Investment Bank had bought into the notion of supporting two collaboration platforms – Lotus Notes and the Web. They were heavily invested in Notes but also invested in Web projects. The ambivalence implied substantial erosion in the original notion of Notes as a single groupware answer. As a consequence, the ‘IT identity’ of Notes was blurred. The two choices did not necessarily have to compete, but once a Web application offered information from the Internet community, Notes was no longer a viable option.

The conclusion of the *CADCAM* case study (***Case 50***) was that the CIT implementation was unduly technology-led, and that the company was utilising an inappropriate ‘root definition’ of the CIT (replacing an existing manual system with a computer system). Thereby, the emphasis was heavily on technical issues (the main concern being that the CIT smoothly integrates into the company’s IT infrastructure), and the attitude was that any organisational issues could be addressed later (‘post factum’). This process additionally aggravated the ‘root definition’ of the CIT and blurred its identity.

According to the *Implementation of Information Engineering* case (***Case 51***), blurred CIT identity was three-fold:

a) The implementation of the technology had led to greater separation and specialism at the work levels. As a result of this change the communication patterns of individuals had become uncoupled or been disturbed.
b) The technology had led to confusion with regard to the handover of tasks as well as how they were carried out.

c) Implementation was excessively technologically dominated. That additionally skewed the CIT identity (in a purely technological direction, without due regard to human and organisational aspects).

The ***case studies 6*** to ***9*** (*ComNotes* case, *Procom* case, *Comtech* case*, Chemhouse* case) concluded that blurred CIT identity was nourished by the availability of other IT applications that were threatening to replace, complement, or minimise the efficiency of Lotus Notes. In a similar manner, the IT identity of Notes was blurred in the case of *Alpha* (***Case 52***) – Notes was seen as a communication or a personal productivity tool, but not as a collaboration tool. At *Midwest Insurance* (***Case 35***) the IT identity of Notes was also blurred in a sense that its use was limited to e-mail – most users saw Notes as e-mail only.

At the *Technical Research Centre (TRC)* in Finland (***Case 46***) Notes was used *not* as a collaboration tool, but (after four months) still only to enter data for reports and to create reports. The workflow in the Notes application was not aligned with the actual work-process interdependences. Therefore, ways around it were developed by the users. The collaboration capabilities of Notes were completely underutilised. Its IT identity was blurred.

At *Unilever* (***Case 39***) Notes only enjoyed restricted use because of the availability of other tools. The IT identity of Notes was confused with that of other tools – hence, Notes private area was not used at all. The employees of *EDF* – the French energy provider (***Case 41***) – left the collaborative capabilities of Notes largely unexplored, again because of its blurred IT identity. The confusion came from the ambitious plan of the departmental management to introduce three different Notes applications in parallel: a workflow system, procedures and quality system, and a resource allocation system. As a consequence of the confusion among the three applications, only e-mail and directory were integrated into work after 18 months. *Roche* (the large multinational pharmaceutical company – ***Case 43***), on the contrary, was able to profit from *clear* CIT identity. The success of the Notes application was claimed to be due to its clear IT identity – the focused nature of the application, enhanced by the homogeneity of the user community.

An important success factor for the frequency and intensity of usage of the 'People Pages' at *Accenture* (***Case 1***) was its integration with various different applications, such as Knowledge Exchange (KE) and the company-wide Social Bookmarking Service (SBS). The opportunity to use familiar services such as KE and SBS as part of People Pages played the role of an adoption accelerator. Contrary to that, various competitive applications, e.g. MS Outlook and the People Directory – which were still available in the form of company-wide CITs – played the role of adoption barriers. Those competitive CITs were minimising People Pages's utilisation levels. Instead of using People Pages, employees were replacing it with familiar (less efficient) applications. That ambivalence implied substantial erosion in the intended notion of People Pages as a single groupware answer. Blurred CIT identity was nourished by the availability of other CIT applications. Users were reluctant to double-enter profile information which they had already entered on different CIT platforms.

IBM's SNS 'Bluepages' (***Case 2***), on the contrary, was able to profit from *clear* CIT identity. The Bluepages were developed gradually, as a successor of the mid-90s' Whitepages. It is important to note that both were not available to users simultaneously. The preservation of the Bluepages' CIT identity was guaranteed. The fact that the Bluepages were well integrated with numerous other services such as the Lotus Sametime chat application and the Employee-Database, was highlighted by many users as very pleasant and time-saving. The smooth integration enabled constant reliability of information.

Unlike IBM's Bluepages, *SAP's SNS 'Harmony'* (***Case 3***) was not well integrated with other services. An important adoption barrier turned out to be the lacking integration with the corporate MSN Messenger, as well as with the Collaboration Rooms. The latter services were seen as 'competitive' to Harmony. Many other systems for collaborative work were available – Collaboration Rooms, internet-based SNS, and the corporate MSN. Harmony was lacking an identity.

An overview of the 'CIT Identity' factor's representation in the case-study reports is presented in Table 9.2 below. Table 9.2 presents a short description of 'what happened' in each case, and how CIT identity was influencing the process of CIT adoption.

Factor / **Case**	**CIT Identity**
Case 1. Social Networking at Accenture	The opportunity to use familiar CIT services as part of 'People Pages' played the role of an adoption accelerator. *Blurred CIT identity* was nourished by the availability of other CIT applications. Various competitive CIT applications (company-wide) played the role of adoption barriers.
Case 2. IBM's SNS 'Bluepages'	The 'Bluepages' SNS had a *clear CIT identity*. The Bluepages and the Whitepages (predecessor) were not available to users simultaneously. The Bluepages were integrated with Lotus Sametime and the Employee-Database. The smooth integration enabled constant reliability of information.
Case 3. SAP's SNS 'Harmony'	The 'Harmony' SNS was *lacking clear identity*. 'Harmony' was not integrated with other services, e.g. with the corporate MSN Messenger, with the Collaboration

	Rooms. The latter services were seen as ‘competitive’ to Harmony. The lacking integration was an adoption barrier.
Case 6. ComNotes ***Case 7***. Procom ***Case 8***. Comtech ***Case 9***. Chemhouse	*Blurred identity* was nourished by the availability of other CIT applications that were threatening to replace, complement, or minimise the efficiency of Notes.
Case 33. Global Investment Bank	The Global Investment Bank supported two collaboration platforms – Lotus Notes and the Web. The ambivalence implied substantial erosion in the original notion of Notes as a single groupware answer. As a consequence, the *IT identity* of Notes was blurred.
Case 35. Midwest Insurance	The *IT identity* of Notes was limited to e-mail – most users saw Notes as e-mail only.
Case 39. Unilever	Notes only enjoyed restricted use because of the availability of other tools. The *IT identity* of Notes was confused with that of other tools – hence, Notes private area was not used.
Case 41. EDF	The collaborative capabilities of Notes were largely unexplored because of its *blurred IT identity*. Three different Notes applications were introduced by management in parallel. As a consequence of the confusion among the three applications, only e-mail and directory were integrated into work practice.
Case 43. Roche	Success of the Notes application was owing to its *clear identity* – the focused nature of the application, enhanced by the homogeneity of the user community.
Case 46. Technical Research Centre (TRC)	Lotus Notes used only to enter data for reports and to create reports (not as a collaboration tool). Lotus Notes workflow: not aligned with the actual work-process interdependences. Notes collaboration capabilities: completely underutilised. *Blurred CIT identity.*
Case 50. Implementation of CADCAM	The company was utilising an inappropriate ‘root definition’ of the CIT (replacing an existing manual with a computer system). Aggravated ‘root definition’ of the CIT. *Blurred CIT*

	identity.
Case 51. Implementation of Information Engineering	*Blurred CIT identity.* CIT implementation led to uncoupled and disturbed communication patterns of individuals. CIT use led to confusion with regard to the handover of tasks as well as how they were carried out. Implementation was excessively technologically dominated. That additionally skewed the system's identity.
Case 52. Alpha	*Blurred CIT identity.* Lotus Notes was seen as a communication or a personal productivity tool, but not as a collaboration tool.

Table 9.2. 'CIT Identity' in the Case Studies

9.1.1 'CIT Identity' – Diffusion Barrier or Accelerator?

The historical review of CIT diffusion, executed through detailed analysis of 53 case-study reports of CIT diffusion (Empirical Study II), has shown the following: the factor of 'CIT Identity' has been ***repeatedly observed*** as playing the role of a 'determinant' (accelerator or barrier) of CIT diffusion in 16 different case studies. These 16 different cases were observed and described by different authors, in different years, from 1993 right the way through 2009. These are ***Cases 1***, ***2***, ***3***, ***6***, ***7***, ***8***, ***9***, ***33***, ***35***, ***39***, ***41***, ***43***, ***46***, ***50***, ***51***, and ***52*** (see Appendix II).

Based on the 16 different case studies of CIT diffusion which stem from different years between 1993 and 2009, and in which the 'identity' factor is present, I may summarise that:

> the factor of 'CIT Identity' has been repeatedly observed as influencing the process of CIT diffusion in important ways, all through the years 1993-2009. That means that this factor has historically been ***persistently influencing*** CIT diffusion in structurally the same form. In most of the cases CIT identity has been blurred – the 'image' of each CIT in the minds of its users has not been clear (the tool was confused with other tools, companies were utilising an inappropriate 'root definition' of the tool etc.). That has hampered CIT diffusion – i.e. has played the role of a diffusion barrier.

Figure 9.1 below represents the proportional availability in the case studies of the 'CIT Identity' factor, discussed as:

- accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process;
- barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process.

Figure 9.1 also takes account of the ***process structure*** of CIT diffusion:

- Top-down Diffusion Path – the cases in which CITs have diffused top-down (authority-based) – this is a total of 14 cases;
- Bottom-up Diffusion Path – the cases in which CITs have diffused bottom-up (initiated by employees) – this is a total of 2 cases.

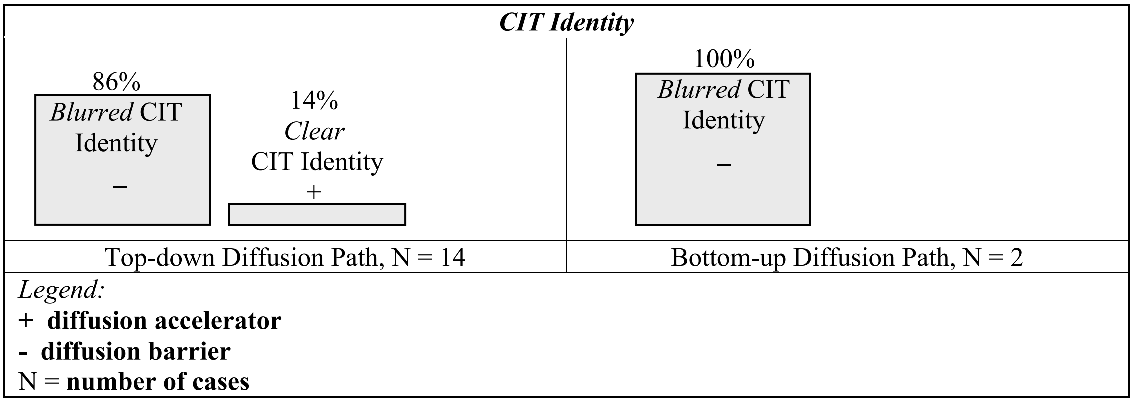


Figure 9.1. ‘Accelerator’ or ‘Barrier’ Role of ‘CIT Identity’ Factor pertaining to CIT Diffusion: Proportional Availability in Cases

Here is some information extracted from the critical meta-analysis of case-study reports.

I. Top-down Diffusion Path

a) In 86% of the (top-down) cases (12 cases altogether), CIT identity has been blurred. In all of those cases, blurred CIT identity has played the role of a diffusion barrier. Some examples include the cases of *SAP’s SNS ‘Harmony’*, *ComNotes*, *Procom*, *Comtech*, *Chemhouse*, *Global Investment Bank*, *Midwest Insurance*, *EDF*, *Technical Research Centre (TRC)*, *Implementation of Information Engineering*, *Alpha* (***Cases 3***, ***6***, *7*, ***8***, ***9***, ***33***, ***35***, ***41***, ***46***, ***51***, ***52***), etc.

b) In 14% of the cases (only 2 cases altogether), CIT identity has been clear. In both of these cases (*IBM’s SNS ‘Bluepages’* and *Roche* – ***Cases 2*** and ***43***) clear CIT identity has played the role of a diffusion accelerator.

II. Bottom-up Diffusion Path – in 100% of the cases (2 cases altogether, i.e. *Social Networking at Accenture* and *Unilever* – ***Cases 1*** and ***39***) blurred CIT identity has played the role of a diffusion barrier.

Based on these findings, and what I said in Section 9.1 above, I may now hypothesise that:

Hypothesis 9.1. Blurred CIT identity – in terms of unclear nature, root definition and socially constructed image of the CIT application – plays the role of a diffusion barrier.

Hypothesis 9.2. Clear CIT identity – in terms of clear nature, root definition and socially constructed image of the CIT application – plays the role of a diffusion accelerator.

Hypothesis 9.3. Blurred CIT identity is typically caused by either compatibility issues or the presence of competitive CIT applications that erodes the notion of the CIT as a single groupware answer.

Hypothesis 9.4. The top-down CIT diffusion path is typically characterised by blurred CIT identity[49].

Figure 9.2 presents Conceptual Framework 3b (CF3b). This Conceptual Framework depicts the hypothesised influence of the 'CIT Identity' factor on CIT diffusion. The representation takes account of the process structure of CIT diffusion with the two identified diffusion paths – top-down and bottom-up. The findings from Empirical Study II have supported/confirmed the assertion of existence of two diffusion paths – CF3b is, therefore, a logical extension of CFØ (Figure 6.3 above).

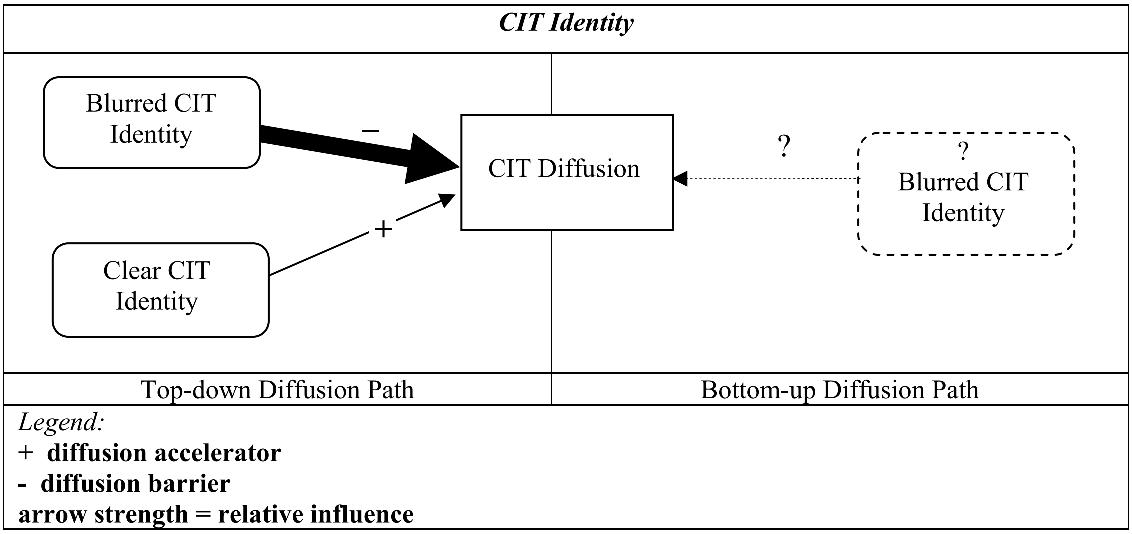


Figure 9.2. Hypothesised Influence of the 'CIT Identity' Factor on CIT Diffusion (Conceptual Framework 3b)

The 'CIT Identity' factor is depicted in Figure 9.2 as: a) accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process; b) barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process. Various line-strength of the arrows in Figure 9.2 is applied to illustrate the level/weight of relative influence of the factor on CIT diffusion. Conceptual Framework 3b (Figure 9.2) has been derived as follows:

- as mentioned above, CF3b is a logical extension of the Preliminary Conceptual Framework, CFØ (see Figure 6.3);

[49] The small number of cases (i.e. 2 cases only – see Figure 9.1) makes it impossible to generate a similar hypothesis for the bottom-up diffusion path.

- CF3b is based on the summary of findings from Empirical Study II (pertaining to the factor in question) which were presented in Figure 9.1.

Conceptual Framework 3b (Figure 9.2) visually represents some of the Hypotheses generated in this Section. The thick arrow on the left-hand side in Figure 9.2 visually represents two of the generated Hypotheses: Hypothesis 9.1 and Hypothesis 9.4 (see above). Those two Hypotheses were derived from the observations – based on the case-study reports – that the top-down (authority-based) CIT diffusion path is typically characterised by blurred CIT identity, and that blurred CIT identity plays the role of CIT diffusion barrier (see Figure 9.1).

The thin arrow on the left-hand side in Figure 9.2 visually represents one of the generated Hypotheses: Hypothesis 9.2 (see above). This Hypothesis was derived from the observation – based on the case-study reports – that when CIT identity is clear – in terms of clear nature, root definition and socially constructed image of the CIT application – it plays the role of a diffusion accelerator (see Figure 9.1).

The right-hand side in Figure 9.2 visually represents the bottom-up CIT diffusion path. The small number of bottom-up cases (i.e. 2 cases only – see Figure 9.1) made it impossible to generate grounded hypotheses concerning the bottom-up diffusion path. The small number of cases requires a note that the results concerning the bottom-up diffusion path are indicative rather than numerically valid. The dotted lines and question marks in the right-hand side of Figure 9.2 are applied to denote that the source data has not been enough in quantity to generate (even a hypothetical) conceptual framework. Therefore, the indicative results concerning the bottom-up diffusion path are depicted in Figure 9.2 as an 'open question' rather than a grounded hypothesis.

9.1.2 Discussion

As mentioned above, the term 'IT Identity' was introduced by Panyasorn et al. (2006) to denote a plausible image – adaptive to its context – socially constructed from the interaction between IT and human agents. Similar to other types of identities (e.g. personal identity), IT identity is not static or monolithic. This theme affirms an observation made by Bansler and Havn (2004) who argued that the *systems identity* in an organisation changed continuously because the applications were used in ways not foreseen and to which they had to adapt to survive (e.g. Orlikowski 1996, Ciborra 2002). The issue of 'CIT Identity' was present in a number of case studies. With the exception of the *Roche* case study (***Case 43***) – the one displaying a clear identity of its collaboration system – most of the other cases demonstrated blurred CIT identity (*CADCAM*, *ComNotes*, *Procom*, *Comtech*, *Chemhouse*, *Alpha*, *Midwest Insurance*, *Technical Research Centre*, *Unilever*, *EDF*, *Global Investment Bank* – ***Cases 50***, ***6***, *7*, ***8***, ***9***, ***18***, ***35***, ***46***, ***39***, ***41***, ***33***).

The case of *Social Networking at Accenture* (***Case 1***) also demonstrated blurred CIT identity that was nourished by the availability of other competitive CIT applications.

Various competitive applications, e.g. MS Outlook and the People Directory – which were still available in the form of company-wide CITs – implied substantial erosion in the intended notion of People Pages as a single groupware answer. Users were reluctant to double-enter profile information which they had already entered on different CIT platforms. While analysing this case, Koch and Richter (2009, p.81) claimed that a process of 'data transfer' between two collaborative platforms may be difficult to initiate due to data privacy protection considerations. However, once successfully initiated, such a process almost surely got rewarded by increased user participation.

Agostini and De Michelis (1997) was one of the first to formulate the problem of 'multimedia continuity' (p.36) – the need for communication media to allow the users to *switch almost continuously* from one medium to another so that they can choose at any time and in any situation the best available medium (Reder and Schwab 1990, Whittaker 1996). The discussion on this 'old' problem – i.e. of lack of multimedia continuity in collaboration technology – was renewed by Muller et al. (2004) who argued that the ***'multitude' of CITs*** at the workplace was causing significant problems. The first problem was that ***attention and effort had to be divided among multiple shared venues***, and the second problem was that ***moving resources from one environment to another was difficult***. These problems are directly linked to CIT identity because – as we saw above – blurred CIT identity is typically caused by either compatibility issues or the presence of competitive CIT applications that erodes the notion of the CIT as a single groupware answer (Hypothesis 9.3).

Correa and Marsic (2004) claimed that a 'key requirement for meaningful collaboration' (p.603) was maintaining a consistent shared state across the collaborating sites. They saw *heterogeneity* in CIT devices as one of the greatest barriers complicating the development of collaborative software systems. Thereby, they defined *heterogeneity* to include 'disparate computing and communication capabilities, differences in users needs and interests, and semantic conflicts across different domains and representations' (Correa and Marsic 2004, p.603).

Rolland et al. (2006) noted that collaborative efforts typically aim at integrating and aligning different fragmented information sources. Correspondingly, processes of implementing collaborative technology typically aim for complete solutions in the sense of comprising the full set of information sources. Rolland et al. (2006) found this ambition of achieving 'perfect compatibility' (p.498) (in the sense of integration) to be empirically as well as analytically problematic. Understandable as it may be, this ambition encounters various limitations and barriers for achieving perfect common information spaces (CIS) across heterogeneous settings. For example, CIS are characterised by 'inherent imperfection' (Rolland et al. 2006, p.498) in the sense that they cannot overcome the fragmentation stemming from the various micro-practices of heterogeneity embedded in achieving cooperation. In particular, Rolland et al. (2006) claimed that the efforts toward overcoming fragmentation failed especially in largish projects. In such projects, these efforts empirically tended to fail in achieving the aspired level of integration and typically reproduced the initial fragmentation.

This finding of Rolland et al. (2006) is similar to what Hanseth and Braa (2001) found to be typical of large-scale IT infrastructures. They described the ambition of achieving corporate-wide IT compatibility and standardisation (in the form of integrated corporate-wide CIT infrastructure) as ‘hunting for the treasure at the end of the rainbow’. Hence, ‘such thing as a fully integrated and standardised IT infrastructure incorporating all required features could practically never exist’ (Rolland et al. 2006, p.498). Rolland et al. (2006, p.498) summarised that striving for a perfect CIS – in terms of flawlessly and seamlessly integrating all thinkable information – is very unlikely to happen in organisations where CISs are bound to produce some abnormalities. In this sense, the prospect of achieving a ‘perfectly clear’ CIT identity may be utopian. However, as we saw above, clear CIT identity is a necessary condition (accelerator) to make CIT diffusion truly successful. The discrepancy between this necessity and the technical problems surrounding IT compatibility remains an open issue.

Mol (2003) analysed CIT compatibility through the notion of ‘boundary object’. The notion of boundary object has been widely employed in the science studies literature but also in CSCW. The potential of boundary objects to alleviate CIT heterogeneity was interpreted by Mol (2003) as follows. The various micro-practices of heterogeneity embedded in cooperative work tend to ‘exclude one another’. In this sense, boundary objects have the capacity to produce compatibility as a practical task. Thereby, ‘boundary objects’ have been defined by Star and Griesemer (1989) as carrying different meanings in different social worlds but having a structure which is common enough to more than one world to make them recognisable means of *translation*.

Ginsburg and Duliba (1997) analysed CIT compatibility in terms of the Internet as a standard and ‘open system’. They considered the case of a firm facing an implementation choice on a collaborative software system spanning the organisation. In this case, the system choice is likely to be influenced by the necessity to interface to outside data sources. Furthermore, those sources are likely to be present on the Internet. Therefore, Ginsburg and Duliba (1997) theorised the importance of open systems as well as of the Internet as a standard for the choice of collaborative software systems. For years after that the IT industry fiercely fought concepts like open systems and open source, but, as pointed out by Tapscott and Williams (2006) ‘in the last decade there has been a stampede toward opens standards, in part because customers are demanding them’ (p.21).

Bardram (1997a) tackled the issue of CIT compatibility from a slightly different angle, namely the *design* perspective. He suggested that the design of groupware should recognise the multiplicity of artefacts in the workplace (both manual and computational) and the need for interconnecting groupware with Information Systems. Today we may add that the design of modern groupware has to be highly flexible to adapt to the fluid boundaries between work units and the 'continual flux' as teams reconfigure to incorporate expertise drawn from any geographical location in the company. Modern CITs have to be 'context-neutral', i.e. adaptable to multiple contexts and heterogeneous social worlds. This is simply because distributed organisations do not have one adoption context, but many (Mark and Poltrock 2003), depending on for example, whether people are working with colleagues who are collocated or remote. Modern CITs have to be capable of creating an environment where people dynamically interact with integrated business processes, other employees, partners, suppliers and customers. Meanwhile groupware solutions have to be customised to each single user: creating a high-performance environment by tailoring representation specifically to each person's role. Modern CIT solutions are required to be capable of providing 'extended team support' – information generated between (outside) group-to-group and distributed meetings. Meanwhile, intelligent collaborative solutions are expected to be restrictive of redundant effort, and to enable 'economies of expertise' – pre-selecting higher value activities for people to focus on in order to reduce the complexity of the work environment, help deploy the right skills at the right time to enable, and get work done where it makes the most sense. The question of 'Is clear CIT identity possible in view of all these demands?' remains open.

Agostini (1997) hypothesised that any CIT supporting a cooperative process should adapt itself to group/team 'membership' with the maximum degree of plasticity in order to avoid constraining the behaviour of the community members. In order to do so, the CIT should be able to support the interaction between those having the 'membership' status and those not having it. As pointed out by Agostini (1997), Lotus Notes was one of the first CITs to go in this direction with its Internotes module. Schmidt and Wagner (2004) went so far as to argue that one of the biggest challenges of cooperative process management was how to achieve compatibility among immensely composite practices, consisting of interrelated artefacts, classification schemes, notations, nomenclatures, standard formats, validation procedures, schedules, routing schemes, etc. This of course, as pointed out by Schmidt and Wagner (2004), raises non-trivial technical issues of interoperability, as digital artefacts such as CAD systems, Excel sheets, lists, photos and e-mail messages are incorporated in these complexes. The good thing about collaborative tools – and a characteristic feature which may be utilised to improve CIT compatibility (and, accordingly, CIT identity) – is, according to Dewan (2001), that both collaborative applications and infrastructures may be built on top of general-purpose software infrastructure such as user-interface tools, databases systems, or distributed systems.

The following Section presents the second factor (a system attribute) which – based on the case studies – I identified as influencing the process of CIT diffusion: 'System Customisation' (see Table 9.1 above).

9.2 System Customisation

By 'System Customisation' I mean:

the practices of 'tailoring' the collaboration systems according to user needs.

The latter is dependent on the possibility for human users to modify the information and reasoning processes their systems are using – the so called 'system tailorability' (after Olson et al. 2001, p.126).

As mentioned in Chapter 7, I have performed the cross-case comparison (Empirical Study II – Critical Meta-Analysis of Case-Study Reports) guided by one of the research questions (see Section 2.2), i.e. 'What influencing factors (barriers or accelerators) are determinant of CIT adoption and diffusion?'.

While seeking an answer to this question, I have compared the case-study reports (through manual coding and matching of similarities, as described in Chapter 7), and based on that, I have discovered the following:

> the factor coded as 'System Customisation' is present and discussed in the role of a 'determinant' (accelerator or barrier) of CIT diffusion in 28% of all case studies. These are 15 different case studies of CIT adoption trials spanning right the way through the years 1994-2006. In most of the cases, the practices of system customisation have played the role of a ***diffusion accelerator***. My cross-case comparison has shown that the 'system customisation' factor has been ***repeatedly observed*** as influencing CIT diffusion in structurally the same form in 15 different case studies. Some cases have been observed and described in 2006, others in 2003, 1999, 1998 etc.

In the *Open Source Software Development* case (***Case 5*** – see Appendix I), team members were tailoring their 'self-made' collaborative system to their needs every time a problem aroused requiring such change (e.g. through problem–focused coping[50]). In the case of *ThinkLets* (***Case 14***), system tailorability was exploited through:

a) *differentiation* – one CIT was appropriated in many different ways for many different purposes, especially for creating solutions for mission-critical collaborative tasks that recurred frequently. There was a general inclination toward avoidance of 'general purpose' GSS facilities;

b) *collaboration engineering* – tailored, repeatable collaborative processes (for deriving value from GSS) were developed to be conducted by practitioners themselves (instead of external facilitators).

At the large UK corporation (the case of the *Implementation of Information Engineering* – ***Case 51***), ***lack of system tailorability (high level of system formality) was imposed on the employees*** in the IT department. There were attempts to formalise the procedures which the employees used to guide their work. The CIT

[50] Problem–focused coping (Coping Theory, Lazarus 2000) aims at managing the disruptive issue itself (unlike emotion–focused coping which concentrates on self-deception, avoidance, and distancing).

tool implicitly assumed a 'rational actor' model of work behaviour, one which conflicted with well established organisational behaviour in the corporation.

In the study of the continued and discontinued use of *OptionFinder* (***Case 15***), negative perceptions of task-technology fit delayed adoption and initial use of the GSS ('OptionFinder'). Users' aspiration for system customisation was obvious in their tendency to 'frame' OptionFinder's compatibility in terms of a specific type of task. In the *Petro* case (***Case 47***), the news-feed Lotus Notes application was tailored and modified by the departmental IS specialist to suit the specific needs of the company executives. ***Before modification, the system was disrupting existing work practices***, and ways around it had been developed by the users.

At *Unilever* (***Case 39***) the Lotus Notes database was initially giving free access to all project info to everybody. This gradually began threatening the independence of the project, and so the database was *tailored* into public and private [project] areas. In the case of the implementation and use of Lotus Notes at the delivery project department of *Valmet* (the large paper machinery manufacturer – ***Case 34***), the Lotus Notes document archives were (here again) ***constantly tailored for the department***. They were modified repeatedly by the support person in the department. Various ways of use emerged bottom-up after two years. Users came up with suggestions for further expansion, enhancement, and modification.

According to the *HDB* case study (***Case 37***), core applications of the Lotus Notes Office System were modified continuously during the three years of use at the Housing and Development Board of Singapore. At the *Eiger* (***Case 32***) software division located in the U.S., Asia, and Europe, the Notes application kept being modified by the software specialists to support specific collaboration requirements. Similarly, at *THC* (the small holding company – ***Case 38***), the Notes applications keep being tailored and modified to support project-related collaboration requirements. System tailorability was used consciously to support the continuing processes of change in the organisation.

At *CCC* (the small computer consulting company – ***Case 20***), several key Notes applications were tailored by two developers in the company, according to users' wishes. Everybody could develop own applications. Applications were often revised and new ones were often devised. In the case of the implementation and use of the Notes artefact within a large, multi-national consulting firm (*Consulting Firm* – ***Case 44***), practices of system customisation were evident in a three-fold manner:

a) through ***ongoing user adaptation*** prompted by market influences;
b) through the opportunity for users to create customised applications which utilised the underlying Notes functionality;
c) through cautious experimentations: a few users explored new modes of distributing information.

In the case of the implementation and use of Lotus Notes within the customer support department (CSD) of *Zeta* (***Case 45***), system customisation was also evident in a similar three-fold manner, the third dimension being 'technological improvisation' – 'a technology-in-use which involved use of the artefact in response to unexpected breakdowns, exceptions, slippages, or opportunities within the workplace' (Orlikowski 1995a, p.22) The case of the evolving use of groupware in a service network of freelancers (*SIGMA* – ***Case 16***) was a design strategy representing a path toward a groupware infrastructure appropriate (customised) for the organisation. SIGMA's members had maintained and gradually refined a unique heterogeneous groupware fabric; the activities involved may be interpreted as a design strategy of ***multiple parallel experimental use, objectification and creative appropriations***.

The customisation of the *BABBLE* (***Case 19***) chat-like system was evident in the user appropriation of two 'social affordance[51]' instances: 1) the communicative practice of 'waylay', 2) the 'unobtrusive broadcast' of information. The communicative practice of waylay meant watching for a person to be active and then opening a communication channel with them. Unobtrusive broadcast stood for requesting or sharing information without interrupting others (i.e. getting help one needed while not overburdening one's more senior colleagues).

An overview of the 'System Customisation' factor's representation in the case-study reports is presented in Table 9.3 below. Table 9.3 presents a short description of 'what happened' in each case, and how the practices of 'system customisation' were influencing CIT diffusion.

Factor / **Case**	**System Customisation**
Case 5. Open Source Software Development	Problem–focused coping and *tailoring* of 'self-made' collaborative system by OSS team members.
Case 14. ThinkLets	*System customisation* performed through: 1. Differentiation: one CIT appropriated in many different ways for many different purposes, especially for mission-critical collaborative tasks; 2. Collaboration Engineering: *tailored*, repeatable collaborative processes.
Case 15. OptionFinder	Adoption delayed because of negative perceptions of task-technology fit. Users *tailoring* the system's fit to specific task types.

[51] Social affordance is 'the relationship between the properties of an object and the social characteristics of a group that enable particular kinds of interaction among members of that group' (Bradner 1999, p.154).

***Case 16*. SIGMA**	Evolving use of groupware in a service network of freelancers. Unique, heterogeneous groupware fabric *tailored* through multiple parallel experimental use, objectification and creative appropriations.
***Case 19*. BABBLE**	*Customisation* of a chat-like system evident in: 1) the communicative practice of 'waylay', 2) 'unobtrusive broadcast' of information.
***Case 20*. CCC**	Key Lotus Notes applications *tailored* by company developers to satisfy user wishes. 'Self-made' system applications. Applications often revised. New applications often devised.
***Case 32*. Eiger**	Lotus Notes application *modified* by software specialists to support specific collaboration requirements.
***Case 34*. Valmet**	Lotus Notes document archives constantly *tailored* by the support person in the department. Various ways of use. User suggestions for system expansion, enhancement, and modification.
***Case 37*. HDB**	Core applications of the Office System *modified* continuously during the three years of use.
***Case 38*. THC**	Notes applications *tailored* and modified to support specific collaboration requirements. *System customisation* performed consciously to support the continuing processes of change in the organisation.
***Case 39*. Unilever**	Lotus Notes database *tailored* into 'public' and 'private' (project) areas.
***Case 44*. Consulting Firm**	*System customisation* evident in a three-fold manner: 1. ongoing user *adaptation* prompted by market influences; 2. the opportunity for users to create *customised* Notes applications; 3. cautious *experimentation* (with new modes of distributing information).
***Case 45*. Zeta**	*System customisation* evident in a three-fold manner: 1. ongoing user *adaptation* prompted by market influences; 2. the opportunity for users to create *customised* Notes applications; 3. *technological improvisation*.

Case 47. Petro	Lotus Notes application *tailored* and modified by the departmental IS specialist to suit the specific needs of the company executives.
Case 51. Implementation of Information Engineering	*Lack of* system tailorability (high level of system formality). Management attempts to formalise work procedures. 'Rational actor' work model of collaborative system conflicted with well established organisational behaviour.

Table 9.3. 'System Customisation' in the Case Studies

Table 9.4 below presents information, extracted from the case-study reports by manual coding, pertaining to the ***actors*** performing the system-customisation practices. In other words, Table 9.4 answers the question of 'customised/tailored by whom?' in relation to the CIT systems.

Cases	Number of Cases	% of Total
System customised by End Users		
Case 5, ***Case 15***, ***Case 16***, ***Case 44***, ***Case 45***	5	33
System customised by Department IT Specialists		
Case 20, ***Case 32***, ***Case 34***, ***Case 47***	4	27
System customised by ? (unknown)		
Case 14, ***Case 19***, ***Case 37***, ***Case 38***, ***Case 39***, ***Case 51***	6	40
Total	15	100

Table 9.4. Actors Performing 'System Customisation' in the Case Studies

Based on the information extracted from the case-study reports by manual coding, I was able to identify two types of actors that were actively involved in system-customisation practices:

- ***End Users*** – the CIT systems were customised by end users in 5 different cases or 33% of the total (those were ***Cases 5***, ***15***, ***16***, ***44***, and ***45***) , and
- ***Department IT Specialists*** – the CIT systems were customised by department IT specialists in 4 different cases or 27% of the total (those were the ***Cases 20***, ***32***, ***34***, and ***47***).

In 6 of the cases, this type of information – i.e. the specification of who *exactly* did the system-customising, department IT specialists or others – was not provided in the case-study reports, and, therefore, could not be extracted at this level of detail.

9.2.1 ‘System Customisation’ – Diffusion Barrier or Accelerator?

The historical review of CIT diffusion, executed through detailed analysis of 53 case-study reports of CIT diffusion (Empirical Study II), has shown the following: the factor of ‘System Customisation’ has been ***repeatedly observed*** as playing the role of a ‘determinant’ (accelerator or barrier) of CIT diffusion in 15 different case studies. These 15 different cases were observed and described by different authors, in different years, from 1994 right the way through 2006. These are ***Cases 5***, ***14***, ***15***, ***16***, ***19***, ***20***, ***32***, ***34***, ***37***, ***38***, ***39***, ***44***, ***45***, ***47***, and ***51*** (see Appendix II).

A sufficient level of system tailorability (to enable system-customisation practices) was available in most cases of bottom-up CIT diffusion. Users were modifying and experimenting with the tools, and that positively influenced the rate of diffusion of the CITs. In cases where system-customisation practices were lacking (e.g. because a high level of system formality was imposed on the employees), that was hampering the adoption and diffusion of the collaborative tools.

Based on the 15 different case studies of CIT diffusion which stem from different years between 1994 and 2006, and in which the ‘customisation’ factor is present, I may summarise that:

> the factor of ‘System Customisation’ has been repeatedly observed as influencing the process of CIT diffusion in important ways, all through the years 1994-2006. That means that this factor has historically been ***persistently influencing*** CIT diffusion in structurally the same form. In most of the cases, system-customisation practices have been an ***accelerator*** of CIT diffusion.

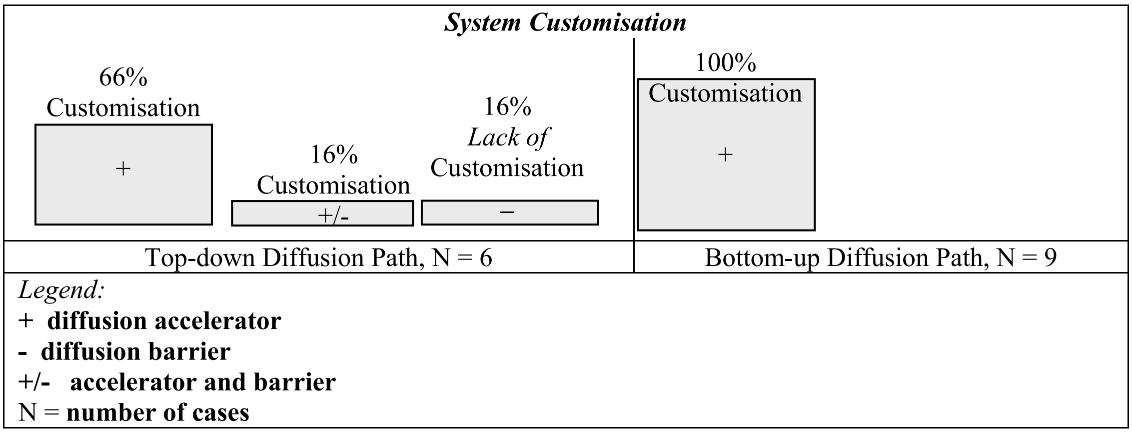


Figure 9.3. ‘Accelerator’ or ‘Barrier’ Role of ‘Customisation’ Factor pertaining to CIT Diffusion: Proportional Availability in Cases

Figure 9.3 represents the proportional availability in the case studies of the ‘System Customisation’ factor, discussed as:

- accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process;

- barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process.

Figure 9.3 also takes account of the ***process structure*** of CIT diffusion:

- Top-down Diffusion Path – the cases in which CITs have diffused top-down (authority-based) – this is a total of 6 cases;
- Bottom-up Diffusion Path – the cases in which CITs have diffused bottom-up (initiated by employees) – this is a total of 9 cases.

Here is some information extracted from the critical meta-analysis of case-study reports.

I. Top-down Diffusion Path

a) In 66% of the (top-down) cases (4 cases altogether), the system-customisation practices that were taking place (enabled by a sufficient level of system tailorability) have tended to stimulate (or enable) CIT diffusion. These cases are *HDB*, *Consulting Firm*, *Zeta*, and *Petro* (***Cases 37***, ***44***, ***45***, and ***47*** – see Appendix II), etc.

b) In 16% of the cases (1 case only), the system-customisation practices have played the role of both a diffusion accelerator and a diffusion barrier. One example is the *BABBLE* chat-like system (***Case 19***). The possibilities to 'tailor' the chat-like system by creating one's own group of contacts has played the role of an adoption accelerator for management, and an adoption barrier for the employees. Through the communicative practice of 'waylay' – watching for a person to be active on the chat-like system – management has been able to control and unobtrusively surveil the availability of their employees. The latter has, respectively, made the employees feel constantly monitored by management.

c) In 16% of the cases (1 case – *Implementation of Information Engineering* – ***Case 51***), system-customisation practices have not taken place (as a consequence of lacking system tailorability) and that has played the role of a diffusion barrier. In this case, the CIT implicitly assumed a 'rational actor' model of work behaviour. The CIT represented the normal sequence of processing of tasks, and so got in the way of changes and sensible variations of normal practice.

II. Bottom-up Diffusion Path

In 100% of the cases (9 cases altogether), the existing system-customisation practices have stimulated (or enabled) CIT diffusion. Some examples are the cases of *Open Source Software Development*, *ThinkLets*, *OptionFinder*, *SIGMA*, *Eiger*, *Valmet*, *THC*, and *Unilever* (***Cases 5***, ***14***, ***15***, ***16***, ***32***, ***34***, ***38***, and ***39*** – see Appendix II), etc.

In view of all of the above, it is clear that – whenever system-customisation practices were taking place – they were prevailingly playing the role of a diffusion accelerator, along both the top-down and bottom-up diffusion path (in 66% of the ‘top-down’ cases, and in 100% of the ‘bottom-up’ cases). Based on this finding, I may now hypothesise that:

Hypothesis 9.5. System-customisation practices tend to stimulate (or enable) CIT adoption and diffusion.

Figure 9.4 presents Conceptual Framework 3c (CF3c). The Conceptual Framework depicts the hypothesised influence of the ‘customisation’ factor on CIT diffusion. The representation takes account of the process structure of CIT diffusion with the two identified diffusion paths – top-down and bottom-up (CF3c is, therefore, a logical extension of CFØ).

The ‘System Customisation’ factor is depicted in Figure 9.4 as: a) accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process; b) barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process. Various strength of the arrows in Figure 9.4 is applied to illustrate the level/weight of relative influence of the factor on CIT diffusion. Conceptual Framework 3c (Figure 9.4) has been derived as follows:

- as mentioned above, CF3c is a logical extension of the Preliminary Conceptual Framework, CFØ (see Figure 6.3);
- CF3c is based on the summary of findings from Empirical Study II (pertaining to the factor in question) which were presented in Figure 9.3.

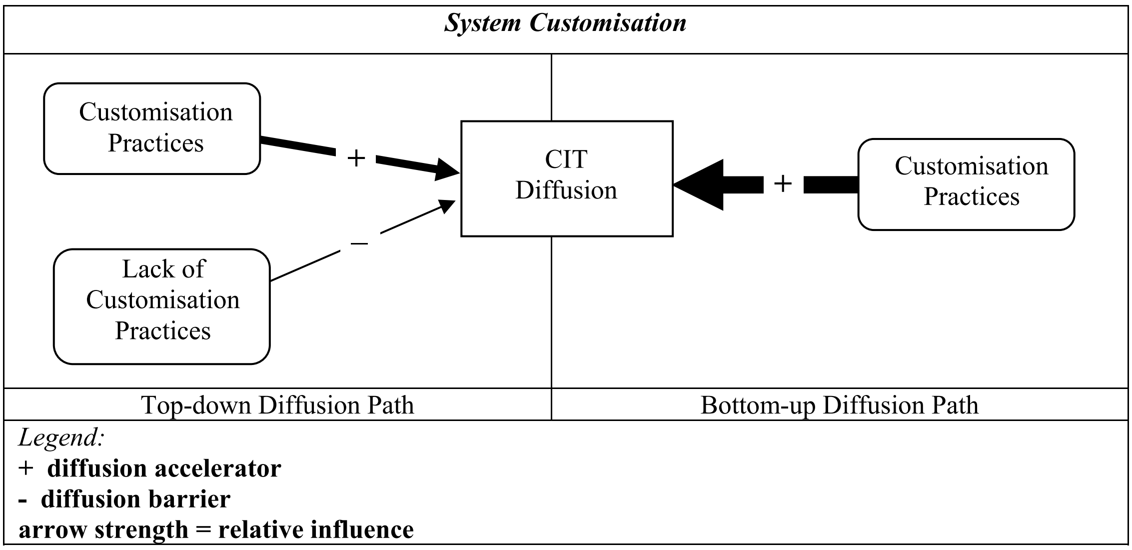


Figure 9.4. Hypothesised Influence of the ‘Customisation’ Factor on CIT Diffusion (Conceptual Framework 3c)

Conceptual Framework 3c (Figure 9.4) visually represents Hypothesis 9.5. This Hypothesis was derived from the observations – based on the case-study reports –

that system-customisation practices tend to stimulate (or enable) CIT adoption and diffusion (see Figure 9.3).

The thin arrow on the left-hand side in Figure 9.4 visually represents what has been depicted in Figure 9.3 as happening in 16% of the top-down diffusion cases – i.e. system-customisation practices have not taken place and that has hampered CIT diffusion. The second (a bit thicker) arrow on the left-hand side in Figure 9.4 visually represents what has been depicted in Figure 9.3 as happening in 66% of the top-down diffusion cases – i.e. the system-customisation practices that were taking place tended to stimulate (or enable) CIT diffusion. The thick arrow on the right-hand side in Figure 9.4 visually represents what has been depicted in Figure 9.3 as happening in 100% of the bottom-down diffusion cases (9 cases altogether) – i.e. the existing system-customisation practices have stimulated (or enabled) CIT diffusion.

9.2.2 Discussion

Several streams of research have been concerned with assessing the practices of IT-system customisation and their influence on user acceptance of IT in general. One of the most frequently-discussed user-acceptance factors, in this respect, is the so called 'task-technology fit' (also know as 'job-fit'). Thompson et al. (1991) defined this factor as the user-perception of how the capabilities of the system can enhance individual's job performance. Venkatesh et al. (2003, p.448) identified this factor as a 'root construct' in assessing the IT-system's performance expectancy from an end-user perspective. 'Task-technology fit' is relevant to the discussion on system-customisation practices because, as mentioned above, system customisation means 'tailoring' according to user needs – i.e. in order to achieve a better task-technology fit.

Other several streams of research have been concerned with assessing the degree of flexibility of technology (e.g. Boudreau and Robey 2005) referring to what extent the users are able to modify and tailor the technology to fit their needs. Some type of technology is more flexible (such as Lotus Notes) (Chisalita 2006, p.99) while other type of technology is less flexible (e.g. most group support systems). Malone, Lai, and Fry (1992) coined the term 'radically tailorable tools' to describe technological artefacts, typically realised in computer software, which are less predetermined, fixed-function, and specific-purpose than other artefacts. Prior to them, Sproull and Goodman (1990) rightfully demanded that more research attention be paid to 'programmable technology' (p.257) as holding much promise for quick user appropriation by 'allowing for the possibility of continuous redesign'. Orlikowski (1995) conceptualised the notion of 'context-specific work aid' while examining the infrastructures of open-ended general-purpose platforms on which users may build their own local customisations and applications.

'System tailorability' is the ability of people (including those who are not skilled programmers) to easily 'tailor' the collaboration systems they are using according to their needs. The latter is guaranteed by the possibility for human users to see and modify the information and reasoning processes their systems are using (after Olson et al.2001, p.126). For example, the case of the evolving use of groupware in a service network of freelancers (*SIGMA* – ***Case 16***), underlined how inappropriate it was to restrict the quality of design relevance only to the activities of those whose official professional responsibility included 'design' (Törpel et al. 2003). This theme actually repeats an observation made by Hutchins et al. (1986) that the 'cognitive distance' between using an application and designing it can be reduced by radically tailorable systems.

In reflecting upon their experiences in designing collaboration technologies over 10 years, Olson et al. (2001) formulated two key design principles 'to embody useful forms of humility in proceeding toward the goal of building truly useful collaboration technology' (p.126):

1. 'Principle of *Semiformal Systems*. Don't try to formally define all the ways a system can be used, and don't build computational agents that try to solve complex problems all by themselves. Instead, build systems where the boundary between what the systems do and what the humans do is a flexible one.
2. Principle of *Radical Tailorability.* Don't try to predetermine all the formal structure in a system, and don't build agents that try to figure out for themselves things that humans could easily tell them. Instead, try to build systems that make it as easy as possible for human users to see and modify the information and reasoning processes their systems are using' (Olson et al. 2001, p.126).

Collaboration information systems seem to have almost always been at one extreme or the other [52]. At one extreme are typically highly-structured systems like conventional electronic meeting systems, group support systems, group calendars and timesheets, group decision support systems, databases and knowledge bases 'with strict requirements about the contents of different kinds of *fields* and with structured procedures for processing the information represented in the system' (Olson et al. 2001, p.134). At the other extreme are very unstructured systems like social collaboration systems (wikis, blogs etc.), as well as electronic mail. The concept of semiformal systems, introduced by Olson et al. (2001), opened up a vast middle ground between these two extremes and suggested that collaborative work could be supported by computer-based systems in a much wider range of ways.

One important consequence of the definition of a *semiformal system* (see above) is that information in a semiformal system is 'semi-structured' with some structured elements such as named fields and some unstructured elements such as free text, voice, or images. It is useful for a semiformal system to be 'tolerant' of unstructured or unexpected information, even in places where some kind of structured information might usually be expected (Olson et al. 2001, p.135). For example, 'Information Lens' – a semiformal collaboration support system – was letting people structure their messages to a certain degree (e.g. by putting some information in special fields), but still letting them include other unstructured information, e.g. 'I don't

[52] This assertion of mine was later confirmed by what I found in CIT literature – e.g. Bernstein's (2000) 'Specificity Frontier', discussed later in this Thesis in Section 14.1.

know yet' in the 'Place' field of a 'Meeting Announcement' message. Apart from that, the system was automatically 'learning' from observing users' behaviour only after having provided a way for users to directly specify what they want (Olson et al. 2001, pp.134-135).

This process of letting end users modify their own systems is often called 'end user programming', and Information Lens embodied – in rudimentary form – a kind of end user programming which Olson et al. (2001, p.137) have since come to call *radical tailorability*. Hereby, the term '*tailorable*' is used to mean that these systems can be changed without ever 'really programming', i.e. without ever having to leave the application domain and work in a separate underlying 'programming' domain. The term '*radically*' is used to suggest that very large changes can be made by tailoring. Radically tailorable systems, therefore, differ from 'ordinary' tailorable systems (such as word processing programs with 'preferences' parameters) in the degree to which users can create a wide range of substantially different applications. For instance, starting with the same blank spreadsheet, users can create applications ranging from personal budgeting to sales forecasting to corporate finance (Olson et al. 2001, p.137).

One of the most radically tailorable computer-based tools is spreadsheets. One radically tailorable collaboration system – according to Olson et al. (2001, p.154) – is Lotus Notes. The system is similar to earlier computer conferencing systems with the important additions that the documents in a database are semi-structured templates (with optional 'hot links' to other documents), and can be filtered and summarised according to various user-definable views. In addition, the system may include templates for unstructured text or customised views of the data that, for example, show only high priority reports or sort reports by what competitors and customers are involved in.

Silver (1990) defined system *restrictiveness* as the degree to which and the manner in which a system limits its users' decision-making processes to a subset of all possible processes. According to Robinson and Bannon (1991), for example, a recurring problem with workflow systems is their restrictiveness and inflexibility. Workflow systems often represent the *normal* sequence of processing of tasks, and may so get in the way of changes that are needed to handle special situations, such as the absence of some person who plays a key role. Left to themselves, humans are capable of finding sensible variations of normal practice in such cases, but a workflow system may prevent them from doing so. Suchman (1983) has pointed out that there is, in some sense, an essentially infinite amount of potential complexity in any real situation. Therefore, formalising procedures through restrictive CITs may be counterproductive.

In summary:

> In this Chapter, I have presented a part of the detailed results from Empirical Study II – the part pertaining to attributes of the system, i.e. the factors of 'CIT Identity' and 'System Customisation'. I have given some details on what

exactly has been observed and described in each of the case-study reports concerning these two factors. I have illustrated (and then discussed) the proportional availability in the cases of the two factors, as either ‘accelerator’ or ‘barrier’ of CIT diffusion. Based on these findings (as well as on findings from previous chapters), I have then generated grounded Hypotheses and derived Conceptual Frameworks 3b (CF3b) and 3c (CF3c).

Chapter 10

ATTRIBUTES OF THE COLLABORATION

This Chapter presents part of the detailed results from Empirical Study II (Critical Meta-Analysis of Case-Study Reports) – the part pertaining to 'attributes of the collaboration', i.e. characteristics of the collaborative ensembles and their members. Table 10.1 depicts the thematic focus of this Chapter.

Factor	% Availability in Cases	Number of Cases
Attributes of the System		
CIT Identity	30	16
System Customisation	28	15
Attributes of the Collaboration		
Mediator Role	**36**	**19**
Number of System Users	**17**	**9**
Support of a Champion	**9**	**5**
Affective Reward	**9**	**5**
Size of the Collaborative Ensembles	**9**	**5**
Collaboration History	**6**	**3**
Attributes of the Organisational Context		
Incentives for Using CITs	55	29
Power-Structure Change	21	11
Long-term Unpredictability	4	2

Table 10.1. Thematic Focus of this Chapter

The 53 different CIT case study reports that I have analysed and compared were presented in Chapter 7. Background information on the cases is available in Appendix II. The sections below discuss six factors (attributes of the collaboration) which – based on the case studies – I identified as influencing the process of CIT diffusion: 'Mediator Role', 'Number of System Users', 'Support of a Champion', 'Affective Reward, 'Size of the Collaborative Ensembles, and 'Collaboration History' (see Table 10.1).

10.1 Mediator Role

By 'Mediator Role' I mean:

the influence of human mediators (such as manager, trainer, arbitrator, referee, MSS/GSS facilitator, moderator) on CIT user acceptance.

As mentioned in Chapter 7, I have performed the cross-case comparison (Empirical Study II – Critical Meta-Analysis of Case-Study Reports) guided by one of the research questions (see Section 2.2), i.e. 'What influencing factors (barriers or accelerators) are determinant of CIT adoption and diffusion?'.

While seeking an answer to this question, I have compared the case-study reports (through manual coding and matching of similarities, as described in Chapter 7), and based on that, I have discovered the following:

> the factor coded as 'Mediator Role' is present and discussed in the role of a 'determinant' (accelerator or barrier) of CIT diffusion in 36% of all case-study reports. These are 19 different case studies of CIT adoption trials spanning right the way through the years 1999-2006. Generally, the case studies have shown that the mediator can influence the CIT diffusion process both positively and negatively – a dominant mediator can make CIT use unappealing, and a skilled mediator can multiply the benefits from CIT use. Some types of CITs – e.g. Meeting Support Systems – seem to be dependant on expert facilitators to operate the technology. My cross-case comparison has shown that the 'mediator role' factor has been ***repeatedly observed*** as influencing CIT diffusion in structurally the same form in 19 different case studies. Some cases have been observed and described in 2006, others in 2005, 2003, 2001, and 1999. What is particularly interesting is that researchers have expressed the same surprise over this factor in 2006 that they were expressing in 1999.

Cases 21 to ***29*** were describing the application and usage of GroupSystems (a group support system) and the influence of the GSS-facilitator on group behaviour. The lessons learned from these case studies show that the following *assumptions* seem to dominate the public, as well as the design of GroupSystems:

1) Groups should be guided by a process facilitator: (a) the facilitator should master the meeting process; (b) the facilitator should control electronic communication opportunities; (c) only the facilitator or the whole group makes changes in the meeting agenda or process.
2) Meeting processes should be 'fair': (a) participants should have equal time contributing to a meeting; (b) participants should have equal opportunity contributing to a meeting; (c) dominant behaviour should be avoided; (d) participants' votes should weigh equally.
3) Meeting processes should be 'rational': (a) the only important attribute of an idea is content; (b) body language should not influence the decision making process; (c) meeting processes should be structured (agenda, behavioural rules, communication rules); (d) consensus on issues can be achieved by voting.

Similarly, in all three ***Cases 11***, ***12*** and ***13*** (*SODA, Strategic Choice,* and *GroupSystems*) the role of the mediator was found to be crucial. That role demanded not only understanding of the system but was extended to taking on 'different roles e.g. arbitrator, referee, moderator'. Critical demands were as follows: (a) facilitation efforts needed to be 'issue based'; (b) facilitators needed to set their expectations 'based on outcomes'; (c) facilitators needed to be flexible in terms of how they managed the GSS; (d) facilitators needed to ensure that quick wins were possible; (e) facilitators needed to ensure that the collaboration design provided the means for developing a common basis for 'shared understanding'.

The *Alpha Alliance* (***Case 18***) was illustrative of the negative effects a dominant facilitator may play on organisational collaborative practices. The facilitated collaboration at Alpha Alliance suffered from:

a) *Democracy Paradox* (Phony Democracy) – where the meeting support system (MSS) exacerbated the degree to which the dominant leader wished his position shared by the group. The leader used the MSS to provide a rationale for the domination of his/her viewpoint. The facilitator role was to mitigate the 'phony democracy' effects, i.e. to prevent the MSS-supported group interaction from being adversely affected by the dominant leader's goals and priorities, and the collaboration climate changing from one of participatory democracy to dictatorship;

b) *Conflict* – where the MSS generated conflict instead of reducing it. Headstrong, domineering leaders sought to stifle individualistic behaviour that did not conform to their goals and priorities. Paradoxically, the MSS, in these circumstances, facilitated emergence of points of friction, and enabled conflict, not reduced it;

c) *Illusion of Alliance* – the feeling the facilitated MSS tended to offer to group members was that their comments and opinions really mattered, when de facto, they did not.

The case of *ThinkLets* (***Case 14***) has shown that some characteristics and skills of a facilitator are crucial for the long-term survival of well-used CIT facilities. In order to succeed, a CIT facilitator must be, among other things: (a) a good communicator, (b) a task-focused problem-solver, (c) a people-person who perceives group objectives and understands group dynamics, (d) experienced with configuring and maintaining the CIT critical hardware and netware, (e) flexible, (f) a leader.

The *ThinkLets* case (***Case 14***) has also shown that, apart from that, a CIT facilitator must be able to cope with high conceptual load. CIT complexity – the need to understand what a CIT could do for a group, and the high conceptual load associated with that – encouraged dependence on expert facilitators to operate the technology and guide the collaboration process. Therefore, high conceptual load obstructed diffusion and self-sustained use of CITs in organisations as expert facilitators often became transient, leaving a CIT facility susceptible to abandonment. Whether for negative economic reasons or positive political reasons, facilitators were transient.

In the ***Cases 6*** to ***9*** (*ComNotes*, *Procom*, *Comtech,* and *Chemhouse*), several factors explained the existence of different Lotus Notes 'identities'. The latter were found to be related to the role of mediators such as manager, trainer, or facilitator. Mediators strongly influenced the adoption of Notes in the case studies, as they themselves were making sense of the technology and influencing others. In the case of *OptionFinder* (***Case 15***) the presence of a skilled technical facilitator was found critical for initial and continued use of the GSS.

An overview of the ‘Mediator Role’s representation in the case-study reports is presented in Table 10.2 below. Table 10.2 presents a short description of ‘what happened’ in each case, and how the mediator was influencing the process of CIT adoption.

Factor **Case**	**Mediator Role**
Case 6. ComNotes ***Case 7***. Procom ***Case 8***. Comtech ***Case 9***. Chemhouse	Different Notes ‘CIT identities’ related to the role of mediators such as *manager, trainer, or facilitator*. Strong influence of ‘*mediators*’ on the adoption of Lotus Notes.
Case 11. SODA: North Ayr Partnership in Europe ***Case 12***. Strategic Choice: Whitbread Partnership in Europe ***Case 13***. GroupSystems: Lanark County	Crucial facilitator role. Facilitator role extended to ‘*arbitrator, referee, moderator*’. Critical demands on facilitator role formulated.
Case 14. ThinkLets	Facilitator skills – found to be crucial for the long-term survival of well-used CIT facilities. Requirements on facilitator skills formulated. Finding: CIT complexity – the need to understand what a CIT could do for a group, and the high conceptual load associated with that – encourages dependence on expert facilitators to operate the technology.
Case 15. OptionFinder	Presence of a skilled technical facilitator: critical for initial and continued use of the GSS.
Case 18. Alpha Alliance	The facilitated-MSS collaboration at Alpha Alliance suffered from: 1. *Democracy Paradox*: the MSS exacerbated the degree to which the dominant leader wished his position shared by the group. The facilitator role was to mitigate the ‘phony democracy’ effects; 2. *Conflict*: the MSS generated conflict instead of reducing it; 3. *Illusion of Alliance*: the facilitated MSS gave group members the feeling that their comments and opinions really mattered, when de facto, they did not.
Case 21. Ministerial Strategy Development ***Case 22***. Optimisation of Waste-Recycling Chains ***Case 23***. Inter-municipal Cooperation ***Case 24***. Oil and Gas Supply	Requirements on facilitator role extracted from cases of application and usage of GroupSystems (a GSS): 1. Groups should be guided by a process facilitator, i.e. the facilitator should master the meeting process etc.; 2. The meeting process should be fair, i.e. dominant leader behaviour should be mitigated by the facilitator;

Industry	3. The meeting process should be rational, i.e. consensus on issues can be achieved by voting.
Case 25. Strategy Development University Board	
Case 26. Environmental Law Enforcement	
Case 27. National Physical Planning	
Case 28. Provincial Working Procedures	
Case 29. Prison Privatisation	

Table 10.2. 'Mediator Role' in the Case Studies

10.1.1 'Mediator Role' – Diffusion Barrier or Accelerator?

The historical review of CIT diffusion, executed through detailed analysis of 53 case-study reports of CIT diffusion (Empirical Study II), has shown the following: the factor of 'Mediator Role' has been ***repeatedly observed*** as playing the role of a 'determinant' (accelerator or barrier) of CIT diffusion in 19 different case studies. These 19 different cases were observed and described by different authors, in different years, from 1999 right the way through 2006. These are ***Cases 6***, *7*, ***8***, ***9***, ***11***, ***12***, ***13***, ***14***, ***15***, ***18***, ***21***, ***22***, ***23***, ***24***, ***25***, ***26***, *27*, ***28***, and ***29*** (see Appendix II).

Based on the 19 different case studies of CIT diffusion which stem from different years between 1999 and 2006, and in which the 'mediator' factor is present, I may summarise that:

> the factor of 'Mediator Role' has been repeatedly observed as influencing the process of CIT diffusion in important ways, all through the years 1999-2006. That means that this factor has historically been ***persistently influencing*** CIT diffusion in structurally the same form. In most of the cases the mediator has played a crucial role in the CIT adoption process. The influence has been both positive and negative, depending on the skills and attitudes of the mediator (experienced or inexperienced, dominant etc.). In many cases mediators became transient (changed their positions), leaving the CIT facilities susceptible to abandonment.

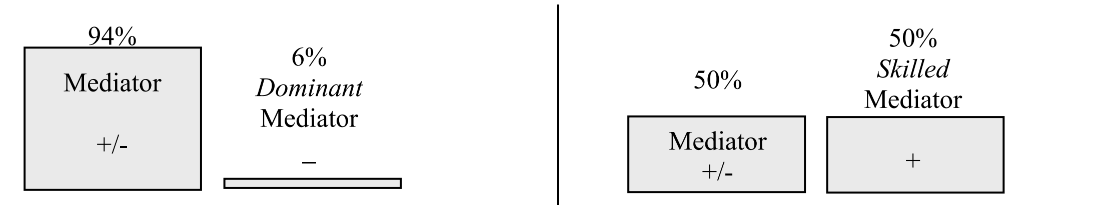
Figure 10.1 represents the proportional availability in the case studies of the 'Mediator Role' factor, discussed as:

- accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process;
- barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process.

Figure 10.1 also takes account of the ***process structure*** of CIT diffusion:

- Top-down Diffusion Path – the cases in which CITs have diffused top-down (authority-based) – this is a total of 17 cases;
- Bottom-up Diffusion Path – the cases in which CITs have diffused bottom-up (initiated by employees) – this is a total of 2 cases.

Mediator Role



Top-down Diffusion Path, N = 17	Bottom-up Diffusion Path, N = 2

Legend:
\+ **diffusion accelerator**
\- **diffusion barrier**
\+ - **accelerator and barrier**
N = **number of cases**

Figure 10.1. ‘Accelerator’ or ‘Barrier’ Role of ‘Mediator’ Factor pertaining to CIT Diffusion: Proportional Availability in Cases

Here is some information extracted from the critical meta-analysis of case-study reports.

I. Top-down Diffusion Path

a) In 94% of the (top-down) cases (16 cases altogether), the CIT mediator has played the role of both a diffusion accelerator and a diffusion barrier. Various mediator roles have crystallised, e.g. manager, trainer, arbitrator, referee, moderator. Generally, the case studies have shown that the degree to which a mediator can influence the CIT diffusion process depends on the manner in which CITs are designed – i.e. what kind and what variety of mediator actions CITs are designed to allow for or to require.

b) In 6% of the cases (one case – *Alpha Alliance* case, ***Case 18***), a *dominant* mediator has played the role of a diffusion barrier. The case was illustrative of the negative effects a dominant or inexperienced mediator may play on organisational collaborative practices, i.e. the Democracy Paradox, Conflict, as well as the Illusion to Alliance:
    - Democracy Paradox: the CIT exacerbates the degree to which the dominant mediator wishes his position shared by the group;
    - Conflict: the CIT generates conflict instead of reducing it;
    - Illusion of Alliance: the facilitated CIT gives group members the feeling that their comments and opinions really matter, when de facto, they do not (see Figure 10.1 above).

II. Bottom-up Diffusion Path

a) In 50% of the cases (1 case only – *ThinkLets*, ***Case 14***), the CIT mediator has played the role of both a diffusion accelerator and a diffusion barrier. Here again, this case study has shown that the degree to which a mediator can influence the CIT diffusion process depends on the manner in which the CIT is designed – i.e. what kind and what variety of mediator actions the CIT is designed to allow for or to require. CIT complexity required facilitator expertise. The need to understand what the CIT could do for the group, and the high conceptual load associated with that, meant dependence on expert facilitators to operate the technology.

b) In 50% of the cases (1 case only – *OptionFinder*, ***Case 15***), a *skilled* mediator has played the role of a diffusion accelerator. The presence of a skilled technical facilitator was critical for initial and continued use of the group support system.

Based on these findings, I may now hypothesise that:

Hypothesis 10.1. The degree to which a mediator can influence the CIT diffusion process depends on the manner in which CITs are designed – i.e. what kind and what variety of mediator actions CITs are designed to allow for or to require.

> **10.1 a)** CIT complexity, and the high conceptual load associated with that, can mean dependence on expert mediators to operate the technology.
>
> **10.1 b)** When CITs are designed to allow for a great variety of mediator actions, that may have 'dominant mediators' as a consequence, and the negative effects associated with that (e.g. a dominant mediator using the CIT as an instrument of imposing his/her position on the group, a dominant facilitator using the CIT as an instrument of creating a 'false consensus effect', thus reinforcing people's willingness to conform, etc.)

The formulation of Hypothesis 10.1 (see above) makes clear that all suggestions concerning 'Mediator Role' are not generalised for all CIT types altogether, but are only relevant for CIT types that are designed to allow for or to require some kind of mediator actions. To state the obvious – if a CIT is not designed to allow for or to require any kind of mediator actions – Hypothesis 10.1 will, obviously, not be relevant to it.

As can be seen from Table 10.3, the following CIT types/applications are dealt with in the case-study reports discussing 'Mediator Role' (a total of 19 case-study reports):

- 79% of the cases (15 case-study reports) are discussing implementation and use of GSS (also called EMS or MSS);
- 21% of the cases (4 case-study reports) are discussing implementation and use of Lotus Notes.

Mediator Role		
CIT Type/Application as in Report	*No of Case-Study Reports*	*%*
GSS/EMS/MSS	15	79
Lotus Notes	4	21
Total	19	100

Table 10.3. CIT Types/Applications in the Case-Study Reports discussing 'Mediator Role'

In the sample of case-study reports, there is a noticeable preponderance of reports on GSS/EMS/MSS (79% – 15 case-study reports). This 'bias' is actually quite logical and 'natural' given that – obviously (and as stated in the formulation of Hypothesis 10.1) – 'Mediator Role' is only relevant for CIT types that are designed to allow for or to require some kind of mediator actions. The latter tend to be – as the primary data has shown – typically GSS, EMS, or MSS, and less typically IBM Lotus Notes collaboration tools.

Figure 10.2 presents Conceptual Framework 3d (CF3d). This Conceptual Framework depicts the hypothesised influence of the 'Mediator Role' factor on CIT diffusion. The representation takes account of the process structure of CIT diffusion with the two identified diffusion paths – top-down and bottom-up. The findings from Empirical Study II have supported/confirmed the assertion of existence of two diffusion paths – CF3d is, therefore, a logical extension of CFØ (Figure 6.3 above).

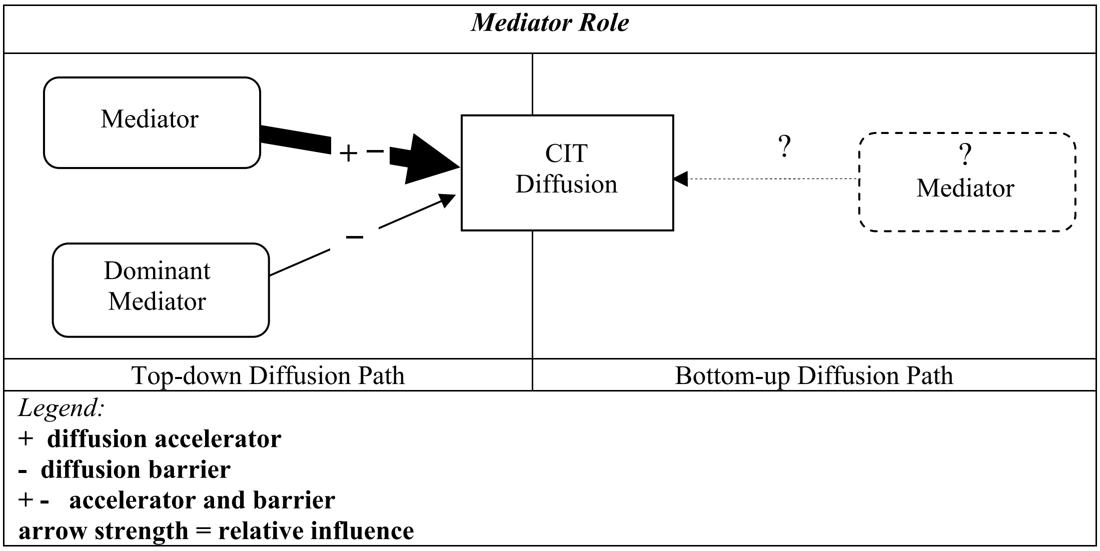


Figure 10.2. Hypothesised Influence of the 'Mediator Role' Factor on CIT Diffusion (Conceptual Framework 3d)

The 'Mediator Role' factor is depicted in Figure 10.2 as: a) accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process; b) barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process, or both. Various line-strength of the arrows in Figure 10.2 is applied to illustrate the level/weight of relative influence of the factor on CIT diffusion. Conceptual Framework 3d (Figure 10.2) has been derived as follows:

- as mentioned above, CF3d is a logical extension of the Preliminary Conceptual Framework, CFØ (see Figure 6.3);
- CF3d is based on the summary of findings from Empirical Study II (pertaining to the factor in question) which were presented in Figure 10.1.

Conceptual Framework 3d (Figure 10.2) visually represents the single hypothesis generated in this Section – Hypothesis 10.1. The thick arrow on the left-hand side in Figure 10.2 visually represents the observations – based on the case-study reports – that the CIT mediator can play both a positive and a negative role (i.e. be both a diffusion accelerator and a diffusion barrier) in the top-down (authority-based) CIT diffusion path (see Figure 10.1 above). The thin arrow on the left-hand side in Figure 10.2 visually represents Hypothesis 10.1.b (see above).

The right-hand side in Figure 10.2 visually represents the bottom-up CIT diffusion path. The small number of bottom-up cases (i.e. 2 cases only – see Figure 10.1) made it impossible to generate grounded hypotheses concerning the bottom-up diffusion path. The small number of cases requires a note that the results concerning the bottom-up diffusion path are indicative rather than numerically valid. The dotted lines and question marks in the right-hand side of Figure 10.2 are applied to denote that the source data has not been enough in quantity to generate (even a hypothetical) conceptual framework. Therefore, the indicative results concerning the bottom-up diffusion path are depicted in Figure 10.2 as an 'open question' rather than a grounded hypothesis.

10.1.2 Discussion

As mentioned above, the mediator role was an important factor for successful CIT implementation in the ***Cases 6-9***. Also in all three ***Cases 11-13*** (the *SODA* case study, the *Strategic Choice* case study, and the *GroupSystems* case study) the role of the mediator was found to be crucial. The *Alpha Alliance* case (***Case 18***) was illustrative of the negative effects a dominant or inexperienced mediator may play on organisational collaborative practices, like the Democracy Paradox, Conflict, as well as the Illusion to Alliance.

The ***Democracy Paradox*** is an effect caused by a mediator's actions during CIT usage where the CIT exacerbates the degree to which a dominant leader imposes his position to be shared by the group. The Democracy Paradox deserves special attention, as it is directly relevant to the quality of the decision-making process:

- Organisational theory argues that the quality of the decision-making process depends on whether the representation of parties reflects many different interests (pluralism) or encompasses only partial interests in a self-propagating process (incrementalism).
- Authors such as Rommetveit (1980, p.126) have affirmed the point that an essential component of communicative competence in a pluralistic social world is our capacity to adopt the perspectives of different others.

- The Theory of Plural Incrementalism (Braybrooke and Lindblom 1963, Brenner 1973, Lindblom 1959,1968) goes so far as to argue that the quality of decisions rests entirely in the quality of the decision-making process; there is need neither for objectives nor their evaluation. All that matters is that in a dynamic field of political forces, an agreed-upon process for negotiation exists (Olson, Malone, Smith 2001, p.661).

Chris Argyris, one of the deans of organisational theory, suggests that there is a 'deep-rooted hostility on the part of bosses to opposition from subordinates' (Surowiecki 2004, p.208). In a case of a boss trying to eliminate opposition from subordinates, 'individual irrationality provokes collective irrationally' (Surowiecki 2004, p.233), and 'inauthentic behaviour' becomes actually the norm within most organisations. According to Parent and Gallupe (2001) CITs can be 'agents of phony democracies', thereby supporting the deep-rooted hostility on the part of bosses to opposition from subordinates. The *democracy paradox* comes from the wishes of dominant leaders to use a CIT as an instrument of imposing their position on the group. Similarly, phony democracies occur when leaders purport to make group members feel part of the decision-making process, when in fact all they are doing is leading them to understand their (the leaders') viewpoint before they impose their own solution (Parent and Gallupe 2001, Davison and Vogel 2000).

According to Oslon et al. (2001, p.22), any group decision can, in principle, be made by authority (e.g. a manager decides), by voting, or by consensus (resulting from negotiation). Some CITs are designed to support decision-making through consensus based on an agreed-upon process for negotiation. Instead of that, however, CITs in practice sometimes give rise to a 'false consensus effect' – a situation described by Ross et al. (1977) as one in which people assume that others are more similar to themselves than is actually the case. According to Surowiecki (2004, pp.43-44), the '***false consensus effect***' appears to be another demonstration of people's willingness to conform, or of the idea of 'social proof', which is the tendency to assume that if lots of people are doing something or believe something, there must be a good reason why.

If CITs are designed in a manner which allows for a variety of facilitator's actions, facilitators can invoke a ***phony democracy*** effect during CIT use by:

- changing the order in which people speak. 'Earlier comments are more influential, and they tend to provide a framework within which the discussion occurs. As in an information cascade, once that framework is in place, it is difficult for a dissenter to break it down' (Surowiecki 2004, p.186);
- giving the word more often to 'higher-status people who end up talking more and more often than lower-status people. This wouldn't matter as much if the authority of higher-status people was derived from their greater knowledge. But oftentimes it does not.' (Surowiecki 2004, p.186).

Olson et al. (2001) saw the task of information technology to be one of supporting the subjective process of perspective making and perspective taking (p.63). They suggested that ideas from Philosophy and Rhetoric be learned from in order to design a CIT environment for active sense making in which individuals can construct representations of their changing understandings and can explore them in a 'fair' conversation with others. In such an environment, the CIT should ***temper and mitigate the dominant role of higher-status people, instead of encouraging it***.

Olson et al. (2001) gave the example of two cooperative work tools, gIBIS (Conklin and Begeman 1988) and Sibyl (Lee 1990) through which the processes of perspective making and perspective taking were achieved by reflection and conversations that involved the narrativisation of experience as well as explicit rational analytic procedures. Both these systems – gIBIS and Sibyl – are based on ideas from philosophy and rhetoric about the logical structure of decision making. For example, the basic elements in the gIBIS system (issues, positions, and arguments) are taken from a philosophical analysis of argumentation by Rittel and Kunz (1970). The constructs for representing arguments in Sibyl are based on the work of philosophers like Toulmin (1958) and Rescher (1977) (Olson et al. 2001, p.31).

CITs can be sources of ***conflict*** when they generate tension among the members of a collaborative ensemble. As pointed out by Parent and Gallupe (2001), the illusion of democracy (as described above) can lead to conflict situations either when group members see through the guile, and realise their opinions are not being heeded, or, as was the case for the *Alpha Alliance* (***Case 18***), when the group members do not adhere to the leader's script. When a leader wishes to use a CIT under the pretext of equal, parallel participation, s/he risks creating more conflict than would otherwise be the case if this pretext were removed. Under these circumstances, CITs serve not as conflict-reducers or conflict-managers, but as ***conflict inducers*** by allowing for contrarian opinions to be surfaced (Parent and Gallupe 2001, p.418).

Scholars like Ciborra (1987), Schelling (1960) and Williamson (1985) have pointed out that some amount of goal conflict is nearly always present in human organisations. Kling (1980) argued that actors performing interdependent activities may have conflicting interests and that what might be called 'political processes' are ways of managing them. Surowiecki (2004) considered the notion of 'group polarisation' (p.184) – circumstances where deliberation does not moderate but rather radicalises people's point of view – a phenomenon that is not well understood. An area to learn from, in this respect, would be the field of *dispute systems design* (Ury et al. 1989), in which a process is established for settling conflicts efficiently.

Olson et al. (2001) saw two potentially valuable alternatives to dispute resolution in the methods of Dialectical Inquiry (DI) and Devil's Advocate (DA). The authors argued that these two methods offered a new role for technology in ***promoting harmony in the presence of goal conflict***. In principle, Olson et al. (2001, p.668) proposed an analysis of harmony in the presence of goal conflicts and suggested seven mechanisms for bringing peace out of conflict – mechanisms to which the design of CITs had to adhere to:

1. ‘Improving participants’ knowledge of each other’s valuations.
2. Improving participants’ knowledge of the true effects of actions and the true valuation of states.
3. Reducing gaps between apparent and informed valuation.
4. Excluding regions of the state space in which conflict is certain.
5. Reducing the actions available to participants directly in favour of exogenous processes which participants can influence indirectly.
6. Altering the tactical valuation of states – communicating the tactical contingencies accurately to other participants, so that they know which courses of action will activate or avert the threat (after Fisher, Kopelman, and Schneider 1994).
7. Recruiting other participants whose available actions change the tactical valuation of states’.

The ***illusion of alliance*** is the feeling a facilitated-CIT tends to offer to group members that their comments and opinions really matter, when de facto, they do not. The leader has an agenda, and uses the CIT to let it emerge unobtrusively (Parent and Gallupe 2001). The illusion of alliance has the disturbing effect not of opening people’s minds but of closing them, similar to a situation of ‘***assumed consensus***’. As the historian Arthur Schlesinger Jr. put it (in Surowiecki 2004, p.37), ‘Our meetings took place in a curious atmosphere of assumed consensus’. Even if at first no consensus existed – only the appearance of ‘assumed consensus’– turned the appearance into reality.

10.2 Number of System Users

By ‘Number of System Users’ I mean:

the certain number of users of a CIT.

As mentioned in Chapter 7, I have performed the cross-case comparison (Empirical Study II – Critical Meta-Analysis of Case-Study Reports) guided by one of the research questions (see Section 2.2), i.e. ‘What influencing factors (barriers or accelerators) are determinant of CIT adoption and diffusion?’.

While seeking an answer to this question, I have compared the case-study reports (through manual coding and matching of similarities, as described in Chapter 7), and based on that, I have discovered the following:

> the factor coded as ‘Number of System Users’ is present and discussed in the role of a ‘determinant’ (accelerator or barrier) of CIT diffusion in 17% of all case studies. These are 9 different case studies of CIT adoption trials spanning

right the way through the years 1994-2009. Generally, the case studies have shown that the number of users of a CIT is crucially important for its adoption rate – the more people are using the tool, the better chances it has to achieve mass uptake quickly. It is important to note that what matters is not simply how many people are using the CIT, but how many 'friends' belonging to one's personal social network are using it. My cross-case comparison has shown that the 'number of users' factor has been repeatedly observed as influencing CIT diffusion in structurally the same form in 9 different case studies. Some cases have been observed and described in 2009, others in 2006, 2003, 1999, 1997, and 1994.

The case of the *Implementation of Information Engineering* at a large UK corporation (***Case 51***) has shown that attempts to use the system were hampered by problems relating to incompatibility with past technologies, and the small number of system users (unutilised network effects) associated with that. The past technologies were designed to be used from 'cradle to grave' and not on selected stages in the software lifecycle. On the contrary, at *Midwest Insurance* (***Case 35***) employees could profit from strong network effects. The more people were using Lotus Notes, the more interdependent and satisfied they were getting, as they could profit from interdependency and the network effects associated with it. From the *Blogging* case study (***Case 10***), it becomes obvious that employees were translating their personal blogging experience into their workplace. With public blogging, they were profiting from the global scale and wisdom of numerous web-tool users.

In the *SIGMA* freelance collaborative arrangement (***Case 16***), network effects (due to increased number of CIT users) were possible owing to:

a) *Integration* – one CIT provided for the existence of multiple use modes formerly realised by multiple systems;
b) *Standardisation* – one or more specific ways of use were objectified in one CIT;
c) *Proliferation* – for the same purpose, different technologies were appropriated.

The 'number of users' factor influenced the adoption of *BABBLE* (the chat-like system for computer-supported collaborative working – ***Case 19***). The adoption of the chat-like system required a critical mass of users. The observed adoption patterns revealed 'fragility' – an issue of critical mass. The system seemed barely to have a sufficient number of users. One or two people, by dropping out, could cause the deployment to fail. In the *Open Source Software Development* case (***Case 5***), software exhibited strong network effects derived from a larger number of individuals using the OSS standard.

At *Accenture* (***Case 1***), the 'number of users' factor seemed to be insignificant in the beginning. There seemed to be no obvious correlation between the number of users and the network awareness about member activities. Later on, it became clear that such correlation did exist. Increased network awareness in the form of, e.g. new contributions to forum discussions, led to significant improvement of the level of user motivation to contribute. It became clear that employees were 'taking the SNS serious' only when sufficient number of their colleagues, especially colleagues occupying higher positions, were members and active users of the SNS. Only under this condition could the SNS transform from an 'idea' to a real business tool.

When asked what kind of SNS they preferred – *Bluepages* or internet-based platforms such as XING – the majority of *IBM* employees (***Case 2***) answered that they preferred the Bluepages because they had a lot more contacts available there. The lack of critical user-mass played the role of an adoption barrier for *SAP's SNS 'Harmony'* (***Case 3***). One user described the problem as follows: he thought that the chances of finding a colleague he needed through Harmony were not very high. It became clear that what mattered was not simply how many people were using the system, but how many 'friends' belonging to one's personal social network were using it. Harmony's intensity of usage increased significantly with the implementation of the 'invitation' feature through which private invitations to participate could be sent.

An overview of the 'Number of System Users' factor's representation in the case-study reports is presented in Table 10.4 below. Table 10.4 presents a short description of 'what happened' in each case, and how the number of users was influencing the process of CIT adoption.

Factor / **Case**	**Number of System Users**
Case 1. Social Networking at Accenture	No sufficient *critical mass of users* in the beginning. No obvious correlation between the number of users and the network awareness about member activities in the beginning. Later on, it became clear that such correlation did exist. Critical mass of users led to significant improvement of the user motivation to contribute.
Case 2. IBM's SNS 'Bluepages'	IBM employees preferred the Bluepages because they had a lot more contacts available there (*critical mass of users*).
Case 3. SAP's SNS 'Harmony'	What mattered was not simply how many people were using the system, but *how many 'friends'* belonging to one's personal social network were using it. Intensity of system usage increased significantly with the implementation of the 'invitation' feature (for sending private invitations to participate).
Case 5. Open Source Software Development	The open–source collaborative ensemble profits from *positive network effects* derived from a larger number of individuals using the OSS standard.

Case 10. Blogging	With public Blogging at work about work, employees were profiting from the global scale and wisdom, as well as the *network effects* offered by the web tools.
Case 16. SIGMA	Network effects in CIT use made possible by: 1. *Integration*: one CIT provided for multiple existing use modes formerly realised by multiple systems; 2. *Standardization*: one or more specific ways of use were objectified in one CIT; 3. *Proliferation*: for the same purpose, different technologies were appropriated.
Case 19. BABBLE	Adoption of the chat-like system was hampered by 'fragility' – an issue of *lacking critical user-mass*. One or two people, by dropping out, could cause the system deployment to fail.
Case 35. Midwest Insurance	The *more people* were using Lotus Notes, the more interdependent and satisfied they were getting, as they could profit from interdependency and the network effects associated with it.
Case 50. Implementation of Information Engineering	Problems relating to incompatibility with past methodologies, and the *negative network effects* (small number of users) associated with that.

Table 10.4. 'Number of System Users' in the Case Studies

10.2.1 'Number of System Users' – Diffusion Barrier or Accelerator?

The historical review of CIT diffusion, executed through detailed analysis of 53 case-study reports of CIT diffusion (Empirical Study II), has shown the following: the factor of 'Number of System Users' has been ***repeatedly observed*** as playing the role of a 'determinant' (accelerator or barrier) of CIT diffusion in 9 different case studies. These 9 different cases were observed and described by different authors, in different years, from 1994 right the way through 2009. These are ***Cases 1***, ***2***, ***3***, ***5***, ***10***, ***16***, ***19***, ***35***, and ***50*** (see Appendix II).

Based on the 9 different case studies of CIT diffusion which stem from different years between 1994 and 2009, and in which the 'number of users' factor is present, I may summarise that:

> the factor of 'Number of System Users' has been repeatedly observed as influencing the process of CIT diffusion in important ways, all through the years 1994-2009. That means that this factor has historically been ***persistently influencing*** CIT diffusion in structurally the same form. In most of the cases,

the number of users of a CIT was crucially important for its successful diffusion – the more people were using the tool, the more quickly it was diffusing. Thereby, what mattered was not simply how many people were using the CIT, but how many ‘friends’ belonging to one’s personal social network were using it, and how many ‘managers’ (or people with high positions in the hierarchy) were using it.

Figure 10.3 below represents the proportional availability in the case studies of the ‘critical mass’ factor, discussed as:

- accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process;
- barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process.

Figure 10.3 also takes account of the ***process structure*** of CIT diffusion:

- Top-down Diffusion Path – the cases in which CITs have diffused top-down (authority-based) – this is a total of 5 cases;
- Bottom-up Diffusion Path – the cases in which CITs have diffused bottom-up (initiated by employees) – this is a total of 4 cases.

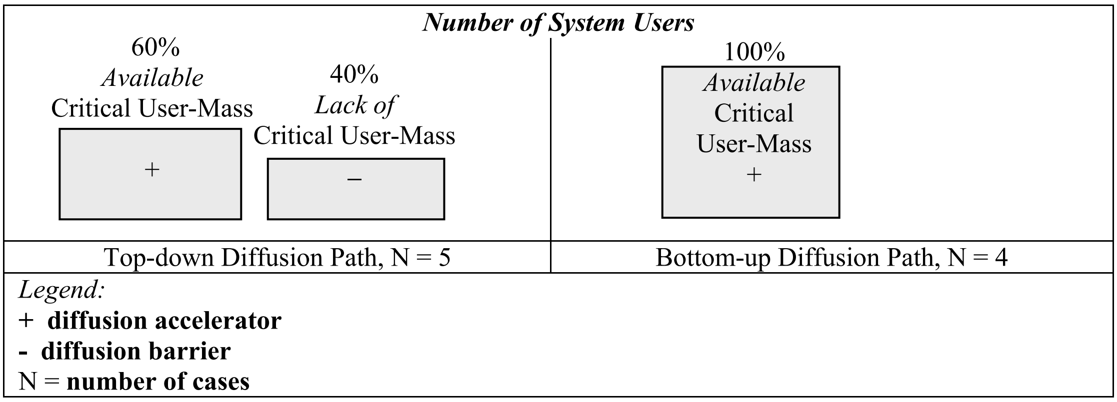


Figure 10.3. ‘Accelerator’ or ‘Barrier’ Role of ‘Number of Users’ Factor pertaining to CIT Diffusion: Proportional Availability in Cases

Here is some information extracted from the critical meta-analysis of case-study reports.

I. Top-down Diffusion Path

a) In 60% of the (top-down) cases (3 cases altogether – *IBM’s SNS ‘Bluepages’*, *SAP’s SNS ‘Harmony’*, *Midwest Insurance* – ***Cases 2, 3, 35***), a critical mass of users has been available. In all of these cases, the sufficient number of users has played the role of a diffusion accelerator. It has not simply mattered how many people have been using the system, but how many ‘friends’ belonging to one’s personal social network have been using it (e.g. for *SAP’s SNS ‘Harmony’* – ***Case 3***).

b) In 40% of the cases (2 cases – *BABBLE* and *Midwest Insurance* – ***Cases 19*** and ***35***), the *lack* of a critical mass of users has played the role of a diffusion barrier.

II. Bottom-up Diffusion Path

In 100% of the cases (4 cases altogether – *Social Networking at Accenture*, *Open Source Software Development*, *Blogging*, *SIGMA* – ***Cases 1***, ***5***, ***10***, ***16***), a critical mass of users has been available. In all of these cases, the sufficient number of users has played the role of a diffusion accelerator.

Based on these findings, and what I said in Section 10.2, I may now hypothesise that:

Hypothesis 10.2. A sufficient number of system users plays the role of a CIT diffusion accelerator.

> **10.2.a)** What matters is not simply how many people are using the CIT, but how many 'friends' belonging to one's personal social network are using it or how many 'managers' (people with high positions in the hierarchy) are using it.

Hypothesis 10.3. The *lack* of critical mass of users plays the role of a CIT diffusion barrier.

Figure 10.4 presents Conceptual Framework 3e (CF3e). The Conceptual Framework depicts the hypothesised influence of the 'number of users' factor on CIT diffusion. The representation takes account of the process structure of CIT diffusion with the two identified diffusion paths – top-down and bottom-up. The findings from Empirical Study II have supported/confirmed the assertion of existence of two diffusion paths – CF3e is, therefore, a logical extension of CFØ.

The 'Number of System Users' factor is depicted in Figure 10.4 as: a) accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process; b) barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process. Various strength of the arrows in Figure 10.4 is applied to illustrate the level/weight of relative influence of the factor on CIT diffusion. Conceptual Framework 3e (Figure 10.4) has been derived as follows:

- as mentioned above, CF3e is a logical extension of the Preliminary Conceptual Framework, CFØ (see Figure 6.3);
- CF3e is based on the summary of findings from Empirical Study II (pertaining to the factor in question) which were presented in Figure 10.3.

Conceptual Framework 3e (Figure 10.4) visually represents the Hypotheses generated in this Chapter and the observations – based on the case-study reports – which were presented in Figure 10.3. The thick arrows on the left-hand and right-hand side in Figure 10.4 visually represent the observation (and Hypothesis 10.2 –

see above) that a sufficient (or growing) number of system users plays a positive role on the rate of CIT diffusion. The thin arrow on the left-hand side in Figure 10.4 visually represents observation (and Hypothesis 10.3) that the lack of critical mass of users hampers the process of CIT diffusion and cause the CIT facilities to become self-extinguishing over time.

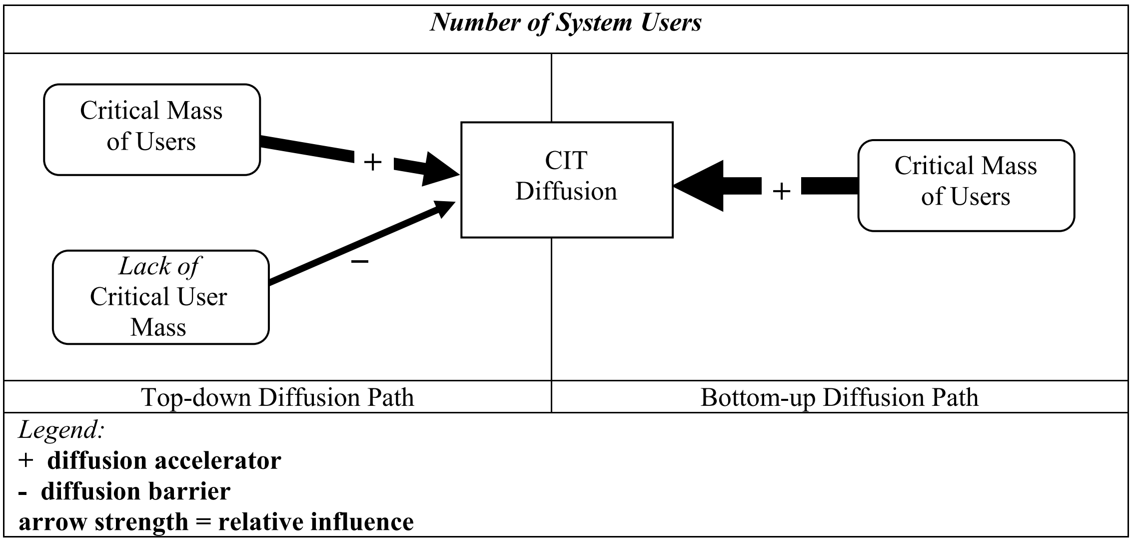


Figure 10.4. Hypothesised Influence of the 'Number of Users' Factor on CIT Diffusion (Conceptual Framework 3e)

10.2.2 Discussion

As we saw above, the number of CIT users may be over or under 'critical'. The term 'critical mass' stems from three different theories/ explanatory models:

- The critical mass theory (Keyes Jr. 1952) – an explanatory model which predicts that the utility of a communication medium to its users will rise with the number of users (Markus 1987), especially when the users' roles are interdependent (as in the case of collaborative work).
- Dix's (1997) analysis of the cost-benefit trade-offs for a CIT user. The costs of use of a CIT are often constant irrespective of the number of other users. The benefit rises with the number of other users. If there is a small number of users, the cost for each user is likely to exceed the benefit; only when there are a large number of other users does the benefit exceed the cost. The cross-over point is called the 'critical mass'.
- Arthur (1994) – critical mass is associated with the so-called 'network effects' of CIT use.

Many of the discussed case studies (*Implementation of Information Engineering*, *Midwest Insurance*, *Blogging*, *SIGMA, BABBLE* – ***Cases 51***, ***35***, ***10***, ***16***, ***19***) have shown that the critical mass of users, and the network effects associated with it, are important factors influencing CIT diffusion. The literal meaning of 'network effect' (in economics and business) is associated with the effect that one user of a good or service has on the value of that good or service to other users. The classic example is the telephone. The more people own telephones, the more valuable is the telephone network. The network effect theory (Katz and Shapiro 1985, Shapiro and Varian 1999a/1999b) posits that the benefits that adopters derive from a network technology are positively associated with the size of the network. Important to note is that strong network effects are displayed by 'combinatorial' networks, while most 'radial' (also called 'hub-and-spoke') networks in which members or users are connected with the dot-com server but not with each other, do not show network effects of great significance (Arthur 2000).

As mentioned above, the critical mass theory (Keyes Jr. 1952) predicts that the utility of a communication medium to its users will rise with the number of users (Markus 1987), especially when the users' roles are interdependent (as in the case of collaborative work). As I pointed out in Section 4.1 above, Kling (1987) observed that one reported reason for the failure of management systems was the difficulty of getting everyone to use them. According to Ehrlich (1987), 'a critical mass of users is essential for the success of any communication system'. Similarly, CIT applications are meant to be used by multiple individuals and critical mass is essential for their adoption. It is not far-fetched to say the following: ***the difficulty of getting a critical mass of individuals to use a CIT application is one of the most important challenges of collaborative technology adoption***.

A user's ability and incentive to adopt a newer technology are largely a function of her level of related experience with prior technologies (Cohen and Levinthal 1990) – the so called path dependency in technology adoption (Arthur 1994, Cohen and Levinthal 1990). Switching costs, as well as factors of customisation, dominant design, and standardisation, dictate a pattern of repetitive adoption and repetitive usage of well–known IT standards, although novel standards may promise better efficiency and effectiveness. Further, it has been claimed that learning effects would provide advantage to any IT version that got ahead in cumulative adoptions; and so the adoption process could lock in, by historical chance, to whichever version of the technology got a better start (Arthur 1994).

Path–dependent effects have been given different names in the information systems literature. For example, the 'bandwagon' effect (Fichman 2000) can also be met as 'me too' variety or 'join the crowd' effect. This effect originates in a self–reinforcing process (critical mass pressure), which yields a tendency for a community to become locked-in to widely adopted technology standards. Hence, a trend emerges for excess inertia to develop around an existing standard because of reluctance among users to leave a mature network and join an immature one.

By the same token, Swanson and Ramiller (2004) elaborated on the commonplace practice of innovating mindlessly with IT – as being entertained whenever organisations choose to be inattentive to the firm's own circumstances; by doing so, they let IT–usage routines lull them into complacency with some widely touted 'best practice'. The origins of IT–mindlessness are in attention deferral, which extends into adoption (bandwagon pressures) (Swanson and Ramiller 2004). All this is accompanied by the 'thoughtlessness' of end–user ***habituation***, which may play the role of subjective norm within Web communities: pervasive informational cascades may prevail, falsely suggesting that a broad, substantive, and well–considered consensus exists.

For example the OSS setting, as a combinatorial eNetwork, displays strong network effects. Shapiro and Varian (1999b) claimed that open-source software is an information good exhibiting network effects stemming from standardisation: increasing marginal value derived from a larger number of individuals using the standard. In other words, the larger the number of individuals using the standard, the more valuable the software (Iannacci 2006). Raymond (1998a) speculated that an extended user base was a wonderful thing to have, because:

'Properly cultivated, [users] can become co–developers. Another strength of the Unix tradition, one that Linux pushes to a happy extreme, is that a lot of users are hackers too. Because source code is available, they can be effective hackers. This can be tremendously useful for shortening debugging time. Given a bit of encouragement, your users will diagnose problems, suggest fixes, and help improve the code far more quickly than you could unaided' (Raymond 1998a).

10.3 Support of a Champion

By 'Support of a Champion' I mean:

the types of support (training, help etc.) that early adopters of technology (champions) provide in order to facilitate the acceptance of a technological artefact.

Technological champions could be managers, trainers, arbitrators, referees, moderators etc., as well as ordinary employees.

As mentioned in Chapter 7, I have performed the cross-case comparison (Empirical Study II – Critical Meta-Analysis of Case-Study Reports) guided by one of the research questions (see Section 2.2), i.e. 'What influencing factors (barriers or accelerators) are determinant of CIT adoption and diffusion?'.

While seeking an answer to this question, I have compared the case-study reports (through manual coding and matching of similarities, as described in Chapter 7), and based on that, I have discovered the following:

> the factor coded as 'Support of a Champion' is present and discussed in the role of a 'determinant' (accelerator or barrier) of CIT diffusion in 9% of all case studies. These are 5 different case studies of CIT adoption trials spanning right the way through the years 1997-2009. Generally, the case studies have shown that active champion support positively influences the process of CIT diffusion. Important are both inter- and intradepartmental technology

champions. My cross-case comparison has shown that the ‘champion’ factor has been ***repeatedly observed*** as influencing CIT diffusion in structurally the same form in 5 different case studies. The cases have been observed and described independently in 2009, 2003, 1998, and 1997.

In the *OptionFinder* case (***Case 15***) the ‘championship’ factor was present within two dimensions:

a) throughout the innovation decision process (initial adoption), support for GSS adoption at IOTA relied heavily on GSS champions, acting as boundary spanners or opinion leaders;

b) some informants attributed continued use to an ‘easily accessible’ *intradepartmental* champion. Adopters needed to feel comfortable exercising the option of access to an intradepartmental champion. When they did not, discontinuance and rejection sometimes occurred.

At *Valmet* (the large paper machinery manufacturer – ***Case 34***), the Lotus Notes use became department policy after the first year. Strong management commitment created inter- and intra-departmental champions to support active use. At *Statoil* (the Norwegian oil producer and exporter – ***Case 31***), the Notes diffusion pattern was authority-based too. There were major corporate-level efforts to streamline and focus Notes use. Strong management commitment motivated inter- and intra-departmental champions.

The insufficient top-management commitment to the implementation of ‘People Pages’ – the innovative *Social Networking Software of Accenture* (***Case 1***) – was the reason for the low degree of perceived credibility of the SNS, especially during the initial adoption phase. The rate of diffusion of the innovative SNS within the company was heavily dependent on the exemplary ‘championship’ behaviour of management. In the case of HDB (***Case 37***), on the contrary – the strong management commitment and the exemplary behaviour of inter- and intradepartmental champions accelerated the rate of diffusion.

An overview of the ‘Support of a Champion’ factor’s representation in the case-study reports is presented in Table 10.5 below. Table 10.5 presents a short description of ‘what happened’ in each case, and how the technological champion was influencing the process of CIT adoption.

Factor / Case	Support of a Champion
Case 1. Social Networking at Accenture	Rate of SNS diffusion: *strongly dependent on the exemplary ‘champion’ behaviour* of management. Insufficient top-management commitment to the implementation of ‘People Pages’. Low degree of perceived credibility of the SNS, especially during the initial

	adoption phase.
Case 15. OptionFinder	1. *Presence of a champion*: initial adoption heavily relied on GSS champions acting as boundary spanners or opinion leaders. 2. *Presence of an intradepartmental champion*: access to an intradepartmental champion guaranteed GSS continued use.
Case 31. Statoil	Purely authority-based diffusion pattern. Major corporate-level efforts to streamline and focus Notes use. Strong management commitment. *Inter- and intradepartmental champions*.
Case 34. Valmet	Purely authority-based diffusion pattern. Strong management commitment. *Inter- and intradepartmental champions.* Lotus Notes use: department policy after the first year.
Case 37. HDB	Strong management commitment. *Inter- and intradepartmental champions.*

Table 10.5. 'Support of a Champion' in the Case Studies

10.3.1 'Support of a Champion' – Diffusion Barrier or Accelerator?

The historical review of CIT diffusion, executed through detailed analysis of 53 case-study reports of CIT diffusion (Empirical Study II), has shown the following: the factor of 'Support of a Champion' has been ***repeatedly observed*** as playing the role of a 'determinant' (accelerator or barrier) of CIT diffusion in 5 different case studies. These 5 different cases were observed and described independently by different authors, in different years, from 1997 right the way through 2009. These are ***Cases 1***, ***15***, ***31***, ***34***, and ***37*** (see Appendix II). In most of the cases, the strong champion support has influenced the process of CIT adoption very positively, i.e. has played the role of a diffusion accelerator.

Figure 10.5 below represents the proportional availability in the case studies of the 'Support of a Champion' factor, discussed as:

- accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process;
- barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process.

Figure 10.5 also takes account of the ***process structure*** of CIT diffusion:

- Top-down Diffusion Path – the cases in which CITs have diffused top-down (authority-based) – this is a total of 2 cases;

- Bottom-up Diffusion Path – the cases in which CITs have diffused bottom-up (initiated by employees) – this is a total of 3 cases.

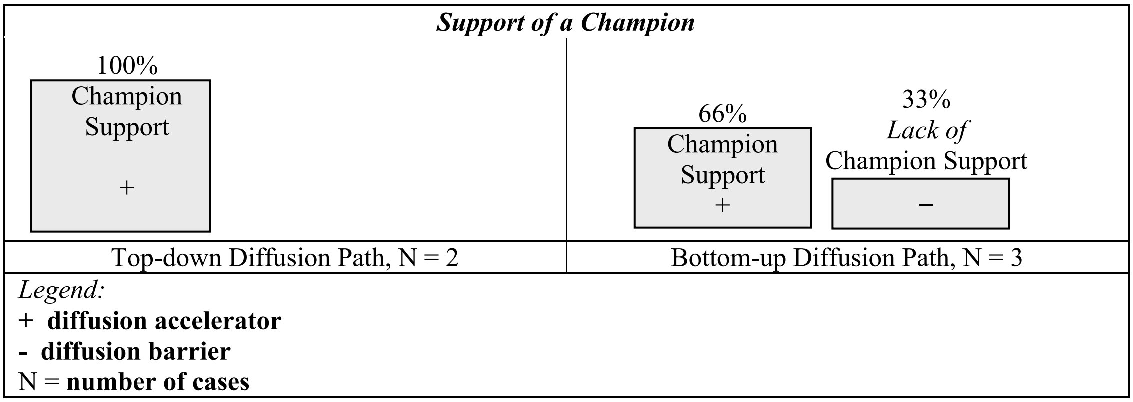


Figure 10.5. 'Accelerator' or 'Barrier' Role of 'Champion' Factor pertaining to CIT Diffusion: Proportional Availability in Cases

Here is some information extracted from the critical meta-analysis of case-study reports.

I. Top-down Diffusion Path

In 100% of the cases (2 cases only – *Statoil* and *HDB* – ***Cases 31*** and ***37***), champion support has played the role of CIT diffusion accelerator. Thereby, important have been both inter- and intradepartmental technology champions.

II. Bottom-up Diffusion Path

a) In 66% of the cases (2 cases), champion support has played the role of CIT diffusion accelerator. Here again, important have been both inter- and intradepartmental technology champions.

b) In 33% of the cases (1 case only – *Social Networking at Accenture* – ***Case 1***), *lack* of champion support has played the role of CIT diffusion barrier. Lacking was, inter alia, an exemplary 'champion' behaviour of management.

The small number of cases dealing with the 'champion support' factor (i.e. 5 cases altogether, 2 describing top-down diffusion and 3 describing bottom-up diffusion – see Figure 10.5) made it impossible to generate grounded hypotheses concerning this factor. The small number of cases requires a note that the results (presented in Figure 10.5) are indicative rather than numerically valid. The source data has not been enough in quantity to generate (even a hypothetical) conceptual framework. Therefore, the indicative results concerning the 'champion support' factor, as depicted in Figure 10.5, serve as 'indications' rather than grounded hypotheses.

10.3.2 Discussion

As mentioned above, I found the ‘Support of a Champion’ intervening factor to be present as a point of deliberation in 9% of the case-study reports (5 cases altogether). In some of the cases (e.g. *OptionFinder*, *Valmet*, *Statoil* – ***Cases 15***, ***34***, ***31***) the ‘championship’ factor was critical. This resonates with Mark and Poltrock’s (2004) diagram showing how groupware technology diffuses through social worlds, often ‘seeded’ by an individual champion (see Figure 4.1 above).

As I pointed out in Section 4.2.1 above, social worlds are ‘seeded’ by one member who has first adopted the technology. That individual – the champion – is usually technically savvy, more knowledgeable about new technologies and more open to trying them. Individual technology championship has been widely recognised as an important push factor stimulating adoption (ever since Roger’s ‘early adoption’). Scholars such as Rai and Patnayakuni (1996) have empirically proven that ‘technology championship has a direct (positive) effect on adoption behaviour’ (p.214).

10.4 Affective Reward

By ‘Affective Reward’ I mean:

the experience of extracting pleasure or happiness from CIT usage.

As mentioned in Chapter 7, I have performed the cross-case comparison (Empirical Study II – Critical Meta-Analysis of Case-Study Reports) guided by one of the research questions (see Section 2.2), i.e. ‘What influencing factors (barriers or accelerators) are determinant of CIT adoption and diffusion?’.

While seeking an answer to this question, I have compared the case-study reports (through manual coding and matching of similarities, as described in Chapter 7), and based on that, I have discovered the following:

> the factor coded as ‘Affective Reward’ is present and discussed in the role of a ‘determinant’ (accelerator or barrier) of CIT diffusion in 9% of all case-study reports. These are 5 different case studies of CIT adoption trials spanning right the way through the years 1996-2009. Generally, the case studies have shown that the degree of affective reward, extracted from CIT use, is an important positive motivator and accelerator for CIT diffusion. On the other hand, the loss of affective reward during CIT use plays the role of a diffusion barrier. My cross-case comparison has shown that the ‘affective reward’ factor has been ***repeatedly observed*** as influencing CIT diffusion in structurally the same form in 5 different case studies. The cases have been observed and described in 2009, 2006 and 1996.

The case of the *Open Source Software Development* (***Case 5***) has shown that OSS team members were partially motivated by ‘hedonism’: a type of affective reward provided by the collaborative environment. According to the *Geek Squad Company* case study (***Case 4***)*,* the employees were experiencing high levels of affective reward while using a massive multiplayer online game (MMOG) as a collaboration support system. The *Fortune 500 Company* case (***Case 40***) revealed a completely different situation. Here, the users of an electronic meeting system (EMS) reported a loss of affective reward often associated with a challenging meeting where they struggled and succeeded. The EMS improved productivity, but participants were feeling emotionally unfulfilled despite exceptionally good results. The comments ran along these lines: 'It went pretty slowly', 'It was a little boring', 'It felt kind of mundane and routine'.

One motivational driver for the use of *IBM's SNS 'Bluepages'* (***Case 2***) was affective reward. Its users were not solely driven by an 'efficiency' motive. As one Bluepages user put it: 'It saves time… but it also satisfies my curiosity. After I have just had a telephone conversation with somebody, I want to see whom I have actually spoken to'.

In the case of *SAP's SNS 'Harmony'* (***Case 3***), affective reward was an adoption accelerator of the system's private component. Many employees saw Harmony as a chance to get involved in private peer groups, and to get to know some colleagues better privately. As a consequence of that, some management representatives saw a risk of Harmony being applied as a private, rather than a business tool.

An overview of the 'Affective Reward' factor's representation in the case-study reports is presented in Table 10.6 below. Table 10.6 presents a short description of 'what happened' in each case, and how affective reward was influencing the process of CIT adoption.

Factor / **Case**	**Affective Reward**
Case 2. IBM's SNS 'Bluepages'	Users were not solely driven by an 'efficiency' motive, but also by an '*affective reward*' motive. The SNS was satisfying the users' curiosity.
Case 3. SAP's SNS 'Harmony'	*Affective reward* was an adoption accelerator of the system's private component. Employees saw the SNS as a chance to get involved in private peer groups, and to get to know some colleagues better privately.
Case 4. Geek Squad Company	Employees were experiencing high levels of *affective reward* while using a MMOG as a collaboration support system.
Case 5. Open Source Software Development	OSS team member are partially motivated by 'hedonism': a type of *affective reward* based on extracting pleasure or happiness from one's work as the chief good in life.

Case 40. Fortune 500 Company	The users of an electronic meeting system (EMS) reported a *loss of affective reward* (compared to a challenging meeting where they struggled and succeeded). The EMS improved productivity, but participants were feeling emotionally unfulfilled.

Table 10.6 'Affective Reward' in the Case Studies

10.4.1 'Affective Reward' – Diffusion Barrier or Accelerator?

The historical review of CIT diffusion, executed through detailed analysis of 53 case-study reports of CIT diffusion (Empirical Study II), has shown the following: the factor of 'Affective Reward' has been ***repeatedly observed*** as playing the role of a 'determinant' (accelerator or barrier) of CIT diffusion in 5 different case studies. These 5 different cases were observed and described by different authors, in different years, from 1996 right the way through 2009. These are ***Cases 2***, ***3***, ***4***, ***5***, and ***40*** (see Appendix II). In most of the cases, the degree of affective reward, extracted from CIT use, has been an important positive motivator and accelerator for CIT diffusion. The loss of affective reward during CIT use has always played the role of a diffusion barrier.

Figure 10.6 below represents the proportional availability in the case studies of the 'Affective Reward' factor, discussed as:

- accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process;
- barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process.

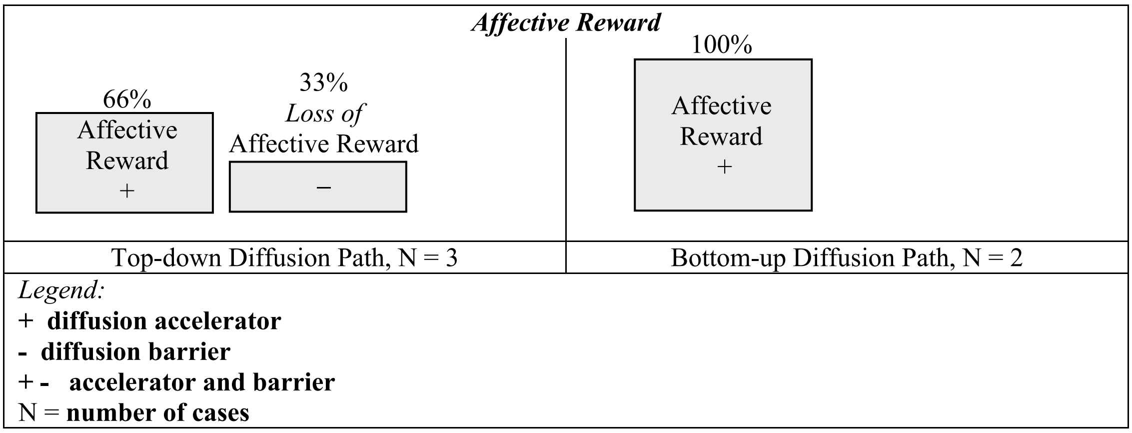


Figure 10.6. 'Accelerator' or 'Barrier' Role of 'Affective Reward' Factor pertaining to CIT Diffusion: Proportional Availability in Cases

Figure 10.6 also takes account of the ***process structure*** of CIT diffusion:

- Top-down Diffusion Path – the cases in which CITs have diffused top-down (authority-based) – this is a total of 3 cases;

- Bottom-up Diffusion Path – the cases in which CITs have diffused bottom-up (initiated by employees) – this is a total of 2 cases.

Here is some information extracted from the critical meta-analysis of case-study reports.

I. Top-down Diffusion Path

a) In 66% of the (top-down) cases (2 cases altogether – *IBM's SNS 'Bluepages'* and *SAP's SNS 'Harmony'* – ***Cases 2*** and ***3***), affective reward has played the role of a CIT diffusion accelerator. The degree of affective reward, extracted from CIT usage, appears to be an important positive motivator for CIT diffusion.

b) In 33% of the cases (only one case – *Fortune 500 Company* – ***Case 40***), the loss of affective reward plays the role of a diffusion barrier.

II. Bottom-up Diffusion Path

In 100% of the cases (2 cases altogether – *Geek Squad Company* and *Open Source Software Development* – ***Case 4*** and ***Case 5***), affective reward has played the role of a CIT diffusion accelerator. Here again, the degree of affective reward, extracted from CIT usage, appears to be an important positive motivator for CIT diffusion.

The small number of cases dealing with the 'affective reward' factor (i.e. 5 cases altogether, 3 describing top-down diffusion and 2 describing bottom-up diffusion – see Figure 10.6) made it impossible to generate grounded hypotheses concerning this factor. The small number of cases requires a note that the results (presented in Figure 10.6) are indicative rather than numerically valid. The source data has not been enough in quantity to generate (even a hypothetical) conceptual framework. Therefore, the indicative results concerning the 'affective reward' factor, as depicted in Figure 10.6, serve as 'indications' rather than grounded hypotheses.

10.4.2 Discussion

Affective reward generally means extracting pleasure or happiness from one's work as the chief good in life. According to Olson et al. (2001, p.11), issues of incentives, motivations, and emotions are usually of much more concern in human systems than in other kinds of systems (i.e. in computer programs, for example, the 'incentives' of a program module are usually easy to describe and be completely controlled by a programmer). Understanding people's emotions and how to satisfy them through CIT is important because of one fundamental question: finding out 'what makes work satisfying and emotionally rewarding for people in the first place, and how can systems like these increase those satisfactions' (Olson et al. 2001, p.158). Briggs et al. (2008) theorised Information Systems/Information Technology (IS/IT) 'satisfaction' to be a key indicator of IS/IT success. As Hamel (2007) so reasonably put it:

‘Beauty. Truth. Love. Service. Wisdom. Justice. Freedom. Compassion. These are the moral imperatives that have aroused human beings to extraordinary accomplishment down through the ages. It is sad, then, that the vernacular of management has so little room for these virtues… As we move toward a world in which economic value is increasingly the product of inspiration, mission, and the joy that people find in their work…’ (p.64, p.98).

According to Malone (2004), the success of Wikipedia for example, shows that non-economic motivations – in the right circumstances – can cause people to do things that normally require serious financial investment. Surprisingly, unlike OSS, the desire for personal recognition doesn’t appear to be an important motivator for most contributors to Wikipedia. Since all articles are unsigned and most are edited by a number of people, individual Wikipedia authors receive no public credit for their contributions. For most people, the main attraction is probably the ***intellectually addictive pleasure*** of the task itself, the remarkable freedom everyone has to improve the product, and the satisfaction of working together toward a grand vision (Malone 2004).

10.5 Size of the Collaborative Ensembles

By ‘Size of the Collaborative Ensembles’ I mean:

the ‘size’ (in terms of number of people/members) of the collaborative ensembles.

As mentioned in Chapter 7, I have performed the cross-case comparison (Empirical Study II – Critical Meta-Analysis of Case-Study Reports) guided by one of the research questions (see Section 2.2), i.e. ‘What influencing factors (barriers or accelerators) are determinant of CIT adoption and diffusion?’.

While seeking an answer to this question, I have compared the case-study reports (through manual coding and matching of similarities, as described in Chapter 7), and based on that, I have discovered the following:

> the factor coded as ‘Size of the Collaborative Ensembles’ is present and discussed in the role of a ‘determinant’ (accelerator or barrier) of CIT diffusion in 9% of all case-study reports. These are 5 different case studies of CIT adoption trials spanning right the way through the years 2003-2006. Generally, the case studies have shown that the ‘size’ (in terms of number of people/members) of the cooperative ensembles is an important contextual factor affecting CIT adoption and diffusion. My cross-case comparison has shown that the ‘Size of the Collaborative Ensembles’ factor has been ***repeatedly observed*** as influencing CIT diffusion in structurally the same form in 5 different case studies. Four of these cases have been observed and described in 2006, and one case – in 2003.

The 'size' (in terms of number of people/members) of the cooperative ensembles has been identified in the cases as an important contextual factor affecting CIT adoption and diffusion. In both ***Cases 8*** and ***9*** (*Comtech* and *Chemhouse*), organisation size was found to be an important contextual factor affecting adoption of Lotus Notes. It was found that the size of the organisation had an impact on how Notes identity was formed through the sensemaking processes. In the case of the continued and discontinued use of *OptionFinder* (the group support system implemented at IOTA – ***Case 15***), perception of the group support system as a large group tool strongly influenced discontinued use. Group size was found to be an important contextual factor affecting adoption of OptionFinder.

An overview of the 'Size of the Collaborative Ensembles' factor's representation in the case-study reports is presented in Table 10.7 below. Table 10.7 presents a short description of 'what happened' in each case, and how the Size of the Collaborative Ensembles was influencing the process of CIT adoption.

Factor / Case	Size of the Collaborative Ensembles
Case 6. ComNotes ***Case 7***. Procom ***Case 8***. Comtech ***Case 9***. Chemhouse	*Organisation size* was found to be an important factor affecting the adoption of Lotus Notes. Organisation size had an impact on how Notes identity was created through the sensemaking process.
Case 15. OptionFinder	Perception of the group support system as a *large group tool* strongly influenced discontinued use. *Group size* was found to be an important factor affecting the adoption of 'OptionFinder'.

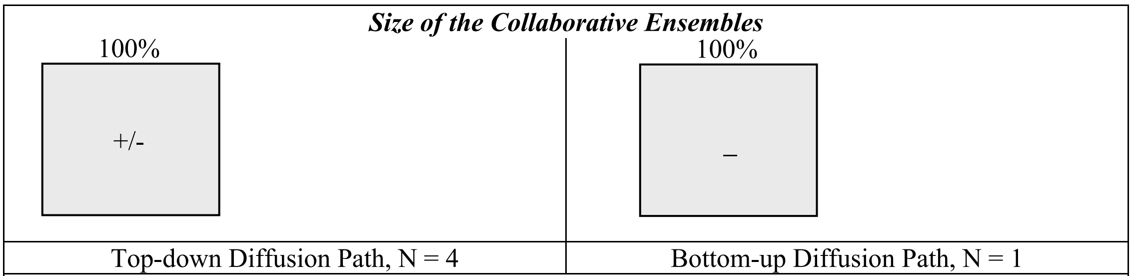
Table 10.7. 'Size of the Collaborative Ensembles' in the Case Studies

10.5.1 'Size of the Collaborative Ensembles' – Diffusion Barrier or Accelerator?

The historical review of CIT diffusion, executed through detailed analysis of 53 case-study reports of CIT diffusion (Empirical Study II), has shown the following: the factor of 'Size of the Collaborative Ensembles' has been ***repeatedly observed*** as playing the role of a 'determinant' (accelerator or barrier) of CIT diffusion in 5 different case studies. These 5 different cases were observed and described by different authors, in 2006 and 2003. These are ***cases 6***, *7*, ***8***, ***9***, and ***15*** (see Appendix II). In some of the cases, the large Size of the Collaborative Ensembles has played the role of a diffusion barrier. Perception of the CIT as a large group tool strongly influenced discontinued use.

Figure 10.7 below represents the proportional availability in the case studies of the 'Size of the Collaborative Ensembles' factor, discussed as:

- accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process;
- barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process, or both.



Legend:
+ diffusion accelerator
- diffusion barrier
+ - accelerator and barrier
N = **number of cases**

Figure 10.7. 'Accelerator' or 'Barrier' Role of 'Size of the Collaborative Ensembles' Factor pertaining to CIT Diffusion: Proportional Availability in Cases

Figure 10.7 also takes account of the ***process structure*** of CIT diffusion:

- Top-down Diffusion Path – the cases in which CITs have diffused top-down (authority-based) – this is a total of 4 cases;
- Bottom-up Diffusion Path – the cases in which CITs have diffused bottom-up (initiated by employees) – this is one case only.

Here is some information extracted from the critical meta-analysis of case-study reports.

I. Top-down Diffusion Path

In 100% of the cases (4 cases altogether), the size of the collaborative ensembles has played a neutral role on CIT diffusion (i.e. as either diffusion accelerator or barrier, or both).

II. Bottom-up Diffusion Path

In 100% of the cases (only one case – *OptionFinder* – ***Case 15***), the large size of the collaborative ensembles has played the role of a diffusion barrier. Perception of the CIT as a large group tool strongly influenced discontinued use.

Two reasons exist that make it implausible to generate grounded hypothesis concerning the 'Size of the Collaborative Ensembles' factor:

1) as far as the top-down diffusion path is concerned, the 4 different cases have shown that the role the size of the collaborative ensembles has played in the

CIT-diffusion process has not been clear-cut and unambiguous – therefore, no meaningful hypothesis can be generated here;

2) as far as the bottom-up diffusion path is concerned, the single illustrative case is not enough in quantity as source data to generate (even a hypothetical) conceptual framework.

Therefore, the indicative results concerning the 'Size of the Collaborative Ensembles' factor, as depicted in Figure 10.7, serve as 'indications' rather than grounded hypotheses.

10.5.2 Discussion

In some of the cases (e.g. *Comtech*, *Chemhouse*, *OptionFinder* – ***Cases 8***, ***9*** and ***15***) the Size of the Collaborative Ensembles (group, organisation etc.) was found to be an important contextual factor affecting CIT adoption and diffusion. The question of what is the optimal 'group size' for people to work together effectively has been a popular topic of discussion ever since the emergence of scientific management. According to Tapscott and Williams (2006, p.258), most firms opt for the U.S. military standard of 150 people as the ideal size for an operating unit. And yet, an increasing number of employees work from home or on the road.

Brynjolfsson, Malone, Gurbaxani, and Kambil (1994) have argued that IT use in practice has been broadly correlated with a *decrease in firm size*. Olson et al. (2001) concur arguing that the decrease in firm size can be observed across a variety of measures – number of employees, revenues, and value-added per firm. According to the Gurbaxani and Shi's (1992) framework, changes in firm size can be explained through reductions in external coordination costs (Olson et al. 2001, p.518). The debate on what is the optimal 'group size' for people to work together, and how IT usage influences group size, is still going on and has not yielded definite answers.

10.6 Collaboration History

By 'Collaboration History' I mean:

the history of working and social relationships (of teams etc.) during which coordination rules are established.

As mentioned in Chapter 7, I have performed the cross-case comparison (Empirical Study II – Critical Meta-Analysis of Case-Study Reports) guided by one of the research questions (see Section 2.2), i.e. 'What influencing factors (barriers or accelerators) are determinant of CIT adoption and diffusion?'.

While seeking an answer to this question, I have compared the case-study reports (through manual coding and matching of similarities, as described in Chapter 7), and based on that, I have discovered the following:

the factor coded as ‘Collaboration History’ is present and discussed in the role of a ‘determinant’ (accelerator or barrier) of CIT diffusion in 6% of all case studies. These are 3 different case studies of CIT adoption trials from 2005. The ‘Collaboration History’ factor has been repeatedly observed as influencing CIT diffusion in structurally the same form in all these three case studies. Generally, the case studies have shown that ‘zero-history teams’ (those lacking collaboration history of working relationships) were less efficient than others.

Collaboration history was found in the case studies to be closely related to issues of coordination of collaborative activity. The lessons learned from ***cases 11*** to ***13*** all point toward a common factor, critical for the level of coordination achieved in any collaborative ensemble. That factor may be described broadly as ‘***lack of history***’ of working relationships. For example, multi-organisation collaboration teams (MCTs – the type of teams described in these three case studies) can be conceived of as ‘zero-history teams’ as their members are unlikely to have a history of working and social relationships. The lack of previous history meant that there were no established coordination rules. In that case, time had to be spent in developing such coordination rules or it was accepted that the teams would work with ill-defined ones.

An overview of the ‘Collaboration History’ factor’s representation in the case-study reports is presented in Table 10.8 below. Table 10.8 presents a short description of ‘what happened’ in each case, and collaboration history was influencing the process of CIT adoption.

<table>
<tr><th>Factor / Case</th><th>Collaboration History</th></tr>
<tr><td>Case 11. SODA: North Ayr Partnership in Europe</td><td rowspan="3">Multi-organisation collaboration teams (MCTs) can be conceived of as ‘zero-history teams’ as their members are unlikely to have a history of working and social relationships.

The lack of previous history means that there are no established coordination rules.

Time can be spent in developing such coordination rules or it has to be accepted that the teams will work with ill-defined ones.</td></tr>
<tr><td>Case 12. Strategic Choice: Whitbread Partnership in Europe</td></tr>
<tr><td>Case 13. GroupSystems: Lanark County</td></tr>
</table>

Table 10.8. ‘Collaboration History’ in the Case Studies

10.6.1 ‘Collaboration History’ – Diffusion Barrier or Accelerator?

Figure 10.8. below represents the proportional availability in the case studies of the ‘Collaboration History’ factor, discussed as:

- accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process;
- barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process.

Collaboration History	
100% *Lack of* Collaboration History –	N.A.
Top-down Diffusion Path, N = 3	Bottom-up Diffusion Path, N = 0
Legend: + **diffusion accelerator** - **diffusion barrier** N = **number of cases**	

Figure 10.8. 'Accelerator' or 'Barrier' Role of 'Collaboration History' Factor pertaining to CIT Diffusion: Proportional Availability in Cases

Figure 10.8 also takes account of the ***process structure*** of CIT diffusion:

- Top-down Diffusion Path – the cases in which CITs have diffused top-down (authority-based) – this is a total of 3 cases;
- Bottom-up Diffusion Path – irrelevant in this case (zero cases).

Here is some information extracted from the critical meta-analysis of case-study reports.

I. Top-down Diffusion Path

In 100% of the cases (all 3 cases – *SODA: North Ayr Partnership in Europe*, *Strategic Choice: Whitbread Partnership in Europe*, *GroupSystems: Lanark County* – ***Cases 11, 12, 13***), the lack of collaboration history has played the role of a diffusion barrier.

The small number of top-down cases (i.e. 3 cases only – see Figure 10.8) made it impossible to generate grounded hypotheses. The small number of cases requires a note that the results concerning the 'Collaboration History' factor are depicted in Figure 10.8 as indicative rather than numerically valid.

10.6.2 Discussion

Collaboration history was found in the case studies to be closely related to issues of *coordination* of collaborative activity. In the ***cases 11*** to ***13***, the factor of coordination was present in the form of 'lack of history' of working relationships. A number of definitions have been suggested for the term 'coordination', the diversity of which illustrates the difficulty of defining it. For my purposes here, I will adopt the following simple definition from Thomas Malone and Kevin Crowston (in Olson et al. 2001, p.10):

‘Coordination is managing dependencies between activities’[53].

This definition is consistent with the simple intuition that, if there is no interdependence, there is nothing to coordinate. It is also consistent with a long tradition in organisation theory of emphasising the importance of interdependence (e.g. Galbraith 1973, Hart and Estrin 1990, Lawrence and Lorsch 1967, Pfeffer 1978, Roberts and Gargano 1989, Rockart and Short 1989, Thompson 1967). As Surowiecki (2004) so rightfully observed, coordination problems are very hard to solve because of, what he called, ‘the self-reflexive spiral’ – when what people want to do depends on what everyone else wants to do, every decision affects every other decision, and there is no outside reference point.

Olson, Malone, and Smith (2001) provided a collection of intriguing analogies to other disciplines (e.g. biology) while tackling the issue of human coordination. As they pointed out, the most striking examples of perfectly coordinated group behaviours are in social insects, such as honey bees or army ants, where the group displays often quite complex behaviour, despite the simplicity of the individuals (e.g. Franks 1989, Seeley 1989, Surowiecki 2004). One reason perfect coordination is possible within these insects is the ***lack of diversity*** of individuals. Another reason is that insects are acting as a ‘solid block’ or a ‘coherent flow’. The issue of diversity has been tackled by Mitch Resnick in his book ‘Turtles, Termites, and Traffic Jams’ in which he observed that one reason coordination on the highway is so difficult is the diversity of the drivers. The issue of flow has been tackled by the German physicist Dirk Helbing, and the Hewlett-Packard scientist Bernardo Huberman who identified a traffic state that they called ‘coherent flow’. In coherent flow, the cars are travelling as one, in a solid block, and even though each car is moving at a speed slower than it would like to go, traffic as a whole is moving at an optimal pace (Helbing and Huberman 1998).

In the ***cases 11*** to ***13*** within my comparative case-study reports, the factor of coordination could be described broadly as ‘lack of history’ of working relationships. In the highly ***diverse*** multi-organisation collaboration teams (MCTs) – unlike in social insects such as honey bees or army ants – nothing like a coherent flow was possible. When information was missing, it could not be inferred from other (past) information. Therefore, additional methods for determining the value of ‘state information’ (Olson et al. 2001, p.374) were required.

In summary:

> In this Chapter, I have presented a part of the detailed results from Empirical Study II – the part pertaining to attributes of the collaboration, i.e. the factors of ‘Mediator Role’, ‘Number of System Users’, ‘Support of a Champion’, ‘Affective Reward’, ‘Size of the Collaborative Ensembles’, and ‘Collaboration History’. I have given some details on what exactly has been observed and

[53] This definition was particularly influenced by Rockart and Short (1989) and Curtis (1989). The importance of coordination in this very general sense was perhaps first recognized by Holt (1980, 1988).

described in each of the case-study reports concerning these factors. I have illustrated (and then discussed) the proportional availability in the cases of the factors, as either ‘accelerators’ or ‘barriers’ of CIT diffusion. Based on these findings (as well as on findings from previous chapters), I have then – whenever plausible – generated grounded Hypotheses and derived Conceptual Frameworks 3d (CF3d) and 3e (CF3e).

Chapter 11

ATTRIBUTES OF THE ORGANISATIONAL CONTEXT

This Chapter presents part of the detailed results from Empirical Study II (Critical Meta-Analysis of Case-Study Reports) – the part pertaining to 'attributes of the organisational context'. By 'context' I mean:

the interrelated conditions in which IT-supported collaboration occurs.

Table 11.1 depicts the thematic focus of this Chapter.

Factor	% Availability in Cases	Number of Cases
Attributes of the System		
CIT Identity	30	16
System Customisation	28	15
Attributes of the Collaboration		
Mediator Role	36	19
Number of System Users	17	9
Support of a Champion	9	5
Affective Reward	9	5
Size of the Collaborative Ensembles	9	5
Collaboration History	6	3
Attributes of the Organisational Context		
Incentives for Using CITs	**55**	**29**
Power-Structure Change	**21**	**11**
Long-term Unpredictability	**4**	**2**

Table 11.1. Thematic Focus of this Chapter

The 53 different CIT case study reports that I have analysed and compared were presented in Chapter 7. (Background information on the cases is available in Appendix II). The most dominant organisational-context attribute – the factor of 'Incentives for Using CITs' – was discussed in Chapter 8 above. The sections below discuss the remaining two contextual factors which – based on the case studies – I identified as influencing the process of CIT diffusion: 'Power-Structure Change' and 'Long-term Unpredictability' (see Table 11.1 above).

11.1 Power-Structure Change

By 'Power-Structure Change' I mean:

dispersion or distribution of functions and powers from a central authority to regional and local authorities (e.g. within a company hierarchy), or vice versa, as a consequence of CIT usage.

CIT usage often has the potential of carrying power-structure change along with it. As shown by the case studies, the intensive use of, especially social CITs, may lead to 'decentralisation' of the company's hierarchy.

As mentioned in Chapter 7, I have performed the cross-case comparison (Empirical Study II – Critical Meta-Analysis of Case-Study Reports) guided by one of the research questions (see Section 2.2), i.e. 'What influencing factors (barriers or accelerators) are determinant of CIT adoption and diffusion?. While seeking an answer to this question, I have compared the case-study reports (through manual coding and matching of similarities, as described in Chapter 7), and based on that, I have discovered the following:

> the factor coded as 'Power-Structure Change' is present and discussed in the role of a 'determinant' (accelerator or barrier) of CIT diffusion in 21% of all case studies. These are 11 different case studies of CIT adoption trials spanning right the way through the years 1995-2009. In most of the cases, power-structure change has played the role of a ***diffusion accelerator*** – people were (more or less consciously) motivated by the possibility of their CIT usage bringing about new organisational arrangements which would gradually dismantle the traditional functional and hierarchical barriers in the company. My cross-case comparison has shown that the 'power-structure change' factor has been ***repeatedly observed*** as influencing CIT diffusion in structurally the same form in 11 different case studies. Some cases have been observed and described in 2009, others in 2006, 1995 etc.

CIT usage often has the potential of carrying power-structure change along with it. As shown by the case studies, the intensive use of, especially social CITs (e.g. SNS), may lead to 'decentralisation' of the company's hierarchy: social CITs may bring about new organisational arrangements which may gradually dismantle the traditional functional and hierarchical barriers in the company. On the other hand, the implementation of some CITs is often enforced by the workers themselves, in a bottom-up, unsteered, and decentralised adoption effort. 'Decentralisation' literally means dispersion or distribution of functions and powers from a central authority to regional and local authorities.

The community-based model of open source software development (as discussed in the *Open Source Software Development* case study – ***Case 5***) was a completely decentralised collaborative arrangement. At *Process Industries* (***Case 30***), the implementation of Lotus Notes was enforced by the workers themselves, in a bottom-up, unsteered, and decentralised adoption effort. In a similar decentralised manner, users developed key Lotus Notes applications for local use at *Statoil* (***Case 31***). Thus, a major readjustment of Notes use was initiated, including a shift from extensive use of e-mail to topical databases.

At the *Eiger* (***Case 32***) software division, the Lotus Notes applications had allowed for increased knowledge of the company work situation, and work practices among employees. Now they had all the information ***to take their own decisions instead of***

following orders. The Lotus Notes applications were implemented by the software specialists (employees) themselves – in a decentralised, bottom-up fashion. At *THC* (the small holding company) (***Case 38***) local experts developed team-level Lotus Notes applications. The usage of these applications brought about new organisational arrangements which gradually ***dismantled the traditional functional and hierarchical barriers*** in the company. Teamwork and open access to people and information were supported by the Notes applications. The latter promoted higher levels of company-wide decentralisation.

According to the findings of the *Consulting Firm* case study (***Case 44***), a philosophy of decentralised control was enacted within the Notes development environment. Notes was deliberately designed to embody a decentralised architecture. A similar philosophy of decentralised control was enacted within the Notes development environment at *Zeta* (***Case 45***). That was strongly reflected in all aspects of the highly distributed architecture of the Notes artefact. One important finding of the *Blogging* case study (***Case 10***) is that the path of diffusion of Blogging in the workplace was decentralised, and bottom-up: for example, hundreds of Sun Microsystems employees started writing public blogs at work, about work, which violated every traditional percept of corporate communication.

According to the *SIGMA* case study (***Case 16***), the network of freelancers functioned based on a culture of self-organisation, decentralisation, local autonomy and synergetic effects between local units. Working with SIGMA meant providing one's own workplace – no 'classical' workspace but a home office with telephone, fax, personal computer, and internet access. The network exhibited a three-fold pattern of bottom-up, decentralised CIT diffusion:

a) '*shadow CIT'* – even though organisation-wide groupware had been introduced, *other* groupware systems had greater local and organisation-wide impact. Locally, individuals and groups introduced a whole range of inexpensive (easily available) groupware applications, and formed their own use practices;
b) *developing one's own groupware solutions* – SIGMA-Southwest (a regional group) developed its own groupware product called 'ViOffice';
c) *less vertical integration* – the already existing groupware-related practice of parallel use was extended in the direction of ongoing refinement of an organisational groupware fabric. The latter ***brought about even less vertical integration*** to an organisational culture already resting on a self-image of a self-organising network.

One of the most illustrative cases in terms of 'decentralisation' seems to be the *Geek Squad Company* case study (***Case 4***). While the management of the Geek Squad company had their heads down preparing the adoption of an incumbent CIT system, the employees had self-organised online in probably the most effective and efficient collaborative tool that was already out there – a multiplayer online game.

At *Accenture* (***Case 1***) the adoption of the 'People Pages' social networking software (SNS) developed as a classical bottom-up process. The innovative idea to implement a company-wide SNS emerged as part of the 'Leadership Development' Program. The idea was later extended into a detailed Business Case by an interdisciplinary team. It is important to note that the innovation-adoption process was anything but smooth. The bottom-up implementation efforts were initially opposed by management resistance. The latter was most probably motivated by fear of power-structure change that the SNS could potentially lead to. Internet-based SNS were known as being powerful 'flatteners' of experience with their multiple features allowing the formation of one's own peer group. It was close to mind that a similar 'flattening' of hierarchy could possibly be one of the consequences of the adoption of 'People Pages' within *Accenture* (***Case 1***). Furthermore, the goals of adoption were formulated by the development team to enable the following:

- the achievement of a stronger personal connection among *Accenture* consultants at all levels;
- adequate support at the creation of Communities of Interests and Peer Groups;
- improvement of the accessibility of expertise within the company.

Because of management resistance within *Accenture*, a lot of additional steps were necessary until the first beta-phase release was passed through in March 2007. The first official rollout was passed in September 2007.

An overview of the 'Power-Structure Change' 'factor's representation in the case-study reports is presented in Table 11.2 below. Table 11.2 presents a short description of 'what happened' in each case, and how the prospect of 'power-structure change' was influencing CIT diffusion.

Factor / **Case**	**Power-Structure Change**
Case 1. Social Networking at Accenture	SNS adoption as a classical bottom-up process. Innovative idea extended by an interdisciplinary team. Bottom-up implementation efforts initially opposed by management resistance. Resistance motivated by *fear of power-structure change*. The SNS is a powerful *'flattener'* of experience and hierarchy.
Case 4. Geek Squad Company	Self-organisation (micro management) of Geek Squad employees' collaborative work through a multiplayer online game.
Case 5. Open Source Software Development	Community-based model of open source software development – a *decentralised* collaborative arrangement.

Case 10. Blogging	Decentralised, *bottom-up diffusion* of Blogging in the workplace: employees writing public blogs at work, about work.
Case 16. SIGMA	A three-fold pattern of decentralised CIT diffusion within a network of freelancers: 1. 'shadow CIT'– even though organisation-wide groupware had been introduced, other groupware systems had greater organisation-wide impact; 2. regional group developing their own groupware solutions; 3. *CIT use brought about even less vertical integration*.
Case 30. Process Industries	Bottom-up, decentralised diffusion of Lotus. Implementation and use enforced by the workers themselves.
Case 31. Statoil	Users developing key Lotus Notes applications for local use.
Case 32. Eiger	Lotus Notes applications implemented by the employees (decentralised, bottom-up diffusion). Lotus Notes use allowed for *increased knowledge* of the company work situation, and work practices.
Case 38. THC	Local experts developed team-level Lotus Notes applications. Lotus Notes usage *gradually dismantled the traditional functional and hierarchical barriers in the company*.
Case 44. Consulting Firm	Lotus Notes deliberately designed to embody a decentralised work architecture.
Case 45. Zeta	A philosophy of *decentralised control* enacted within the Notes development environment.

Table 11.2. 'Power-Structure Change' in the Case Studies

11.1.1 'Power-Structure Change' – Diffusion Barrier or Accelerator?

The historical review of CIT diffusion, executed through detailed analysis of 53 case-study reports of CIT diffusion (Empirical Study II), has shown the following: the factor of 'Power-Structure Change' has been ***repeatedly observed*** as playing the role of a 'determinant' (accelerator or barrier) of CIT diffusion in 11 different case studies. These 11 different cases were observed and described by different authors, in different years, from 1995 right the way through 2009. These are ***Cases 1***, ***4***, ***5***, ***10***, ***16***, ***30***, ***31***, ***32***, ***38***, ***44***, and ***45*** (see Appendix II).

Based on the 11 different case studies of CIT diffusion which stem from different years between 1995 and 2009, and in which the 'power-structure change' factor is present, I may summarise that:

> the factor of 'Power-structure Change' has been repeatedly observed as influencing the process of CIT diffusion in important ways, all through the years 1995-2009. That means that this factor has historically been ***persistently influencing*** CIT diffusion in structurally the same form. In some cases power-structure change (decentralisation etc.) has played a positive role on CIT diffusion.

Figure 11.1 below represents the proportional availability in the case studies of the 'Power-structure Change' factor, discussed as:

- accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process;
- barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process.

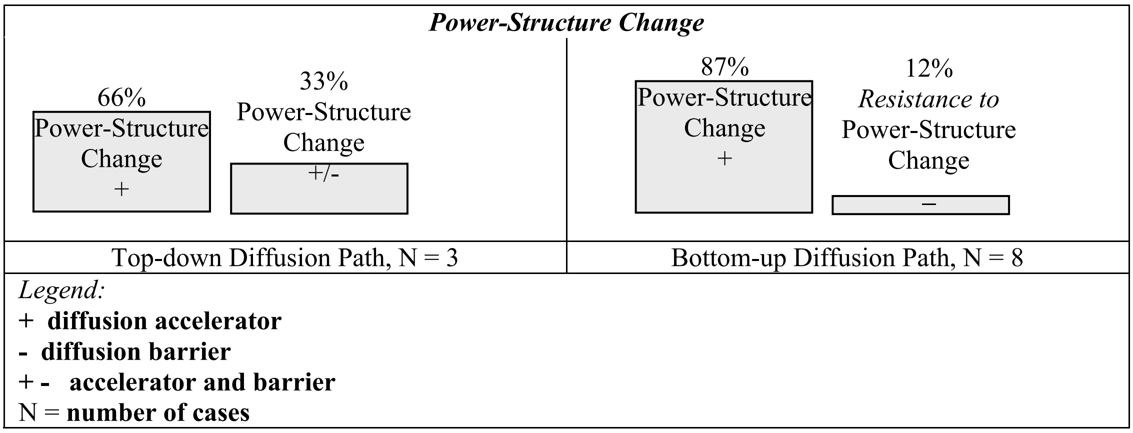


Figure 11.1. 'Accelerator' or 'Barrier' Role of 'Power-Structure Change' Factor pertaining to CIT Diffusion: Proportional Availability in Cases

Figure 11.1 also takes account of the ***process structure*** of CIT diffusion:

- Top-down Diffusion Path – the cases in which CITs have diffused top-down (authority-based) – this is a total of 3 cases;
- Bottom-up Diffusion Path – the cases in which CITs have diffused bottom-up (initiated by employees) – this is a total of 8 cases.

Here is some information extracted from the critical meta-analysis of case-study reports.

I. Top-down Diffusion Path

a) In 66% of the cases (2 cases altogether – *Consulting Firm* and *Zeta* – ***Cases 44, 45***), power-structure change has played the role of a diffusion accelerator.

Decentralisation has played a positive role for CIT diffusion. CITs have diffused in a bottom-up, decentralised manner.

b) In 33% of the cases (1 case only – *Statoil* – ***Case 31***), power-structure change has played a neutral role for CIT diffusion.

II. Bottom-up Diffusion Path

a) In 87% of the cases (7 cases altogether), power-structure change has played the role of a motivational driver for CIT diffusion. In most of the cases (e.g. *Geek Squad Company*, *Open Source Software Development*, *Blogging*, *SIGMA*, *Process Industries*, *Eiger* – ***Cases 4, 5, 10, 16, 30, 32***) CIT applications (mostly social CITs) were implemented by the employees themselves – in a decentralised, unsteered manner. In some of the cases (e.g. *THC* – ***Case 38***), CIT usage brought about new organisational arrangements which gradually dismantled the traditional functional and hierarchical barriers in the company.

b) In 12% of the cases (1 case only), resistance to power-structure change played the role of a diffusion barrier. For example, because of management resistance at *Accenture* (***Case 1***), a lot of additional steps were necessary until the CIT became a part of the company infrastructure.

Based on these findings, I may now hypothesise that:

Hypothesis 11.1. The bottom-up CIT diffusion path is characterised by 'power-structure change' being a motivational driver for CIT diffusion.

> **11.1 a)** The process of bottom-up diffusion of social CITs can be seen as closely related to decentralisation within organisations – handing on control over to users and is therefore capable of dismantling the traditional functional and hierarchical barriers in the company.

Hypothesis 11.2. Resistance to power-structure change may play the role of a diffusion barrier for the bottom-up CIT diffusion[54].

Figure 11.2 presents Conceptual Framework 3f (CF3f). The Conceptual Framework depicts the hypothesised influence of the 'Power-Structure Change' factor on CIT diffusion. The representation takes account of the process structure of CIT diffusion with the two identified diffusion paths – top-down and bottom-up. The findings from Empirical Study II have supported/confirmed the assertion of existence of two diffusion paths – CF3f is, therefore, a logical extension of CFØ.

The 'Power-Structure Change' factor is depicted in Figure 11.2 as: a) accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process; b) barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process. Various strength of the arrows in Figure 11.2 is applied to illustrate the level/weight of relative influence of

[54] Because of the small number of 'top-down' cases (only 3), no similar Hypotheses for the top-down diffusion path may be generated.

the factor on CIT diffusion. Conceptual Framework 3f (Figure 11.2) has been derived as follows:

- as mentioned above, CF3f is a logical extension of the Preliminary Conceptual Framework, CFØ (see Figure 6.3);
- CF3f is based on the summary of findings from Empirical Study II (pertaining to the factor in question) which were presented in Figure 11.1.

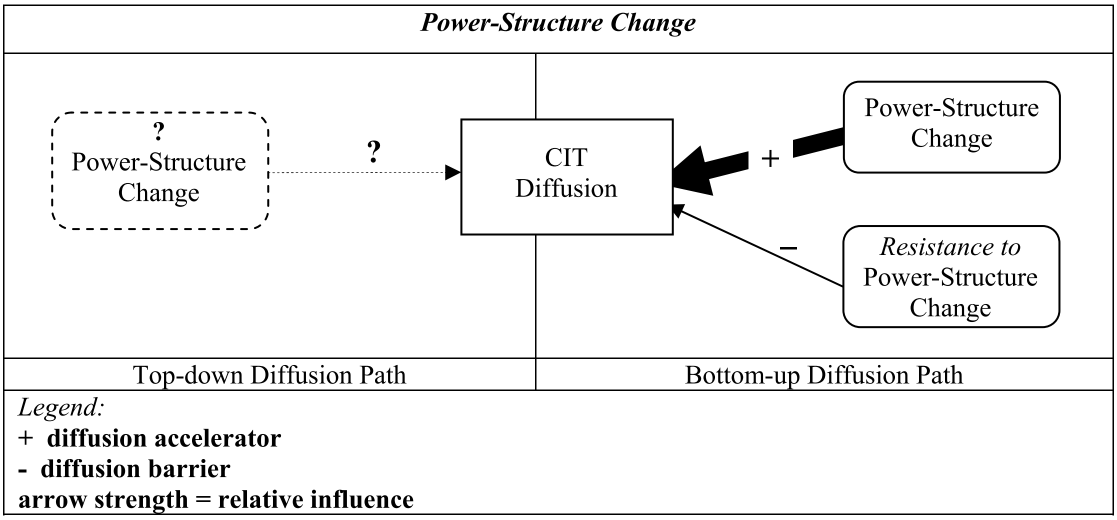


Figure 11.2. Hypothesised Influence of the 'Power-Structure Change' Factor on CIT Diffusion (Conceptual Framework 3f)

Conceptual Framework 3f (Figure 11.2) visually represents the two Hypotheses generated in this Section. The thick arrow on the right-hand side in Figure 11.2 visually represents two of the generated Hypotheses: Hypothesis 11.1 and Hypothesis 11.2 (see above). Those two Hypotheses were derived from the observations – based on the case-study reports – that the bottom-up CIT diffusion path is characterised by 'power-structure change' being a motivational driver for CIT diffusion and that Resistance to power-structure change may play the role of a diffusion barrier for the bottom-up CIT diffusion (see Figure 11.1).

The left-hand side in Figure 11.2 visually represents the top-down CIT diffusion path. The small number of top-down cases (i.e. 3 cases only – see Figure 11.1) made it impossible to generate grounded hypotheses concerning the top-down diffusion path. The small number of cases requires a note that the results concerning the top-down diffusion path are indicative rather than numerically valid. The dotted lines and question marks in the left-hand side of Figure 11.2 are applied to denote that the source data has not been enough in quantity to generate (even a hypothetical) conceptual framework. Therefore, the indicative results concerning the top-down diffusion path are depicted in Figure 11.2 as an 'open question' rather than a grounded hypothesis.

11.1.2 Discussion

One possible pattern of power-structure change, brought about by CIT usage, is 'decentralisation' which literally means dispersion or distribution of functions and powers from a central authority to regional and local authorities. Many of the case studies that I have analysed (*Open Source Software Development*, *Process Industries*, *Statoil*, *Eiger*, *THC*, *Consulting Firm*, *Zeta*, *Blogging*, *SIGMA*, *Geek Squad Company* – ***Cases 5***, ***30***, ***31***, ***32***, ***38***, ***44***, ***45***, ***10***, ***16***, ***4***) were demonstrations of decentralised collaborative arrangements where collaborative technology diffused in a bottom-up, unsteered manner. As we mentioned in Section 6.5 above – according to Gallivan's (2001) Taxonomy of Two-Stage Innovation Adoption Types (Table 6.6) – bottom-up organisational innovation adoption occurs in cases when *only the employees* adopt the innovation. The comparative case-study reports I have analysed have proven that CIT adoption may be seen as a stage process, beginning 'bottom-up', and eventually leading to authority-based adoption (as long as the organisation embraces the innovative idea).

This observation concurs with the conclusion made by Malone (2004) that … 'dispersed physically, but connected by technology, workers are now able, on a scale never before imaginable, ***to make their own decisions*** using information gathered from many other people and places'. In the modern 'high-trust, low-fear organization' (Hamel 2007, p.89), employees do not need a lot of oversight. Employees are developing 'their own ***self-organised interconnections***' (Tapscott and Williams 2006, p.263), thus enabling bottom-up diffusion of different types of technologies.

Based on the evaluation of the *Accenture* case study (***Case 1***), as well as the comparison with other successfully implemented company-internal SNS, 'it becomes clear that companies cannot easily oppose the intrinsic needs of their employees for networking and exchange' (Koch and Richter 2009, p.81).

There are a number of ways in which collaboration technology can alter the hierarchical power-structures of an organisation. For instance, in one case studied by Crowston et al. 1987, a computer conferencing system was used to help remove a layer of middle managers and thus to reduce coordination costs. Another example (as pointed out by Olson et al. 2001, p.27) is that collaboration technology can facilitate what some observers (e.g. Mintzberg 1979, Toffler 1970) have called 'adhocracies'. Adhocracies are very flexible organisations made of relatively autonomous entrepreneurial groups, including many shifting project teams connected by highly decentralised communication networks (e.g. Lotus 1989, Malone, Grant, Turbak, Brobst, and Cohen 1987).

11.2 Long-term Unpredictability

By 'Long-term Unpredictability' I mean:

the longitudinal nature of collaborative work which is highly contingent on the properties of the context in the long term and therefore – highly unpredictable.

As mentioned in Chapter 7, I have performed the cross-case comparison (Empirical Study II – Critical Meta-Analysis of Case-Study Reports) guided by one of the research questions (see Section 2.2), i.e. 'What influencing factors (barriers or accelerators) are determinant of CIT adoption and diffusion?'. While seeking an answer to this question, I have compared the case-study reports (through manual coding and matching of similarities, as described in Chapter 7), and based on that, I have discovered the following:

> the factor coded as 'Long-term Unpredictability' is present and discussed in the role of a 'determinant' (accelerator or barrier) of CIT diffusion in 4% of all case studies. These are 2 different case studies of CIT adoption trials from 2003 and 1995. These are ***Cases 16*** and ***44*** (see Appendix II). It was observed in both cases that the success of CIT implementation was highly contingent on the properties of the context in the long term. The long-term unpredictability of collaborative work, and the failure of some CITs to capture the contextual information embedded in collaborative work, hampered CIT diffusion in both cases.

CSCW context is generally characterised by *long-term unpredictability* (I shall return to this statement, and explain it in detail in the 'Discussion' section below). As may be seen from the *Consulting Firm* case study (***Case 44***)*,* institutional context influenced how Lotus Notes was utilised. Institutional context changes produced a wary, short-lived, and episodic use of Notes ('technological exploration'). The institutional context, as well as the usage pattern of Notes, were ***unpredictable in the long run***. At *SIGMA* (the network of freelancers – ***Case 16***), the use of groupware was evolving. The usage pattern of each different collaborative system was context-specific. Success of CIT implementation was highly contingent on the properties of the context in the long term. The latter was characterised by a high degree of change and unpredictability.

An overview of the 'Long-term Unpredictability' factor's representation in the case-study reports is presented in Table 11.3 below. Table 11.3 presents a short description of 'what happened' in each case, and how contextual unpredictability was influencing the process of CIT adoption.

Factor / **Case**	**Long-term Unpredictability**
Case 16. SIGMA	Evolving CIT use at a network of freelancers. Context-specific usage pattern of each collaborative system. Success of CIT implementation*: highly contingent on the properties of the context in the long term.* CSCW context characterised by a high degree of change and *unpredictability*.

Case 44. Consulting Firm	The unpredictable institutional context influenced how Lotus Notes was utilised. *Changing institutional context* produced a wary, short-lived, and episodic use of Notes (technological exploration).

Table 11.3. 'Long-term Unpredictability' in the Case Studies

11.2.1 'Long-term Unpredictability' – Diffusion Barrier or Accelerator?

Figure 11.3 below represents the proportional availability in the case studies of the 'Long-term Unpredictability' factor, discussed as:

- accelerator of CIT diffusion (+), i.e. a factor stimulating the diffusion process;
- barrier to CIT diffusion (-), i.e. a factor hampering the diffusion process.

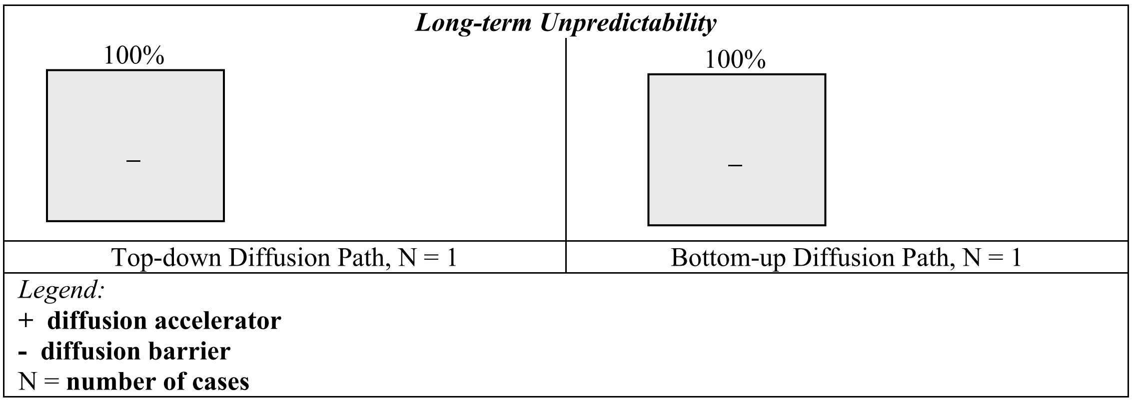


Figure 11.3. 'Accelerator' or 'Barrier' Role of 'Long-term Unpredictability' Factor pertaining to CIT Diffusion: Proportional Availability in Cases

Figure 11.3 also takes account of the ***process structure*** of CIT diffusion:

- Top-down Diffusion Path – the cases in which CITs have diffused top-down (authority-based) – 1 case;
- Bottom-up Diffusion Path – the cases in which CITs have diffused bottom-up (initiated by employees) – 1 case.

Here is some information extracted from the critical meta-analysis of case-study reports.

I. Top-down Diffusion Path

In 100% of the cases (1 case), long-term unpredictability of collaborative work, and the failure of the studied CITs to capture the contextual information embedded in collaborative work, have played the role of a diffusion barrier.

II. Bottom-up Diffusion Path

> In 100% of the cases (1 case), long-term unpredictability of collaborative work, and the failure of the studied CITs to capture the contextual information embedded in collaborative work, have played the role of a diffusion barrier.

The small number of both 'top-down' and 'bottom-up' cases (only one each – see Figure 11.3) made it impossible to generate grounded hypotheses. The small number of cases requires a note that the results concerning the 'Long-term Unpredictability' factor are depicted in Figure 11.3 as indicative rather than numerically valid.

11.2.2 Discussion

Neale et al. (2004) stressed the importance of the longitudinal nature of collaborative work with its following aspects: a) activities mediated by collaborative technologies have a 'long-term temporal structure' (McGrath 1990); b) collaborative ensembles typically involve interdependent and comprehensive ongoing activities, spanning in time from weeks to years, i.e. information sharing, planning, acting, scheduling, role taking, synchronisation, allocation of resources, and adaptation to iterative re-planning based on temporally-changing objectives and circumstances.

Collaborative activities are interdependent and comprehensive, and highly contingent on the properties of the context *in the long term*. When interdependency comes into play, complexity becomes a central issue. That resonates with the history of computer systems development which shows that the focus of analysis (Suchman 1987, Neale et al. 2004) has been shifted from physical ergonomics, to information processing at the interface, to the broader framework of behaviour and interaction rich with complexity. The long-term unpredictability of collaborative work may become a serious barrier hindering CIT diffusion in cases where collaborative technologies may fail to capture contextual information, especially contextual information that is *temporally* removed from the immediate situation. As pointed out by Neale et al. (2004), this type of contextual information only gets shared informally and in the subtlest of ways, and trying to represent it digitally is not only difficult, but may also render it useless, and unappealing.

Temporally-embedded contextual change is the main reason for the so called 'altering shared context' of CIT system usage. The latter has been theorised as 'the single most significant reason for the failure of distributed [collaborative] system adoption and use' (Neale et al. 2004, p.116). Hereby, shared context is the common ground of beliefs held by group members, and 'surprise' breakdowns caused by temporal contextual developments may be especially frustrating to users of CIT systems. Because of temporal-change considerations, designing computer-based systems for cooperative work settings is like writing in water.

One example of long-term unpredictability in collaborative work is how people use videotape to access meeting information. Wolf and Rhyne (1992) studied how group participants in computer-mediated design sessions used videotape to access meeting information. They found that people searched for information using four main access methods:

- 'by participant: they remembered person X doing some action;
- by communication medium: people recalled what medium was used (e.g. whiteboard, overhead transparency);
- by time: people used relative time ("midway through the meeting"), duration ("25 minutes into the discussion"), and clock time ("we only got through Item 1.2 by 5 o'clock");
- by relation to other events: people used events as markers before or after other events' (Olson et al. 2001, p.462).

By reflecting on this example, Olson et al. (2001, p.463) concluded that *history tools* were needed (embedded as part of CITs) to alleviate the long-term unpredictability of collaborative work, and to support the durability of the cooperative relationship. Motivation for their argument Olson, Malone, and Smith found in the work done in situated cognition relating to text (Carraher et al. 1985, Lave 1988). Many collaborative environments tend to capture only a portion of the whole context, for instance, only the dates when a user made certain changes. The missing portion of contextual information may be crucial. History tools serve to remind the user of how the art came to be and what the context was when certain decisions were made. Especially when large projects evolve over time and turnover and action take their toll, it is important for collaborative environments to help capture the *evolution* of collaborative work and not its current state. Halbwachs (1994) and Douglas (1986) argued that the quintessentially individual act of '*remembering*' is becoming inextricably collective (Hernández-Ramos and Bowker 2008). The ability of collaborative environments to capture the *evolution* of collaborative work and not its current state (an important facet of the CIT research on 'awareness') is pivotal in achieving organisational memory (in meetings, 'on the go', for knowledge-exchange purposes etc).

In resonance with such considerations, and in accordance with some properties of 'complex systems' (i.e. direct communication in complex systems is impossible, impractical or undesirable; communication is shared around artefacts; artefacts continue to evolve over long periods of time; participants need to be informed within the context of their work), Grudin (1994a) formulated an extension of the Time-Space-Matrix (Johansen 1988) (see Figure 11.4).

Figure 11.4 represents a classification of different CSCW perspectives. This classification scheme extends the Time-Space-Matrix (Johansen 1988, Table 3.2 above) with a focus on the unpredictable communication that occurs within complex systems. Not only is the time and place unpredictable: the participants themselves are not always known over the long life-cycles of complex systems (Grudin 1994a). According to Olson et al. (2001, p.451), computer-based collaboration support in this situation should allow participants to work separately – across substantial distances in space and time – but alert them to the existence of potential interactions between their work and the work of others, including work done previously. Thus, CIT should enable virtual cooperation between all participants who ever worked on the project.

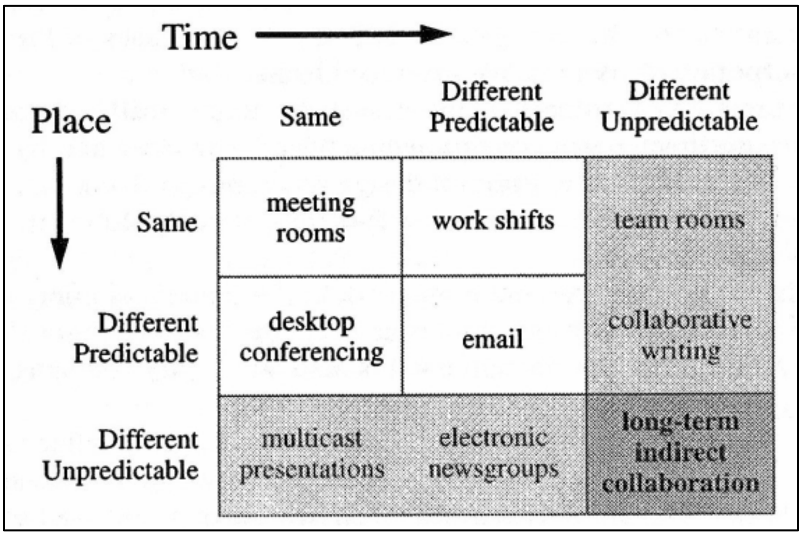


Figure 11.4. A Classification of Different CSCW Perspectives. Source: Grudin (1994a)

In summary:

> In this Chapter, I have presented a part of the detailed results from Empirical Study II – the part pertaining to 'attributes of the organisational context', i.e. the factors of 'Power-Structure Change' and 'Long-term Unpredictability'. I have given some details on what exactly has been observed and described in each of the case-study reports concerning these factors. I have illustrated (and then discussed) the proportional availability in the cases of the factors, as either 'accelerators' or 'barriers' of CIT diffusion. Based on these findings (as well as on findings from previous chapters), I have then – whenever plausible – generated grounded Hypotheses and derived Conceptual Framework 3f (CF3f).

Chapter 12

SUMMARY OF FINDINGS AND CONCEPTUAL FRAMEWORK DEVELOPMENT

Chapter 7 has offered an short summary of the overall results from Empirical Study II (Critical Meta-Analysis of Case-Study Reports) by identifying the major determining factors which have historically influenced the process of CIT diffusion (see Table 7.4, Table 7.5 and Table 7.6 above). Chapters 8, 9, 10, and 11 have then presented the detailed results from Empirical Study II – i.e. a detailed comparative analysis of the practices observed and lessons learned from the 53 case-study reports. In this following Chapter, two further steps will be undertaken:

1) I will present the results summary in graphical form;

2) I will develop Conceptual Frameworks 1, 2, and 3.

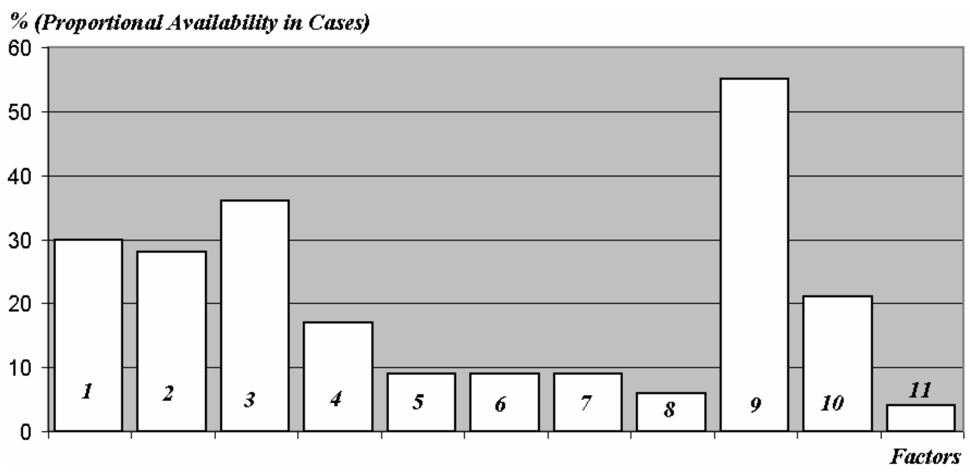
As previously mentioned, the purpose of this theory-building Thesis is to develop and validate a reliable Conceptual Framework to serve as an integrative grounding, reflecting the adoption–diffusion continuum of collaboration information technology (CIT). The Framework has to present a systematic classification of some contextual and longitudinal determinants of CIT adoption and diffusion. For the purpose of finding out what these determinants are, I have performed a comparative analysis of CIT adoption-usage case-study reports – Empirical Study II. In Empirical Study II I have analysed CIT case-study reports published between 1992-2009 and representing different, independently-observed cases of collaboration-technology adoption and use within organisational settings. Thus, Empirical Study II is a review of the observational experience from more than one decade of collaboration-technology adoption trials. Based on this experience, I have identified some ***persistent problems*** and ***persistent success factors*** for the adoption of collaboration technologies. These problems and success factors have been observed in cases of CIT use one decade ago, five years ago, three years ago etc., and continue to be observed today in structurally the same form despite what is unarguably 'rapid technological development'. This gave me reason to believe that, at least some of the persistent problems of CIT diffusion could be hypothesised as 'determining factors'. The three consecutive versions of the Conceptual Framework which will be presented below – CF1, CF2, and CF3 – graphically illustrate the 'determining factors' identified and their 'relative weight' in terms of degree of influence on the CIT-diffusion process.

Figure 12.1 depicts in graphical form the basic findings from Chapter 7 – i.e. the proportional availability in the cases of the 11 factors that were identified as persistently observed and discussed (see Figure 7.4), and therefore – persistently influencing CIT diffusion:

- *Attributes of the System*
    - CIT Identity – 30% availability in the cases (a total of 16 cases);

- System Customisation – 28% availability in the cases (a total of 15 cases).

- *Attributes of the Collaboration*
    - Mediator Role – 36% availability in the cases (a total of 19 cases);
    - Number of System Users – 17% availability in the cases (a total of 9 cases);
    - Support of a Champion – 9% availability in the cases (a total of 5 cases);
    - Affective Reward – 9% availability in the cases (a total of 5 cases);
    - Size of the Collaborative Ensembles – 9% availability in the cases (a total of 5 cases);
    - Collaboration History – 6% availability in the cases (a total of 3 cases).
- *Attributes of the Organisational Context*
    - Incentives for Using CITs – 55% availability in the cases (a total of 29 cases);
    - Power-Structure Change – 21% availability in the cases (a total of 11 cases);
    - Long-term Unpredictability – 4% availability in the cases (a total of 2 cases).



Attributes of the System
1. CIT Identity, **2**. System Customisation
Attributes of the Collaboration
3. Mediator Role, **4**. Number of System Users, **5.** Support of a Champion, **6**. Affective Reward, **7.** Size of the Collaborative Ensembles, **8**.Collaboration History,
Attributes of the Organisational Context
9. Incentives for Using CITs, **10**. Power-Structure Change, **11**. Long-term Unpredictability.

Figure 12.1. Factors Influencing CIT Diffusion – Proportional Availability in Cases

Figure 12.2 presents Conceptual Framework 1 (CF1). The Framework depicts the hypothesised overall influence of each factor on CIT diffusion. The causal relationships in the graph are depicted by means of a 'stock and flow structure', whereby CIT Diffusion is depicted as a 'stock' and the 11 inflencing factors are depicted as 'flows'. The structure is derived based on the results from Empirical Study II (see Figure 12.1 above).

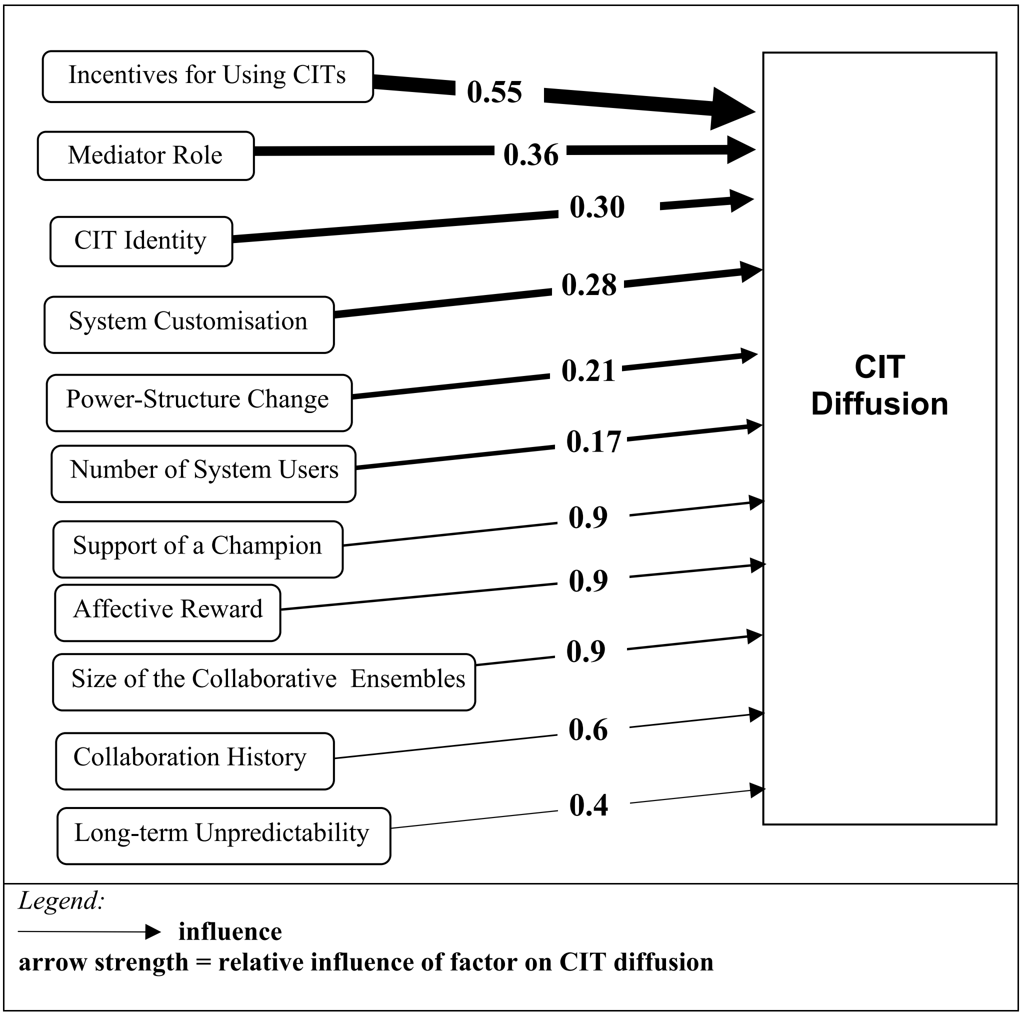


Figure 12.2. Conceptual Framework 1: Hypothesised Influence of Factors on CIT Diffusion

The 'arrow strength' in Figure 12.2 (CF1) depicts the 'relative weight' of each factor in terms of degree of influence on CIT Diffusion. The factors are depicted in descending order, starting with the 'most strongly influencing' factor and ending with the 'least strongly influencing' factor. 'Incentives for Using CITs' is hypothesised as the 'most strongly influencing' factor (0.55 pixel arrow strength corresponding to 55% availability in the cases – see Figure 12.1 above). Following are the factors of 'Mediator Role' (0.36 pixel arrow strength corresponding to 36% availability in the cases), 'CIT Identity' (0.30 pixel arrow strength corresponding to 30% availability in the cases), 'System Customisation' (0.28 pixel arrow strength corresponding to 28% availability in the cases), 'Power-Structure Change' (0.21 pixel arrow strength corresponding to 21% availability in the cases), 'Number of

System Users' (0.17 pixel arrow strength corresponding to 17% availability in the cases), 'Support of a Champion' (0.9 pixel arrow strength corresponding to 9% availability in the cases), 'Affective Reward' (0.9 pixel arrow strength corresponding to 9% availability in the cases), 'Size of the Collaborative Ensembles' (0.9 pixel arrow strength corresponding to 9% availability in the cases), 'Collaboration History' (0.6 pixel arrow strength corresponding to 6% availability in the cases), 'Long-term Unpredictability' (0.4 pixel arrow strength corresponding to 4% availability in the cases).

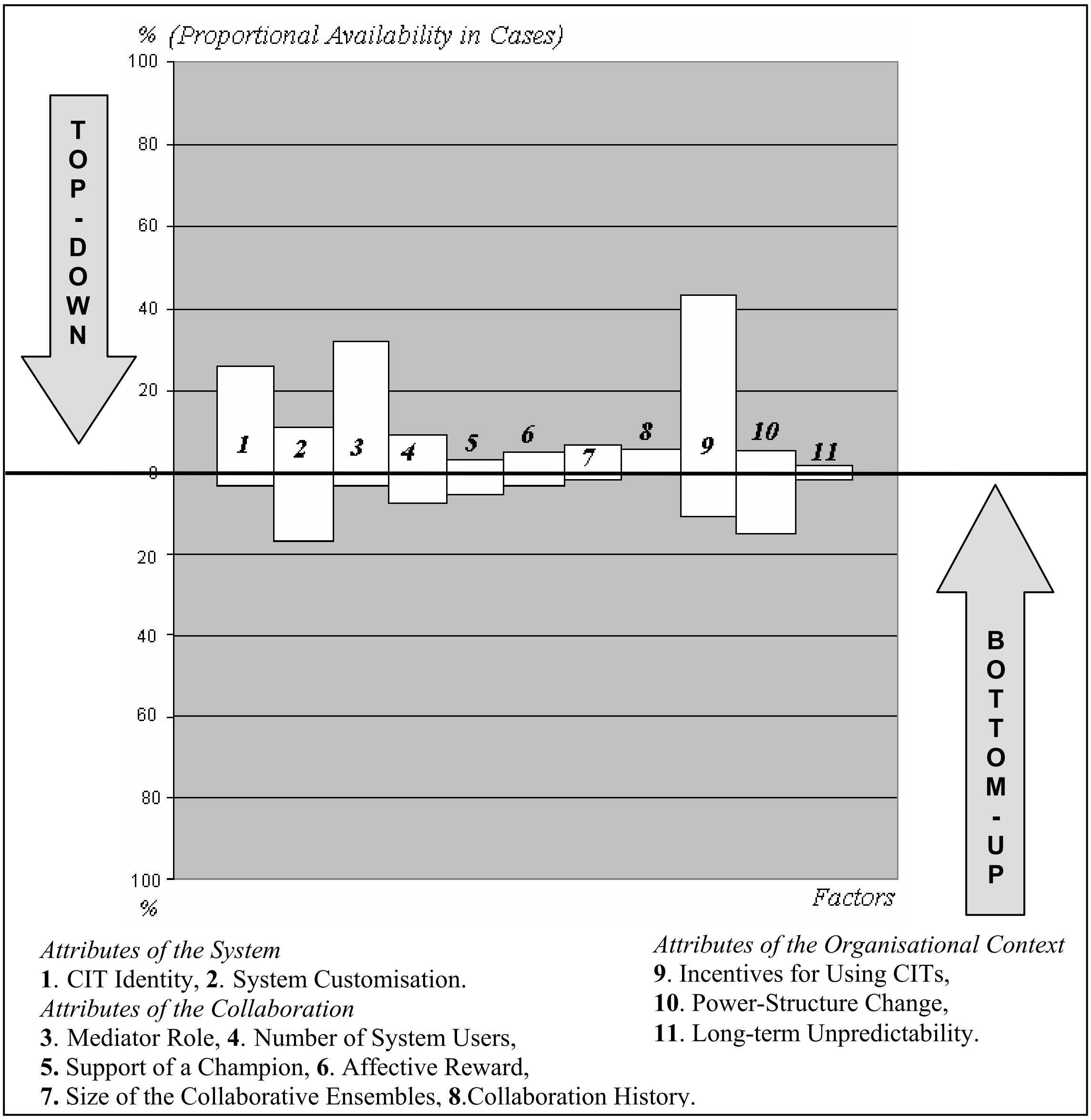


Figure 12.3. Top-down and Bottom-up Diffusion of CIT – Relative Weight of Influencing Factors

Figure 12.3 above presents a results summary of Empirical Study II from a slightly different viewpoint – the focus here is on the process structure of CIT diffusion and the two hypothesised orthogonal diffusion paths – 'top-down' and 'bottom-up'. Thus, Figure 12.3 graphically represents the detailed results from Empirical Study II

– i.e. the detailed comparative analysis of the practices observed and lessons learned from the 53 case-study reports – which were described and discussed in the previous Chapters 8-11.

The raw data for Figure 12.3 is derived as shown in Table 12.1 below. Each case has been analysed and classified in terms of the structural type of CIT diffusion – top-down or bottom-up. The cases have then been matched to the factors, in respect of this structural classification.

Factor	**Number of Cases – Top down**	**Number of Cases – Bottom up**	**Number of Cases – total**	**% Availability total**
CIT Identity	14	2	16	30
System Customisation	6	9	15	28
Mediator Role	17	2	19	36
Number of System Users	5	4	9	17
Support of a Champion	2	3	5	9
Affective Reward	3	2	5	9
Size of the Collaborative Ensembles	4	1	5	9
Collaboration History	3	0	3	6
Incentives for Using CITs	23	6	29	55
Power-Structure Change	3	8	11	21
Long-term Unpredictability	1	1	2	4

Table 12.1. Top-down and Bottom-up CIT Diffusion in the Case Studies

Figure 12.4 presents Conceptual Framework 2 (CF2). The framework illustrates the 'process structure' of CIT diffusion – characterised by 'top-down' and 'bottom-up' diffusion paths – as well as the main factors that have been identified as 'influencing' the diffusion process. The framework takes into account and illustrates the 'relative weight' of each factor in terms of degree of influence on CIT diffusion.

The length of the arrows in Figure 12.4 corresponds proportionally to the ***number of cases ('N')*** in which each factor has been observed (see Table 12.1). The arrows are depicted as having two opposite directions – top-down and bottom-up – to illustrate the two distinct CIT-diffusion paths identified. The identification of two distinct diffusion paths in this Thesis was suggested by the Literature Review (Chapter 3/ Sections 3.3.1, 3.4.1, 3.4.2, and 3.4.3) and was supported by the Expert Talks (Empirical Study I). The existence of two distinct diffusion paths was first depicted in the Preliminary Conceptual Framework, CFØ (Figure 6.3). The findings from Empirical Study II have supported/confirmed the assertion of existence of two diffusion paths – CF2 is, therefore, a logical extension of CF1 and CFØ. The 'Spiral Toward Understanding' (i.e. the overall research design of this study – see Section 5.5.4 above) has allowed for a continuing process of constructing meaning by an ongoing, cyclical adjustment and refinement of the conceptual framework according to the collected data.

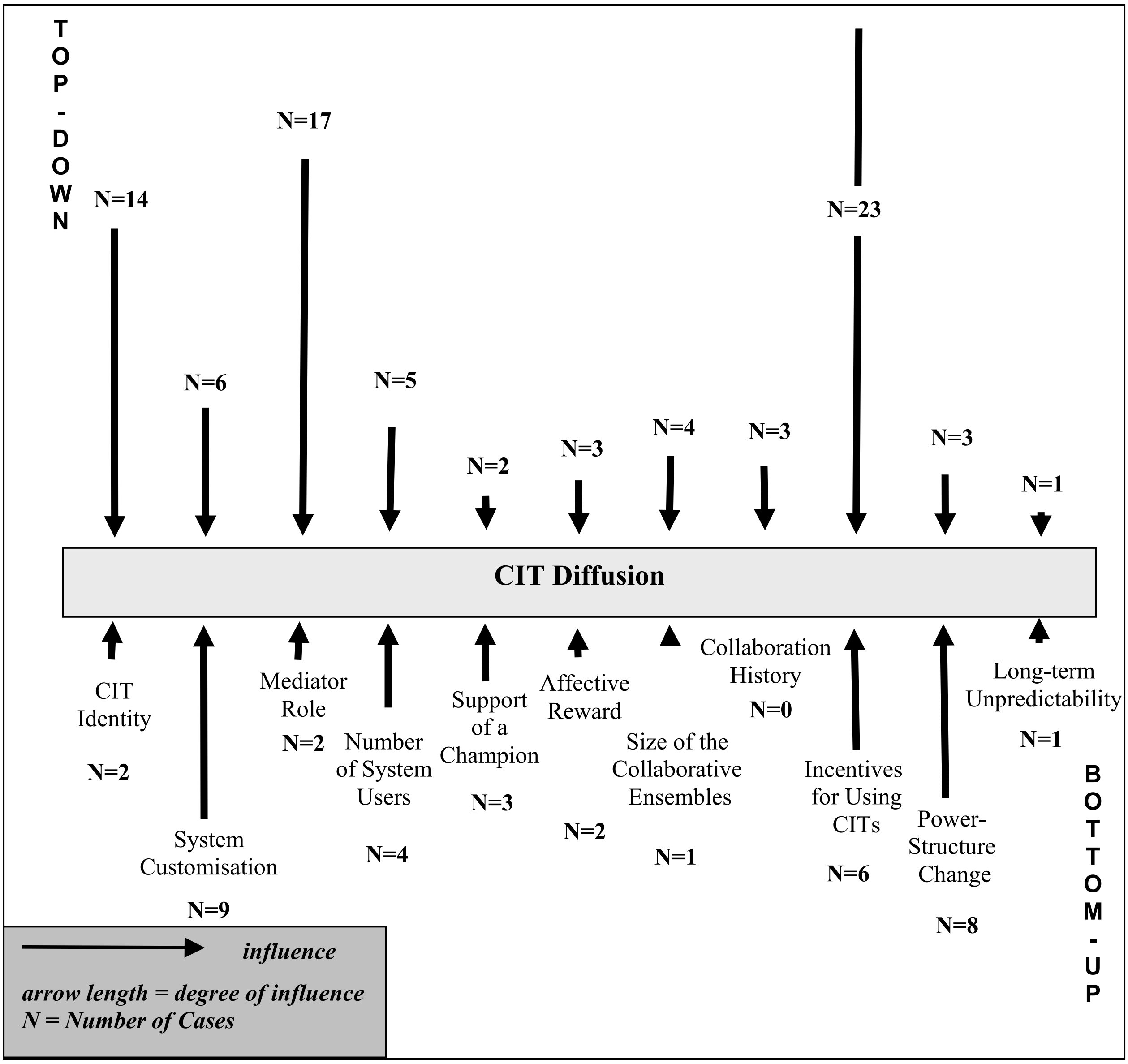


Figure 12.4. Conceptual Framework 2: Top-down and Bottom-up CIT Diffusion and Relative Influence of Factors

Accordingly, the version of the Conceptual Framework presented in Figure 12.4 (CF2) has been derived as follows:

(1) initially, the assertion that two CIT diffusion paths exist – top-down and bottom-up – was suggested by the Literature Review (Chapter 3/ Sections 3.3.1, 3.4.1, 3.4.2, and 3.4.3);

(2) confidence was added, as to the validity of this assertion, through Empirical Study I (the overall results of which were depicted in CFØ);

(3) additional confidence was added based on the basic findings from Empirical Study II (presented in Chapter 7);

(4) the detailed results from Empirical Study II (see Chapters 8-11) have added essential information in terms of the 'relative weight' of each influencing factor ***along each diffusion path*** – top-down or bottom-up.

Conceptual Framework (CF2) reflects the cyclically-gathered information from these four consecutive research phases.

Figure 12.5 presents Conceptual Framework 3 (CF3). CF3 extends the two earlier framework versions (CF1 and CF2) from a different viewpoint. This third version takes into account the ***specific role*** of each influencing factor as either ***'accelerator'*** or ***'barrier'*** of the process of CIT Diffusion. The necessary information is derived from the detailed results of Empirical Study II (which were presented in Chapters 8-11) – based on these results, each factor was identified as playing the role of:

- an accelerator (facilitating the CIT diffusion process), or
- a barrier (hindering the process).

Conceptual Framework 3 has been derived as a summative representation (a combination) of the following partial conceptual frameworks:

- Conceptual Framework 3a (CF3a) – Hypothesised Influence of the 'Incentives' Factor on CIT Diffusion (Figure 8.2 above),
- Conceptual Framework 3b (CF3b) – Hypothesised Influence of the 'CIT Identity' Factor on CIT Diffusion (Figure 9.2),
- Conceptual Framework 3c (CF3c) – Hypothesised Influence of the 'Customisation' Factor on CIT Diffusion (Figure 9.6),
- Conceptual Framework 3d (CF3d) – Hypothesised Influence of the 'Mediator Role' Factor on CIT Diffusion (Figure 10.2),
- Conceptual Framework 3e (CF3e) – Hypothesised Influence of the 'number of users' Factor on CIT Diffusion (Figure 10.4),
- Conceptual Framework 3f (CF3f) – Hypothesised Influence of the 'Power-Structure Change' Factor on CIT Diffusion (Figure 11.2).

The factors influencing CIT diffusion, depicted in Figure 12.5 (CF3), are split into three major categories (the standard categories in this Thesis): Attributes of the System, Attributes of the Collaboration, and Attributes of the Organisational Context.

I. Attributes of the System

The hypothesised influence of the '***CIT Identity***' factor on CIT Diffusion is depicted in Figure 12.5 (CF3) as follows. The thick arrow on the left-hand side in Figure 12.5 visually represents two of the generated Hypotheses: Hypothesis 9.1 and Hypothesis

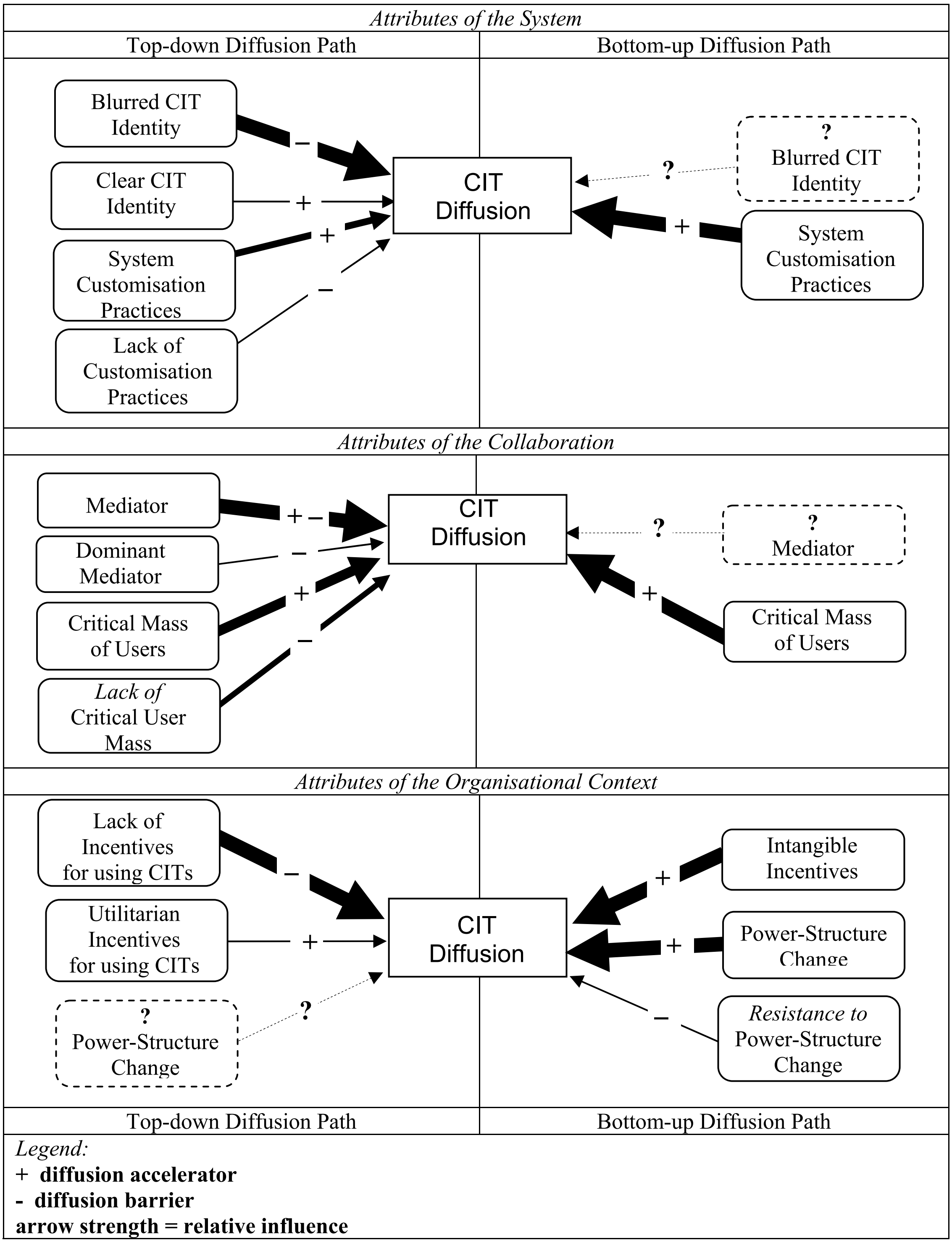


Figure 12.5. Conceptual Framework 3: Top-down and Bottom-up CIT Diffusion – ‘Accelerator’ or ‘Barrier’ Role of Factors

9.4 (see above). The thin arrow on the left-hand side in Figure 12.5 visually represents one of the generated Hypotheses: Hypothesis 9.2 (see above). The right-hand side in Figure 12.5 visually represents the bottom-up CIT diffusion path. The small number of bottom-up cases (i.e. 2 cases only – see Figure 9.1 above) made it impossible to generate grounded hypotheses concerning the bottom-up diffusion path. The dotted lines and question marks in the right-hand side of Figure

12.5 are applied to denote that the source data has not been enough in quantity to generate (even a hypothetical) conceptual framework[55].

The hypothesised influence of the '***System Customisation***' factor on CIT Diffusion is depicted in Figure 12.5 (CF3) as follows. The thin arrow on the left-hand side in Figure 12.5 visually represents what has been observed as happening in 16% of the top-down diffusion cases – i.e. system-customisation practices have not taken place and that has hampered CIT diffusion (see e.g. Figure 9.5 above). The second (a bit thicker) arrow on the left-hand side in Figure 12.5 visually represents what has been observed as happening in 66% of the top-down diffusion cases – i.e. the system-customisation practices that were taking place tended to stimulate (or enable) CIT diffusion. The thick arrow on the right-hand side in Figure 12.5 visually represents what has observed as happening in 100% of the bottom-down diffusion cases (9 cases altogether) – i.e. the existing system-customisation practices have stimulated (or enabled) CIT diffusion[56].

II. Attributes of the Collaboration

The hypothesised influence of the '***Mediator Role***' factor on CIT Diffusion is depicted in Figure 12.5 (CF3) as follows. The thick arrow on the left-hand side in Figure 12.5 visually represents the observations – based on the case-study reports – that the CIT mediator can play both a positive and a negative role in the top-down CIT diffusion path (see e.g. Figure 10.1 above). The thin arrow on the left-hand side in Figure 12.5 visually represents Hypothesis 10.1.b (see above). The right-hand side in Figure 12.5 visually represents the bottom-up CIT diffusion path. The small number of bottom-up cases (i.e. 2 cases only – see e.g. Figure 10.1 above) made it impossible to generate grounded hypotheses concerning the bottom-up diffusion path. The dotted lines and question marks in the right-hand side of Figure 12.5 are applied to denote that the source data has not been enough in quantity to generate (even a hypothetical) conceptual framework[57].

The hypothesised influence of the '***Number of System Users***' factor on CIT Diffusion is depicted in Figure 12.5 (CF3) as follows. The thick arrows on the left-hand and right-hand side in Figure 12.5 visually represent the observation (and Hypothesis 10.2 – see above) that a sufficient (or growing) number of system users plays a positive role on the rate of CIT diffusion. The thin arrow on the left-hand side in Figure 12.5 visually represents observation (and Hypothesis 10.3) that the lack of critical mass of users hampers the process of CIT diffusion and cause the CIT facilities to become self-extinguishing over time[58].

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[55] For more details, see Figure 9.2 above – "Hypothesised Influence of the 'CIT Identity' Factor on CIT Diffusion (Conceptual Framework 3b)".

[56] For more details, see Figure 9.6 above – "Hypothesised Influence of the 'Customisation' Factor on CIT Diffusion (Conceptual Framework 3c)".

[57] For more details, see Figure 10.2 above – "Hypothesised Influence of the 'Mediator Role' Factor on CIT Diffusion (Conceptual Framework 3d)".

[58] For more details, see Figure 10.4 above – "Hypothesised Influence of the 'number of users' Factor on CIT Diffusion (Conceptual Framework 3e)".

III. Attributes of the Organisational Context

The hypothesised influence of the '***Incentives for using CITs***' factor on CIT Diffusion is depicted in Figure 12.5 (CF3) as follows. The thick arrow on the left-hand side in Figure 12.5 visually represents two of the generated Hypotheses: Hypothesis 8.2 and Hypothesis 8.3 (see above). The thin arrow on the left-hand side in Figure 12.5 visually represents one of the generated Hypotheses: Hypothesis 8.4 (see above). The thick arrow on the right-hand side in Figure 12.5 visually represents one of the generated Hypotheses: Hypothesis 8.5 (see above)[59].

The hypothesised influence of the '***Power-Structure Change***' factor on CIT Diffusion is depicted in Figure 12.5 (CF3) as follows. The thick arrow on the right-hand side in Figure 12.5 visually represents one of the generated Hypotheses: Hypothesis 11.1 (see above). The thin arrow on the right-hand side in Figure 12.5 visually represents Hypothesis 11.2 (see above). The left-hand side in Figure 12.5 visually represents the top-down CIT diffusion path. The small number of top-down cases (i.e. 3 cases only – see e.g. Figure 11.1 above) made it impossible to generate grounded hypotheses concerning the top-down diffusion path. The dotted lines and question marks in the left-hand side of Figure 12.5 are applied to denote that the source data has not been enough in quantity to generate (even a hypothetical) conceptual framework[60].

It is important to note that not all not all 11 factors that were identified as influencing CIT diffusion (see e.g. Figure 12.2 and Figure 12.4 above) are part of Conceptual Framework 3 (Figure 12.5). The factors ***missing***[61] in CF3 are the ones for which ***the number of cases for each diffusion path*** (top-down or bottom-up) ***is less than 4***. The source data has not been enough in quantity to include these factors as part of CF3.

As mentioned above, the 'Spiral Toward Understanding' (i.e. the overall research design of this study – see Section 5.5.4) has allowed for a continuing process of constructing meaning by an ongoing, cyclical adjustment and refinement of the conceptual framework according to the collected data. CFØ was developed based on the results from Empirical Study I, then – CF1, CF2 and CF3 were developed based on the results from Empirical Study II. The development of CF3 was preceded by development of six 'partial' conceptual frameworks – CF3a, CF3b, CF3c, CF3d, CF3e, CF3f – presented in Chapters 8-11 (see e.g. Figure 5.6 above).

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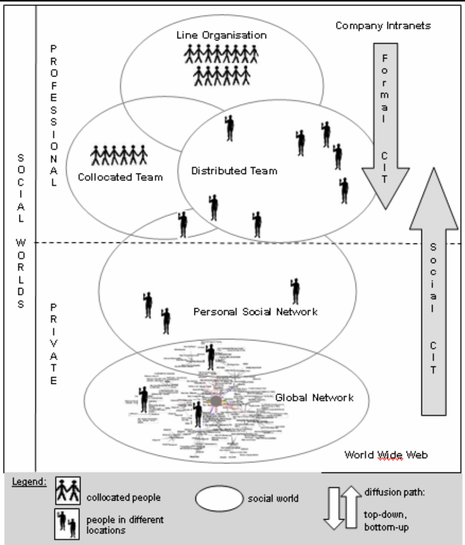
[59] For more details, see Figure Figure 8.2 above – "Hypothesised Influence of the 'Incentives' Factor on CIT Diffusion (Conceptual Framework 3a)".

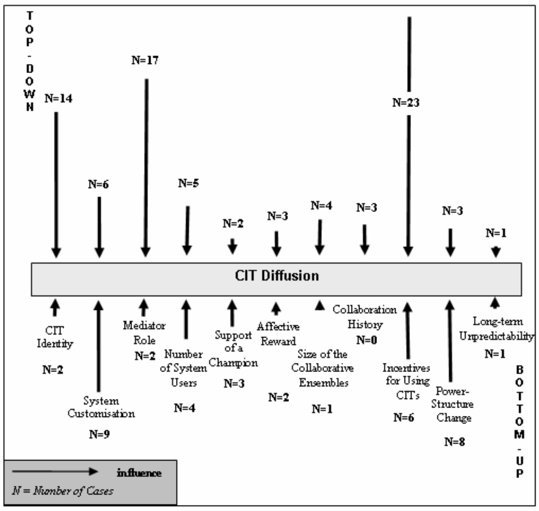
[60] For more details, see Figure 11.2 above – "Hypothesised Influence of the 'Power-Structure Change' Factor on CIT Diffusion (Conceptual Framework 3f)".

[61] According to this criteria, missing in CF3 are the following factors: *Attributes of the Collaboration* – Support of a Champion, Affective Reward, Size of the Collaborative Ensembles, Collaboration History; *Attributes of the Organisational Context* – Long-term Unpredictability.

In this line of thought, CF3 is a logical extension of CF2, CF2 – of CF1, and CF1 – of CFØ. Figure 12.6 below visually compares CFØ and CF2. What becomes obvious from Figure 12.6 is that the structure of CF2 is not very different from the structure of its (indirect) predecessor. The overall structure is the most obvious similarity between the two frameworks. There are ***dissimilarities*** (differences) too, the most important of which are as follows.



Preliminary Conceptual Framework (CFØ)



Conceptual Framework 2 (CF2)

Figure 12.6. Preliminary Conceptual Framework (CFØ) and Conceptual Framework 2 (CF2) – Comparison

First, the source data has not been enough in order to continue and extend the 'rich picture' of CIT diffusion, presented in CFØ, with the same level of detail concerning the concept of the ***social worlds*** as units of analysis. CFØ remains in this Thesis as a valid 'start' of a modelling effort that needs to be – in this particular direction – continued in future research.

Second, although the 'process structure' of CIT diffusion depicted in CFØ has – legitimately – been 'duplicated' in CF2 and CF3 (the findings from Empirical Study II have supported/confirmed the assertion of existence of two distinct diffusion paths), the assertion that 'social CITs are diffusion predominantly bottom-up, and formal CITs are diffusion predominantly top-down' (see Figure 6.3 – CFØ) ***has not held***. That assertion was suggested by the Expert Talks (Empirical Study I) but has not been solidly supported by Empirical Study I. Table 12.2 below represents the case-study reports discussing 'social CITs' (5 cases altogether), and shows that in three of the cases the diffusion process has been bottom-up, but in two of the cases the diffusion process has been top-down. Therefore, unlike CFØ in which 'social CITs' are depicted as representing the bottom-up diffusion path, in CF2 and CF3 'social CITs' are not explicitly mentioned.

Social CIT	
Case	*CIT Diffusion Path*
Case 1. Social Networking at Accenture	bottom-up
Case 2. IBM’s SNS ‘Bluepages’	top-down
Case 3. SAP’s SNS ‘Harmony’	top-down
Case 4. Geek Squad Company	bottom-up
Case 10. Blogging	bottom-up

Table 12.2. Case-Study Reports discussing Social CITs – CIT Diffusion Path

In summary:

> In this Chapter I have developed – based on the overall and detailed results from Empirical Study II – three consecutive versions of the Conceptual Framework (CF1, CF2, and CF3). These conceptual frameworks are visual representations of the hypothesised answers to the question ‘why’ CIT diffusion is developing as it is – what major factors are driving it, how strongly and along what structural matrix is each factor relevant, etc.

Chapter 13

CONTENT ANALYSIS OF CIT LITERATURE: EMPIRICAL STUDY III

This Chapter presents Empirical Study III – Content Analysis of CIT literature. In Section 5.5.3 above I explained my justification for the use of the 'Content Analysis' data-treatment methodology for this empirical study. This content analysis is an exhaustive evaluation of CIT academic and business literature – published over the last-decade period, i.e. 1997 up to 2009 – in an effort to take stock of the current state of the art. The purpose of the content analysis has been to gather, organise and classify the lessons learned from one decade of CIT research.

In reviewing the literature, I have immediately discovered a lack of consistency in nomenclature, thus I first sought to describe a classification scheme for CITs which provides a basis for understanding the CIT community's perception of the relative importance of CIT types – and to tell a coherent story of the community focus over the one-decade period. I also needed a classification scheme to form the 'skeleton' and structure of my content analysis. Guided by my classification scheme, I analysed the nature of the literature and drew, from this analysis, some findings as well as open questions which require further research. This Chapter is structured as follows:

1. I describe the form of the research – the source of my data, approach to sampling and basic coding;
2. I briefly outline my findings by 'Research Type and Method', by 'Focus of Research' and by 'CIT Types';
3. Then, in turn, I show how the source data leads to these findings;
4. I discuss these findings in detail by comparing them to similar findings from literature.

13.1 Methodology – Source Data, Sampling and Basic Coding

To locate studies, I have performed a keyword-based search on the SCOPUS database, applying a keyword set of 'adoption', 'diffusion, 'uptake', 'use' etc., combined with different term-variations for CIT – i.e. computer supported collaborative work (CSCW), group support systems (GSS), groupware (GW), collaboration support software (CSS), group communication support systems (GCSS). The SCOPUS search database was selected for its wide content coverage (14 000 peer-reviewed journal titles) as 'one of the most comprehensive scientific, technical and social science point of access containing all relevant literature (Fingerman 2005)', as well as for its unique 'cited by' filtering feature, ordering frequently cited handbook papers on an upper position.

The content analysis data comprised a final data set of 332 research papers published in the field of CIT/CSCW over the last decade, i.e. 1997 up to 2009. (A detailed list and description of the 332 research papers is presented in Appendix VIII). The final data set was derived after refinement of the keyword search results, including filtering and selection, as follows:

a) The original keyword search results – the sum of results derived by each search phrase – produced a total of 2660 paper titles.
b) ***Filtering***: all titles were filtered using the SOPUS 'cited by' filtering feature, whereby frequently cited handbook papers were ordered on an upper position. Thus, I secured the inclusion of the most frequently referenced papers, and therefore the ones that have been most influential in the field.
c) ***Selection 1***: papers were selected based on the relevance of the 'paper title'. After that selection, a sample of 500 papers was downloaded.
d) ***Selection 2***: papers were selected based on relevance of paper content, i.e. the focus of the article. 168 papers were removed as irrelevant. The preponderance of removed papers were those that were not discussing clearly CIT topics (see Figure 13.1 below).

Sources of the 332 relevant studies were 141 different refereed journals and conferences, among them: Computer Supported Cooperative Work – 50 downloaded papers, ACM Conference on Computer Supported Cooperative Work – 27 papers, Group Decision and Negotiation – 16 papers, European Conference on Computer Supported Cooperative Work – 13 papers, Journal of Management Information Systems – 12 papers, etc.

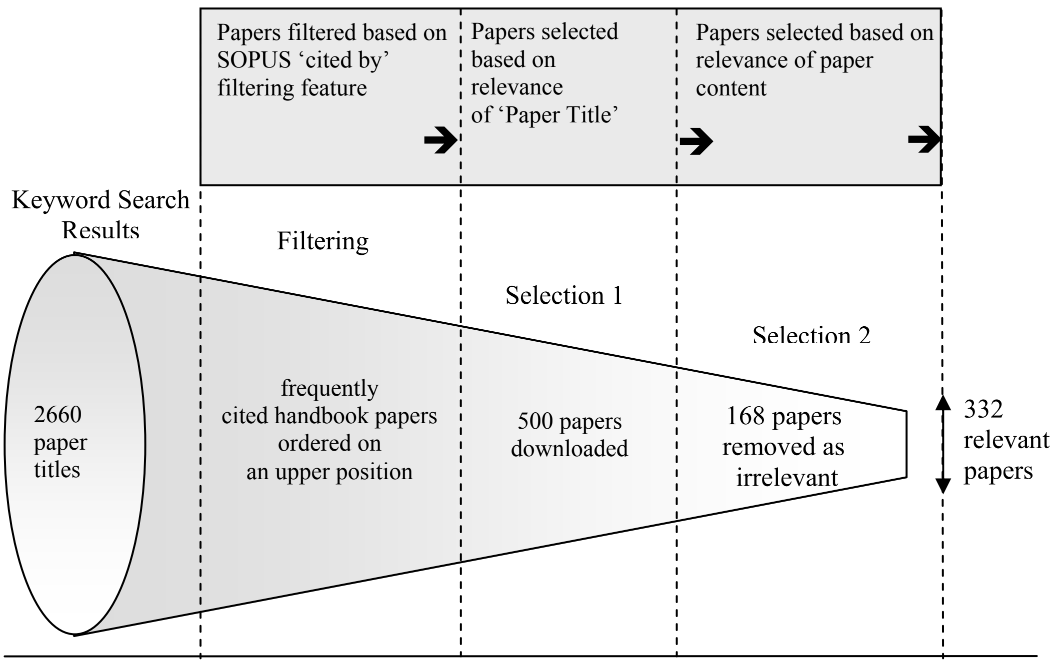


Figure 13.1. Content Analysis Methodology – Filtering and Selection

All studies were categorised and coded by me and then put into a database that uses the academic or business study as the unit of analysis, and records and reports the results at the level of the individual type and findings of each study, yielding a number of category/subcategory pairings. Thus, the 'focus of study' information was stored in the database in the form of category/subcategory pairings, where the categories represented the CIT system types, and the subcategories represented the corresponding CIT application types. The application and system type descriptions were taken as 'per original', i.e. as described by the authors of the papers themselves.

Author/ Year	**Journal**	**Research Design**		**Focus of Study**		
		Research Type (category)	**Research Method (subcategory)**	**CIT Generic Type**	**CIT System Type (category)**	**CIT Application Type (subcategory)**
Kumar et al. (2004)	Communications of the ACM	content analysis	N.A.	Level-A CITs	CMC/ social CITs	blogs
Tung et al. (2000)	International Journal of Information Management	field study	survey/ questionnaire	Level-A CITs	CMC	IBM Lotus collaboration tools (SameTime)
Agres et al. (2005)	Group Decision and Negotiation	case study	cross-case comparison	Level-C CITs	group decision support systems	non-specific
Scott et al. (2004)	ACM Conference on Computer Supported Cooperative Work, CSCW	experiment	observational	Level-B CITs	shared workspaces	collaborative tabletop workspaces
Turel and Yuan (2007)	Group Decision and Negotiation	field study	survey/ questionnaire	Level-D CITs	negotiation support systems	web-based negotiation support systems

Table 13.1. An Excerpt from the Content-Analysis Database

Table 13.1 above gives an excerpt from the content-analysis database. The 'research design' information was stored in the database in the form of category/subcategory pairings, where the categories represented the research types, and the subcategories represented the research methods used. The following information was recorded and stored in the database:

- academic/business study classified by study number, and year;
- journal: journal, conference;
- research design: research type (category) and research method (subcategory);
- focus of study: CIT generic type, CIT system type (category) and CIT application type (subcategory);
- various additional variables related to research context, arguments, and findings.

A detailed list of the final data set of 332 research papers (including all information as in the Excerpt – Table 13.1 – and a short description), is given in Appendix VIII.

13.2 Summary of Content Analysis Results

In this section I present a brief outline of my findings. Then I will show how the source data leads to these findings, and will discuss each finding in detail. The findings from the content analysis may be summarised as follows. The content analysis of post-1997 CIT literature has revealed:

– by 'Research Type and Method' –

Finding 1: a slight preponderance of case studies (over 17%), followed by field studies (over 12%), experiments (over 10%), as well as technical tool descriptions and ethnographic studies (over 9% each);

– by 'Focus of Research' –

Finding 2: scarcity of research on 'diffusion' and abundance of reporting on 'adoption' (testing and implementation) of collaboration technologies;

– by 'CIT Types' –

Finding 3: preponderance of reporting on adoption of level-A CITs over others (higher-level CITs);

Finding 4: reported dissatisfactory diffusion of higher-level CITs versus reported satisfactory diffusion of level-A CITs;

Finding 5: abundant reporting on adoption of social CITs

The remaining part of this section is devoted to showing how the source data leads to these findings, as well as discussing each finding in detail.

13.3 Finding 1: a slight Preponderance of Case and Field Studies

As mentioned above, ***Finding 1*** of the content analysis (by research type and method) has revealed a slight preponderance of case studies (over 17%), followed by field studies (over 12%), experiments (over 10%), as well as technical tool descriptions and ethnographic studies (over 9% each). Table 13.2 below represents the results pertaining to ***Finding 1***.

Research Type	Availability in Post-1997 CIT Literature %
case study	17.87
field study	12.97
experiment(s)	10.37
technical description	9.51
ethnographic study	9.22
theoretical argumentative	7.2
multiple case studies	6.63

survey/questionnaire	4.61
action research study	4.03
meta-analysis	3.75
expert talk	3.17
market analysis	2.31
literature review	2.31
content analysis	2.02
analytical descriptive study	1.73
sociometric analysis	0.58
workplace research	0.58
conceptual descriptive study	0.58
quasi-experimental field study	0.29
Delphi study	0.29

Table 13.2. Finding 1 (Results by Research Type)

The most frequently used data-collection methods for field studies are the survey/ questionnaire (36.59%), action research (24.39%), as well as ethnographic data-collection (17.07%). The most frequently used data-collection methods for CIT case studies are the ethnographic data-collection (29.03%), followed by action research (20.97%). Table 13.3 below gives a detailed description of the types of data-collection methods used.

Research Type/Availability	Data-collection Method	%
case study – 17.87%	ethnographic data-collection	29.03
	action research	20.97
	others	17.74
	survey/questionnaire	6.45
	cross-case comparison	6.45
	descriptive	6.45
	content analysis	3.23
	longitudinal	3.23
	observational	1.61
	quasi-ethnographic method	1.61
	interpretive	1.61
	exploratory	1.61
field study – 12.97%	survey/questionnaire	36.59
	action research	24.39
	ethnographic data-collection	17.07
	interpretive	7.32
	test/trial	4.88
	descriptive	2.44

	longitudinal	2.44
	process-oriented exploratory field study	2.44
	theoretical argumentative	2.44
experiment(s) – 10.37%	others	41.67
	laboratory	25.00
	observational	8.33
	exploratory	5.56
	model validation	5.56
	test/trial	5.56
	content analysis	2.78
	simulation	5.56
	hypotheses testing	2.78
technical description – 9.51%	application description	33.33
	system description	24.24
	tool description	12.12
	framework description	9.09
	evaluation report	6.06
	model description	3.03
	system architecture outline	3.03
	implementation guide	3.03
	working prototype description	3.03
ethnographic study – 9.22%	ethnographic data-collection method	53.13
	others	28.13
	fieldwork	6.25
	longitudinal	6.25
	team research	3.13
	interpretive	3.13
theoretical argumentative – 7.20%	others	96.00
	descriptive	4.00
multiple case studies – 6.63%	cross-case comparison	39.13
	ethnographic data-collection method	21.74
	action research	13.04
	others	13.04
	literature review	8.70
	survey/questionnaire	4.35
survey/questionnaire – 4.61%	others	56.25
	survey/questionnaire	25.00
	ethnographic data-collection method	6.25
	test/trial	12.50
action research study – 4.03%	descriptive	14.29
	ethnographic data-collection method	28.57
	participatory	7.14
	longitudinal	7.14
	others	42.86
meta-analysis – 3.75%	others	53.85

	descriptive	15.38
	review of academic literature	7.69
	content analysis of research techniques	7.69
	literature review	7.69
	theoretical argumentative	7.69
expert talk – 3.17%	ethnographic data-collection	54.55
	interviews	18.18
	others	27.27
market analysis – 2.31%	others	75.00
	ethnographic data-collection	25.00
literature review – 2.31%	others	75.00
	law review - court cases on workers' privacy	12.50
	review of academic literature	12.50
content analysis – 2.02%	content analysis of academic literature	42.86
	others	14.29
	content analysis of discussion group messages	14.29
	content analysis of discussion transcripts	14.29
	content analysis of online discussion postings	14.29
analytical descriptive study – 1.73%	computer-assisted qualitative analysis	16.67
	adoption process description	16.67
	others	66.67
sociometric analysis – 0.58%	social network analysis	50.00
	quantitative content analysis of blog networks	50.00
workplace research – 0.58%	others	50.00
	team research	50.00
conceptual descriptive study – 0.58%	others	100.00
quasi-experimental field study – 0.29%	others	100.00
Delphi study – 0.29%	interviews	100.00

Table 13.3. Finding 1 (Results by Research Type) – Detailed [62]

The great preponderance of field studies are reports on ***single CIT tools*** and their implementation within various local domains (e.g. hospitals, universities etc.). This observation of mine may be checked against numerous statements (non-empirical) of a great number of CIT researchers, like:

- 'Despite the fact that no single medium can support collaboration in different types of tasks, there is a scarcity of research investigating the adoption and use of multiple CIT options across regions… Still, adoption and use of multiple CIT solutions remains largely unexplored' (Bajwa, et al. 2005, pp.130, 131).

[62] The in-depth discussion of this Table 13.3 will be a part of my future work.

- ‘For the most part, the focus of these [CIT] investigations has been on a single CIT solution, despite the fact that the business press has emphasised using a variety of tools to collaborate’ (DeKoven 2000).
- ‘The majority of the research efforts have focused on investigations of adoption of a single IT even though collaboration amongst distributed groups is typically supported by a combination of communication technologies’ (Tung and Turban 1998).
- ‘There are few studies which have focused on large-scale groupware technology adoption in an organisation’ (Mark and Poltrock 2003).

13.3.1 Discussion

Finding 1 (see above) supports an early trend noticed by Munkvold and Anson (2001) and Fjermestdad and Hiltz (2000, 2001) whose literature reviews documented how the number of case and field studies had increased over the years 2000/01. While laboratory experiments had been the dominant approach in early CIT research (Bajwa, et al. 2005, p.138, Chun and Park 1998, p.313), case and field studies, focusing on the effects of using CITs on organisational group processes, began to show a slight preponderance in 2000/01.

The slight but noticeable shift from laboratory experiments toward more case and field studies may be seen as a consequence of the realisation of the CIT community that the internal validity of lab experiments with collaboration technologies do not guarantee a sufficient level of external validity. The first scholars who noticed the problem were Dennis, Nunamaker, and Vogel (Dennis et al.1990-91) who – in their paper titled ‘A comparison of laboratory and field research in the study of electronic meeting systems’ – argued that there were *differences* between lab and field findings. The scholars from the University of Arizona (Nunamaker et al. 1997) agreed saying that actual field use of collaboration technology was producing effects that were not modelled or measured in the early lab experiments, often because ‘real groups do not perform tasks in a void, but within an organisational context that drives objectives, attitudes, and behaviours in group meetings’ (p.170). Malone (1985) lamented that while it was relatively easy to bring a single user into a lab to be tested on the perceptual, cognitive, and motor variables that have been the focus for single-user applications, it was difficult or impossible to create a group in the lab that will reflect the social, motivational, economic, and political factors that are central to group performance (Malone 1985). Grudin (1988) noticed that, in addition, group observation must extend over a longer period of time. For example, much of a person’s use of a spreadsheet might be observed in a single hour, but collective collaborative interactions typically unfold over days or weeks. Neale et al. (2004) noticed that there was a great number of laboratory experiments reported in the literature (for a review see Pinelle and Gutwin 2000), and there was a rich tradition for experimental approach in engineering and computer science. However, as Neale et al. (2004, p.114) pointed out:

'… laboratory studies have been criticised for being ineffective as a paradigm for evaluating CSCW (e.g. Arrow et al. 2000 – 'Small Groups as Complex Systems)'.

CIT field studies, on the other hand, have been criticised for focusing more on group impacts of the technology rather than the process related to organisational implementation of this technology (Munkvold and Anson 2001, p.280).

13.4 Finding 2: Scarcity of Research on 'Diffusion' and Abundance of Reporting on 'Adoption' (Testing and Implementation) of Collaboration Technologies

As mentioned above, ***Finding 2*** of the content analysis (by focus of research) has revealed extreme scarcity of research on 'diffusion' and abundance of reporting on 'adoption' (testing, implementation, initial use) of CITs. Hereby, the terms 'adoption' and 'diffusion' I see in the sense of their most well-accepted meanings:

- '**adoption**' is the process through which collaboration technology is ***acquired*** by single or multiple social worlds.
- '**diffusion**' is the process through which the acquired collaboration technology becomes ***assimilated*** [63] into multiple social worlds (I shall return to this terminology later in this section).

Figure 13.2 below represents the results pertaining to ***Finding 2***.

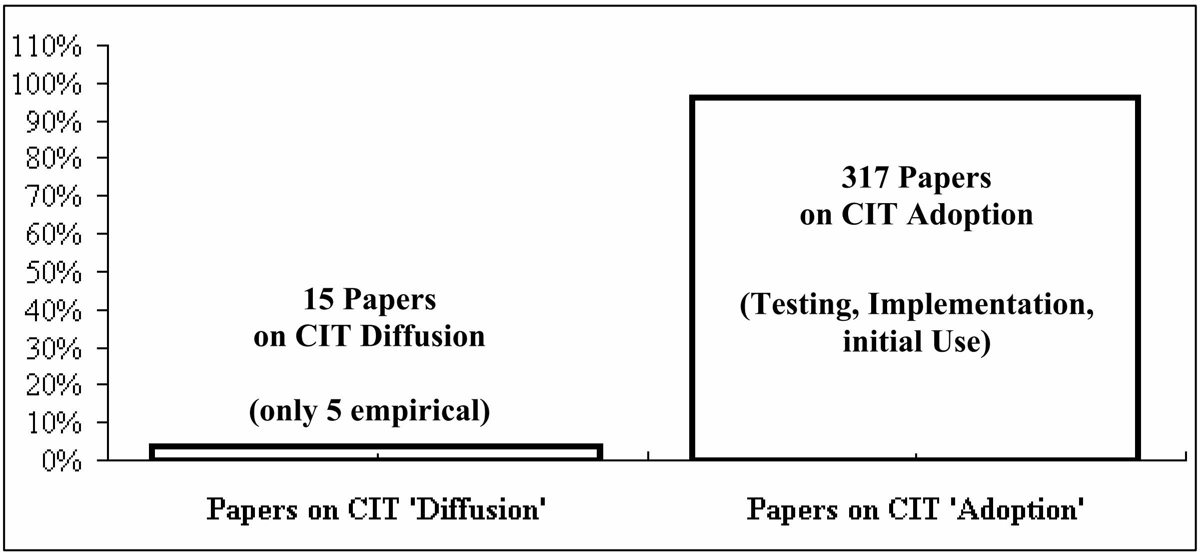


Figure 13.2. Finding 2 – Results by Research Type

[63] The terms 'assimilation' and 'diffusion' I understand as synonymous.

As can be seen from Figure 13.2, only 15 papers (out of a total of 332 papers) dealt with problems of CIT diffusion. It is worth mentioning also that only 5 studies (Bajwa and Pervan 2004, Bajwa et al. 2005, Lewis et al. 2004, Lewis et al. 2007, Pervan et al. 2004b) were empirical studies of CIT diffusion – i.e. measuring the levels of diffusion empirically. The remaining 10 studies (Stanoevska-Slabeva 2009, Agres et al. 2005, Dennis and Reinicke 2004, Chen and Lou 2002, Munkvold and Anson 2001, Agostini and De Michelis 2000, Briggs et al. 1999, Whittaker and Schwarz 1999, Bentley et al. 1997a, Brézillon and Pomerol 1997) were only partially tackling problems of diffusion. Therefore, it can safely be concluded that diffusion analysis of CITs (especially on a macro level) seems to be an area of great neglect. At the same time, CIT literature is rich in case and field studies reflecting adoption, [initial] usage or deployment/implementation issues concerning CITs (typically single CIT tools). Those issues are typically analysed within a local field context (e.g. hospital, university etc).

13.4.1 Discussion

Finding 2 may be checked against numerous statements of CIT researchers, pertaining to the quality of CIT research, like:

- ‘Almost nothing is known about CIT diffusion’ (Nunamaker et al. 1998, p.203);
- ‘A number of research opportunities remain, not the least of which are efforts aimed at addressing questions pertaining to the diffusion of CITs’ (Parent and Gallupe 2001, p.405), etcetera.

The scarcity of research on ‘diffusion’ alone would not be worrisome if this were not accompanied by abundance of reporting on ‘adoption’ (testing, implementation, and initial use). This puzzling misbalance of reporting may be indicative of a trend which seems obvious – the existence of numerous implementation attempts of collaboration technologies and few success stories of faithful use and diffusion (i.e. nothing to report on in terms of CIT diffusion). The abundance of reporting on adoption, accompanied by extreme scarcity of reports on successful diffusion, may be deemed indicative of dissatisfactory diffusion rates [of at least some types] of CITs.

Within the sample of papers, I did not find any report of rapid and broad diffusion of collaboration information technology, except from e-mail, and – only partially – audio teleconferencing and IBM Lotus collaboration tools. There seems to be a mismatch between adoption and diffusion rates even of successful CIT products. For example, Bajwa et al.’s (2005) empirical findings indicate that e-mail and audio teleconferencing are perhaps the only two CITs that have been widely *adopted* [in the US, Australia, and Hong Kong[64]]. As far as the *diffusion levels*[65] of both technologies (e-mail and audio teleconferencing) are concerned, however, Bajwa et al.’s results indicated that only e-mail had high diffusion levels across all the three

[64] These findings are based on data collected from 344 organisations across the three regions.

[65] The exact term used in the study is ‘utilisation levels’.

regions. Actually, except for e-mail, none of the other CITs had high utilisation levels. While e-mail had the highest mean utilisation, electronic meeting systems had the lowest mean utilisation.

In another study – a global comparison spanning across Australia, Hong Kong, Norway, Switzerland, and US – Bajwa et al. (2007) found that a high majority (72%) of groupware CITs, including conferencing CITs, had '***limited assimilation***' – i.e. belonged to *Sector I* (in Figure 13.3 below).

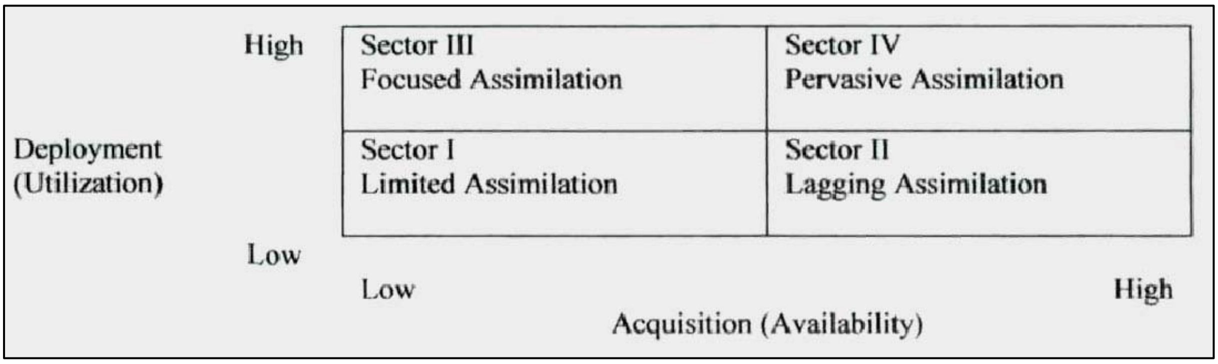


Figure 13.3. IT Assimilation States. Source: Bajwa et al. (2007)

The four 'sectors' of CIT assimilation – as depicted in Figure 13.3 above – are described by the authors [in Lewis et al. 2004] as follows.

- '*Limited Assimilation* (Sector I): This sector is characterised by low access levels for a technology (i.e. it has not been made available to many users in the organisation) as well as low utilisation of the technology (it is used infrequently). Under these conditions, the assimilation of the technology is limited. Several possible scenarios can lead to limited assimilation of an IT. For example, it could be a new and unfamiliar technology, or a technology with few perceived benefits, or with many barriers to assimilation' (Lewis et al. 2004, p.17).
- '*Lagging Assimilation* (Sector II): This sector is characterised by high access to a technology (i.e. it has been made available to most of the members of an organisation) but the utilisation remains low. This has been labelled 'lagging assimilation' and represents a scenario where 'assimilation gaps' (Fichman 2001) exist. Such a condition could be described by a situation where management or the IT function decides to bring in a technology, but intended users do not seem to utilise the technology as much as expected. Again, there are likely to be some significant barriers to the utilisation of technologies in this sector, such as complexity and difficulty of use or lack of clear benefits' (Lewis et al. 2004, p.17).
- '*Focused Assimilation* (Sector III): Sector III is characterised by low access (i.e. an IT is available to relatively few members of an organisation) but high utilisation (i.e. the IT is being used very frequently by those end-users with access to the technology). The assimilation of IT under such circumstances is considered 'focused'. Special-purpose technologies that are relevant to only a special group within the organisation (for example, CAD, CAM etc.) may fall in

this category. Technologies that are considered too expensive for general assimilation or technologies undergoing pilot study before wider assimilation may also fall under focused assimilation' (Lewis et al. 2004, p.17).

- *Pervasive Assimilation* (Sector IV): Technologies that have been assimilated organisation-wide (i.e. they have wide accessibility/availability in the organisation, and are also very frequently used) belong to this sector. These technologies become part of everyday business operations by overcoming all barriers to availability and utilisation.' (Lewis et al. 2004, p.17).

This said, we may ascertain that 'adoption' and 'diffusion' (synonymous to 'assimilation') are different, and it is crucial to understand them and measure them differently. The study by Lewis et al. (2004) is one of the few, which recognise and take account of the importance of this differentiation.

If we take our attention away from the specific CIT domain for a moment, and look at research on 'diffusion of innovation' (DoI) in general, we will see that DoI research has been placing considerable time and effort on trying to define which successive 'stages' constitute the process of innovation adoption. Table 13.4 below presents a unified view of different innovation-diffusion successive stages, as outlined from various perspectives – decision processing perspective (Engel at al. 2001), management perspective (Cooper and Zmud 1990), user perspective (Rogers 1962, 1986, 1995), and organisational perspective (Swanson and Ramiller 2004).

<table>
<tr><th>Decision Processing Perspective (Engel et al.)</th><th>Management Perspective (Cooper & Zmund)</th><th>User Perspective (Rogers)</th><th>Organisational Perspective (Swanson & Ramiller)</th></tr>
<tr><td>Exposure</td><td>Initiation</td><td rowspan="2">Knowledge</td><td rowspan="5">Comprehension</td></tr>
<tr><td rowspan="2">Attention</td><td rowspan="3">Adoption</td></tr>
<tr><td rowspan="4">Persuasion</td></tr>
<tr><td>Comprehension</td></tr>
<tr><td></td><td>Adaptation</td></tr>
<tr><td rowspan="2">Acceptance</td><td rowspan="2">Acceptance</td><td rowspan="2">Adoption</td></tr>
<tr><td>Decision</td></tr>
<tr><td rowspan="3">Retention</td><td rowspan="2">Routinisation</td><td>Implementation</td><td>Implementation</td></tr>
<tr><td rowspan="2">Confirmation</td><td rowspan="2">Assimilation</td></tr>
<tr><td>Infusion</td></tr>
</table>

Table 13.4. Innovation Adoption-Diffusion Continuum – a Unified View

Some of the terms, included in the above model (Table 13.4), have been interpreted by various authors as follows:

- *Knowledge*: potential users become aware and gain understanding of an innovation (Rogers 1962, 1986, 1995 in Agres at al. 2005);
- *Persuasion*: Potential users form favourable attitudes towards the innovation (Rogers 1962, 1986, 1995 in Agres at al. 2005);
- *Decision:* Activities lead to a choice to adopt or reject an innovation (Rogers 1962, 1986, 1995 in Agres at al. 2005);
- *Initiation* is a stage that focuses on the awareness for an upcoming change either due to external or internal pressures (Bajwa et al. 2005);
- This leads to the *adoption* stage which usually involves commitment of resources to the innovation under consideration (Bajwa et al. 2005);
- *Implementation*: People use the innovation (Rogers 1962, 1986, 1995 in Agres at al. 2005);
- *Confirmation:* individual seeks reinforcement of the innovation-decision (Rogers 1962, 1986, 1995 in Agres at al. 2005).

Within the context of the above unified model (Table 13.4), of particular interest is that the final ***diffusion*** stages are identified as retention, infusion, confirmation and assimilation, whereby 'infusion' implies using the application in a comprehensive and integrated manner (Cooper and Zmud 1990), and confirmation implies decision reinforcement (Rogers 1962, 1986, 1995). This makes the final diffusion stages qualitatively ***distinct*** from all of the initial stages up to 'adoption'.

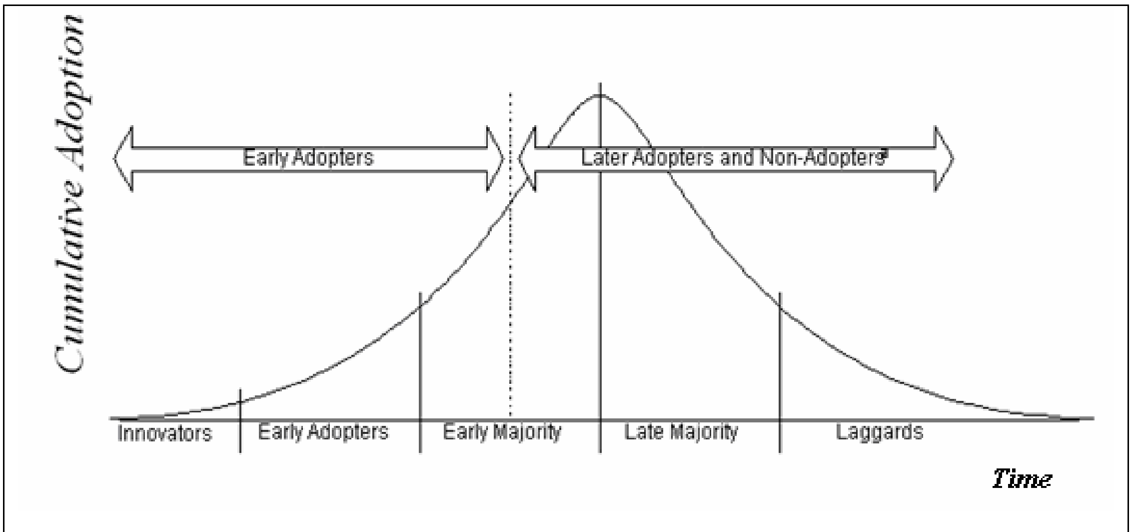


Figure 13.4. Innovation Diffusion Process. Source: Rogers (1962, 1986, 1995)

Rogers' (1962, 1986, 1995) Innovation Diffusion Process is a seminal example of a process-centric view on innovation diffusion and one of the most influential frameworks in this field. Figure 13.4 represents a typical Roger's diffusion curve, where the ultimate criterion for diffusion is the business market's confirmation of the decision to (re-)buy the product, i.e. decision reinforcement. A very similar – to

Rogers' (1962, 1986, 1995) diffusion curve – has been derived by Gordebeke (2002) as a result of their analysis of the trends for acquisition, use, and maintenance of group support systems (GSS) in the Netherlands (see Figure 13.5 below).

Gordebeke (2002) conducted a survey about the business market for GSS with 441 CIT users at IBM and Nationale-Nederlanden, one of the largest insurance firms in Europe. As can be seen from Figure 13.5 – which shows the number of organisations in the Netherlands from 1994 to 2001 that acquired and used GSS maintenance contracts and the number that chose not to renew maintenance contracts – from 1998 to 2001 the quantity of new contracts diminished by a half, while the quantity of contracts terminated matched the number of new contracts.

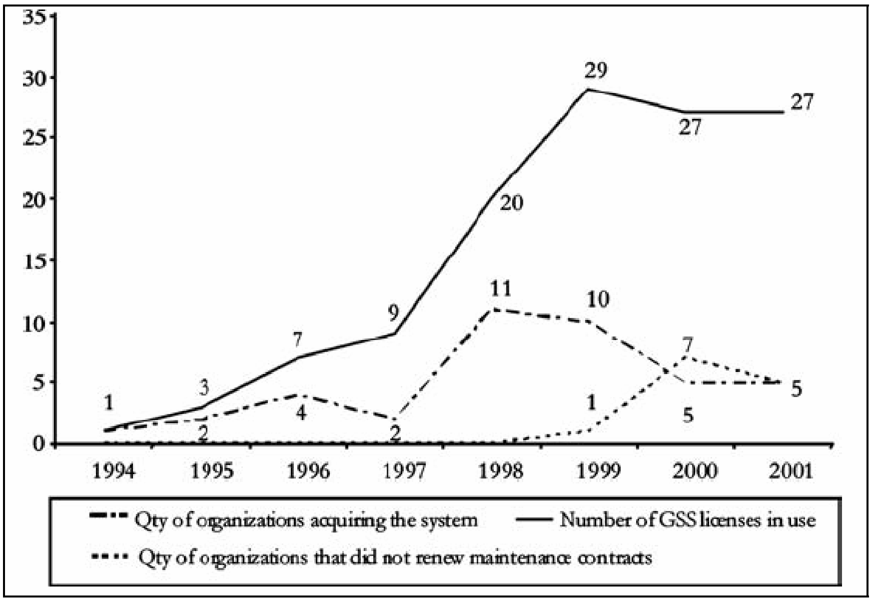


Figure 13.5. Trends for acquisition, use, and maintenance of GSS in the Netherlands. Source: Gordebeke (2002)

Thus, the results reported by Gordebeke (2002) suggest that at least some of the CIT adopters in the Netherlands may have become ***rejecters*** over time. Instead of forming self-sustaining and growing communities, GSS users in the Netherlands formed diminishing communities. Bajwa et al.'s (2007) empirical results – that a high majority (72%) of groupware CITs had 'limited assimilation' – suggest that at least some of the CIT adopters may have become *rejecters* over time (analogous to the GSS adopters in the Netherlands in Gordebeke 2002).

Technology 'rejection' has been analysed in the DoI literature in terms of two most popular theories:

1. *Expectation–Disconfirmation Theory* (Oliver 1980) – conceptualises that within IT usage context, disconfirmation [leading to rejection] implies discrepancy between users' original expectations and observed performance of the IT application.

2. *Coping Theory* (Lazarus 1966, Beaudry and Pinsonneault 2005) – posits that, on the basis of 'secondary appraisal' (a user's assessment of his/her control over the situation), people identify four adaptation strategies (benefits maximising, benefits satisficing, disturbance handling, and self-preservation) which result in different individual-level outcomes: restoring emotional stability, minimising the perceived threats of the technology etc.

Pollard (2003) studied the pattern of use of 'OptionFinder', a group support system, at a large organisation. She found out that the usage pattern was either 'continued', 'discontinued' or 'stalled'. She disagreed with Rogers' (1962, 1986, 1995) definition of '***discontinuance***' – 'a decision to reject an innovation after it has previously been adopted' either because of disenchantment (dissatisfaction with its performance) or replacement (in order to adopt a better idea). Pollard's (2003) findings did not support this definition, but instead suggested that discontinuance was a multidimensional state. Her findings clearly showed two types of discontinuers – those that reject an innovation permanently and those that temporarily stop using it with the intention of using it again. Pollard (2003) suggested that the latter were not rejecting the technology, but were instead 'stalled' users. For example, many 'rejecters' reported they had resumed using OptionFinder after a period of discontinuance.

In summary:

> The content analysis has revealed extreme scarcity of research on 'diffusion' and abundance of reporting on 'adoption' (testing and implementation) of CITs. The existence of numerous reports on implementation attempts of collaboration technologies and very few success stories of diffusion may be indicative of discontinued use, stalled use, or rejection of this technology over time.

13.5 Results by CIT Types – CIT classification scheme

From a 'CIT Types' perspective, I have coded the content analysis data with the help of two classifications:

a) Dewan's (1993a, 1993b, 2001) definition of 'collaboration systems' and 'collaborative applications';

b) Ngwenyama and Lyytinen's (1997) Social Action Framework for Analysing Groupware Technologies – it is important to note that this second framework is only drawn upon as a conceptual 'starting point' but is ***considerably revised and modified*** in my own interpretation of it. Thus, the actual classification scheme which I have applied – to play the role of a 'skeleton', i.e. an underlying structure for the coding procedure – is inspired by Ngwenyama and Lyytinen's original framework but is considerably modified (for comparison, see Table 13.5 and Table AVII.1. – Appendix VII).

a) Dewan's (1993a, 1993b, 2001) definition of 'collaboration systems' and 'collaborative applications'

I have coded the corpus of literature in terms of 'collaboration systems', and 'collaborative applications', as defined by Dewan (1993a, 1993b, 2001):

- a collaborative *application* helps its users to perform some collaborative task;
- a collaboration *system* automates part of the functionality of a set of collaborative applications. Collaboration systems include both general infrastructures and specific applications for supporting collaboration.

b) Ngwenyama and Lyytinen's (1997) Social Action Framework for Analysing Groupware Technologies - adapted

Ngwenyama and Lyytinen's (1997) framework was practically and heuristically helpful to me, bringing order to a conceptual space – the world of CIT – that had seemed confusing in terms of terminology and nomenclature. Thus, this framework served an optimally helpful role in the execution of my content analysis – i.e. as a 'starting point' of consideration. (As mentioned above, the actual classification scheme which I have applied – to play the role of a an underlying structure for the coding procedure – is inspired by Ngwenyama and Lyytinen's original framework but is considerably modified).

Ngwenyama and Lyytinen published their framework in Computer Supported Cooperative Work: The Journal of Collaborative Computing (6/1997). The framework is informed by Habermas's Theory of Social Action known often as the Theory of Communicative Action (Habermas 1984, 1987). This theory outlines a set of social action categories and the rules and resources needed to support them in everyday activity (I shall return to this point later in this Section).

Ngwenyama and Lyytinen's (1997) framework is among a substantial (and growing) body of work that has applied Habermas's theory of social action for the study of organisational behaviour, as well as for the study of the implementation and use of information technologies in organisations. Here are some examples.

- Forester (1982, 1983) utilised Habermas's theory of social action to study public sector planning and organisational policies.
- Mumby (1988) used this theoretical perspective in an extensive theoretical study of organisational communication, ideology, and culture.
- Dietz and Widdershoven (1991) adopted this theoretical perspective to analyse communications within electronic media.
- Ngwenyama (1996) used the same perspective in an empirical study of 17 groupwork situations to define their social action characteristics.
- Hirschheim and Klein (1994) also adopted this social action perspective for their MIS Quarterly study titled 'Realising Emancipatory Principles in Information Systems Development: The Case for ETHICS'.

- The same theory has been applied by Sheffield (2004) in analysing the design of GSS-enabled interventions.

In the following lines, I will present my motivation and justification for choosing Ngwenyama and Lyytinen's (1997) framework as a 'starting point' of consideration for this content analysis.

13.5.1 Motivation and Justification for Choice of Framework

As we saw in Chapter 3, several models and frameworks have been proposed for studying the field of CIT, each trying to direct research toward a different theoretical basis. In Chapter 3, I presented the most popular frameworks and models proposed for studying CITs which fell into three main categories:

- frameworks and models proposed for studying computer-supported collaborative work (CSCW): e.g. Grief (1988), Johansen (1988), Ellis et al. (1991), and Schmidt and Bannon (1992), Kuutti and Arvonen (1992), Winograd (1988), and Suchman (1989);
- frameworks and models proposed for CIT design: three major frameworks – focus on *Speech Act and Conversation Theory* (Winograd 1988 and Kuutti 1991), focus on *Activity* (Kuutti 1991, Kuutti and Arvonen 1992) and focus on *Coordination Theory* (Oslon et al. 2001);
- frameworks proposed for CIT evaluation: *feature-based evaluation approaches* (Polson et al. 1992, Pinelle and Gutwin 2002 etc.), broad *ethnographic* investigations of system use in context (e.g. Garfinkel 1967, Button 1991, Bentley et al. 1994, Rouncefield et al. 1994, Heath and Luff 1996, Harper 2000, Halverson 2001, Kane and Luz 2009), and hybrid *multi-method* evaluation approaches (Blythin et al. 1997, Sokolov 1999, Haynes et al. 2009).

Although the frameworks for studying computer-supported collaborative work have contributed much to our understanding of what constitutes the field of CIT, a number of researchers (Kling 1991, Grudin 1991, Greenberg 1991) have argued that these frameworks do not offer much advice on articulating the complexity of collaborative work ***for specific contextual situations***. For example, Kling (1991) and Perrin (1991) have argued that different type of modelling was needed, capable of articulating the complexity of social interactions of collaborative work in the organisational context. The higher the level of precision of such articulation, the better our ability to provide CIT environments best '*fitting*' the groupwork situation and its organisational context.

The two major frameworks proposed for CIT design (see above) are insightful and function as 'clever and successful devices for building a research community' (Latour 1987). Both of them, however, are constrained by the same limitation: they are addressing narrow areas of the problem space. They are reducing the focus of CIT design principles on either 'conversations' or 'instrumental activity', thereby largely ignoring symbolic interaction. Olson et al. (1992, 1993, 1994) attacked the problem from a different perspective, and suggested that groupwork can be characterised by its ***activity structure***. That suggestion has given impetus to the work of Ngwenyama and Lyytinen (1997).

Among the frameworks proposed for CIT evaluation, only one of the hybrid *multi-method* evaluation approaches – i.e. Haynes et al.'s (2009) scenario-based evaluation framework – pays *some* tribute to the understanding of specific collaborative situations. The focus, however, is not on the activity structure of specific contextual situations but on eliciting 'system contributions': explicit reflections on scenarios of system use coupled with analysis of the consequences of these use scenarios.

In summary:

> Most of the frameworks outlined above somehow fail to pay adequate tribute to the understanding of ***specific collaborative situations*** in terms of their activity structure. Thus, they do not offer much advice so that we can derive precise requirements to support these specific collaborative situations. Among all proposed frameworks, Ngwenyama and Lyytinen's framework stands our by its holistic and structured understanding of the complex social activity that is constitutive of collaborative work.

13.5.2 The Classification Scheme

Through our everyday interactions, we gain collaborative experience in different societal roles. Whether in cyber or real life, whether collaborating with family members and friends or doing our professional duties, we perform the same types of collaborative functions. We seek or give communication support, information access support, and deliberation support. In this section I will present the classification scheme based on which I have coded the content analysis data. The classification scheme outlines two major categories of generic CIT types:

- ***Level-A CITs:*** providing communication support and information access support;
- ***Higher-level CITs** (B,C, and D):* providing communication support, information access support, ***and*** deliberation support.

Table 13.5 below shows an outline of my scheme with indications pertaining to: (a) category of social action; (b) action orientation in the focus of the CIT functionalities, and (c) CIT generic types (with examples of CIT environments). Thus, I am analysing CITs according to the primary social-action types they target. According to my scheme, collaboration information technology (CIT) may serve as media supporting different types of 'social action', as outlined by Habermas's Theory of Social Action (Habermas 1984, 1987), i.e.:

- '***Communicative action*** is concerned with achieving and maintaining mutual understanding among participants engaged in coordinated action. In routine interactions, communicative action implies a claim to validity based on four criteria: clarity, veracity, comprehensibility, and sincerity. Communicative activity presupposes a common language, media, and a shared understanding of the organisational context. Successful communicative action depends heavily on the actors' knowledge of language and the organisational context' (Habermas 1984, 1987 in Ngwenyama and Lyytinen 1997, p.77). What is meant by 'knowledge of language' is competence in the usage of rules of syntax and semantic and universal rules of pragmatic behaviour (Grice 1975).

- '***Instrumental action*** is goal oriented, focusing on the control, manipulation, and transformation of physical artefacts. In groupwork, instances of instrumental action can be observed in joint designs that involve manipulation and transformation of artefacts that are constituted as work-objects. Typical instances are document preparation, software design, and other work activities' (Habermas 1984, 1987 in Ngwenyama and Lyytinen 1997, pp.76, 77).
- '***Discursive action*** is oriented towards developing or restoring the background conditions for collaborative action. The aim is either to re-establish confidence in what is being said or done, or to find rational explanations for the behaviour of individuals. This requires that the participants suspend their immediate objectives in order to search for good reasons to justify or refute the claims which are in question. Discursive activity unfolds through critical debate and argumentation which forms the basis for joint decision making and agreement' (Habermas 1984, 1987 in Ngwenyama and Lyytinen 1997, p.77).
- '***Strategic action*** is oriented toward achieving advantage over another individual or group. Its focus is on influencing and transforming the behaviour of others to conform to the agents' desires or goals. Strategic action is a fundamental aspect of the organisational influence process, often referred to as 'office politics'. Typical examples of overt strategic activity are negotiation and bargaining. The idea of strategic confrontation is followed in many negotiation support and bargaining systems' (Habermas 1984, 1987 in Ngwenyama and Lyytinen 1997, p.78).

Thus, Table 13.5 presents examples of CITs according to the primary social-action types they target. The latter approach is unison with Ngwenyama and Lyytinen's (1997) original CIT-classification framework (see Table AVII.1 – Appendix VII) and is – indeed – directly borrowed from it.

The classification scheme presented in Table 13.5 (and the one applied in this study) is my own interpretation on Ngwenyama and Lyytinen (1997). In this interpretation of mine, the original classification scheme of Ngwenyama and Lyytinen (1997) is ***considerably revised and modified***, the main modifications being the following:

- ***Unlike*** Ngwenyama and Lyytinen's (1997) scheme, the CIT generic types in Table 13.5 are not named after the category of social action they (most closely) correspond to – that is in order to avoid direct transfer of meaning from 'action types' to 'CIT types' which may be misleading and way too restrictive. Instead, the CIT generic types in Table 13.5 are named 'Level-A CIT', 'Level-B CIT', 'Level-C CIT', and 'Level-D CIT'.

- One reason the CIT generic types are not named after the category of social action they (most closely) correspond to is that – according to Table 13.5 – they do not correspond to a single type of social action. ***Unlike*** Ngwenyama and Lyytinen's (1997) scheme, the CIT generic types in my classification scheme correspond to one ***or more than one types of social action***:
    - ***Level-A CITs*** are hypothesised as media supporting communicative action – i.e. giving communication support and information-access support;
    - ***Level-B CITs*** are hypothesised as media supporting communicative action ***and*** instrumental action – i.e. the transformation, manipulation, and control of Objects;
    - ***Level-C CITs*** are hypothesised as media supporting communicative action, instrumental action ***and*** discursive action – i.e. developing or restoring agreement on background conditions for coordinated action (critical debate and argumentation, joint decision making);
    - ***Level-D CITs*** are hypothesised as media supporting communicative action, instrumental action**,** discursive action ***and*** strategic action – i.e. influencing and transforming the behaviour of others.

Action Orientation	**Category of Social Action**	**CIT Generic Type**
giving communication support and information-access support	Communicative Action	**Level-A CIT** e.g. E-mail, E-conferencing, E-news, Bulletin Boards, CMC (Computer Mediated Communication), Instant Messaging, e.g. IBM Lotus Sametime, Skype
transformation, manipulation, and control of Objects	Instrumental Action	**Level-B CIT** e.g. Group Editors, Co-authoring Systems, e.g. Collaborative Writing Systems, Co-designing Systems, Shared Workspaces, Knowledge Based Systems
developing or restoring agreement on background conditions for coordinated action: critical debate and argumentation, joint decision making	Discursive Action	**Level-C CIT** GDSS (Group Decision Support Systems), MSS (Meeting Support Systems), IBIS (Issue Based Information Systems), Discussion Moderation Tools
influencing and transforming the behaviour of others	Strategic Action	**Level-D CIT** NSS (Negotiation Support Systems)

Table 13.5. Examples of CITs and Primary Action Types they Target. Author's Interpretation on Ngwenyama and Lyytinen (1997)

Based on this classification scheme presented in Table 13.5 (conceptual differentiation of CIT types), my content analysis has yielded a number of category/subcategory pairings, formed on three epistemic levels: generic CIT type, CIT system type, and CIT application type. The section below presents brief descriptions of the *generic* CIT types.

13.5.2.1 Generic Type 1: Level-A CITs

According to my classification scheme, ***level-A CITs*** are electronic environments that ***provide communication support and information access support*** (see Table 13.5 above). In other words, level-A CITs are electronic environments that assume that *communicative action* is the focal point of groupwork. These CITs are mediums for communication and distributing messages as objects-of-work. Some examples include e-mail, e-conferencing, e-news, Bulletin Boards, CMC (Computer Mediated Communication), Instant Messaging, e.g. IBM Lotus Sametime, Skype (see Table 13.5).

Some examples of papers, included in my content analysis, that were dealing with level-A CITs, are the studies by Sgouropoulo et al. (2000), Tung et al. (2000), Reimer (2006), Strupp (2005), Arthur (2006), Muller et al. (2003), Hewitt (2005), Karsten (2003), Rosenbloom (2004), Roush (2006), Smith (2005), Begole et al. (2002), Achstetter (2004), Muller et al. (2004), Crabtree et al. (2004), Murillo et al. (2005), Murphrey and Coppernoll (2006), Kethers et al. (2004), McFadden et al. (2002), Basharina (2007), Bishop et al. (2004), etcetera.

13.5.2.2 Generic Type 3: Level-B CITs

Level-B CITs are electronic environments that provide communication support, information access support, ***and deliberation support*** in the form of instrumental-action support (i.e. with the transformation, manipulation, and control of Objects) (see Table 13.5 above). In other words, level-B CITs are electronic environments that assume that *instrumental action* forms the focal point of collaborative work, often characterised as knowledge work. In this sense, knowledge work is the joint production of intellectual products such as reports, articles, plans, engineering designs, or software code. The focus here is the efficient manipulation, control and production of such work objects. One example are group writing tools (also known as collaborative writing tools). Although participants in collaborative writing projects engage in the entire spectrum of social action in the course of their work, the level-B CITs which support instrumental action (in this case – group writing tools) are mostly focused on supporting the instrumental action (after Ngwenyama and Lyytinen 1997). Some other examples of level-B CITs are Group Editors, Co-authoring Systems (e.g. Co-designing Systems), Shared Workspaces (e.g. Workflow Management Systems, Knowledge Based Systems) etcetera.

Some examples of papers, included in my content analysis, that were dealing with level-B CITs, are studies discussing '*collaborative writing systems*' (Ligorio et al. 2005, Noel and Robert 2004, Pargman 2003, Tammaro et al. 1997), '*collaboration work settings*' (Fitzpatrick 2002, Gross and Prinz 2004, López and Skarmeta 2003, Olguin et al. 2000), '*collaborative learning systems*' (Kear and Heap 2007, Schrire 2006), etcetera.

13.5.2.3 Generic Type 2: Level-C CITs

Level-C CITs are electronic environments that provide communication support, information access support, ***and deliberation support*** in the form of developing or restoring agreement on background conditions for coordinated action – i.e. critical debate and argumentation, joint decision making (see Table 13.5 above). In other words, these CITs assume that *discursive action* forms the focal point of collaborative work. Accordingly, this class of CITs provide means and arenas for open and critical problem exploration, critical debate and argumentation, and joint decision making. Some examples include GDSS (Group Decision Support Systems), MSS (Meeting Support Systems), IBIS (Issue Based Information Systems), and Discussion Moderation Tools (see Table 13.5).

According to Ngwenyama and Lyytinen (1997), GDSS and MSS can be defined as 'discursive' because they seek to relax some of the limitations and constraints posed by the hierarchical management meeting such as: (a) seriality and limitations to air time, (b) control over topics and viewpoints followed, and (c) the time spent on rational debate and analysis. MSSs are sometimes considered second generation GDSS, because they subsume much of the functionality of GDSS (Ngwenyama and Lyytinen 1997, p.85).

Some examples of papers, included in my content analysis, that were dealing with level-C CITs, are the studies by Dennis et al. (2003), Cook (2002), Cortes et al. (2001), Kerr (2003), Moon et al. (2003), Johnston et al. (2004), Chiasson and Lovato (2001), Dennis and Reinicke (2004), Vennix et al. (1992), Wijekumar and Spielvogel (2006), Zhu (2006), Kayler and Weller (2007), etcetera.

13.5.2.4 Generic Type 4: Level-D CITs

Level-D CITs are electronic environments that provide communication support, information access support, ***and deliberation support*** in the form of strategic-action support – i.e. for influencing and transforming the behaviour of others (see Table 13.5 above). In other words, these CITs assume that *strategic action* forms the focal point of collaborative work. One example of CIT platforms (here called level-D CITs) that seek to supports strategic collaborative activities are negotiation support systems (NSS).

According to Ngwenyama and Lyytinen (1997, p.87), strategic action necessitates the support of negotiation and bargaining processes that are characterised by goal conflict, deception, and unequal distribution of information and power. Although such processes are very common in organisational life, there is not much research on this type of collaboration-work support. One reason for this is the inherently complex and fluid nature of rules and resources that are drawn in such interactions, as pointed out by Lyytinen et al. (1994).

The results from my content analysis have shown that today there is still not much research on strategic collaboration-work support. Only four studies (out of a total of 332 studies included in the content analysis) I identified as dealing with level-D CITs (e.g. negotiation support systems): Lim (2003), Turel and Yuan (2007), Shakun (1999), Bichler et al. (2003).

13.5.2.5 Generic Type 5: Non-specific

A total of 37 papers were not dealing with any of the above CIT generic types. Instead, those were *theoretical-argumentative* studies discussing the field of computer-supported collaborative work in general. To ensure inclusion of these papers in the coding process, and so – comprehensiveness of the content analysis – I added a fifth CIT generic type: 'non-specific'. The meaning of this generic type corresponds with the definitions of CIT[66] (collaborative information technologies) and CSCW[67] (computer supported cooperative work), and includes studies with focus of research generally on computer-supported collaborative work or a variation thereon, e.g.:

- '*collaborative systems and technology*' (Lee et al. 1999),
- '*collaborative technologies*' (Kock 2001),
- '*CSCW systems*' (Zacklad 2003),
- '*CSCW software*' (Cluts 2003),
- '*CSCW*[68]' (Barley et al. 2004, Crabtree et al. 2005, Leinonen et al. 2005), etc.

In Section 13.2 above (Summary of Content Analysis Results) I presented a brief outline of all of my findings, including the three pertaining to the classification by '*CIT Types*'. The findings by *CIT Types* were as follows:

- preponderance of reporting on adoption of level-A CITs over others (higher-level CITs) ***(Finding 3)***;
- reported dissatisfactory diffusion of higher-level CITs versus reported satisfactory diffusion of level-A CITs ***(Finding 4)***;

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[66]… e.g. 'CITs are electronic technologies that support the work of groups of individuals engaged in collaborative tasks, usually in organisations' (Zhu 2006);

[67] … e.g. 'CSCW is a generic term, which combines the understanding of the way people work in groups with the enabling technologies of computer networking, and associated hardware, software, services and techniques' (Wilson 1991).

[68] descriptive term exactly as in paper.

- abundant reporting on adoption of social CITs *(**Finding 5**)*.

The remaining part of this chapter is devoted to showing how the source data leads to these three findings, as well as discussing each finding in detail.

13.6 Finding 3: Preponderance of Reporting on Adoption of level-A CITs over higher-level CITs

The content analysis has revealed a preponderance of reporting in CIT literature on adoption of level-A CITs over others (level-B, level-C and level-D).

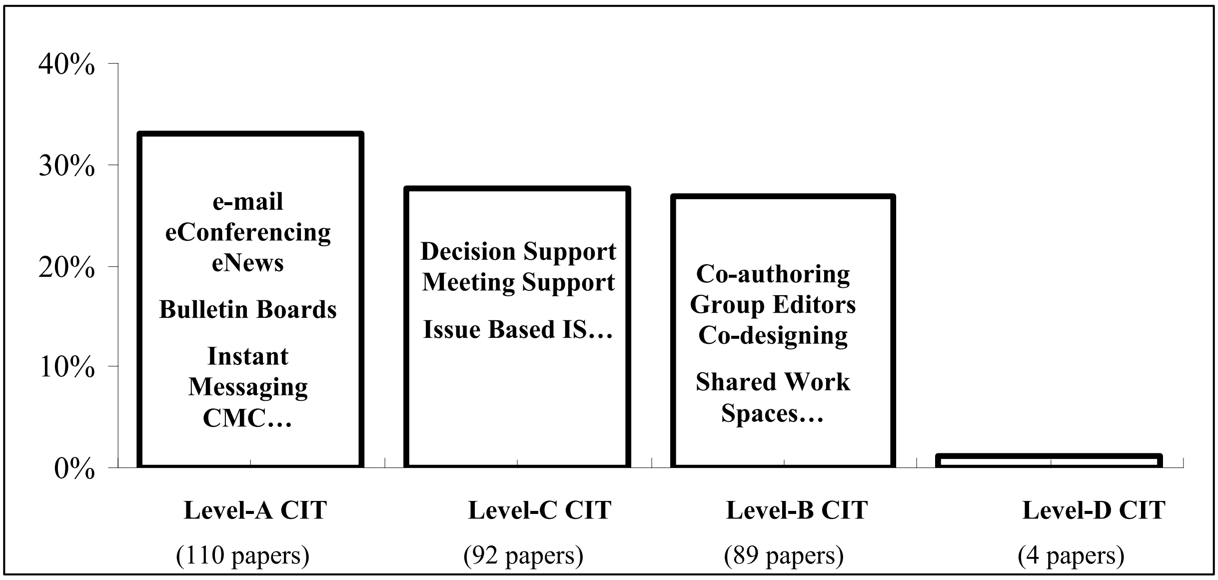

Figure 13.6. Percentage of Reporting on Adoption – by CIT Generic Types[69]

Figure 13.6 above shows the percentage of reporting on each generic type, as follows:

- level-A CITs – 110 papers out of a total of 332 – equals 33.13%;
- level-C CITs – 92 papers out of a total of 332 – equals 27.71%;
- level-B CITs – 89 papers out of a total of 332 – equals 26.81%;
- level-D CITs – 4 papers out of a total of 332 – equals 1.20%;
- Not included in Figure 13.6 below (for reasons of illustrative clarity) are the remaining 37 papers (the remaining 11% up to 100%), constituting the generic type of 'non-specific CITs'.

[69] Not included in this Graph are the remaining 37 papers (up to 100%), constituting the generic type of 'non-specific CITs'.

In the following Section I will show how the source data has lead to ***Finding 4***.

13.7 Finding 4: Reported Dissatisfactory Diffusion of Higher-level CITs versus Reported Satisfactory Diffusion of Level-A CITs

As I mentioned in Section 13.4 above (***Finding 2***), *diffusion* analysis of CITs (especially on a macro level) seems to be an area of great neglect. At the same time, CIT literature is rich in case and field studies reflecting adoption, [initial] usage or deployment/implementation issues concerning CITs (typically single CIT tools). Those issues are typically analysed within a local field context (e.g. hospital, university etc). As I said before, within the total data corpus of 332 papers, I found only 15 papers which dealt with problems of CIT diffusion. Only 5 studies (Bajwa and Pervan 2004, Bajwa et al. 2005, Lewis et al. 2004, Lewis et al. 2007, Pervan et al. 2004b) were empirical studies of CIT diffusion – i.e. measuring the levels of diffusion empirically. The remaining 10 studies (Stanoevska-Slabeva 2009, Agres et al. 2005, Dennis and Reinicke 2004, Chen and Lou 2002, Munkvold and Anson 2001, Agostini and De Michelis 2000, Briggs et al. 1999, Whittaker and Schwarz 1999, Bentley et al. 1997a, Brézillon and Pomerol 1997) were only partially tackling problems of diffusion. In the remainder of this section I will present the findings of both types of diffusion studies – empirical and non-empirical.

– Findings of the Five Empirical Studies –

Bajwa et al.'s (2005) empirical findings indicate that e-mail and audio teleconferencing [**level-A CITs**] are perhaps the only two CIT types that have been widely adopted within enterprises [in the US, Australia, and Hong Kong[70]]. The findings indicate also that only e-mail has high diffusion levels across all the three regions. Actually, except for e-mail, none of the other has high utilisation levels. While e-mail has the highest mean utilisation, electronic meeting systems [**level-C CITs**] have the lowest mean utilisation. To quote the authors themselves:

- Bajwa et. al. (2004, p.66): 'Our results indicate that e-mail and audio conferencing are perhaps the only two CITs that have been widely adopted'.
- Bajwa et al. (2005, p.137): 'Overall, we found that except for e-mail, none of the other CITs had high utilisation levels across all the three regions (US, Australia, Hong Kong)'.
- Lewis et al. (2007, p.387): 'Our results indicate that adoption and use of electronic meeting systems (EMS) in all the four regions (Australia, US, Hong Kong, Norway) is quite limited suggesting that there must be formidable barriers to their adoption and use'.

– *Findings of the Studies Tackling Problems of Diffusion –*

All of the 10 studies that were partially tackling problems of diffusion (Stanoevska-Slabeva 2009, Agres et al. 2005, Dennis and Reinicke 2004, Chen and Lou 2002,

[70] These findings are based on data collected from 344 organisations across the three regions.

Munkvold and Anson 2001, Agostini and De Michelis 2000, Briggs et al. 1999, Whittaker and Schwarz 1999, Bentley et al. 1997a, Brézillon and Pomerol 1997) supported the view that numerable level-C and level-B CITs have not reached mass uptake, high utilisation levels, or critical mass, and have been slow to transition into the workplace. Here are the observations from these studies.

- Stanoevska-Slabeva (2009, p.319): 'Most of the coordination tools show a marginal usage: shared calendar, routing and workflow, user directory and workflow support [**level-B CITs**] are not used at all respectively by 53.47%, 61.62%, 49.00% and 69.00% of the respondents'.
- Agres et al. (2005, p.267): 'Research shows that, under certain circumstances, people using group support systems (GSS) [**level-C CITs**] can be substantially more productive than people who do not. However, GSS has been slow to transition into the workplace'.
- Agres et al. (2005, p.268): 'There is a large body of research that describes the potential benefits that teams and organizations can derive from GSS [**level-C CITs**]. However, the diffusion of this technology has been slow. Therefore, many organisations do not derive the benefits the technology appears to offer'.
- Dennis and Reinicke, (2004, p.1): 'Despite the compelling research on its performance benefits, electronic brainstorming [**level-C CITs**] has not yet displaced – or even joined – verbal brainstorming as a widely used idea generation technique'.
- Chen and Lou (2002, p.1): 'Groupware technologies have become an important part of the business computing and communication infrastructure in many organisations. However, literature suggests that many groupware applications, especially those requiring significant collaboration and cooperation among users, are still not adequately used. Their potential benefits are far from being fully realised due to the lack of user acceptance. While there are studies that show the relevance and positive impact of group support systems [**level-C CITs**] on groupwork, very few have looked into user's perception of the groupware technologies and their motivation to participate (Nunamaker 1997).
- Munkvold and Anson (2001, p.279): 'The obvious benefits for team collaboration achieved through the use of electronic meeting systems (EMS) [**level-C CITs**], do not appear to be so obvious on an organisational scale. After years of trying, there are relatively few published reports of rapid and broad adoption and diffusion of this technology'.
- Agostini and De Michelis (2000, p.335): 'Workflow management systems (WMS) [**level-B CITs**] are considered a hot technology. Nevertheless, up to now they have not had the diffusion other packages such as e-mail systems have. We believe that this fact is due to the many limitations of current workflow technology (weak support for changes; complex exception handling mechanisms; limited openness to and integrability with other system components) and that radically new workflow management systems should be designed and developed in order to offer adequate products to the market.

- Briggs et al. (1999, p.152): 'There are several thousand group support systems (GSS) [**level-C CITs**] installations worldwide, and, while that number is growing, GSS has not yet achieved critical mass. One reason may be that it can take one to three years for an organisation to complete a transition to GSS'.
- Whittaker and Schwarz (1999, p.175): 'Despite a wealth of electronic group tools for coordinating the software development process [**level-B CITs**], instead we find technologically adept groups preferring to use what seem to be outmoded "material" tools in critical projects'.
- Bentley et al. (1997a, p.111): 'Despite the growth of interest in the field of CSCW, and the increasingly large number of systems which have been developed, few systems have been adopted for widespread use. This is particularly true for widely-dispersed, cross-organisational working groups where problems of heterogeneity in computing hardware and software environments inhibit the deployment of CSCW technologies [**non-specific CITs**]'.
- Brézillon and Pomerol (1997, p.1): 'A realistic evaluation of the number of expert systems or knowledge-based systems (KBS) [**level-B CITs**] that really are operational within companies or administrations is difficult. It seems that a large number of such systems have never been used in operations, and a rich literature stresses this point'.

Table 13.6 below summarises all of these observations concerning the diffusion levels of different CITs – level-B, level-C, non-specific etc.

Author/Year	**Observation regarding Level of Diffusion**	**CIT Type**	**Diffusion Level**
Stanoevska-Slabeva (2009), p.319	Most of the coordination tools show a marginal usage: shared calendar, routing and workflow, user directory and workflow support are not used at all respectively by 53.47%, 61.62%, 49.00% and 69.00% of the respondents.	level-B CITs	dissatisfactory
Agres et al. (2005), p.267	Group support systems (GSS) have been slow to transition into the workplace.	level-C CITs	dissatisfactory
p.268	The diffusion of group support systems (GSS) technology has been slow.		
Dennis and Reinicke, (2004), p.1	Electronic brainstorming has not yet displaced – or even joined – verbal brainstorming as a widely used idea generation technique.	level-C CITs (issue-based)	dissatisfactory
Chen and Lou (2002), p.1	Literature suggests that many groupware applications, especially those requiring significant collaboration and cooperation among users, are still not adequately used. Their potential benefits are far from being fully realised due to the lack of	level-C CITs	dissatisfactory

	user acceptance.		
Munkvold and Anson (2001), p.279	After years of trying, there are relatively few published reports of rapid and broad adoption and diffusion of this technology [electronic meeting systems].	level-C CITs	dissatisfactory
Agostini and De Michelis (2000), p.335	Workflow management systems (WMS) are considered a hot technology. Nevertheless, up to now they have not had the diffusion other packages such as e-mail systems have.	level-B CITs	dissatisfactory
Briggs et al. (1999), p.152	There are several thousand group support systems (GSS) installations worldwide, and, while that number is growing, GSS has not yet achieved critical mass.	level-C CITs	dissatisfactory
Whittaker and Schwarz (1999), p.175	Despite a wealth of electronic group tools for coordinating the software development process, instead we find technologically adept groups preferring to use what seem to be outmoded 'material' tools in critical projects.	level-B CITs	dissatisfactory
Bentley et al. (1997a), p.111	Despite the growth of interest in the field of CSCW, and the increasingly large number of systems which have been developed, it is still the case that few systems have been adopted for widespread use.	non-specific	dissatisfactory
Brézillon and Pomerol (1997), p.1	It seems that a large number of such [knowledge-based] systems have never been used in operations, and a rich literature stresses this point.	level-B CITs	dissatisfactory

Table 13.6. Observations from Literature on CIT Utilisation Levels and Diffusion

The content analysis has shown that all of the studies which tackled or empirically analysed CIT diffusion ***unanimously supported the view*** that higher-level CITs have not reached mass uptake, high utilisation levels, or critical mass, and have been slow to transition into the workplace. On the other hand, empirical findings indicate that level-A CITs (like e-mail and audio teleconferencing) are perhaps the only CITs that have been widely adopted within enterprises. Therefore, it can safely be concluded that:

> CIT literature has reported dissatisfactory levels of diffusion of higher-level CITs, and satisfactory levels of diffusion of level-A CITs (***Finding 4***).

13.7.1 Discussion of Finding 4

Finding 4 was presented above (in Section 13.7). ***Finding 4*** indicated that CIT literature has reported *dissatisfactory* levels of diffusion of higher-level CITs, and *satisfactory* levels of diffusion of level-A CITs. In this section I will discuss ***Finding***

4. In particular, I will try to elaborate ***why*** higher-level CITs seem to be less accepted than level-A CITs.

Experimental CIT research (Fjermestdad and Hiltz 2001) has shown that level-C CITs, like group decision support systems, meeting support systems etc., have fared quite good in improving ‘efficiency’, ‘effectiveness’, ‘consensus’, ‘usability’, and ‘satisfaction’ (i.e. the outcome factors in CIT functional research). However, ***Finding 4*** has shown that such level-C CITs (in contrast to level-A CITs) seem to be only slowly winning an uphill battle diffusing into organisations.

One reason for that could be what Olson and Olson (2000) hypothesised to be true for the ‘distributed teams’ domain: i.e. a review of technology use by distributed teams has shown ***lack of common ground, collaboration readiness, or collaboration technology readiness*** and the latter can lead to technology resistance. Cameron (2005) reported that the failure rate for eBusiness collaborative projects in Australia was thought by practitioners (interviewed in 2004) to be as high as 90% of all projects initiated. It is important to note that eBusiness collaborative projects are examples of complex IT projects that have added complexity arising from *collaboration*. To quote Tapscott and Williams (2006, p.267), ‘technology may open doors, but it can not force people to walk through them’. Here I want to discuss one factor that I will hypothesise to be determinant of the ‘diffusion’ success or failure of higher-level CITs: Conceptual Load. Table 13.7 below depicts the thematic focus of the following subsection.

Attributes of the System
CIT Identity
System Customisation
+ Conceptual Load
Attributes of the Collaboration
Mediator Role
Number of System Users
Support of a Champion
Affective Reward
Size of the Collaborative Ensembles
Collaboration History
Attributes of the Organisational Context
Incentives for Using CITs
Power-Structure Change
Long-term Unpredictability

Table 13.7. Thematic Focus of the following Subsection

13.7.1.1 Conceptual Load

In a special issue of the CSCW journal, Procter et al. (2006) claimed the following:

‘Self-evidently, society’s dependence on computer-based systems continues to increase, while the systems themselves – embracing humans, computers and engineered systems – become ever more complex’ (p.413).

Procter et al. (2006) general description of ‘rising complexity’ is related to Agres et al.’s (2005, p.272) definition of ‘conceptual load’ – i.e. ‘the amount of effort required to understand what the technology is supposed to do for the user’. Briggs et al. (2003), in seeking answers to the question of ‘why GSS[71] installations are self-extinguishing?’ (p.34) presented the summative observational experience from field observations on GSS (group support systems) usage. Based on that experience, they suggested a causal explanation of why GSS facilities may become self-extinguishing in some cases, and self-sustaining in others; why some previously successful GSS facilities fall into disuse, but others seem to flourish. One explanation of the case of self-extinguishing facilities was, according to Briggs et al. (2003), the high conceptual load: i.e. a number of users reported high conceptual load, that is, they found it difficult to understand what the system was supposed to do for them and for their group when they were asked to run the system for themselves.

I believe that the explanation of Briggs et al. (2003) is quite plausible, and – although their observational evidence refers to group support systems only – I think this explanation is conceptually transferable to other types of higher-level CITs. ***Higher-level CITs – unlike level-A CITs – are normally burdened with a lot more conceptual load***. The latter is true because higher-level CITs are at least one level more ‘complicated’ than level-A CITs – they require significant collaboration and cooperation among users. As mentioned in Section 13.5.2.1 above, level-A CITs are relatively ‘simple’ electronic environments that assume that *communicative* action is the focal point of groupwork. These groupware platforms are mediums for communication and distribution of messages (i.e. require relatively low conceptual load). Some examples include Web 2.0 social-software platforms that are prominent with their ‘ease of use’ and ‘ease of information exchange’ (Ozok and Panayiotis 2009, pp.357/8).

Meanwhile, as mentioned in Section 13.5.2.3 above, level-C CITs are electronic environments that assume that *discursive* action forms the focal point of collaborative work. Accordingly, this class of CITs provide means and arenas for open and critical problem exploration, critical debate and argumentation, and joint decision making. Level-A CITs CIT are, in principal, burdened with considerably less conceptual load in terms of the amount of effort required from users to understand what the technology is supposed to do for them. The latter seems to be especially true for social CITs, like blogs, wikis, forums, and various social-networking tools that are extremely easy to use. Apart from everything else, they do not place any requirements on the ‘content’ in form of user input.s

[71] GSS: Group Support Systems

Muller et al. (2004) formulated the following two problems which they hypothesised as typical for the 'multitude' of level-B and level-C CITs offered at the workplace:

- Problem 1: *Dividing Attention and Effort among Multiple Shared Venues* – the result of a single collaborative activity being managed with multiple, different stores of shared resources and media;
- Problem 2: *Difficulty of Moving Resources from One Environment to Another*. The second problem is a direct consequence of the first, and is connected to the difficulty of managing heterogeneous resources. Given a multitude of simultaneously available and simultaneously used CITs, people typically face difficulties in moving resources from one environment to another.

The latter two problems add additional conceptual load associated with the usage of level-B and level-C CITs. These problems have been hypothesised by Fichter (2005) as one 'reason' for people to choose a single level-A CIT (for example, a blog) instead of wasting time or energy to select, set up, and maintain multiple complicated tools. Nor did employees want to learn six different tools, one for each project team. The high required conceptual load did not match the 'speed of business' of today.

Kaplan and Seebeck (2001) analogously hypothesised the practice of 'multi-tasking among multiple collaborations' to be an important factor for CIT acceptance. Davison and Briggs (2000) argued that the high conceptual load associated with the usage of Discussion Moderation Tools [another type of level-C CIT] may bring about a lot of potential negative effects. Especially in cases where human attention is distracted, that distraction may outweigh other benefits of using a CIT (in this case, a Discussion Moderation Tool). In cases of distracted attention because of high system conceptual load, the computer-facilitated discussion could digress, or 'even devolve into flaming' (Davison and Briggs 2000, p.92).

Olson, Malone, Smith (2001, p.264) summarised the findings of (Ellis et al. 1991, Schneider et al. 1992, Olson et al. 1993) and outlined a brief listing of common 'difficulties' of CIT implementations. Those difficulties were a consequence of the fact that – *in addition to* single-user interaction tasks – CITs had to support collaboration tasks such as:

- dynamically making and breaking connections with (possibly remote) users;
- multiplexing input from and de-multiplexing output to multiple users;
- coupling the input-output of the users;
- providing concurrency and access control, and
- offering collaborative undo-redo.

Another difficulty stems from the classical '*vocabulary problem*' which is a consequence of diversity of expertise and backgrounds of CIT system users (Furnas

1982, 1987). The vocabulary problem is present in almost any collaborative situation (especially in the case of 'zero-history teams' – see Section 10.6 above). As pointed out by Olson et al. (2001, p.739), previous research in information science and in human-computer interactions has shown that people tend to use different terms (vocabularies) to describe a similar concept. According to Furnas (1987), the chance of two people using the same term to describe an object or concept is less than 20%. In this sense, Frenkel (1991) further theorised on the 'fluidity' of concepts and vocabularies that further aggravated the retrieval issue. According to Söldner et al. (2009, p.280), the vocabulary problem can be solved especially well by wiki systems, and social bookmarking solutions (e.g. del.icio.us).

All of these difficulties are 'indicative' of the embedded complexity of higher-level CITs. That embedded complexity makes many CIT designers vulnerable to the idea of building in functionalities requiring high conceptual load during their usage. The latter statement is a hypothesis of mine, in which I have good reasons to believe.

There are numerous reported instances where it has been proven technically difficult to 'imitate' or reproduce in a virtual electronic environment all of the face-to-face communicative mechanisms that are present in everyday human communication and which play the role of subtle but powerful 'minimisers' of conceptual load. This difficulty seems especially aggravating for the usefulness, and indeed, the acceptability of level-C CITs, e.g. Discussion Moderation Tools. One example is the problem faced by CIT designers (as reported by Olson et al. 2001, p.284) in building 'visual cues' in Discussion Moderation Tools. In face-to-face meetings, speakers often achieve a smooth discussion by using pointers or other visual cues to provide a common focus and guide the participants through the discussed material. Thus, during face-to-face discussions, it is relatively easy to direct the attention of other participants to areas of interest through visual cues. CIT-design experience has reportedly shown that it is relatively difficult to build such visual cues in an electronic environment with similar effectiveness.

Agres et al. (2005, p.277) studied the effects of the 'conceptual load' factor on the patterns of group interaction (in a series of field and case studies). They found that the 'amount of mental effort required to find and control the features and functions of the technology' (p.277) was found 'daunting' (p.278) by many of the users. Therefore, some CITs were only useful when a trained facilitator was on hand to conduct the sessions. The facilitator skills and competencies had to cover both group dynamics and the technology. Agres et al. (2005) also found that the factor of 'frequency of use' seemed to play a role for CIT acceptance, since one interviewee reported that 'It is very easy when you use it several months' (p.277).

13.7.2 Discussion of Findings 3 and 4

In the following section I will discuss ***Findings 3 and 4*** (see Section 13.2) in terms of an additional influencing factor I choose to term 'conversation for action' (after Olson et al. 2001). I will hypothesise that this factor – as can be derived from literature – may be seen as one possible reason for ***Findings 3 and 4*** (*Finding 3*:

Preponderance of Reporting on Adoption of Level-A CITs over Others; *Finding 4:* Reported Dissatisfactory Diffusion of Higher-level CITs versus Reported Satisfactory Diffusion of Level-A CITs). Thereby, I will quote and build on what the literature has produced as collective state of understanding on this factor. Table 13.8 depicts the thematic focus of this subsection.

Attributes of the System
CIT Identity
System Customisation
Conceptual Load
Attributes of the Collaboration
Mediator Role
Number of System Users
Support of a Champion
Affective Reward
Size of the Collaborative Ensembles
Collaboration History
+ Conversation for Action
Attributes of the Organisational Context
Incentives for Using CITs
Power-Structure Change
Long-term Unpredictability

Table 13.8. Thematic Focus of this Subsection

Table 13.9 below shows some examples of papers which have discussed the theme of ‘conversation for action’. The table also shows which corresponding CIT types have been dealt with in this respect (in this case – level-A CITs and level-C CITs).

Issue discussed	**Conversation for Action**	
Type of CIT discussed	**level-A CIT**	**level-C CIT**
Paper	Sgouropoulo et al. (2000) Roush (2006) Muller et al. (2004) Fono and Baecker (2006) Nardi et al. (2000)	Wijekumar and Spielvogel (2006)

Table 13.9. Examples of Papers Discussing the Theme of ‘Conversation for Action’

‘Conversation for action’ has a lot to do with what Bannon and Schmidt (1991) defined as ‘articulation work’: i.e. articulation is a part of any collaborative effort and involves a number of secondary steps of mediating and controlling the association of individuals. The secondary steps involve meshing and clustering of tasks, outlining task trajectories, assembling resources, scheduling subtasks, as well as recovering from errors. Hereby, Bannon and Schmidt (1991) conceptualised that adequate computer support for collaborative work should aim at self-organisation of cooperative ensembles as opposed to disrupting collaboration by computerising formal procedures. In order to foster collaboration – instead of disrupting it –

collaboration technologies have to, according to Bannon and Schmidt (1991), offer adequate levels of articulation possibilities.

Analogously, Robinson (1989) in his paper on 'double-level languages' hypothesised the following system-design requirement: a CIT application should support at least two interacting 'levels of language'. For example, an embedded voice link could provide 'the second level of language'. In summary, even early CIT research – in the face of pioneers like Robinson (1989) and Bannon and Schmidt (1991) – has recognised the importance of systems offering 'facilities that allow users to freely negotiate task allocation and articulation' (Bannon and Schmidt 1991, p.365). Almost ten years later, Olson et al. (2001) renewed the debate on the importance of CIT systems providing multiple alternative channels of interaction, and termed the requirement as 'conversation for action'.

In the words of Ross Mayfield, CEO and founder of Socialtext (in Tapscott and Williams 2006, p.255): 'what people do [during most of their working time] is they manage exceptions to processes. Even in the most mundane workplaces like a call center, people are constantly wrestling with new problems'. This may be one of the reasons why, historically, e.g. the promises of 'Office Automation' to automate office work have been abandoned as unattainable, and – eventually – denounced as ludicrous. We aught to have learned the lesson by now that most of what constitutes work is 'unstructured' work. The same theme – of CITs offering limited alternative channels of interaction, and 'conversation for action' – has emerged over and over again during two decades of CIT research. Tapscott and Williams (2006, p.255) argued that CIT features allowing for conversation-for-action were especially necessary now when '…after years of optimising supply chains, outsourcing, automation, and stripping costs and inefficiencies out of the back office, most employees spend very little of their day working on regularised activities'.

The above discussion is relevant to what Nardi et al. (2000, p.86) described as 'outeraction': the 'processes outside of information exchange in which people reach out to others in *social* rather than informational ways'. Outeractional processes include 'delicate negotiations' about availability, finding ways to establish connection by inhabiting and maintaining a shared communication zone, etcetera. Nardi et al.'s (2000) 'outeraction' is actually a conceptual successor of Bannon and Schmidt's (1991) 'grapevine': the informal networks of communication conducted by informal groups in the workplace, that 'not only serve important psychological functions in terms of acting as a human support network for people, for example, providing companionship and emotional support, but are crucial to the actual conduct of the work process itself' (Bannon and Schmidt 1991, p.365).

'Markets are conversations', announced the New Economy screed 'The Cluetrain Manifesto' published in 2000 (in Roush 2006). '***Groupwork is a conversation***', we might add today, especially after witnessing the recent developments in mass collaboration. My content analysis has shown that considerable attention in post-1997 CIT literature has been devoted to *conversational* collaborative applications, like data-conferencing (e.g. Anderson and McCarthy 2005, Carletta et al. 2000, Kethers et al. 2004, Mark and Poltrock 2003, Mark and Poltrock 2004, Ocker and Yaverbaum 1999, Vincent 2000). Meanwhile, instant messaging, chat, and bi-directional chat-like facilities seem to be the most widely-researched ad-hoc interaction systems (e.g. Fitzpatrick et al. 1999, Fono and Baecker 2006, Muller et al. 2003, Reimer 2006, Van Dolen and De Ruyter 2002). This finding matches the reportedly large user base of data-conferencing applications. A core element of data conferencing is instant messaging, with some very successful products, e.g. Skype with over 220 million total users in 2007 (eBay Watch 2007). Data conferencing has often been criticised in literature for carrying the risk of losing essential data or precious assets such as audio or visual media. Future research should further our understanding of why some corporations actually depend on instant messaging as their primary tool for synchronous collaboration (Martin 2007, p.54), given the fact that instant messaging is an alleged 'compliance and control nightmare' (Martin 2007, p.58) – an interesting observation, in itself, since face-to-face communication has almost identical characteristics from this perspective.

The content analysis has also shown that blogs (weblogs) seem to be the most widely-reported social CITs (e.g. Cooke 2006, Fichter 2005, Fine 2005, Gely and Bierman 2006, Laff 2007, Martin 2007). Blogs can be, and have been, classified in literature as *conversational* collaborative applications for the following reasons:

- The so called 'blogosphere' has created a new 'space', albeit a virtual one, where workers communicate in a conversational manner. Thus, blogs foster conversation and discussion both inside and outside the organisation (Fichter 2005, Roush 2006, Martin 2007).
- Reportedly, increasing numbers of (especially high-tech) employees write public blogs at work, about work, which 'violates every traditional percept of corporate communication' (Roush 2006, p.1). Usually, employees seek advice – outside the organisation – regarding the substantive aspects of what they do (Gely and Bierman 2006). The focus of their blogging is not on their co-workers or their immediate environment, which might entail numerous risks for the enterprise (see 'Guidelines for IBM Bloggers' in Laff 2007).
- Despite that, the idea that honest, unfiltered conversation between companies and employees might actually be good for business lives on – and, to the degree that open conversation does happen, it seems to be happening largely through blogs (Lunden 2005, Roush 2006).

According to Tapscott and Williams (2006), one advantage of social CITs, like blogs, is their ability to 'capture and codify the moments of inspired brilliance' (p.256) – those are the moments when, e.g. in a spontaneous *conversation*, someone finds the key to unlocking a whole new approach to getting things done. Tapscott and Williams (2006) suggest that, in contrast to incumbent CITs, social CITs support – through authentic and unrestricted conversation – the occurrence of a ***self-organising group formation process***. On the other hand, most current higher-level CITs – like electronic meeting systems, group support systems, group decision support systems, group calendars and timesheets – allow conversations in some form, but this feature remains under-exploited and 'hidden' behind the rigid software structure. It seems that the current homogenised ‘voice of business’ – the sound of mission statements, e-calendars, task lists and brochures, transferred via classical collaborative platforms – may soon appear to be as contrived and artificial as the language of the 18-century French court. Collaborative discussion is obviously only valuable if it is conducted in an authentic human voice.

Muller et al. (2004) introduced the metaphorical construct of ‘conversations through objects’ and hypothesised that, in a CIT environment, people would make use of diverse objects in a conversational manner – e.g. a question posed in a message might be answered with a file; a shared screen might be commented on in a message; or a planning document might give rise to a list of tasks. An important condition thereby was that the CIT environment had to be semiformal and had to provide for ***equal-prominence*** of multiple object types (e.g. messages, files, tasks, chats, folders). The experience with Muller et al.’s prototype, the ActivityExplorer, supported the hypothesis that people would make use of diverse objects in a conversational manner.

Fono and Baecker (2006) introduced the term ‘persistent chat’, arguing that most commercially available chat or instant messaging applications incorporated very limited forms of ‘persistence’. Thereby, ‘persistence’ was the ability of users to keep track of chat histories. Persistence allows a ***blend*** [combination] ***of synchronous and asynchronous conversational interaction***. The latter adds dynamicity to the collaborative environment. Halverson (2004) elaborated on the importance of ‘recovery’ of useful information from old chat conversations. According to Fono and Baecker’s (2006, p.456) functional description, the traditional chat interface consists of a textbox for typing in new messages, and a history pane that displays a chronologically sorted list of recent messages. These messages are *lost* as soon as the user logs out, and each new session starts with a blank history. Here is a list of some experimental investigations that have tested the effect of different degrees of persistence:

- Erickson et al. (1999) studied the way in which persistent conversation continuously evolved in Babble – a chat application which stored all conversations in a single document. The authors found that this ‘conversation as a single document’ enhanced awareness, and helped build an ongoing narrative of the collaboration process.
- Ribak et al. (2002) experimentally found that chat ‘persistence’ generated additional ideas, which may not have otherwise emerged and fostered a higher level of dialogue. Instead of building ‘on thin air’ or starting new discussions, users were able to observe previous discussions and the latter enhanced the creativity of their own contributions.
- Robbins-Sponaas and Nolan (2005) have made similar observations about multi-user real-time virtual worlds, many of which have embedded chat-like properties. In particular, they observed that persistence in chat enhanced a variety of useful collaborative practices.

Olson et al. (2001) actually preceded Fono and Baecker (2006) in elaborating on the importance of the ***blend*** [combination] ***of synchronous and asynchronous conversational interaction***. The importance of the latter can be seen, as pointed out by the authors, in the usage patterns of voice mail systems in large corporations. Experience has shown that, after a while, people using voice mail systems learned how to take advantage of asynchronous communication – i.e. they learned that it was more efficient to place an item on another person's 'electronic stack' or 'inbox' than to interrupt what they were doing with a phone call. They learned that it could be better to give the person time to research the question and call back, rather than surprise him with a problem and expect instant diagnosis (Olson et al. 2001, p.450).

Last but not least, the factor of 'conversation for action' seems to be relevant in building organisational IS strategies. The experience of Google, for example, has shown that the higher level of support for the process of 'mutual agreeing' through conversation, offered by company-side CITs, the more effectively collaboration practices seem to develop.

> *Illustrative Example: Google – A Continuous, Companywide Conversation*
>
> Google has invested heavily in building highly a networked organisation that makes it easy for employees to share ideas, poll peers, recruit volunteers, and build constituencies for change – all of which requires a lot more than a good e-mail system. At Google, there are several mechanisms that knit together all those independent teams and lightly supervised engineers (Hamel 2007, p.116). When the teams need to exchange information, they often don't need to involve managers at all. Instead, they communicate directly, either face-to-face or electronically. In early 2003, Google started using a system to help teams keep Web logs, or blogs that chronicle their day-to-day activities, discoveries, and problems. Within weeks, the use of these online diaries had exploded. By reading the blogs, the different teams could keep track of one another's work and find issues that needed further discussion – with less need for top-down control by centralised managers (Malone 2004).

In the following Section I will show how the source data has lead to ***Finding 5***.

13.8 Finding 5: Abundant Reporting on Adoption of Social CITs

Now I will show how the content-analysis data has lead to the conclusion that there is abundant reporting in CIT literature on adoption of 'social CITs' (***Finding 5***).

Table 13.10 below has been derived from the content-analysis data corpus of 332 papers, and represents ***detailed*** results regarding the frequency of reporting in literature ***for each System Type*** included in the 'generic type' categories (i.e. level-A CIT, level-B CIT, level-C CIT, level-D CIT)[72].

a) **Level-A CIT**	**Frequency of Discussion (times discussed in papers)**	**%**
Computer Mediated Communication Systems (Instant Messaging etc.)	148	70
e-Conferencing Systems	45	21
e-Mail	16	8
Bulletin Boards	2	1
e-News	1	0,5
	Total	*100*
c) **Level-B CIT**	**Frequency of discussion (times discussed in papers)**	**%**
Shared Workspaces	85	89
Co-authoring Systems	5	5
Co-designing Systems	3	3
Social CITs: Social Tagging, Open-source Collaboration, novel prototypes	3	3
	Total	*100*
b) **Level-C CIT**	**Frequency of discussion (times discussed in papers)**	**%**
Group Decision Support Systems	59	54
Meeting Support Systems	37	34
Discussion Moderation Tools	11	10
Issue-based Information Systems	2	2
	Total	*100*
d) **Level-D CIT**	**Frequency of discussion (times discussed in papers)**	**%**
negotiation support systems	4	100
	Total	*100*

Table 13.10. Detailed Results by CIT Generic Types – Frequency of Reporting in terms of System Adoption

Table 13.11 below represents detailed results for the system type of CMC (Computer Mediated Communication) regarding frequency of reporting in literature for each application type included in the category.

[72] As mentioned in Section 13.2 above (Finding 2), the vast majority of reporting is on 'adoption' (testing, implementation, initial use) of CITs.

Computer Mediated Communication Systems (CMC)	Frequency of Discussion (times discussed in papers)	%
Social CITs: Blogs, Wikis, Online Personal Networks, Mashups	51	60
Instant Messaging	15	18
Calendar and Scheduling Systems	7	8
Mobile Collaboration Systems	6	7
Notification Systems	2	2
Facsimile	1	1
Voice Mail	1	1
Webpages	1	1
non-specific	1	1

Table 13.11. Detailed Results for Computer Mediated Communication Systems (CMC) – Frequency of Reporting in terms of Application Adoption

From the results presented in the tables above, the following information can be retrieved:

- Computer Mediated Communication (CMC) Systems seem to be the most frequently reported on level-A CIT in terms of adoption – with 70% of the total (see Table 13.8 above).
- Within CMC, the most frequently reported application types in terms of adoption are Social CITs – with 60% of the total (see Table 13.9 above). To this category belong application types like blogs, wikis, podcasts, online personal networks, mashups, SNS, social tagging tools etc.

Substantial reporting exists, especially within business CIT literature, on the transition of blogging into the workspace – with the corresponding blogging server software and blogging platforms and aggregators necessary for internal blog aggregation (microblogging), e.g. Bachnik et al. (2005), Brabazon (2006), Cooke (2006), Fichter (2003), Fine (2005), Gely and Bierman (2006), Haskell and Martin (2004), Kirkpatrick and Roth (2005), Kumar et al. (2004), Laff (2007), Madden (2005), Miller (2003), Nardi et al. (2004), Pomerantz and Stutzman (2006), Powell (2007), Rosenbloom (2004), Roush (2006), Smith (2005), Stephens and Gordon (2006), Strupp (2005), Wilson (2006), etcetera. Blogs are followed by wikis, which are, reportedly, also being adopted for business purposes, e.g. Brabazon (2006), Fine (2005), Pomerantz and Stutzman (2006), Martin (2007), etcetera.

13.8.1 Discussion

As mentioned in Section 3.3.1 above, social collaborative software (social CIT) is conceptually and structurally different from the 'decision-room' collaborative software of the 80ies for the following reasons: it transforms small-scale collaboration into mass collaboration, it has performed a transition from the Internet public space into the enterprise private space, and it has penetrated the enterprise primarily bottom-up. The abundant reporting on adoption of ‘social CITs’ (Finding 5 – see above) may be interpreted as a consequence of a belief – often expressed in CIT literature – that social CITs may be capable of filling certains ‘gaps’ that are generally unfulfilled by formal CITs.

To identify possible gaps that social CITs may be capable of filling (according to CIT literature), I have performed a comparison between reported ‘shortcomings of formal CITs’ and ‘advantages offered by social CITs’ – both located through the extensive content analysis of CIT literature. The comparison is organised around a four-issue scheme, reflecting four critical concerns: ‘performance’, ‘personal satisfaction’, ‘compatibility’, and ‘affordability’. I have identified these four issues as critical based on their regularity of reporting in literature (see Tables 13.12(a) and 13.12(b) below). The following shortcomings of formal CITs have been widely discussed in literature:

Issues of *‘performance’*

- Formal CITs require training on the technology.
- Formal CITs are facilitator dependent.
- Their usage requires many sessions.

Issues of *‘personal satisfaction’*

- Formal CIT usage is associated with loss of [human] affective reward.
- Lack of anonymity hinders freedom of expression.
- Leader domination hinders active participation.

Issues of ‘*compatibility*’

- Formal CITs have not reached critical mass.
- Transition to organisational CIT is complex and time-consuming.
- Lack of compatibility hinders cross-organisational use of CITs.

Issues of *‘affordability’*

- Formal suites are costly.
- Economic causes make some CIT facilities self-extinguishing.
- Some formal CITs require additional costs for facilitation.

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	Reported shortcomings of formal CITs					
	performance			**personal satisfaction**		
	Require training on the technology	**Facilitator dependent**	**Usage require s many sessions**	**Loss of affective reward**	**Lack of anonymity hinders freedom of expression**	**Leader domination hinders active participation**
Lewis et al. (2007)	x	x			x	
Agres et al. (2005)	x	x	x			
Bajwa et al. (2005)						
Fichter (2005)						
Briggs et al. (2003)	x	x	x	x	x	
Fjermestdad and Hiltz (2001)	x	x	x		x	x
Munkvold and Anson (2001)	x	x				
Briggs et al. (1999)	x	x	x	x		
Brézillon and Pomerol (1997)						
Nunamaker et al. (1997)	x	x	x		x	x
Reinig et al. (1997)				x		

Table 13.12(a). Shortcomings of Formal CITs as Reported in Literature – ‘Performance’ and ‘Personal Satisfaction’

Tables 13.12(a) and 13.12(b) review some seminal CIT papers and indicate the presence of reporting in each of them on one or more of the above-mentioned issues.

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	Reported shortcomings of formal CITs						
	compatibility				affordability		
	Leader domination hinders active participation	**Formal CITs have not reached critical mass**	**Transition to organisational CIT is complex and time-consuming**	**Lack of compatibility hinders cross-organisational use of CITs**	**Formal suites are costly**	**Economic causes make some CIT facilities self-extinguishing**	**Some formal CITs require additional costs for facilitation**
Lewis et al. (2007)		x	x	x	x	x	x
Agres et al. (2005)		x					x
Bajwa et al. (2005)		x					
Fichter (2005)			x		x		
Briggs et al. (2003)			x	x	x	x	x
Fjermestdad and Hiltz (2001)	x						
Munkvold and Anson (2001)		x	x				x
Briggs et al. (1999)		x	x				x
Brézillon and Pomerol (1997)		x				x	
Nunamaker et al. (1997)	x		x				x
Reinig et al. (1997)							

Table 13.12 (b). Shortcomings of Formal CITs as Reported in Literature – ‘Compatibility’ and ‘Affordability’

Table 13.13 below presents an overview of the advantages offered by some social CITs, identified to have been widely discussed in literature. According to the content analysis results, most widely discussed are blogs, or weblogs (61.54% reporting within web-based social collaboration systems), wikis (15.38% reporting), and *conversational* social CITs. Some examples of conversational social CITs include data-conferencing, instant messaging, chat, bi-directional chat-like facilities, web-based discussion moderation tools, common information spaces, etc. Conversational social CITs have been the object of discussion of a rich body of case and field studies (e.g. Anderson and McCarthy 2005, Carletta et al. 2000, Fitzpatrick et al. 1999; Fono and Baecker 2006, Kethers et al. 2004, Mark and Poltrock 2003, Mark and Poltrock 2004, Ocker and Yaverbaum 1999, Müller et al. 2003, Reimer 2006, Van Dolen and De Ruyter 2002, Vincent 2000 etc.). To ensure consistency of comparison between reported ‘shortcomings of formal CITs’, and ‘advantages offered by social CITs’, Table 13.12 is organised around the same four-issue scheme – as in Tables 13.11(a) and 13.11(b) – reflecting the critical concerns of ‘performance’, ‘personal satisfaction’, ‘compatibility’, and ‘affordability’.

		blogs	wikis	conversational social CITs
performance	speed	good	good	excellent
	easy content update and dissemination	excellent	excellent	excellent
	reliable archiving/ journaling capability/ easy traceability	excellent	very good	bad
personal satisfaction	freedom of expression	excellent	excellent	excellent
	discussion	excellent	satisfactory	satisfactory
	man-to-man communication/ affective reward	very good	satisfactory	satisfactory
	active involvement/ perceived behavioural control	excellent	excellent	very good
compatibility	transferability/ pervasiveness	excellent	excellent	excellent
	ability to seek advice outside the enterprise/ build communities of interests	excellent	excellent	excellent
affordability	quick return on investment	excellent	excellent	excellent

Table 13.13. Reported Advantages and Levels of Fulfilment offered by Social CITs

'Performance expectancy' in the context of technology acceptance stems from Social Cognitive Theory, and has been defined as dealing with job-related outcomes (Compeau and Higgins 1995). The first requirement performance expectancy places on CITs – in the contemporary unstructured teamwork environment – is that of *speed.* Most conversational tools (e.g. instant messaging) offer immediate gratification by providing real-time, instantaneous communication. Minor matters can be cleared up instantly (Fichter 2005). Blogs are also successful at spreading ideas quickly. With their RSS feeds notifying the users of new posts, blogs are very gratifying for *easy content update and dissemination*. The so called 'tipping point' effect in maximizing impact on social networks can come into play which allows effective swapping of links, collaborative tagging, referencing etc. – leading to enhanced content, and turning some blogs into excellent knowledge-sharing repositories.

The first requirement performance expectancy places on groupware is that of easy traceability of information: the journaling capability allowing reliable archiving. Blogs are excellent archives for a couple of reasons. First, with their reverse-chronological order (the most recent posts come first) blogs combine the immediacy of up-to-the-minute posts, and latest first (Nardi et al. 2004). Second, some blogs offer just one archiving choice, for example, by day, others offer a whole range of options: by entry, day, week, month or category (Fichter 2003). Third, each post is uniquely identified by an anchoring link, commonly referred to as a ‘permalink’. The permalink is a persistent URL: it never changes over time, thus allowing reference to the post by anyone who wishes to hyperlink to it or cite it (Pomerantz and Stutzman 2006). Thus, bloggers link to one another’s posts, which typically remain accessible indefinitely (Kirkpatrick and Roth 2005). This unique journaling capability can serve as corporate ‘memory’ offering excellent levels of traceability. Perhaps to a lesser degree, corporate Wikis – with their permissions to access, write, or edit – as well as with their indexing or tagging for search, recovery and audit trails – are easily discoverable (Martin 2007, Fine 2005). Synchronous conversational media such as instant messaging or chat offer moderate journaling capability: with this type of media reference transactions have pacing similar to face-to-face conversations, but this may lead to the user feeling rushed to provide a response quickly rather than taking the time to conduct more research and formulate a better response (Kaske and Arnold 2002).

‘Personal satisfaction’ (see Table 13.13) may be viewed as a result of an outgrowth of internal influences, fuelled primarily by ‘secondary appraisal’ (Coping Theory – Lazarus 1966, Beaudry and Pinsonneault 2005, p.493) – i.e. a user’s assessment of his/her control over the situation in terms of benefits maximizing, benefits satisficing, disturbance handling, and self-preservation. In the case of social CITs, authors feel free to express their opinions and views on different subjects (Bachnik et al. 2005). Blogs contain hot new thoughts, devoid of artifice and enriched with a heavy dose or irreverence (Finneran 2006). In addition to that, posting preliminary thoughts through blogging tends to foster *discussion*. What previous research termed ‘thinking with computers’ (Mortensen and Walker 2002), is now being demonstrated by ‘thinking by writing’ through blogs (Nardi et al. 2004). With some formal channels, in contrast, collaborative efforts, such as brainstorming, marketing strategy, software development, and e-learning have been ill-served (Martin 2007).

Researchers in the field of group support systems (GSS) have discovered that users sometimes find themselves feeling emotionally unfulfilled while using GSS. Users report loss of the *affective reward* associated with a challenging meeting where they struggle and succeed. This lack of engagement has been shown to be a cause of user resistance to adopting GSS technology (Reinig et al. 1997). Blogs – with their very personal nature – seem to be able to compensate the lack of affective reward. This might be the reason why they have had far more resonance than more impersonal corporate media products (Gely and Bierman 2006). Blogs combine a strong sense of the author’s personality, passions, and point of view (Nardi et al. 2004). Even a mediocre Blog might be entertaining (Finneran 2006). Some researchers even view Blogs as ‘catharsis’ (Nardi et al. 2004, p.44), as an outlet for thoughts and feelings, giving people a place to ‘shout’. Blogs – a medium where, simultaneously, everyone is a publisher and everyone is a critic (Kirkpatrick and Roth 2005) – can convey a sense of *active involvement* (Finneran 2006) and *perceived behavioural control*. Perceived behavioural control has been theorised as ‘perceptions of internal and external constraints on behaviour’ (Taylor and Todd 1995, p.149), like self-efficacy (Venkatesh et al. 2003). This, blogs seem to be arenas for practicing collective control: a strategy for survival in the workplace. Collective control is an active strategy, encompassing aspects of social support and social solidarity (Johnson 1989).

With the WWW as a common popular platform, web-based social CITs enjoy a great degree of platform neutrality and compatibility. Thus, they are successful at connecting loosely joined communities (Fichter 2005). For example, public blogs make it possible for employees to seek advice *outside* the enterprise. This has often proven to be more rewarding and effective than seeking advice inside the enterprise: public bloggers will often have a recognisable point of view, but it will emerge from their knowledge rather than their attitude. They will be engaging writers, but they will win our attention with insights, not insults (Finneran 2006). Ultimately, blogs and wikis are cheap or free to produce, easy to use and require little or no training. Often, this can be critical for the choice between using a formal or a social collaboration solution. Proprietary suites can be powerful, but are often costly, with additional costs stemming from the need for training and facilitation. Portal suites are usually top-down endeavours, requiring heavy, upfront investment before it can be seen whether people will effectively use the collaboration areas (Fichter 2005). Thus, costly and heavy enterprise collaboration endeavours may be 'neglected' in favour of social CITs.

According to Deans (2009), just about everyone who talks and writes about collaborative technology, 'freely and openly substitutes terms such as Web 2.0, social networking, and collaboration as though they all mean the same thing' (p.2). This confusion tends to create an impression that there is more marketing hype than substance in the social CIT trend. 'Web 2.0' is a technology concept, unlike 'social networking' which is a sociology concept. The other popular term – 'Enterprise 2.0' – is a recently identified term that is used to refer to the application of Web 2.0 and social networking concepts in an enterprise business context (Deans 2009, p.7). First coined by Andrew McAfee (2006b, p.1),

'Enterprise 2.0 is the use of emergent social software platforms within companies, or between companies and their partners or consumers'.

As Deans (2009, pp.7, 8) so reasonably put it,

'With all of the excitement surrounding the Web 2.0 and social software phenomenon, many businesses are in the position of deciding whether they should jump an the Web 2.0 and social software bandwagon or sit this one out. It is not an easy choice when you are a business. The stakes are high and a gamble in the technology space that does not pay off can have quite an effect an the company's bottom line. On the other side of the coin, if the company decides to sit it out and then its competitors can leverage the trend, the company is at a competitive disadvantage in the marketplace and could be equally penalized on the bottom line of the fiscal reports'.

In summary:

In this Chapter I have presented Empirical Study III – Content Analysis of CIT Literature. First, I have described the source of my data and my approach to sampling and coding. Then, I have briefly outlined the findings and have shown how the source data leads to these findings. Finally, I have discussed these findings in detail. Two of the findings have revealed: a) preponderance of reporting on adoption of level-A CITs over higher-level CITs and b) reported dissatisfactory diffusion of higher-level CITs versus reported satisfactory diffusion of level-A CITs. As one possible reason for the latter two findings, I have hypothesised the factor of 'conceptual load' – i.e. the amount of effort required to understand what the technology is supposed to do for the user. Another finding revealed abundant reporting on adoption of social CITs. I have discussed this finding in detail by presenting a comparison between social CITs and formal CITs and their representation in literature (in terms of reported advantages and shortcomings of each).

Chapter 14

ENFOLDING LITERATURE

As previously mentioned, the purpose of this theory-building Thesis is to develop a Conceptual Framework to serve as an integrative grounding, reflecting the adoption–diffusion continuum of collaboration information technology (CIT). My research by now has produced a series of conceptual frameworks CF1, CF2, CF3, where CF3 (Figure 12.5 above) is the most recent framework. The 'spiral toward understanding' – the conceptual core of the 'Structured Case' methodology – requires a continuing process of constructing meaning by an ongoing, cyclical adjustment and refinement of the conceptual framework according to the collected data. The purpose of this Chapter is to perform the next development cycle. The results from Empirical Study III (Content Analysis) are fed into this cycle of research, and the conceptual framework is further refined accordingly. Figure 14.1 depicts the thematic focus of this Chapter.

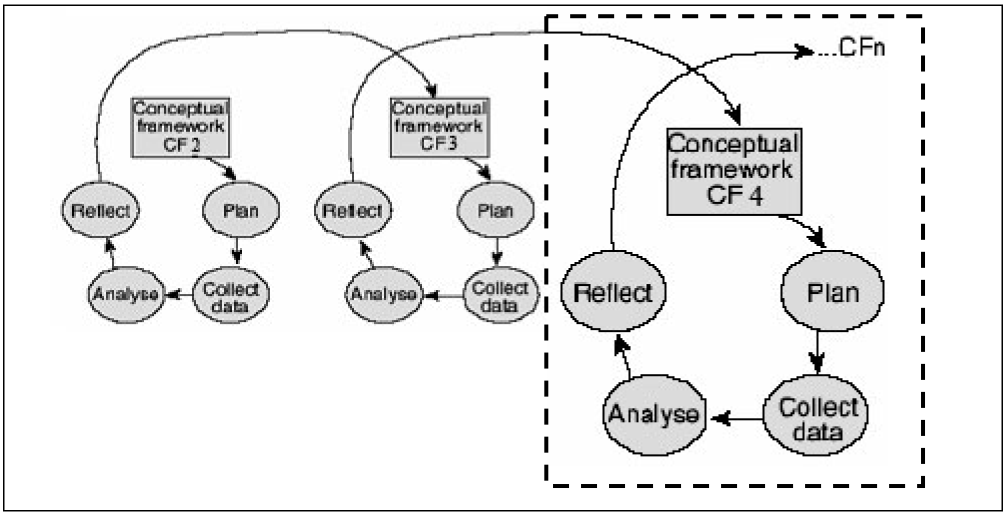

Figure 14.1. Thematic Focus of this Chapter

The three versions of the Conceptual Framework presented above – CF1, CF2 and CF3 (Figures 12.2, 12.4, and 12.5 above) – graphically illustrate the CIT-diffusion 'influencing factors' identified and their 'relative weight' in terms of degree of influence on the CIT diffusion process. This Chapter revisits (i.e. checks the validity) of the factors which were identified in Empirical Study II by means of the findings from Empirical Study III. In other words, the factors identified by means of the Critical Meta-Analysis of Case-Study Reports are checked against the findings from the Content Analysis.

Table 14.1 above presents the factors (which were identified by means of the Critical Meta-Analysis of Case-Study Reports) whose relevance has been checked against the findings from the Content Analysis – some factors' relevance has been supported by the Content Analysis, and other factors' relevance has not been supported by the Content Analysis (i.e. their presence in literature has proven to be insignificant). In the following lines, only the factors whose significance has been supported by Empirical Study III will be revisited i.e.:

I. Attributes of the System: System Customisation;

II. Attributes of the Collaboration: Mediator Role, Number of System Users, Support of a Champion;

III. *Attributes of the Organisational Context:* Incentives for Using CITs, Power-Structure Change, Long-term Unpredictability.

Factor	**Relevance supported/ not supported**
Attributes of the System	
CIT Identity	not supported
System Customisation	supported
Attributes of the Collaboration	
Mediator Role	supported
Number of System Users	supported
Support of a Champion	supported
Affective Reward	not supported
Size of the Collaborative Ensembles	not supported
Collaboration History	not supported
Attributes of the Organisational Context	
Incentives for Using CITs	supported
Power-Structure Change	supported
Long-term Unpredictability	supported

Table 14.1. Relevance of Factors Based on the Content Analysis (Empirical Study III)

Two additional factors have been identified as significant based on the Content Analysis (Empirical Study III) – Habituation and Anonymity. Both will be presented in Section 14.8 of this Chapter.

14.1 System Customisation – Revisited

Attributes of the System
System Customisation
Conceptual Load
Attributes of the Collaboration
Mediator Role
Number of System Users
Support of a Champion
Conversation for Action
Attributes of the Organisational Context
Incentives for Using CITs
Power-Structure Change
Long-term Unpredictability

Table 14.2. Thematic Focus of this Chapter

I have checked and refined the collected data from the Critical Meta-Analysis of Case-Study Reports (Empirical Study II) to the data collected from the Content Analysis. This comparison has confirmed the importance of the 'System Customisation' factor. Here I will organise and build on what the literature has produced as collective state of understanding on this factor. Table 14.2 depicts the thematic focus of this Section.

The issue of 'system customisation' has been discussed as shown in Table 14.3 below. The table shows which corresponding CIT types have been dealt with in this respect (i.e. level-C CITs, level-A CITs, level-B CITs, and non-specific).

Issue discussed	**System Customisation**			
Type of CIT discussed	**non-specific**	**Level-C CIT**	**Level-A CIT**	**Level-B CIT**
CA Paper	Törpel et al. (2003) Shipman and Marshall (1999) Dourish (2003) Bansler and Havn (2006) Ackerman (2000) Stanoevska-Slabeva and Hoegg (2006)	Briggs et al. (2003) Kim et al. (2002) Dennis et al. (2001) Nunamaker et al. (1997) Gilbert and Dabbagh (2005)	Muller et al. (2004)	Bernstein (2000) Rolland et al. (2006)

Table 14.3. Examples of Content-Analysis Papers Discussing the Theme of 'System Customisation'

The issue of 'System Customisation' has been discussed by the following studies – all part of the content-analysis data pool:

- Bansler and Havn (2006) elaborated on 'tailoring and adaptation' in CIT use;
- Rolland et al. (2006) argued that, rather than order, there will inherently be surprises, risks, and thus *imperfection* in establishing collaboration information systems. Thus, Rolland et al. advocated *system imperfection* instead of striving for a level of perfection in integrated solutions that is neither attainable nor ultimately desirable;
- Gilbert and Dabbagh (2005) tackled the topic of system customisation in terms of 'structuredness' of system design;
- Muller et al. (2004) described a novel collaboration technology that was carefully poised between informal, ad hoc, easy-to-initiate collaborative tools, versus more formal, structured, and high-overhead collaborative applications;
- Briggs et al. (2003) discussed the level of system tailorability of 'ThinkLets' (a group support system);

- Dourish (2003) tackled the issue of system customisation by elaborating on flexibility in CIT design techniques;
- Kim et al. (2002) discussed coordination structures and system restrictiveness in asynchronously distributed group support systems;
- Dennis et al. (2001) pondered upon 'understanding appropriation' through considering two recent theories in the institutionalist school: Adaptive Structuration Theory and Process Restrictive Adaptive Structuration Theory;
- Ackerman (2000) saw one of the reasons for the necessity of system customisation in, what he called, 'the social–technical gap' – the divide between what we know we must support socially and what we can support technically;
- Bernstein (2000) elaborated on how cooperative work tools could support dynamic group processes through bridging the 'specificity frontier' – a metaphorical construct illustrating the level of system tailorability embedded in workplace collaboration systems;
- Shipman and Marshall (1999) discussed experiences with a variety of system 'formalisms';
- Nunamaker et al. (1997) speculated on 'the values of modularity'. They found it to be very useful to build GSS software into a collection of special-purpose modules rather than as a single unit.

Ackerman (2000) argued that human activity is highly flexible, nuanced, and contextualised and that computational entities such as information sharing, roles, etc. needed to be similarly flexible, nuanced, and contextualised. He introduced the metaphorical construct of 'CSCW ***social–technical gap***' to describe the divide between what we know we must support socially and what we can support technically. Thereby, he argued that, since the social–technical gap has been one of the central (still unsolved) problems for human–computer interaction, exploring, understanding, and hopefully ameliorating this social–technical gap should be the central challenge for CSCW as a field.

Rolland et al. (2006) argued that, rather than order, there will inherently be surprises, risks, and thus imperfection in establishing collaboration information systems. Thus, Rolland et al. advocated accepting ***system imperfection*** rather than striving for a level of perfection in integrated solutions that is neither attainable nor ultimately desirable. To quote Law (2003, p.11):

'There are always many imperfections. And to make perfection in one place (assuming such a thing was possible) would be to risk much greater imperfection in other locations…The argument is that entropy is chronic. Some parts of the system will dissolve…For a manager accepting imperfection is not a failing. It is an advantage. Indeed a necessity. Perfectionism would be dangerous.'

Bansler and Havn (2006) observed that for many years, CIT researchers have explored the issue of ***tailoring or customisation***, and 'it is now widely assumed that groupware systems must be adaptive and flexible in order to effectively support communication and cooperation in different and ever changing work environments' (p.57). Bansler and Havn's reading of CIT literature indicates that, in looking at system tailorability, researchers have almost exclusively focused on the question of how to design 'tailorable' or adaptive systems, i.e. systems that can be customised to the needs of particular users or settings.

Many different approaches to system tailorability have been pursued. Some researchers have explored the problem of how to design flexible *software toolkits* (e.g. Malone et al. 1995, Wasserschaff and Bentley 1997, Dourish and Keith 2000). Other researchers have focused on *modeling languages* (Cortes 2000, Ellis and Keddara 2000), the technical foundations of *flexible component-based systems* (Koch 1995, Teege 2000), or *design patterns* (Hummes and Merialdo 2000). Yet another stream of researchers has focused on case studies of *customisation practices* (Mackay 1990, MacLean et al. 1990, Gantt and Nardi 1992, Okamura et al. 1994, Trigg and Bødker 1994).

For example, Andriessen et al. (2003) claimed that understanding the appropriation processes of collaboration technology has to be seen as a 'key research issue in the field of CSCW' (p. 367), because mutual adaptation of technology and organisation is crucial to successful CIT use, and because enhancing our understanding of the social processes of appropriation may help us build CIT systems that 'encourage unanticipated and innovative patterns of use' (p.367). Preceding Andriessen et al., Nunamaker et al. (1997) recognised 'the values of modularity' (p.178), and argued that it was very useful to build GSS software into a collection of special-purpose modules rather than as a single unit. They also found out that toolkits were more flexible than indivisible systems because they increased the potential for tool reuse for a variety of tasks – including new, unanticipated tasks (Nunamaker et al. 1997, p.178). For example, Bernstein (2000) found that 'the combination of previously unconnected approaches could lead to extremely useful solutions' (p.286), just as the combination of messaging, database technology, security, and networking approaches led to a versatile tool like Lotus Notes.

Dennis et al. (2001) pondered upon 'understanding appropriation' in CIT usage patterns through considering two recent theories in the institutionalist school: Adaptive Structuration Theory and Process Restrictive Adaptive Structuration Theory. They placed in the foreground the process structure factor of *restrictiveness* (from the conceptual apparatus of Process Restrictive Adaptive Structuration Theory), which refers to the extent to which the GSS constrains individual behaviour and makes it more difficult for individuals to adopt the structures in ways unfaithful to the meeting agenda (Silver 1990). Highly restrictive CIT software, according to Dennis et al. (2001, p.173) is e.g., the GroupSystems Electronic Brainstorming.

Bernstein (2000) claimed that 'most collaboration support systems have focused on ***either automating fixed work processes or simply supporting communication in ad-hoc processes***' (p.279), thereby disregarding the fact that our environment includes well-structured and less well-structured problems (as pointed out by numerous researchers, e.g. Newell and Simon 1972). Scholars like Suchman (1987), Weick (1979), and Bardram (1997a) have largely elaborated on the fact that human actors are boundedly rational and have only limited knowledge about the future, so – consequently – plans (as well as process maps or Workflow descriptions) are often imperfect, since they typically can not account for all possible circumstances. Irrespective of that, typical process maps (a representation of plans, executed through process support systems), do not allow for runtime changes to the original plan and do not provide enough contextual information about the running process to the actor as a basis for reasoning about the possible next steps (Bernstein 2000, p.280). Here there is much space for a certain level of 'system tailorability', which, in Bernstein's view, should include the following enablements.

- Any system that plans to support emergent activity[73] (which is what all activity is to a certain degree following the situated-action approach) should be able to support it by supplying a fertile environment for new solutions to emerge (Bernstein 2000, p.281). It is important to note that emergent activity relies on some form of structure and thus some form of specificity.
- 'Change' induced by the bounded rationality and varying specificity of tasks, can be understood as a series of improvisational embellishments to existing practice (Orlikowski 1996). This is analogous to, for example, Jazz improvisation is a type of emergent activity which depends on the actors '… having absorbed a broad base of musical knowledge' (Berliner 1994, p.492). As Weick (1998) points out '… improvisation does not materialise out of thin air…' (p.546). People need something to improvise on. Similarly, people in an organisational context must have some foundational knowledge and contextual information about the task at hand. Consequently, any system that plans to support emergent activity 'should provide some structure as a contextual basis for situated improvisation' (Bernstein 2000, p.281).

Further on, Bernstein (2000) formulated a conceptual framework he called 'The Specificity Frontier' to illustrate that organisational processes lie on a continuum from highly specified and routine processes at one extreme to highly unspecified and dynamic processes at the other extreme (see Figure 14.2 below). He argued that two types of processes are at the extremes of the specificity frontier: (1) at the '***highly specified***' extreme are well-specified and almost procedurally executed processes (traditionally supported by WfMSs), and (2) at the '***highly unspecified***' extreme are emergent situated processes (typically supported by communication support systems like e-mail and Lotus Notes).

'Highly specified' are level-C CITs (e.g. ERP, workflow management systems, shared workspaces) that are usually focused on supporting fixed organisational processes. Typically they are too rigid to easily support changing processes. They are mainly used for highly specified and highly routinised organisational processes. For example, WfMSs are too restrictive as they traditionally prescribe the workflow and

[73] Emergent activity surfaces '… unpredictably from complex social interactions' (Markus and Robey 1988, p.588).

do not allow human agents to adapt the process to the specific local situation, neither to handle exceptions (Bernstein 2000, p.279).

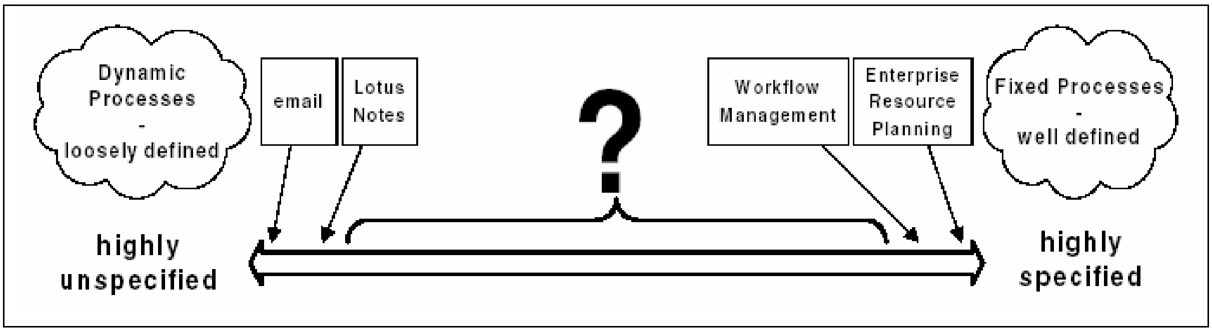

Figure 14.2. The Specificity Frontier. Source: Bernstein (2000)

'Highly unspecified' are Communicative CITs (like e-mail or Lotus Notes) that are able to support rapidly changing, non-routine processes. However, these systems suffer from a shared disadvantage: they typically require users to do a lot of work themselves to keep track of and understand the ongoing processes, i.e. what has been done, what needs to be done next, and so forth. The latter actually means that an actor typically is on his/her own in deciding what to do next (Bernstein 2000, p.279).

Bernstein chose to divide the specificity frontier into four subspectra, different execution types for process maps: (A) providing context for enactment, (B) monitoring constraints about the task, (C) providing/planning options to reach a goal, and (D) guiding through scripts/directions through a given script (see Figure 14.3 below).

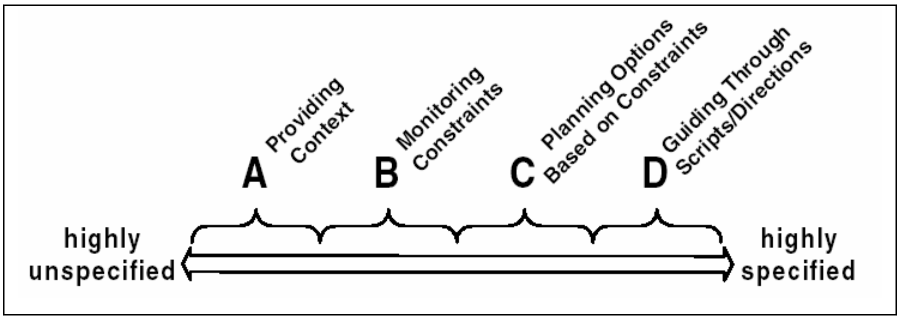

Figure 14.3. Different Execution Types. Source: Bernstein (2000)

A. Providing Context. In the least specified of the sub-spectra (A, on the left in Figure 14.3) the support system does not have a lot of information about the process. Therefore its major goal is to provide context for the user to be able to decide what to do next. For example, the system helps the users to share to-do lists and documents (resources), which are specific to the context at hand (Bernstein 2000, p.281).

B. Monitoring Constraints. When the user decides to add some machine-readable constraint to a to-do item, the system provides constraint-monitoring services. For instance, adding a deadline to a to-do item could allow the system to prompt the user when the deadline is imminent (similar to a project management system). The system's support in this sub-spectrum is comparable to the support a map provides to a hiker. It shows the ravines and the mountains in the area and may therefore help the user to reach his/her goal without long detours by alerting him/her of an obstacle (i.e. a constraint) (Bernstein 2000, p.282).

C. Planning Options Based on Constraints. Using the hiking analogy this approach parallels giving a hiker a trail map of the area and having him/her decide what trails he/she would like to take. Since the constraints are specified, the map also contains the ravines and mountains, such that the user might be able to decide that none of the proposed trails are feasible, and choose to take his/her own route. Consequently, in this sub-spectrum the system plans tasks and resources to achieve goals and lets the user decide which of the possible paths to take. As with any knowledge-based approach, there is a bootstrapping problem in filling the repository with an adequate initial number of possible actions/processes (Bernstein 2000, p.283).

D. Guiding through Scripts/Directions. Providing 'imperative' scripts/directions in this last sub-spectrum can be likened to a traditional WfMS (see Hammer et al. 1977, Zisman 1978, Jablonski and Bussler 1996). Since the process details are algorithmically well defined, the to-do item software agent will direct each step leading to the result. Using the hiker's analogy again, this sub-spectrum can be compared to giving a hiker a specific set of directions (Bernstein 2000, p.284).

Finally, Bernstein (2000) proposed a novel well-grounded approach to enabling the mobility of a process instance across the specificity frontier during run time. This new kind of tool was meant to bridge the gap between the 'highly specified' and the 'highly unspecified' extremes by flexibly supporting processes at many points along the spectrum of different execution types (see Figure 14.3 above). The tool would, in this manner, be able to support both well-specified and routine, and highly unspecified and situated actions (by reacting to exceptions as they occur etc.). Thereby, the user would not need to explicitly tell the system to cross the boundaries between the spectra of the specificity frontier. The user would, however, need to enter the information (e.g. the constraint specification) that would prompt the system to cross the boundary. The system would be radically tailorable/customisable in a sense that it would allow processes to start out as being well defined (and supported by a WfMS-type technology) and would allow the structure to emerge guided by user action and input, as soon as an exception occurred and – therefore – a need for '***situated improvisation***'.

Similarly to Bernstein (2000), Muller et al. (2004) outlined a classification of CIT systems into two major types: ad hoc lightweight collaboration systems and structured shared workspaces.

1. ***Ad Hoc Lightweight Collaboration Systems***. Ad hoc collaboration systems, such as e-mail and chat are lightweight and flexible, and provide adequate dynamic support for short-term communication needs. However, for those collaborative activities which extend over longer periods of time, or over larger numbers of participants, these lightweight collaboration environments rapidly become unmanageable (Muller et al. 2004, p.375).
2. ***Structured Shared Workspaces***. At the other extreme are structured shared workspaces that provide good support for making sense of large corpora of messages and files. The major drawback of these environments is that they are relatively labor-intensive to initiate, and discourage people from using them for small-scale or short-term collaborations (Muller et al. 2004, p.375).

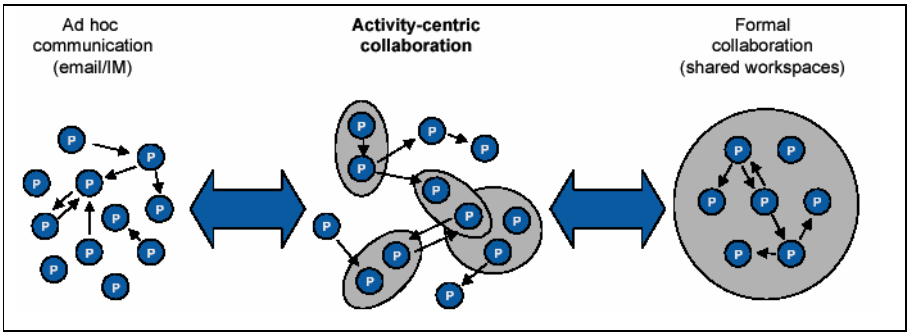

Figure 14.4. From Ad Hoc Communication to Formal Collaboration. Source: Muller et al. (2004, p.375)

Based on this type of basic understanding, Muller et al. (2004) formulated a conceptual model of different spectra between ad hoc communication to formal collaboration, in the middle being the spectrum of '***activity-centric collaboration***' (Figure 14.4 above). According to Muller et al. (2004), this type of divergence between the two extremes of computer-based support for collaboration – formal and ad hoc – leads to the following types of problems.

Problem 1. *Dividing Attention and Effort among Multiple Shared Venues*. The result is often that a single collaborative activity is managed with *multiple*, different stores of shared resources and media, such as e-mail, chat, wikis, document management systems, discussion databases, listservs, etc. This diversity of shared resources means that people must divide their attention and their effort across multiple media to be able to monitor and participate in multiple shared venues (Muller et al. 2004, p. 375).

Problem 2. *Difficulty of Moving Resources from One Environment to Another*. The second problem is a direct consequence of the first, and is connected to the difficulty of managing heterogeneous resources. Given a multitude of simultaneously available and simultaneously used CITs, people need to predict the scale of each collaboration upfront. They typically face difficulties in choosing which medium to use for any new collaborative activity. It is also difficult and time-consuming to move resources from one environment to another. For example, critical information may be contained in a brief chat conversation. That information may need to be transferred into e-mail, or another, more structured environment for the convenience of multiple participants. Another example is e-mail, which may gradually prove a chaotic and unmanageable venue for large-scale collaborations. In such situation it again becomes necessary to transfer the resources into a more structured collaboration space (i.e. for structured discussion or document management) (Muller et al. 2004, p.375).

Prompted by such considerations, Muller et al. (2004) described a new collaboration technology that is carefully poised between informal, ad hoc, easy-to-initiate collaborative tools, vs. more formal, structured, and high-overhead collaborative applications – the ActivityExplorer prototype. The prototype is a hybrid system that is meant to bridge the gaps between the two extremes (as shown in Figure 14.4 above). This semiformal system was designed with a great level of embedded 'tailorability': it was letting people '***start collaborating in an ad hoc way but also supported gradually adding structure by combining shared objects into larger threads***' (Muller et al. 2004, p.382).

With its quality to let structure emerge during run-time, this prototype differed from most other collaborative environments of 2004. It also differed by the principle of ***equal-prominence*** of multiple object types (e.g. messages, files, tasks, chats, folders). Most other collaborative environments restricted people 'to a single type of object (e.g. an e-mail or a discussion entry or a chat text), and require that other types of objects be *attached* or enclosed within that type of object' (Muller et al. 2004, p.381). The experience with ActivityExplorer has shown that people readily mix object types when that is possible.

Muller et al.'s principle of equal-prominence of multiple object types is conceptually closely related to two other antecedent constructs: Bellotti et al.'s notion of a '***thrask***', and Kaptelinin's '***project-related pools***'. Bellotti et al.'s thrasks are threaded task-oriented collections that contain different types of artefacts such as messages, hyperlinks, and attachments and treat such content at an equal level. Thus, 'thrask' are a means for better organising e-mail activities. Kaptelinin's 'project-related pools' are combinations of heterogeneous resources related to a single topic, including not just e-mail, but also any desktop application. These 'pools' help users organise resources into higher-level activities (Muller et al. 2004, p.375).

The experience with Muller et al.'s prototype, the ActivityExplore, has shown that different equally prominent objects were utilised differently. Messages were by far the most frequently used type of object, followed by files and tasks. Interestingly, folders (containers for other types of objects) were used least. As the system allowed any object to be used as a 'parent' (analogous to a container) for other objects, the users may have decided that folders were not needed in this inherently tree-structured environment, i.e. that they may 'hide' rather than store necessary information.

In order to further clarify what 'system tailorability' is, let us go back and see what its practical and heuristic antonym – '***system restrictiveness***' – has been theorised to be in the literature:

- DeSanctis et al. (1989) defined system restrictiveness as the extent to which process intervention limits or channels the collective use of activities and sequences inherent in collaborative work; … As the adaptive structuration theory (DeSanctis and Poole 1994) states, a restrictive system leaves little room to tailor a system to individual preferences and specific work situations (DeSanctis and Poole 1994, Poole and DeSanctis 1990).
- Wheeler and Valacich (1996) conceptualised system restrictiveness as the manner of limiting collaborative interaction to some certain types of coordination structures and communication philosophy.
- Silver (1990) defined system restrictiveness as the degree to which and the manner in which decision support systems limit their users' decision-making processes to a subset of all possible processes.
- Putnam (1979) summarised the characteristics of a restrictive structure as planned and sequential patterns, involving more concern for time management, more emphasis on regular and predictable procedures, and more emphasis on clarifying group procedures. (This is opposed to less restrictive structure which is characterised by cyclical procedural patterns, flexibility in establishing and changing plans, no time constraints, and having a tendency to ***balance and vacillate between task and socio-emotional needs of a group***).

As pointed out by Kim et al. (2002), there have been many decision room studies – e.g. Jessup et al. (1990), Turoff et al. (1993) – 'with face-to-face groups, which argue that restrictive communication structures can improve group processes and outcomes' (p.382). Most of these studies, in the words of DeSanctis and Gallupe (1987), focus on restrictive intervention into a group process by providing structures to impact the behaviour of groups. It is easily observable that a big majority of these studies (that advocate restrictive communication structures to improve group processes and outcomes) have one thing in common: most of them are decision-room studies. As Kim et al. (2002, p.382) rightfully observed, 'no [prior to theirs] studies have examined the impact of restrictiveness on group processes and outcomes in asynchronously distributed group support systems (DGSS) environments'.

14.1.1 Less System Restrictiveness for Asynchronously Interacting Distributed Groups

A research tendency of the 90ties (e.g. Fjermestad and Hiltz 1999) remains to be true today that most research on group coordination has been conducted with collocated groups rather than with distributed, asynchronously interacting collaborative ensembles. In such asynchronous environments, it turns out, less restrictive coordination structures seem to be more appropriate. For example, the findings of Kim et al. (2002) (from a 2×2 factorial experiment) clearly show that '***less restrictive coordination structures are more appropriate to support asynchronously interacting distributed groups***'. Their study argues that a coordination structure for asynchronously interacting groups should be flexible enough to allow each participant to customise his or her preferred decision strategy.

The reasons for the latter may be summarised as follows.

- One reason may be that, because a coordination structure determines who can talk to whom, when, how, and about what (Poole 1986), restrictive coordination may fail to generate a critical mass of interaction necessary for effective group decision-making in conditions of asynchronous groupwork.
- Asynchronous (anytime-anywhere) interaction of distributed groups is more difficult to coordinate (than face-to-face group interaction) and, respectively requires special adaptive structures (Chidambaram and Jones 1993, Turoff 1991, Turoff et al. 1993). Asynchronous (anytime-anywhere) interaction requires also ***more time*** (Hightower and Sayeed 1996) to coordinate activities.
- Another difficulty comes from the fact that asynchronous communication can take place anytime and anywhere. The latter means that this type of communication is not always mediated through technology (Kim et al. 2002, p.380).
- Distributed groups have special communication needs: i.e. to incorporate better meta-models for both individual and group problem-solving, to improve participation of uncooperative subgroups, to generate a critical mass of communication activities for effective interaction, etcetera (Turoff et al. 1993).
- Because a coordination structure determines who can talk to whom, when, how, and about what (Poole 1986), restrictive coordination may fail to generate a critical mass of interaction necessary for effective group decision-making in an asynchronously distributed environment (Kim et al. 2002, p.380).
- DeSanctis et al. (1989) observed that excessive restrictiveness may cause groups to lose their sense of ownership and control over technology and, thus, may reduce consensus.
- It appears that less restrictive CITs may result in better productivity by allowing the individual to concentrate on those aspects of a problem to which he/she can best contribute (Turoff et al. 1993).
- Wheeler et al. (1993) found that collaborative ensembles, supported by a *restrictive* coordination structure, develop a *sequential* interaction pattern [coordination mode]. On the other hand, collaborative ensembles with a *less restrictive* coordination structure adopt a *cyclical* interaction pattern and generate better group outcomes. Mennecke et al. (1992) and Wheeler et al. (1993) concurred arguing that a restrictive coordination structure leads to a sequential coordination mode, whereas a less restrictive structure is more likely to lead to a *non-sequential* or *parallel* coordination mode.

Here is the place to clarify what is meant in literature by ‘coordination mode’. Following the definition of Hiltz and Turoff (1978/1993), coordination mode refers to a regulatory process by which a group coordinates its execution of a task. According to Kim et al. (2002, p.385), a *sequential coordination mode* is a step-by-step procedure that leaves no freedom to deviate from a system-defined linear interaction procedure, and interaction is reactive to what is required by this procedure. A *parallel coordination mode*, on the other hand, allows individuals and groups to move back and forth among sub-tasks and to have different group members working on different sub-tasks at the same time in parallel. It thus provides group members with flexibility to adapt a coordination structure to the way that they can best contribute.

Asynchronous computer-supported communication means that social cues and context information are already lacking. In this situation, according to Kim et al.'s (2002) experimental results, a restrictive CIT may deteriorate group interaction, possibly resulting in failure to generate a critical mass of communication for effective collaboration. 'This may lead to increased decision-making cost by reducing efforts and contributions of each individual' (Kim et al. 2002, p.385).

14.1.2 System Customisation and Social CIT

Social CITs tend to be more customisable as other CITs – mainly because they usually represent flexible collaborative environments. One of the first impressions of Second Life for example – according to Purvis and Savarimuthu (2008) – is the diversity of the surroundings. This diversity is the result of a collective creative human imagination from which individual efforts combine to create a world that changes, evolves and sometimes disappears in real time. Most importantly, almost everything in the world is generated by the residents, for the Second Life software in general provides the capability for building and terra-forming, not the actual constructs themselves (Purvis and Savarimuthu 2008, p.10).

When comparing MySpace with Facebook, one understands that the first is harder to work with, but it has 10 times more users namely because it empowers them to totally manipulate their profile, rather than having, like Facebook, a standard design (Ozok and Panayiotis 2009, p.359). O'Reilly (2005) summarised the customisable features of some popular social CITs as follows:

- 'Amazon has gathered a number of utilities to make user participation the centre of their business. One of the features is related to reviewing content. There are numerous possibilities of contributing to the site on nearly every page and Amazon continuously works with the output of this participation to improve search results, thus improving customers' experience.
- Flickr and delicio.us have introduced a system of collaborative categorisation, often designated 'folksonomy'. It catalogues sites using selected keywords or tags, which permits multiple and layered associations of categories, thus working in opposition to the traditional rigid organization of tags, taxonomy. The development of these tools promotes user involvement and it is this participation that contributes to a Web 2.0 application success and pre-eminence over competitors' (O'Reilly 2005 in Ozok and Panayiotis 2009, p.359).

Another example are wiki-like systems. A wiki is, by design, a flexible collaborative and learning environment: a wiki page can take any form including threaded discussions; a wiki can contain most file formats – audio, video, text, or picture; or it can link to sites that support other features such as databases. The learners themselves organise the wiki structure and can link to other pages or outside resources (Ozok and Panayiotis 2009, p.508).

14.2 Mediator Role – Revisited

In line with the principles of 'spiral toward understanding' – the conceptual core of the 'Structured Case' methodology – I have checked and refined the collected data from the Critical Meta-Analysis of Case-Study Reports (Empirical Study II) to the data collected from the Content Analysis (Empirical Study III). This comparison has confirmed the importance of the 'Mediator Role' factor. Here I will organise and build on what the literature has produced as collective state of understanding on this factor. Table 14.4 depicts the thematic focus of this section.

Attributes of the System
System Customisation
Conceptual Load
Attributes of the Collaboration
Mediator Role
Number of System Users
Support of a Champion
Conversation for Action
Attributes of the Organisational Context
Incentives for Using CITs
Power-Structure Change
Long-term Unpredictability

Table 14.4. Thematic Focus of this Section

For example, 'Mediator Role' has been discussed as shown in Table 14.5. The table also shows which corresponding CIT types have been dealt with in this respect (i.e. level-C CITs and level-B CITs).

Issue discussed	**Mediator Role**	
Type of CIT discussed	**level-C CIT**	**level-B CIT**
Paper	Parent and Gallupe (2001) Whiteley and Garcia (1996) Dennis et al. (2001) Nunamaker et al. (1997) Briggs et al. (2003) Gilbert and Dabbagh (2005)	Kienle and Ritterskamp (2007)

Table 14.5. Examples of Papers Discussing the Theme of 'Mediator Role'

As mentioned above, all suggestions concerning 'Mediator Role' are not generalised for all CIT types altogether, but are only relevant for CIT types that are designed to allow for or to require some kind of mediator actions. To state the obvious – if a CIT is not designed to allow for or to require any kind of mediator actions – the factor of 'Mediator Role' will not be relevant to it.

Briggs et al. (2003) argued that the high conceptual load of CIT (i.e. understanding of the intended effect of CIT functionality) encouraged organisations to employ expert facilitators to wield the technology on behalf of others. Meanwhile, the authors have shown that economic and political factors – like promotion or job change-over – mitigated against facilitators remaining long term in CIT facilities. This, according to Briggs et al. (2003), especially hampered scaling CIT technology to support distributed collaboration.

The 'Mediator Role' factor is tightly related to the general-management factor of 'leadership' because:

a) both leadership (Jago 1982) and facilitation are basically coordination processes;

b) as such, both leadership and facilitation focus on process structuring and entail different degrees of coordination restrictiveness (Briggs et al. 1998).

As pointed out by Kim et al. (2002, p.385), in GSS research, leadership has mainly been studied as a 'facilitator role' (Anson et al. 1995, Dickson et al. 1993, Griffith et al. 1998, Niederman et al. 1996, Wheeler and Valacich 1996), in which a leader was referred to as a group process facilitator (Griffith et al. 1998), and flexible facilitation was recommended in response to evolving group needs. Kim et al. (2002) claimed that 'a group *without* a leader is considered more restrictive' (p.386). However, this view has been quite controversial considering the different standpoints produced by literature.

Wheeler and Valacich (1996) expressed a view similar to Kim et al. (2002), arguing that *without* a group leader conditions are the most restrictive because they focus on preventing the choice of alternate structures. Nunamaker et al. (1997, p.193) defended a similar view saying that *without* support of a facilitator, competition among members for control can create dysfunction[74] – for example, any group member may change or delete the group memory. So, in this case, the lack of a facilitator was preventing the choice of alternate structures.

On the other hand, scholars like Anson et al. (1995) have argued that GSS structures alone are relatively static and inflexible, compared to coordination by a group facilitator. Whatever of these two orthogonal standpoints may be true, a facilitator can unarguably 'have a significant intentional (and unintentional) impact on the

[74] While this was manageable for small collaborative groups, it was much less so for larger groups with diverse membership or where competitive political motives and vested interests exist (Nunamaker et al. 1997, p.193).

group's meeting process' (Dennis et al. 2001, p.172). In Section 10.1 above, I have shown that three different negative effects may be caused by a dominant facilitator:

a) a *Democracy Paradox* (Phony Democracy) – where the CIT exacerbated the degree to which the dominant leader wished his position shared by the group;
b) *Conflict* – where the CIT generated conflict instead of reducing it;
c) an *Illusion of Alliance* – the feeling the facilitated-CIT tended to offer to group members that their comments and opinions really mattered, when de facto, they did not.

Kienle and Ritterskamp (2007) analysed the facilitator role under the term 'moderation' (i.e. moderator). Whiteley and Garcia (1996) came up with a 'sample list' of facilitator roles, including 'encourager', 'persuader', 'disciplinarian', 'process controller', 'structure controller', 'analyist', 'moodmaker', 'ownership promoter', 'negotiator', 'information disseminator' etc. (see Table 14.6 below).

Encourager	Analyist
Persuader	Moodmaker
Disciplinarian	Ownership Promoter
Process Controller	Negotiator
Structure Controller	Information Disseminator

Table 14.6. Sample List of Facilitator Roles. Source: Whiteley and Garcia (1996)

Nunamaker et al. (1997), in their article 'Lessons from a Dozen Years of Group Support Systems Research', summed up what they knew about leadership (mediator role) in GSS use in the maxim: 'GSS technology does not replace leadership' (p.170). If the group lacks good leadership in principle – i.e. if the group is unclear about its goals and suffers from a lack of direction *a priori* – then, the use of GSS may not only fail to help but may also aggravate the situation. Nunamaker et al. (1997) frequently observed situations of teams (unclear about their goals) abandoning the meeting process within ten or fifteen minutes, demonstrating that GSS use did not replace leadership.

One of the most desirable (i.e. optimal) contributions of a mediator – according to Nunamaker et al. (1997) – is to '*remove one level of system complexity*' (p.193) by e.g. initiating and terminating specific software tools and functions, guiding the group through the technical aspects necessary to work on the task etc. An interesting question has attracted adequate attention in the CIT literature – namely, does facilitation produce better results and effects when it is performed by an *insider* (a member of the collaborative ensemble – group, team, etc.), or when it is performed by a *neutral individual* (a non-member of the collaborative ensemble – group, team, etc.)?

According to Nunamaker et al. (1997), an *insider* performing facilitator roles is automatically deprived from the possibility of participating actively in the discussion. Thus, the group automatically gives up one member to serve as chair. On the other hand, using a *neutral individual* enables all group members to participate actively, but brings about the disadvantage of a facilitator lacking insider knowledge. The latter may not always be bad, given that a neutral facilitator may prove able to set 'non-biased' ground rules for interaction, and enforce protocols and norms that may be beneficial. The latter may prove crucial in providing organisational continuity by maintaining the group memory repository in the long run.

14.3 Number of System Users – Revisited

In line with the 'spiral toward understanding' – the conceptual core of the 'Structured Case' methodology – I have checked and refined the collected data from the Critical Meta-Analysis of Case-Study Reports (Empirical Study II) to the data collected from the Content Analysis (Empirical Study III). This comparison has confirmed the importance of the 'Number of System Users' factor. Now I will organise and build on what the literature has produced as collective state of understanding on this factor. Table 14.7 depicts the thematic focus of this section.

Attributes of the System
System Customisation
Conceptual Load
Attributes of the Collaboration
Mediator Role
Number of System Users
Support of a Champion
Conversation for Action
Attributes of the Organisational Context
Incentives for Using CITs
Power-Structure Change
Long-term Unpredictability

Table 14.7. Thematic Focus of this Section

For example, the issue of 'Number of System Users' has been discussed as shown in Table 14.8 below. The table also shows which corresponding CIT types have been dealt with in this respect (i.e. level-A CITs, and non-specific).

Issue discussed	**Number of System Users**	
Type of CIT discussed	**non-specific**	**Level-A CIT**
Paper	Törpel et al. (2003) Dix (1997) Ackerman (2000)	Ginsburg and Duliba (1997)

Table 14.8. Examples of Papers Discussing the Theme of 'Number of System Users'

The Critical Meta-Analysis of Case-Study Reports has shown and the Content Analysis has confirmed that the number of system users, and the network effects associated with it, are important factors influencing CIT diffusion. The 'network effects' factor has been operationalised in the field of technology adoption by authors like Arthur (1994) and Cohen and Levinthal (1990) through the following constructs:

1. A user's ability and incentive to adopt a newer technology are largely a function of her level of related experience with prior technologies– the so called ***path dependency*** in technology adoption (Arthur 1994, Cohen and Levinthal 1990).
2. ***Switching costs***, as well as factors of customisation, dominant design, and standardisation, dictate a pattern of repetitive adoption/usage of well–known IT standards, although novel standards may promise better efficiency and effectiveness (Arthur 1994, Cohen and Levinthal 1990).
3. Further, it has been claimed that ***learning effects*** would provide advantage to any IT version that got ahead in cumulative adoptions; and so the adoption process could lock in, by historical chance, to whichever version of the technology got a better start (Arthur 1994).

As I noticed in Section 4.1 above, CIT adoption is collective. While, for single-user applications, critical user-mass is important but not necessarily crucial (see Table 4.1 above), for CIT adoption critical user-mass is crucial. Therefore, all of the considerations regarding 'network effects' in the field of technology adoption [as listed above] are *even more relevant* for the field of CIT adoption.

In three exploratory case studies, Ginsburg and Duliba (1997) studied the strategic reasons motivating firms' choices in the implementation phase of CIT usage (specifically, CITs like Lotus Notes and alternatives which use Intranet-based technologies). Hereby, the authors considered a thematic pair of related issues: Internet standards and interoperability. A guiding question in this respect was 'why is the proprietary nature of Lotus Notes a stumbling block to some firms and a strategic advantage to others?'. In seeking answers to this question, Ginsburg and Duliba (1997) expanded a conceptualisation from Goldberg (1994) on what the '*ideal enterprise-wide groupware*' would offer. Many of the requirements on the '*ideal enterprise-wide groupware*' ring even truer today, as they have not been achieved despite the alleged 'technological development':

- *Scalability*. 'The groupware should be able to accommodate numerous simultaneous users without a noticeable degradation of performance' (Ginsburg and Duliba 1997, p.93).
- *Interoperability with Legacy Systems*. 'The groupware should be able to access data stored in mainframe databases (such as Oracle, Sybase, or DB2) or in other ad hoc development systems such as large Excel or Lotus spreadsheets' (Ginsburg and Duliba 1997, p.93), etc.

The 'role of standards' as mediators of critical mass and network effects in technology acceptance and usage, has interested the IS community for decades and continues to be a hot topic of discussion today. Back in 1997, Ginsburg and Duliba (pp.212, 213) noticed that the questions of software choice, *de facto* standards (which consumers have voted on, in effect, with their purchase decisions) and *de jure* standards (which are arrived at by a legislative body, for example a standards committee) were crucial. For example, it was difficult to decide on a proprietary CIT (e.g. Lotus Notes) which would fulfil immediate organisational goals, or opt for an 'open' solution using Internet standards, which might be sub-optimal at the present time but offer network-effect gains to profit from as it grows in over time. Briggs et al. (2003) renewed the discussion on '*de facto*' technological standards arguing (based on findings such as those of e.g. Gordebeke 2002) that *self-sustaining communities* of CIT users were being slow to form, but whenever they formed, it was due to technology becoming a de facto standard. Using a CIT as a standard practice trained new people to use the CIT as a matter of course, and to fix the CIT if it breaks, rather than abandoning it. Agres et al. (2005) defined a 'growing community' of users as one where more people found more uses for the technology over time.

Dix (1997) was one of the first scholars (after Grudin 1988) to consider the cost-benefit trade-off for a CIT user. The costs of use of a CIT are often constant irrespective of the ***number of other users*** (see Figure 14.5 below). The benefit rises with the number of other users. If there is a small number of users, the cost for each user is likely to exceed the benefit; only when there are a large number of other users does the benefit exceed the cost. The cross-over point is called the critical mass (see Figure 14.5). Since Dix (1997) opened the discussion on the 'cost-benefit trade-offs' for CIT users, various authors have tried to operationalise what the costs of CIT usage actually involved. For example, LaMafrca (1999) argued that the costs of CIT usage actually involved two things: support for content work and support for coordination. Agres et al. (2005) took the stance that there was a significant difference between the costs and benefits to the CIT *transition* process and the costs and benefits of CIT *usage* once it is in place.

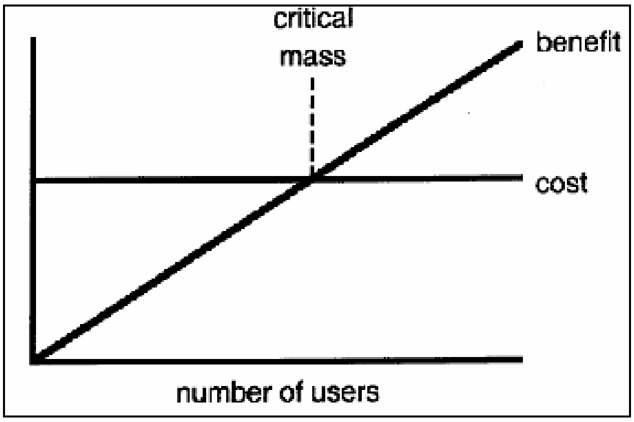

Figure 14.5. Cost-benefit of Collaborative Systems, Source: Dix (1997)

Bitter-Rijpkema et al. (2002) elaborated on the network effects in CIT usage from a different perspective – they analysed CIT *critical mass and diffusion across distance.* They argued that, CIT's critical mass and diffusion across distance should be best analysed outside 'well-defined' organisational and corporate boundaries (Bitter-Rijpkema et al. 2002). Thus, Bitter-Rijpkema et al. (2002) aligned with the stream of research which advocates the need for CIT research to extend its boundaries and move beyond its current and almost exclusive focus on the traditional workplace.

There is a CIT research stream that has been studying the network externalities enabled by the World Wide Web as an infrastructure for cooperative work. One [additional] finding from my Content Analysis of CIT literature has shown the following: within my sample of post-1997 CIT studies, I have identified web-based collaboration systems (or collaboration systems with a web interface) to be in the focus of more than 24% of all papers (e.g. De Wever et al. 2006, Gilbert and Dabbagh 2005, Gordon-Murnane 2007, Heldal et al. 2005, Kayler and Weller 2007, Paul et al. 2004, Power 2000, Turel and Yuan 2007). These studies have argued that the Web is already a very successful collaborative environment, and have advocated several advantages of the World Wide Web as a CIT platform. Some reported advantages include:

- the usage of standard browsers and network externalities associated with that;
- the enabling role of the World Wide Web as a lightweight and extensible client-server architecture, offering client implementations for all popular computing platforms, and enjoying an ***existing user base numbered in millions*** (Bentley et al. 1997a, Bentley et al., 1997b);
- the ability of the World Wide Web to provide a common platform for homogenous collaboration infrastructures, thus dealing away with heterogeneity in computing devices and application scenarios (heterogeneity is known to complicate the development and acceptance of collaborative software systems) (Correa and Marsic 2004).
- The combination of the two – user control and network externalities – that accounts for the spontaneous social combustion enabled by the Web. (Web-based CITs are popular because, inter alia, the Web user decides who he/she wants to network with, when, and how often).

Maybe one of the most concise and eloquent formulations on the issue of ‘network effects’ in IT usage has been produced by Tapscott and Williams (2006, p.211):

‘After all, success in most platform-related businesses is linked to pervasiveness and continuous innovation. The bigger the ecosystem the better, because bigger ecosystems support more raw intelligence and more requisite variety. Becoming a pervasive and continuously innovative presence means becoming a magnet for innovation that attracts lots of partners, suppliers, developers, customers, and other interested participants who are willing to build on your organisation’s platform’.

According to Ozok and Panayiotis (2009), the number of users is one of the greatest indicators of success for social CITs. ‘Viral marketing’, user to user advertising, is one of the main reasons. Word of mouth, recommendation and even pressure from colleagues and friends are at the centre of the adhesion to these sites. Moreover, the online communities themselves exert pressure and persuade the individual into participating (p.357).

14.4 Support of a Champion – Revisited

In line with the principles of the 'spiral toward understanding', I have checked the data collected from the Critical Meta-Analysis of Case-Study Reports (Empirical Study II) against the data collected from the Content Analysis (Empirical Study III). This comparison has confirmed the importance of the 'Support of a Champion' intervening factor. Here I will organise and build on what the literature has produced as collective state of understanding on this factor. Table 14.9 depicts the thematic focus of this section.

Attributes of the System
System Customisation
Conceptual Load
Attributes of the Collaboration
Mediator Role
Number of System Users
Support of a Champion
Conversation for Action
Attributes of the Organisational Context
Incentives for Using CITs
Power-Structure Change
Long-term Unpredictability

Table 14.9. Thematic Focus of this Section

For example, the issue of 'champion support' has been discussed as shown in Table 14.10. The table also shows which corresponding CIT types have been dealt with in this respect (i.e. level-C CITs, level-A CITs, and non-specific CITs).

Issue discussed	**Support of a Champion**		
Type of CIT discussed	**level-C CIT**	**level-A CIT**	**non-specific**
Paper	Munkvold and Anson (2001)	Mark and Poltrock (2004)	Bansler and Havn (2006)

Table 14.10. Examples of Papers Discussing the Theme of 'Support of a Champion'

The important role of the technology champion is well acknowledged in the [general] diffusion of innovation (DoI) literature (e.g. Rogers 1995). The importance of the role of the champion has also been well acknowledged in various EMS (electronic meeting systems) adoption studies (e.g. Bikson and Eveland 1996, Grohowski et al. 1990). Munkvold and Anson (2001), for example, found the 'role of the project champion' to be as significant and crucial for the diffusion of CITs as the role of top management support. Numerous cases have shown that, whenever the champion was pulled away from 'championing' a CIT project, the rapid initial CIT [e.g. NetMeeting] diffusion was placed on hold and lost ground. Munkvold and Anson

(2001) also found that 'champion support' and 'top management support' were closely interrelated. In cases where the project champion lacked the managerial mandate to allocate resources to the CIT implementation himself [lacked top management support], he played more of an 'operating sponsor' role (Grohowski et al. 1990 in Munkvold and Anson 2001, p.284). A continuous executive sponsor would probably have resulted in more rapid CIT diffusion in most of the cases.

Bansler and Havn's (2006) studies highlighted the collaborative nature of customisation and revealed that different types of champions (mediators or local developers) played a critical role by intervening in and shaping (other) users' use of technology. These findings are analogous to Mackay's (1990) discoveries that a small group of champions – whom she called 'translators' – played a crucial role in the successful deployment of the technology by helping their colleagues customise their software environment. Translators enjoyed 'talking directly to their colleagues and [got] satisfaction from helping to make their colleagues' lives easier' (Mackay 1990, p.219). Bansler and Havn (2006, p.58) asserted that 'the role of translator was not officially recognised and few of the managers were aware of their accomplishments'.

Nardi and Miller (1990), in a study of spreadsheet use in diverse companies, found that 'nearly all of the spreadsheets used in the work environments studied were the result of collaborative work' among users (p.197). Similarly, Gantt and Nardi (1992) performed an ethnographic study of CAD users in seven companies. Their results also highlighted the importance of 'local developers' who were, for example, writing the macros and scripts for many CAD applications.

Trigg and Bødker (1994) argued that the local champions were doing all of the tailoring in a cooperative work process 'on the borders between technology development and everyday work' (p.47). Orlikowski et al. (1995) found that the use of computer conferencing systems was critically influenced by the adaptation work of a small group of people, referred to as 'mediators'. Weick (2001) expressed special concern about how mediators enacted or 'realised' their interpretations of technology use through their actions. In a similar vein, Pollard (2003) studied the usage patterns of group support systems (GSS) and found that the close contact between GSS champions and the vendor through site visits, telephone support, participation in user conferences, etc. promoted 'vendor–champion alliances'. The latter enabled the champions to act as technical gatekeepers at all stages of the innovation decision process. While witnessing similar developments over and over again, Bansler and Havn (2006, p.60) concluded that understanding how technological champions make sense of a technology is critical to understanding how people interact with it.

One possible theoretical lens within which the 'champion's role' can be studied is the Elaboration Likelihood Model (ELM) (Cacioppo and Petty 1986). The ELM compares two alternative influence processes, the central and peripheral routes, in motivating IT acceptance:

1. the central route processes message-related arguments (the case when users have thought about the system while adopting it);
2. the peripheral route processes cues, when people are thinking of *who* is saying they should adopt the system [i.e. a 'champion'], rather than what they are saying. The amount of cognitive effort is much less here, as well as the level of persuasion – therefore the adoption decisions are not long-lasting, and usually end up with system abandonment.

Though ELM has a rich history in social psychology (e.g. Petty et al. 1981) and marketing (e.g. Lord et al. 1995) research, its application in information systems research is just beginning to emerge (Bhattacherjee and Sanford 2004). Three independent studies (Mak et al. 1997, Dijkstra 1999, Sussman and Siegel 2003) have attested to the empirical validity of ELM in IS contexts, though all three studies have been conducted within the context of information acceptance rather than technology acceptance. The first study to apply ELM within the context of technology acceptance, to the best of my knowledge, is Bhattacherjee and Sanford's (2006) theoretical articulation and empirical test of the role of persuasion strategies on individual IT usage behaviour.

The ELM is based on the idea that attitudes result from *persuasion* as a primary source. The key variable in the process of persuasion is *involvement*, the extent to which an individual is willing and able to 'think' about the position advocated. When people are motivated and able to think about the content of the message, elaboration[75] is high (Cacioppo and Petty 1979, Cacioppo et al. 1981, Petty and Cacioppo 1986, Petty and Wegener 1999). I deem the ELM *promising for theorising on the 'role of a champion'* in CIT acceptance. The model addresses factors – e.g. the source of the message [the 'champion'] and his/her level of influence – that explain why and when messages and self-motivated efforts are more or less likely to lead to attitude formation. ELM therefore could be helpful in explaining the implications of the champion's role on processing ability and attitude change.

14.5 Incentives for Using CITs – Revisited

In line with the principles of the 'spiral toward understanding', I have checked the data collected from the Critical Meta-Analysis of Case-Study Reports (Empirical Study II) against the data collected from the Content Analysis (Empirical Study III). This comparison has confirmed the importance of the factor of 'Incentives for Using CITs', although the pattern does not seem to have been recognised and internalised by the research community. Table 14.11 below depicts the thematic focus of this Section.

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[75] 'Elaboration' involves cognitive processes such as evaluation, recall, critical judgment, and inferential judgment.

Attributes of the System
System Customisation
Conceptual Load
Attributes of the Collaboration
Mediator Role
Number of System Users
Support of a Champion
Conversation for Action
Attributes of the Organisational Context
Incentives for Using CITs
Power-Structure Change
Long-term Unpredictability

Table 14.11. Thematic Focus of this Section

One of the very few content-analysis studies that actually discussed the factor of 'Incentives for Using CITs' – Lewis et al. (2007) – found (by means of an empirical survey) that large numbers of respondents in the US, Norway, and Australia indicated that their organisations did not provide any incentives for efficient and effective meetings. This was especially true in Australia where it was the top-ranked barrier (62% agreement). Lewis et al. (2007) also argued that, if an organisation did not provide any incentives for improving the effectiveness and efficiency of meetings, managers might not be motivated to adopt and use EMS.

Interestingly, Lewis et al. (2007) found that the lack of 'incentives for using CITs' is not seen as a significant barrier by nearly as many respondents in Hong Kong (27.3% agreement). This finding Lewis et al. (2007) related to the stronger emphasis on collective behaviour in Hong Kong (Rutkowski et al. 2002), as well as the low score in the national cultural measure of 'individualism' (Hofstede 2005). Other scholars, e.g. Lai et al. (2005), have argued that organisations based in the region of Hong Kong are known to emphasise the general importance of efficiency and effectiveness, which may – according to Lewis et al. (2007) – extend to meetings.

The results presented in Lewis et al. (2007) – i.e. 62% agreement on organisations not providing any incentives for efficient and effective meetings – actually repeat Nunamaker et al.'s (1997) finding that the lack of incentives for CIT use 'may well resist actively participating in GSS sessions where information is shared and ideas are contributed' (p.172). This repetition of results proves that the problem of lack of incentives for CIT use has been a ***persistent problem*** for CIT use over a whole decade of time. Perhaps even longer, considering that Nunamaker et al.'s (1997) article was an overview article, consolidating the 'lessons from a dozen years of group support systems research'. According to that experience, the use of GSS has not always been enthusiastically welcomed by organisation members. If organisational rewards were based on individual performance, and individual specialised knowledge, persons might well resist actively participating in GSS sessions where information was shared and ideas were contributed in a common pool (often anonymously). Nunamaker et al.'s (1997) summarised the problem as follows:

'It is important that organisational incentives and rewards be aligned with GSS use, or GSS implementation can fail' (p.172).

Grudin (1988) was the first scholar to notice and report a problem in CIT design which was even worse than 'lack of incentives'. He noticed that, in case of one work-management CIT, there were '***contra-incentives***' offered to the users. Employees who reported identifying a priority problem began receiving system-generated requests for progress reports to be forwarded to the Chief Executive Officer. This quickly led to the end of priority problem reporting. The vigilant system noted that employees had stopped using the system, and alerted the administrator. The employees dealt with the resulting complaints from the administrator by writing programs that periodically opened files and changed dates, which satisfied (and thus managed to circumvent) the watchful, automatic monitor. Thus 'sabotaged', the work management application was of little use, and was eventually quietly withdrawn (Grudin 1988).

Even the organisational theory of the 60ties (e.g. Cyert and March 1963) noticed that organisations were not perfectly collaborative systems. Rather, 'the perspective on organisations that views them as a mixture of collaboration and conflict, overt and covert, appears to be more illuminating and have greater explanatory potential than the traditional rationalistic account' (Bannon and Schmidt 1991, p.368). According to Bannon and Schmidt (1991), in organisational settings information is used daily for misrepresentation purposes because an organisation is a coalition of individuals motivated by individual interests and aspirations and pursuing individual goals. On this background, the provision of incentives for using CITs is crucial in a context of goal incongruence and discord of interests and motives. Team Theory, for example, posits that 'the cognitive effort required for communication, deliberation, and information access is motivated by goal congruence – the degree to which the vested interests of individual team members are compatible with the group goal' (Nunamaker et al. 1997, p.166).

According to Deans (2009, p.9), sites like MySpace, Facebook, Flickr, and others are focused on serving the ***self-interests of individuals*** by providing services to connect with each other on an independent, individual level. The author claims that – in the Enterprise 2.0 – new metrics for employee compensation may be necessary, i.e. attributes such as seniority and authority may be replaced with characteristics such as creativity, speed, and diversity of opinion (p.48).

14.6 Power-Structure Change – Revisited (Social-CIT Diffusion)

I have checked and refined the collected data from the Critical Meta-Analysis of Case-Study Reports (Empirical Study II) to the data collected from the Content Analysis. This comparison has confirmed the importance of the 'Power-Structure Change' factor. Here I will organise and build on what the literature has produced as collective state of understanding on this factor. Table 14.12 below depicts the thematic focus of this Section.

Attributes of the System
System Customisation
Conceptual Load
Attributes of the Collaboration
Mediator Role
Number of System Users
Support of a Champion
Conversation for Action
Attributes of the Organisational Context
Incentives for Using CITs
Power-Structure Change
Long-term Unpredictability

Table 14.12. Thematic Focus of this Section

Mark and Poltrock (2004) continued an old CSCW theme (e.g. Markus 1987) by arguing that, contrary to the common view that technology diffusion is a rational, top-down, well-planned process, CIT diffusion is in fact, a messy process. For example, most of the ***social CIT*** environments dealt with in this Thesis (e.g. blogs, wikis, mashups, peer-to-peer networks etc.) have, reportedly, diffused bottom-up. They have, eventually, been either accepted or rejected by company management – thereby exhibiting a messy diffusion process.

In this Section, I will describe this diffusion process, and will also hypothesise that the degree of system ***sociality*** (mentioned in ***Finding 5***, Chapter 13) may be seen as a factor either: a) capable of causing power-structure change in terms of decentralisation, or b) stemming from the process of decentralisation. For example, social CITs such as blogs, wikis, peer-to-peer networks, and personal broadcasting ‘are putting unprecedented *power* in the hands of individual workers to communicate and collaborate more productively’ (Tapscott and Williams 2006, p.247). This in turn is driving organisational change toward greater decentralisation.

According to Deans (2009), enterprise 2.0 social CITs are changing the way organizations are managed, and ‘… ideas and people are moving up the ladder much more quickly’ (p.46). Furthermore, Deans (2009, p.8) claimed that social CITs allow employees internally to be more aware of what is happening within the company, thus creating a smarter environment. These applications ‘***have changed the hierarchal structure into a more horizontal structure*** because employees at all levels are allowed to participate in the activities of the company’ (p.11).

Scholars such as Tom Malone even went further, saying that ‘***we are in the early stages of an increase in human freedom in business and that may be as important as the change to democracies has been for governments***’ (Malone 2005). Either overestimated, or underestimated, *micro-management* seems to be establishing itself as a form of inter- or intra-organisational self-organisation, and it is being exercised autonomously by individual employees who now have all the resources and information available to make their own decisions instead of following orders.

As many leading thinkers have pointed out, technology has brought about the merging of the work life and the personal life. This has lead to the transfer of 'consumer' experience from the Internet into the expectations for 'employee' experience at the enterprise. Thus, we have witnessed a process at which, initially 'shadow CITs'[76], have entered the workspace somehow naturally. One example is the evolution of blogging. In 2006 (Cooke 2006) employees started translating their personal blogging experience into their workplace. Lots of high-tech employees (for example hundreds of Sun Microsystems employees) started writing public blogs at work, about work, which violated every traditional percept of corporate communication (Roush 2006). Eventually, employee blogging 'at work, about work' took myriad of forms. Employees blogged in order to obtain technical types of feedback about work-related issues, and sought advice outside the enterprise. The focus of their blogging was generally *not* on their co-workers or their immediate environment (Gely and Bierman 2006). Bloggers of this type 'clustered' in a variety of social worlds, such as law (law-library.rutgers.edu), accounting (pro2net.com), medicine (medrants.com), etc. Thus, blogs made a bottom-up, un-steered transition into the workspace, entering it initially as 'shadow CITs'. Noticing these developments, business managers did not know if what was happening 'might really be dangerous…, and they did not know how to decide that' (Boyd 2007). Different companies reacted differently, but altogether, three types of reaction strategies seem to have been performed:

- strategy of fear, rejection, and banning;
- strategy of limitation and regulation;
- strategy of acceptance.

14.6.1 Rejection and Banning of Social CITs

The transition of self-selected solutions into the workplace was an expression of the freedom of choice of individual employees to decide how to get their work done. Some leading thinkers classified this choice as liberation of the workforce from the constraints of legacy communication and productivity tools (Enterprise 2.0 conference). Many organisations were not ready for a bottom-up approach in which individuals sought to affiliate with others of similar interests (with instant messaging, for example, they were creating their own groups, and organising them to meet their personal and work goals (Fichter 2005)). Empowerment of this type was thought of as reducing management's ability to exert unilateral control, and some companies reacted by ***banning*** the usage of new-generation social collaboration tools at the workplace.

[76] We introduced the term 'shadow CIT' in Shumarova and Swatman (2008).

Deans (2009, p.8) described how a knowledge management team felt ***threatened by social software***. The reason for this was that the KM team had a wealth of experience in organising and managing corporate knowledge, i.e. a rich background in working with knowledge management and collaborative software, and lots of experience in creating information taxonomies. So, the concept of folksonomies seemed to go against everything on which they have worked for the pass decade.

Lynch (2008) summarised the motivational perspectives for banning consumer social networks (like Facebook) at work:

- One concern is that it can become a recreational time suck for employees draining productivity from an organisation.
- Another concern is that employees post personal opinions which can be misconstrued as the public position of the company they work for, or leak other sensitive information inadvertently while collaborating with peers across different companies.
- There seems to be a tendency of many organisations just not having the time to think about or get into such applications and so it is just easier to ban them.

14.6.2 Limitation and Regulation of Social-CIT Usage

Other companies, like IBM, crafted and established corporate policies aimed at regulating their employees' participation in consumer social networks. Those policies were put in writing, in the same fashion that other personnel issues were traditionally regulated (Laff 2007) (see Table 14.13 below).

Guidelines for IBM [public] Bloggers:
1| IBMers are personally responsible for their posts. Be mindful that what you write will be public for a long time—protect your privacy.
2| Identify yourself—name and, when relevant, role at IBM—when you blog about IBM or IBM-related matters.
3| Use a disclaimer such as this: 'The postings on this site are my own and don't necessarily represent IBM's positions, strategies, or opinions.'
4| Respect copyright, fair use, and financial disclosure laws.
5| Don't provide IBM's or another's confidential or other proprietary information.
6| Don't cite or reference clients, partners, or suppliers without their approval.
7| Respect your audience. Don't use ethnic slurs, personal insults, obscenity, etc., and show proper consideration for others' privacy and for topics that may be considered objectionable or inflammatory—such as politics and religion.
8| Find out who else is blogging on the topic, and cite them.
9| Don't pick fights, be the first to correct your own mistakes, and don't alter previous posts without indicating that you have done so.

Table 14.13. Guidelines for IBM Bloggers. Source: Laff (2007)

According to Deans (2009, p.12), by removing the traditional business structure and empowering people through social CITs, most businesses are legitimately concerned about corporate information security. The very thought of accidentally exposing internal confidential information is something that immediately sends business IT security departments into a full panic. Realistically, according to Deans (2009), there is a balance to be struck between providing openness and ensuring that truly confidential information does not wind up freely available to all. This balance is struck by understanding which boundaries are going to be crossed by using social CIT, recognising the implications of crossing each boundary, and putting the proper guidance and security in place for each. Most businesses already have corporate information guidelines that can be easily extended to cover social CITs (see, for example, the Guidelines for IBM Bloggers – Table 14.13 above).

14.6.3 Strategy of Acceptance of Social CIT

Other companies saw a potential value in the 'shadow' solutions, and embraced the idea that – instead of banning or limitation – their implementation as organisation-mandated tools may actually be beneficial. One example was the emergence of ***organisational blogging***. Over the past three years, companies including BBC, Boeing, Disney, Ford, General Motors, Google, the Guardian, Hewlett Packard, IBM, GM, Microsoft, and Sun Microsystems have encouraged their employees to create and use organisational blogs (Gely and Bierman 2006, Fichter 2005, Fine 2005, Kirkpatrick and Roth 2005, Laff 2007, Larson 2005, Lunden 2005, Martin 2007, Roush 2006). Many large corporations started using wikis internally, including Adobe, Best Buy, Disney, Eastman Kodak, General Motors, IBM, Microsoft, Motorola, Nokia, Novell, SAP.

These companies acted as innovative early adopters, but they are still a minority, if we judge, for example, based on the percentage of the CEOs at major corporations in the United States who had established corporate blogs in 2005 – i.e. 10% (CNN.com 2005). According to Boyd (2007) innovative companies are eager to explore how to adopt the best parts of Web 2.0, and apply them, and at the same time they want to retain the best of what they already have in Web 1.0 and pre-web technologies, but they do not know how far to go with applying the lessons from the non-enterprise consumer space. Clearly, early adopting enterprises have understood that: a) in a global working environment, access to the global wisdom of the world is needed (Glotzbach 2006) and therefore the global scale offered by Web 2.0 solutions; b) rather than being feared, transparency can be central to business success (Tapscott 2008); c) collective intelligence may be translated to competitive advantage (Enterprise 2.0 conference).

I may introduce the metaphorical construct of '***shadow CIT***' – analogous to 'shadow IT' (Raden 2005, Schaffner 2007) – to describe the strategic choice to use autonomous CITs (for example semi-formal collaboration tools) instead of enterprise/formal CIT tools. 'Shadow IT' has been defined by Raden (2005, p.1) as a set of IT tools used 'for performing IT functions but not part of the mainstream IT organisation'. Similarly, 'shadow CIT' solutions are employee-autonomous: they are not implemented as part of the organisational IT infrastructure, and have not received any targeted investment. Often, without being able to articulate why, users appear to shun enterprise CITs and 'good' architecture in favour of the ability to get their work done through autonomous 'shadow' solutions.

To understand the issue precisely, it is necessary to clearly differentiate between what is meant by 'formal' collaborative solutions, as reported in literature, and what I mean by 'shadow' solutions. Firstly, formal solutions are organisation-mandated, while shadow solutions are adopted by individual employees autonomously, through self-initiative, and they are self-selected. Formal solutions are an *intended* part of the organisational IT infrastructure, and the result of targeted investment. Shadow solutions are, by contrast, emergent, *defacto* collaboration systems. Formal solutions are organisational strategy-driven, while shadow solutions are social culture-driven. Formal solutions are usually created by professionals, while shadow solutions are created by the user community. Last but not least, in contrast to formal collaborative solutions, which impose structure *prior* to use, shadow solutions tend to encourage use prior to providing structure by offering more user participation and authenticity.

As I pointed out in Section 3.4.1 above, the 'transformation of the organisation of work' has led, since the beginning of the 21st-century, to a further development toward flattening hierarchies, informal alliances, and communities. Thus, the modern company looks less like a hierarchy and more like a community. According to Hamel (2007, p.61), '***when it comes to mobilising human capability, communities outperform bureaucracies***'. Hamel 2007 (p.61) hypothesised some of the reasons for that to be as follows:

- 'In a bureaucracy, the basis for exchange is contractual – you get paid for doing what is assigned to you. In a community, exchange is voluntary – you give your labour in return for the chance to make a difference, or exercise your talents.
- In a bureaucracy, you are a factor of production. In a community you are a partner in a cause.
- In a bureaucracy, 'loyalty' is a product of economic dependency. In a community, dedication and commitment are based on one's affiliation with the group's aims and goals.
- When it comes to supervision and control, bureaucracies rely on multiple layers of management and a web of policies and rules. Communities, by contrast, depend on norms, values, and the gentle prodding of one's peers'.

One example of a social collaborative environment, operating as a ***decentralised loose hierarchy***, is Wikipedia. The founders of the project (Wales and Sanger) played an important role in setting an original direction and setting some guiding policies. But thereafter, their managerial roles gradually diminished. In the words of Malone (2004), now, with the project's foundations in place, the community operates effectively, with very little management intervention. To quote Fichter (2005), collaboration tools such as weblogs and wikis open up the possibility of allowing organic self-supporting and self-organising to form.

This type of self-organising may be compared to what the economist Friedrich Hayek liked to term ‘spontaneous order’ (in Surowiecki 2004, p.102). Hayek was interested in the sense of ‘spontaneous order’ one gets by watching a flock of birds move through the air. Flocks exhibit a biologically programmed spontaneity – starlings do not decide what rules to follow, they just do. No plans are made of how the flock should be moving. The flock just moves. According to Surowiecki (2004, p.102), ‘a flock is a wonderful example of a social organisation that accomplishes its goals and solves problems in a bottom-up fashion, without leaders and without having to follow complex algorithms or complicated rules’.

In some cases, decentralisation has been classified as ‘counterproductive’. For example, in his analysis of the reasons for the failure of the United States intelligence agencies to anticipate the 9/11 attacks on the World Trade Center despite the rich data they had available, Senator Richard Shelby blamed the agencies for being too decentralised, and recommended the creation of one centralised agency. Surowiecki (2004) analysed the issue carefully, and concluded that centralisation was not the answer; but aggregation and coordination was (p.78). The solution to the problem would have been to tap into the collective wisdom of the decentralised agencies – National Security Agency, CIA, and FBI – by coordinating and aggregating the content and the process of their collaborative work.

To quote once again Ross Mayfield, CEO and founder of Socialtext,

‘Wikis ***hand on control over to users*** to create their own ways of organising knowledge, workplaces, processes, and perhaps even their own applications in ways that they’ve not been able to do before’ (Tapscott and Williams 2006, p.255).

14.7 Long-term Unpredictability – Revisited

Attributes of the System
System Customisation
Conceptual Load
Attributes of the Collaboration
Mediator Role
Number of System Users
Support of a Champion
Conversation for Action
Attributes of the Organisational Context
Incentives for Using CITs
Power-Structure Change
Long-term Unpredictability

Table 14.14. Thematic Focus of this Section

I have checked and refined the collected data from the Critical Meta-Analysis of Case-Study Reports (Empirical Study II) to the data collected from the Content Analysis (Empirical Study III). This comparison has confirmed the importance of the 'Long-term Unpredictability' factor. Here I will organise and build on what the literature has produced as collective state of understanding on this factor. Table 14.14 depicts the thematic focus of this Section.

As I theorised in Section 11.2 above, collaborative activities are highly contingent on the properties of the context in the long term, and therefore they are hardly predictable in the long term. I also graphically presented Grudin's (1994a) Classification of Different CSCW Perspectives (Figure 11.4 above) – an extension of Johansen's (1988) Time-Space-Matrix – which focused on the unpredictable communication that occurs within complex systems. Not only is the time and place unpredictable, but the participants themselves are not always known over the long life-cycles of complex systems (Grudin 1994a).

According to Malone (1985), it is relatively easy to bring a single user into a lab to be tested on the cognitive, perceptual, and motoric reactions, tastes, and variables pertaining to single-user applications usage. But it is difficult or impossible to recreate the social organisation of collaborative work within lab settings – i.e. to reliably reflect the motivational, social, psychological, economic, and political factors that are typical of real-world human collaboration.

In addition, collaborative work observation must extend over a longer period of time. According to Grudin (1988), while much of a person's use of a spreadsheet might be observed in a single hour, collaborative interactions typically unfold over days or weeks. The 'temporal granularity' (Grudin 1988) required to understand CIT applications seems to be much higher than for single-user applications.

According to Karsten (2003), CIT applications have to be able to make available to users in an accessible form the '***history of interaction***' (p.449) in order to increase the transparency of the practices and provide a growing archive of information that can be referred to, to further ground the collaborative relationships. CIT systems have a greater chance to be 'institutionalised' if they build on active and chronic reproduction of past interactions. By failing to do so, CITs are in danger of being counter-productive to collaborative work, and bringing about what Dix (1998) liked to term 'action–effect gap', 'stimulus–response gap' or 'missing stimulus'.

The '*action–effect gap*' (Dix 1998) describes the delay before the effects of a user action occur, or become apparent to the user. For example, if you send an e-mail and some days later get a reply, you may or may not be able to automatically recall the context when you eventually receive the feedback. The problem here is loss of context[77]. The '*stimulus–response gap*' (Dix 1998) describes a situation when the user must respond, but for some reason cannot do so immediately. The simplest reason might be that the user simply forgets to respond immediately – in the psychological literature this has been termed 'prospective memory' (Payne 1993). Hence the need for to-do lists or other forms of reminders [embedded into collaborative technologies] (Dix 1998).

'*Missing stimulus*' (Dix 1998) describes a situation where the user performs an action, but something goes wrong and there is never a response. For example, you send someone a letter, but never get a reply. For short-term interactions, the lack of response is immediately obvious. However, for long-term interactions the user cannot afford to do nothing for several days waiting for a response. In this case, the CIT application needs to provide a reminder that someone else needs to do something – a to-be-done-to list. In Section 11.2.2 above, I quoted Olson et al.'s (2001) conclusion that *history tools* were needed (embedded as part of CITs) to alleviate the long-term unpredictability of collaborative work, and to support the durability of the cooperative relationship. Here I may hypothesise that history tools, embedded as part of CITs, are also needed in order to compensate for the three collaboration problems outlined by Dix (1998) – i.e. the 'action–effect gap', the 'stimulus–response gap', and 'missing stimulus'.

Numerous authors – e.g. Orlikowski (1993a), Prinz and Kolvenbach (1996), Whittaker (1996), Ciborra (1996) – have theorised that the actors of a cooperative process sometimes need the context of it to be transparent or visible. They are immersed in the history of the cooperative process and need to refer to a representation of it in order to act effectively (Agostini and De Michelis 1997). Agostini and De Michelis (1997) described the 'cooperative process' as a *history* of mutually related communication and action events. According to them, any communication (action) event logically follows some communication and/or action events, except for the event starting a new cooperative process. Within the temporal evolution of the events, the ordering among the events of a cooperative process selects the links defining a dependence relation. Thus, the context of a cooperative process is mirrored by the partial order of communication and action events representing its history. For example, Lotus Notes supports partially contextualisation through the possibility of attaching a conversation to a document, as well as the possibility to create a folder for any cooperative process where the documents created during its execution are stored and mutually linked (Agostini and De Michelis 1997).

Neale et al. (2004) elaborated on what contextualisation meant for CITs. According to them, 'collaboration context' had two parts:

1. Collaboration context is comprised of the collaborative activities themselves – a notion stemming from activity theory (Nardi 1996);

[77] When the reply comes you have to remember the reason why the original message was sent and what your expectations of the reply were. The way in which e-mail systems include the sender's message in the reply is an attempt to address this problem (Dix 1998).

2. ***Context is more than just a container that frames the collaborative activities***. Thus, context is made of the subtle circumstances of actors' lives and situations, as well as the internal states of the actors themselves.

Much of the contextual information gets shared in lightweight, informal interactions. Trying to represent it digitally is difficult, and transforming it in subtle ways may render it useless, unappealing or unusable (Neale et al. 2004). Neale et al. (2004) even went further by theorising that contextual information is especially difficult to represent digitally in cases of ***remote collaboration***. The latter was hypothesised by Neale et al. (2004) to be true because of the following: in remote collaboration, context considerations must span across organisational boundaries. Inter-organisational context is especially difficult to capture. Neale et al. (2004) concluded by saying that, because most CIT research has come from the positivist paradigm, context [and therefore the factor of long-term contextual unpredictability] has been stripped away from the analytic process.

14.8 Additional Factors

As mentioned above, the Content Analysis has revealed that some *additional* factors have been discussed in literature as ***significant factors*** affecting CIT adoption and diffusion. Those are two factors: 'habituation' and 'anonymity'.

14.8.1 Habituation

One such *additional* factor revealed by the Content Analysis is 'Habituation' – a factor which has repeatedly been observed – in various CIT developments and implementation trials as highly influencing CIT diffusion. Table 14.15 depicts the thematic focus of this Section.

Attributes of the System
System Customisation
Conceptual Load
Attributes of the Collaboration
Mediator Role
Number of System Users
Support of a Champion
Conversation for Action
+ Habituation
Attributes of the Organisational Context
Incentives for Using CITs
Power-Structure Change
Long-term Unpredictability

Table 14.15. Thematic Focus of this Section

‘Habituation’ stems from ‘habit’, which in its turn stems from the Latin ‘habitus’ meaning condition, or character (Oxford Advanced Dictionary of Current English). With any repetitive behaviour, reflective cognitive processing dissipates over time, leading to non–reflective, routinised behaviour, also called Habit (Jasperson et al. 2005). Expectancy relates to familiarity and routine, and the attention-getting object (IT artefact) survives occlusion in space, and over time (based on Brinck 2003). Ng–Kruelle et al. (2003) analysed ‘habituation’ as a psychological phenomenon characterising the individual continuing to either reject or accept an innovation – based on previous experience – without indulging in much pre-thought or structured decision-making . In a broader sense, habituation is a neurological phenomenon that causes a person to become less aware of repetitive stimuli (Cohen 2003).

One advantage which habituation unquestionably offers, in terms of technology usage, is the opportunity to save time and effort. We all tend to sometimes choose the least-hassle route of applying the same old solution over and over again, especially when our time resources are limited. The latter seems to be the overreaching case, and therefore ‘effort expectancy’ gains in importance as a user-acceptance moderator. There is empirical evidence to suggest that some consumer reactions may operate through effort expectancy (Venkatesh et al. 2003). For example, one stream of research sees the user value of mobile technologies *not* in their convenience, simplicity or immediacy within existing routines (Durlacher Research 2000) but in the freedoms they create (Kadyte 2005) and therefore the amount of effort they save.

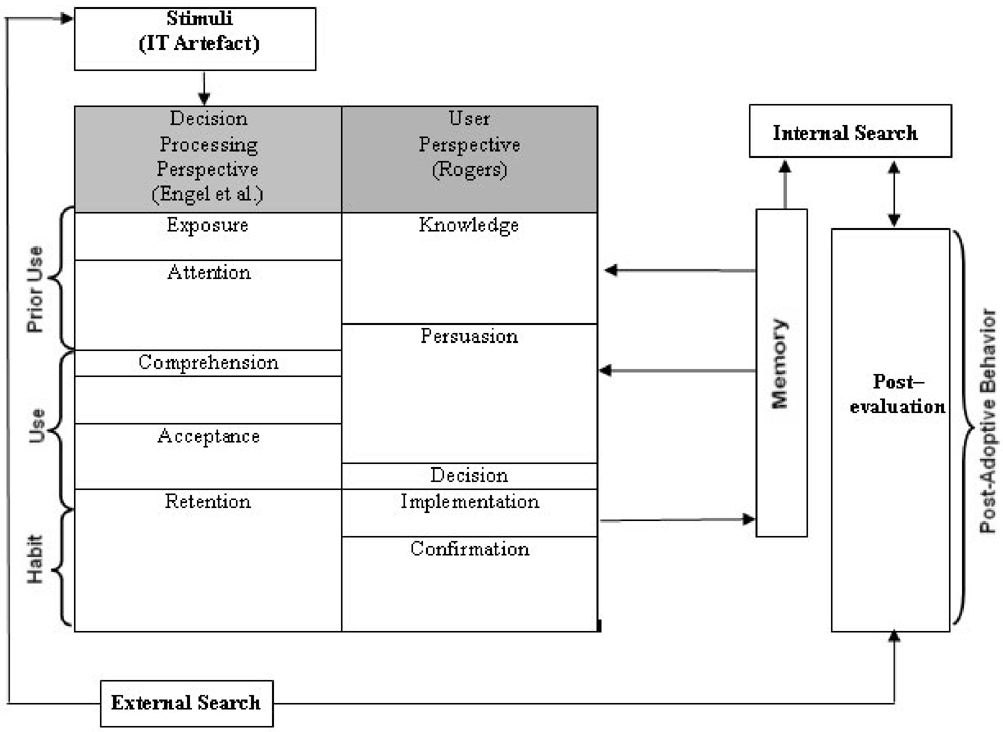


Figure 14.6. Unified Model of IT Adoption–Diffusion Decision Processing

In Shumarova and Swatman (2007) we formulated a from Unified Model of IT Adoption Decision Processing (see Figure 14.6). The model adapts the Consumer Decision Process Model (CDPM) (Engel et al. 2001) within IT context, and extends the CDPM with two innovation-diffusion process models: Cooper and Zmud (1990), and Rogers (1995). The model's structure is based on the time-related user acceptance (of IT) constructs: Prior Use, Use, Habit, and Post-adoptive Behaviour (Jasperson et al. 2005), and two mediating cognitive processes – External Search and Internal Search (Figure 14.6).

As can be seen from Figure 14.6, habituation contains the substages of retention (decision processing perspective), and confirmation (user perspective). Retention implies formation of 'semantic knowledge', as a map that ties together the multiple exposure reflections in a meta-mental model of committed comprehension. Confirmation implies decision reinforcement (Rogers 1995). With the decision being repetitively reinforced, the brain desensitises to the significance of the decision-making process.

14.8.2 Anonymity

As mentioned above, the Content Analysis has revealed that some *additional* factors

Attributes of the System
System Customisation
Conceptual Load
Attributes of the Collaboration
Mediator Role
Number of System Users
Support of a Champion
Conversation for Action
Habituation
+ Anonymity
Attributes of the Organisational Context
Incentives for Using CITs
Power-Structure Change
Long-term Unpredictability

Table 14.16. Thematic Focus of this Section

have been discussed in literature as ***significant factors*** affecting CIT adoption and diffusion. One such factor is 'Anonymity' – a factor which has repeatedly been observed – in various CIT developments and implementation trials – to play the role of either a 'barrier' or an 'accelerator' to CIT adoption and diffusion. Meant is:

the anonymity of participation in computer-supported meetings.

Hereby, anonymity is a 'membership characteristic' of the user pool of Meeting Support Systems (MSS). Table 14.16 depicts the thematic focus of this Section.

'Anonymity' of Membership in MSS use: **Positive Effects** (on groupwork effectiveness, group creativity etc.)	**Author**
Increased Objectivity Anonymity encourages objective evaluation of ideas by MSS participants. Criticism is seen as a signal to suggest other ideas. Because nobody knows where a particular idea came from, people criticise the idea rather than the person who presented it.	Nunamaker et al. (1997)
No 'Embarrassment' In a face-to-face meeting, criticism of an idea is a 'slap' to the person who presented it, not necessarily to the idea. In an anonymous MSS-supported meeting, nobody is being embarrassed. So, people do not get emotional about criticism.	Nunamaker et al. (1997)
Constructive Criticism Anonymity encourages constructive criticism by freeing people to explore or to criticise ideas without fear of retribution from peers or superiors.	Diehl and Stroebe (1987), Nunamaker et al. (1997)
Less 'Flaming' Electronic discussion are less likely to degenerate into 'flaming' sessions. There is less sting in an anonymous electronic criticism than in a direct rebuke during a face-to-face meeting. The screen buffers the negative emotions that may accompany such criticism.	Nunamaker et al. (1997)
Increased Participation Anonymity reduces concerns about negative repercussions from contributing unpopular, critical, or new ideas. This, combined with increased available airtime, should lead to increased participation in discussions.	Davison and Briggs (2000)
Empowerment and Engagement of all Participants Anonymity empowers *all* participants to engage, rather than only the same active few.	www.groupsystems.com
Increased Quantity of Ideas Teams using anonymous MSS technology contribute many more ideas when they are allowed to enter both positive and negative comments. Anonymity encourages people to participate in generating ideas without inhibition.	Nunamaker et al. (1997), Connolly et al. (1990)
Amplified 'Rationality' and Reduced Management Bias Anonymity helps amplify 'rationality' of the group process and reduce management bias.	Ngwenyama and Lyytinen (1997), Dennis et al. (1988)
Anonymity: instrument against 'Groupthink' The anonymity offered by MSS can be used to attack some group-meeting dysfunctions, like 'groupthink'.	Grohowski et al. (1990)
Separate Ideas from the Politics behind Them Anonymity helps to separate ideas from the politics behind them.	Nunamaker et al. (1997)

Table 14.17. 'Anonymity' of Membership in MSS Use: Positive Effects

The lessons learned about 'anonymity of MSS membership' during the history of CIT development have shown predominantly positive effects (on groupwork effectiveness, group creativity etc.). A whole range of negative effects of anonymity have also been detected – all of them contradictory to the positive effects. No consensus has been reached within the IS community on how to 'combine' both perspectives. Tables 14.17 and 14.18 present a coherent review of the positive and negative effects of anonymity that have been reported in literature.

As shown in Table 14.17 above, the anonymity offered by MSS has reportedly had the following positive effects (on groupwork effectiveness, group creativity etc.):

- ***Increased Objectivity***. Anonymity encourages MSS participants to evaluate ideas more objectively. Because the 'source' of the idea is anonymous, people criticise the idea rather than the person who presented it. Anonymity may also encourage meeting participants to view their own ideas more objectively and to see criticism as a signal to suggest other ideas (Nunamaker et al. 1997).
- ***No 'Embarrassment'***. Nobody is being embarrassed when someone is being critical of someone else's idea (as the idea is anonymous). People do not get emotional about criticism. This is in contrast to a face-to-face meeting where criticism of an idea is a 'slap' to the person who generated the idea, not necessarily to the idea (Nunamaker et al. 1997).
- ***Constructive Criticism***. Diehl and Stroebe's (1987) theory on productivity loss in brainstorming groups suggests, and field experience confirms, that anonymity frees people to explore or to criticise ideas without fear of retribution from peers or superiors. Thus, anonymity encourages constructive criticism (Nunamaker et al. 1997, Diehl and Stroebe 1987).
- ***Less 'Flaming'***. Group discussions often tend to degenerate into 'flaming' sessions. Nunamaker et al. (1997) noted that, in the case of anonymous MSS meetings, they had seen only two instances of such disintegration within thousands of sessions in business and government organisations. People are just as critical in electronic meetings as they are in face-to-face meetings, if not even more – electronic-meeting participants will often raise issues that would never come out in face-to-face discussions. There is less 'sting', however, in an anonymous electronic criticism than in a direct clash during a face-to-face meeting. The electronic screen seems to buffer the negative emotions that may accompany criticism (Nunamaker et al. 1997).
- ***Increased Participation***. 'The anonymity allowed by a GSS may reduce concerns about negative repercussions from contributing unpopular, critical, or new ideas. This, combined with increased available airtime, should lead to increased participation in discussions' (Davison and Briggs 2000).
- ***Empowerment and Engagement of all Participants***. Anonymity and structured dialogues, enabled by intelligence software, help (i) determine who knows what, (ii) empower all participants to think and contribute outside normal boundaries, or (iii) engage all individuals in creative or problem-solving objectives, rather than only the same active few (www.groupsystems.com).

- ***Increased Quantity of Ideas***. Anonymity seems to encourage people to participate in generating ideas without inhibition. People, who are usually reluctant to express themselves in face-to-face meetings, feel free to take part as anonymous MSS[78] participants. Laboratory studies have shown that teams using anonymous MSS technology contribute many more ideas when they are allowed to enter both positive and negative comments (Nunamaker et al. 1997, Connolly et al. 1990).

- ***Amplified 'Rationality' and Reduced Management Bias***. MSSs[79] provide anonymity and parallel processing which may help to reduce management bias and amplify 'rationality' of the group process (Dennis et al. 1988). MSSs provide 'public electronic domains' in which ideas, arguments, and opinions can be expressed, organised, and developed (Ngwenyama and Lyytinen 1997).

- ***Anonymity: Instrument against 'Groupthink'***. Anonymity seems to be particularly beneficial in the electronic meeting process. Historically, group meetings have been plagued by such dysfunctions as 'groupthink', fear of reprisals, member status incongruities, etc. The anonymity offered by MSS[80] can potentially be used to attack some of these dysfunctions (Grohowski et al. 1990).

- ***Separate Ideas from the Politics behind Them***. Anonymity makes it possible that ideas be weighted on their merits rather than on their source. The latter helps to separate ideas from the politics behind them (Nunamaker et al. 1997).

'Anonymity' of Membership in MSS use: **Negative Effects** (on groupwork effectiveness, group creativity etc…)	**Author**
Lack of Individual Incentives and Rewards People rewarded based on individual performance may be frustrated by the idea of being anonymous contributors.	Nunamaker et al. (1997)
Leader 'Embarrassment' Sometimes it takes courage for a manager to deal with the issues that surface in an anonymous MSS meeting.	Nunamaker et al. (1997)
Barrier to the Evolution of a Social Community The anonymity of electronic discussion could hinder the evolution of a social community among the participants.	Davison and Briggs (2000)

Table 14.18. 'Anonymity' of Membership in MSS Use: Negative Effects

As shown in Table 14.18, the anonymity offered by MSS has reportedly had the following negative effects (on groupwork effectiveness, group creativity etc.):

- ***Lack of Individual Incentives and Rewards***. Anonymity is not always an incentive for MSS use but may also be a barrier. People rewarded based on

[78] In the original text: 'GSS'.

[79] In the original text: 'GDSSs'.

[80] In the original text: 'EMS'.

individual performance may be frustrated by the idea of being 'anonymous'. Nunamaker et al. (1997) summarised the issue as follows:

'If organisational rewards are based on individual performance, information access, or specialised knowledge, persons valuing these characteristics may well resist actively participating in MSS[81] sessions where information is shared and ideas are contributed anonymously. It is important that organisational incentives and rewards be aligned with MSS use, or MSS implementation can fail' (p.172).

- ***Leader 'Embarrassment'***. MSS use is not always comfortable for the leader of a project or enterprise. As mentioned above, electronic-meeting participants will often raise issues that would never come out in face-to-face discussions. 'Sometimes it takes courage for a manager to deal with the issues that surface in an anonymous meeting' (Nunamaker et al. 1997, p.174).
- ***Barrier to the Evolution of a Social Community***. Electronic discussions might be a mixed blessing in regard to social-community building. The anonymity of online discussion could hinder the evolution of a social community among the participants (Davison and Briggs 2000, p.92).

Nunamaker et al. (1997) have proposed a way for 'combining' and profiting in an optimal way from the positive and negative effects of anonymity: MSS can try to balance between the positive and negative effects of anonymity by 'manipulating the varying degrees of anonymity to achieve their goals' (p.173). 'Partial anonymity' (p.173) can be introduced in a variety of ways. For example, participants can be asked to use an 'alias' so that all of their contributions can be attributed to the same author (often used are the names of American presidents for 'aliases'). Alternatively, as proposed by Nunamaker et al. (1997), participants can have their comments labelled by their subgroup membership (e.g. teachers, parents, administrators) so subgroup membership is attached to a comment, and hence the position that a participant is likely coming from, but individual anonymity is maintained.

14.9 Conceptual Framework 4 (CF4)

The purpose of Empirical Study III (Content Analysis) was to aid the CIT researcher by presenting detailed results of what has been studied and found in CIT literature. The summarized findings on adoption, usage or implementation patterns of CITs may provide useful pointers in the idiosyncratic structural and contextual issues surrounding current CIT knowledge.

Chapter 7 has offered an short summary of the overall results from Empirical Study II (Critical Meta-Analysis of Case-Study Reports). Chapters 8, 9, 10, and 11 have then presented the detailed results from Empirical Study II. In Chapter 12, I have developed – based on the detailed results from Empirical Study II – three consecutive

[81] In the original text: 'GSS'.

versions of the Conceptual Framework (CF1, CF2, and CF3). In Chapter 13, I have presented Empirical Study III – Content Analysis of CIT Literature. In this following Chapter, two further steps will be undertaken:

1) I will present a summary of the results pertaining to ‘factors’ influencing CIT diffusion;

2) I will develop Conceptual Framework 4.

Factor	Identified in…	Supported/not supported by…
	Attributes of the System	
CIT Identity	Empirical Study II / Section 9.1	***not*** supported by Empirical Study III
System Customisation	Empirical Study II / Section 9.2	supported by Empirical Study III
Conceptual Load	Empirical Study III / Section 13.7.1.1	N.A.
	Attributes of the Collaboration	
Mediator Role	Empirical Study II / Section 10.1	supported by Empirical Study III
Number of System Users	Empirical Study II / Section 10.2	supported by Empirical Study III
Support of a Champion	Empirical Study II / Section 10.3	supported by Empirical Study III
Affective Reward	Empirical Study II / Section 10.4	***not*** supported by Empirical Study III
Size of the Collaborative Ensembles	Empirical Study II / Section 10.5	***not*** supported by Empirical Study III
Collaboration History	Empirical Study II / Section 10.6	***not*** supported by Empirical Study III
Conversation for Action	Empirical Study III / Section 13.7.2	N.A.
Habituation	Empirical Study III / Section 14.8.1	N.A.
Anonymity	Empirical Study III / Section 14.8.2	N.A.
	Attributes of the Organisational Context	
Incentives for Using CITs	Empirical Study II / Section 8.1	supported by Empirical Study III
Power-Structure Change	Empirical Study II / Section 11.1	supported by Empirical Study III
Long-term Unpredictability	Empirical Study II / Section 11.2	supported by Empirical Study III

Table 14.19. Factors Identified and Supported/Not Supported in this Study

Table 14.19 presents a summary of the results pertaining to ‘factors’ influencing CIT diffusion, as follows:

- *Attributes of the System*
    - CIT Identity – has been identified as relevant based on Empirical Study II (see Section 9.1) but has ***not*** been solidly supported by Empirical Study III;

- System Customisation – has been identified as relevant based on Empirical Study II (see Section 9.2) and has been supported by Empirical Study III;
- Conceptual Load – has been identified as relevant ***later in the study***, i.e. based on Empirical Study III (see Section 13.7.1.1).

- *Attributes of the Collaboration*
    - Mediator Role – has been identified as relevant based on Empirical Study II (see Section 10.1) and has been supported by Empirical Study III;
    - Number of System Users – has been identified as relevant based on Empirical Study II (see Section 10.2) and has been supported by Empirical Study III;
    - Support of a Champion – has been identified as relevant based on Empirical Study II (see Section 10.3) and has been supported by Empirical Study III;
    - Affective Reward – has been identified as relevant based on Empirical Study II (see Section 10.4) but has ***not*** been solidly supported by Empirical Study III;
    - Size of the Collaborative Ensembles – has been identified as relevant based on Empirical Study II (see Section 10.5) but has ***not*** been solidly supported by Empirical Study III;
    - Collaboration History – has been identified as relevant based on Empirical Study II (see Section 10.6) but has ***not*** been solidly supported by Empirical Study III;
    - Conversation for Action – has been identified as relevant ***later in the study***, i.e. based on Empirical Study III (see Section 13.7.2);
    - Habituation – has been identified as relevant ***later in the study***, i.e. based on Empirical Study III (see Section 14.8.1);
    - Anonymity has been identified as relevant ***later in the study***, i.e. based on Empirical Study III (see Section 14.8.2).

- *Attributes of the Organisational Context*
    - Incentives for Using CITs – has been identified as relevant based on Empirical Study II (see Section 8.1) and has been supported by Empirical Study III;
    - Power-Structure Change – has been identified as relevant based on Empirical Study II (see Section 11.1) and has been supported by Empirical Study III;
    - Long-term Unpredictability – has been identified as relevant based on Empirical Study II (see Section 11.2) and has been supported by Empirical Study III.

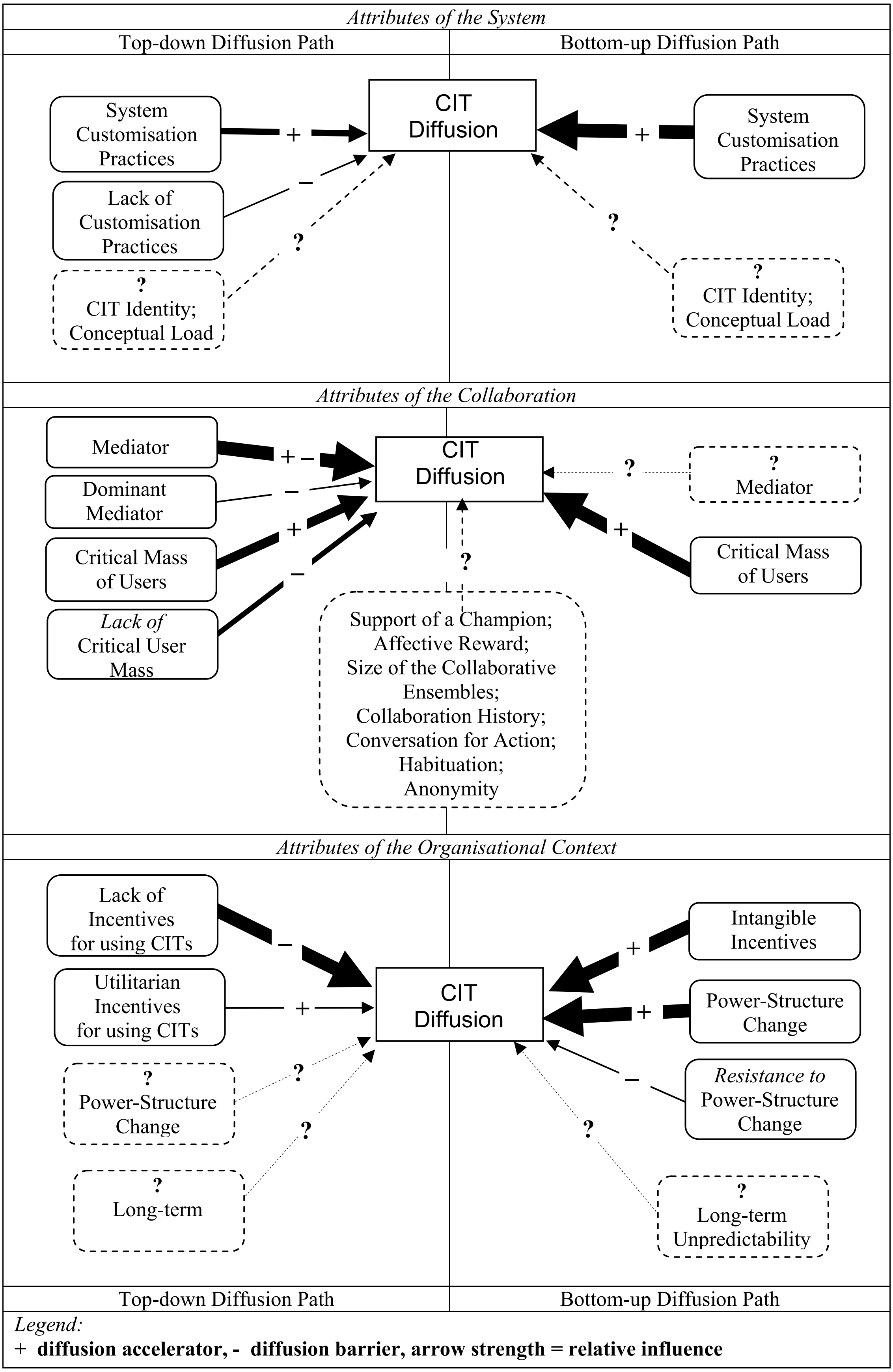


Figure 14.7. Conceptual Framework 4: Top-down and Bottom-up CIT Diffusion – 'Accelerator' or 'Barrier' Role of Factors

Figure 14.7 presents Conceptual Framework 4 (CF4). CF4 reflects the cyclically-gathered information from the four consecutive research phases of this study – i.e. the necessary information is derived from the detailed results of Empirical Studies I, II, and III. CF4 extends the earlier framework version CF3 by ***adding*** all of those factors that have been identified to have 'some' influence on CIT diffusion, but the exact influence of which is not known. In other words, these factors are 'suspected' to influence CIT diffusion to some extent, but their strength and degree of relative influence is not known (i.e. the source data in this study has not been enough to generate plausible hypotheses about the latter). The 'direction' of influence – positive as accelerator or negative as barrier – is not known either. Figure 14.7 sketches the existence of these 'additional' factors, and sets the scene for future research to make further informed inferences about them.

The factors influencing CIT diffusion, depicted in Figure 14.7 (CF4), are split into three major categories (just like in the previous framework version, CF3): Attributes of the System, Attributes of the Collaboration, and Attributes of the Organisational Context. The 'additional' factors (mentioned above) ***are marked with dotted lines and question marks in CF4*** (Figure 14.7). These additional factors fall into three categories:

(I). factors that have been identified in Empirical Study II but have ***not*** been solidly supported by the results of Empirical Study III;

(II). factors that have been identified as relevant ***later in the study***, i.e. based on Empirical Study III (and the source data has not been enough in detail and quantity to generate hypotheses about their relative influence on CIT diffusion).

(III). factors that have been identified in Empirical Study II but the ***source data has not been enough*** in quantity to generate hypotheses about their relative influence on CIT diffusion.

I. Attributes of the System

- CIT Identity – significant relevance has ***not*** been solidly supported by Empirical Study III;
- Conceptual Load – has been identified as relevant ***later in the study***, i.e. based on Empirical Study III (and the source data has not been enough in detail and quantity to generate hypotheses about its relative influence on CIT diffusion).

II. Attributes of the Collaboration

- Support of a Champion – has been identified as relevant based on Empirical Study II and has been supported by Empirical Study III, but the source data (of Empirical Study II) has not been enough in quantity to generate hypotheses about its relative influence on CIT diffusion;
- Affective Reward, Size of the Collaborative Ensembles, Collaboration History – all three factors have ***not*** been solidly supported by Empirical Study III, and

the source data (of Empirical Study II) has not been enough in quantity to generate hypotheses about their relative influence on CIT diffusion;

- Conversation for Action, Habituation, Anonymity – all three factors have been identified as relevant ***later in the study***, i.e. in Empirical Study III and the source data has not been enough in detail and quantity to generate hypotheses about their relative influence on CIT diffusion.

III. Attributes of the Organisational Context

- Long-term Unpredictability – has been identified as relevant based on Empirical Study II and has been supported by Empirical Study III, but the source data (of Empirical Study II) has not been enough in quantity to generate hypotheses about its relative influence on CIT diffusion.

Therefore, the indicative results concerning these additional factor – depicted in CF4 as ***dotted lines*** – serve as 'indications' rather than grounded hypotheses.

In summary:

> In this Chapter I have revisited and checked the validity of all factors, identified in previous chapters as having 'some influence' or 'significant influence' on CIT diffusion. With the help of this literature-based scrutiny, I have then developed – guided by the results from Empirical Study III – the last version of the Conceptual Framework – CF4.

Chapter 15

CONCLUSION AND FUTURE WORK

As stated in Section 2.1 above , the purpose of this theory-building Thesis has been to develop a Conceptual Framework to serve as an integrative grounding, reflecting the adoption–diffusion continuum of collaboration information technology (CIT). At a supporting epistemic level, used to aid framework development, two secondary goals of this investigation have been as follows:

1. to identify which factors have had and continue to have significant influence on CIT diffusion, and what role each of these factors has played as diffusion accelerator or diffusion barrier;
2. to report on the current state of diffusion of collaboration information technology (CIT) within organisations.

The first secondary goal has been achieved by means of Empirical Study II. In Chapters 7-11 – by reviewing 53 major case studies – I identified which factors have had and continue to have significant influence on CIT diffusion (see Chapter 7, Table 7.4), and what role each of these factors has played as diffusion accelerator or diffusion barrier (see Sections 8.1.1, 9.1.1, 10.1.1 to 10.6.1 and 11.1.1 to 11.2.1; CF3 – Figure 12.5). Based on that analysis, I have arrived at a range of Hypotheses which suggested important questions for the way forward in CIT (a list of all Hypotheses generated in this Thesis is available in Appendix V).

The other secondary goal has been achieved by means of Empirical Studies I, II and III. An up-to-date and reliable picture of the current state of diffusion of collaboration information technology (CIT) within organisations was derived based on:

a) the Expert Talks (Empirical Study I, Chapter 6);
b) the Critical Meta-Analysis of Case-Study Reports (Empirical Study II, Chapters 7-11) – the organised observational evidence from more than a decade of collaboration-technology developments and adoption trials has revealed some ***persistent problems*** and reported ***persistent barriers*** to the adoption of, especially higher-level, collaboration technologies;
c) the Content Analysis of CIT Literature (Empirical Study III). Here my secondary (summative) finding was that all studies to date which have tackled issues of CIT diffusion, have unanimously supported the view that higher-level (more complicated and structured) CITs have not yet reached mass uptake and high utilisation levels within organisations. Meanwhile, there are also *no* existing reports on rapid diffusion of higher-level collaborative solutions.

Findings 2, 3, and 4 from Content Analysis (see Appendix IVb), the Mental Map produced based on the Expert Talks (MM2 – see Figure 6.2), and the identified ***persistent problems (barriers)*** and persistent stimulators (accelerators) of CIT diffusion (see Figure 12.5 – Conceptual Framework 3 and Hypotheses Overview – Appendix V) give the following (summative) account of the current state of diffusion of collaboration information technology (CIT):

> **today we have a 'satisfactory' diffusion level of some level-A CITs (mostly e-Mail, distantly followed by Audio Conferencing), and a 'dissatisfactory' diffusion level of higher-level CITs (i.e. those requiring significant collaboration and cooperation among users, like Meeting Support Systems, Group Decision Support Systems, etc.). The potential benefits of the latter seem to be far from fully realised due to lack of user acceptance.**

In practice, this means that if we walk into any organisation today, there is a great probability that we will observe the following, typical pattern of collaborative systems use: a few types of level-A CITs in active use (by far most important being e-Mail, fairly distantly followed by Audio Conferencing). It is highly *un*likely (i.e. exceptional) that we see any other types of CITs in active use. The usage patterns we are likely to observe are 'technological shunning', 'sceptical/heedful use', 'exploration', 'adoption but no deployment', 'lagging assimilation' or stalled use. We will also observe that least available and least frequently used are tools like Group Decision Support Systems, Meeting Support Systems, Issue Based Information Systems, and Discussion Moderation Tools (what I called 'higher-level' collaboration technologies – see Classification Scheme, Section 13.5.2, Table 13.5).

An additional, unplanned and rather interesting, finding from this study has been the recognition of large [mostly business] reporting on numerous Web 2.0 user-community produced collaboration technologies (most of them belonging to the category of 'social software[82]') (see Content-Analysis Finding 5– Appendix IVb, Chapter 3/Section 3.3.1, Chapter 14/Section 14.6 and MM2 – Figure 6.2) and their metamorphosis from autonomous, '*bottom-up*' solutions into enterprise-supported infrastructures (see 'bottom-up diffusion path' – CFØ – Figure 6.3, Section 6.6, Chapter 12, CF1 – Figure 12.2, CF2 – Figure 12.4, CF3 – Figure 12.5 etc.). Some examples include the following reported practices of: employees blogging 'at work about work', employees using self-selected wikis or mashups for project management purposes without informing management about it, building organisational 'folksonomies' through social tagging, affiliating with others of similar interests (forming their own peer group), or employees using even multiplayer online games to coordinate their activities and to manage their virtual collaborative work. Since 2006, there has been abundant business reporting on such practices, and these practices actually violate every traditional percept of corporate communication. The latter is true because:

- instead of being organisation-mandated, these collaborative solutions are adopted by individual employees autonomously, through self-initiative, and they are self-selected;

[82] Social Software: user-created and community-driven software, produced by volunteer contributors, and offering high levels of social involvement and participation. Also called user-generated content (UGC) or consumer-generated media (CGM).

- instead of being an intended part of the organisational IT infrastructure, and the result of targeted investment, these solutions are emergent, 'de facto' collaboration systems. In this sense, such collaborative solutions resemble what has been discussed by the IS community as 'shadow IT' (i.e. a set of IT tools used for performing IT functions but not part of the mainstream IT organisation).

15.1 Failure and Surprise in CIT Diffusion

It has long been recognised that technologies are often not used as designed or intended (e.g. von Hippel 1988, Bijker 1995). Artificial intelligence researchers have had to address the problem of what Nilsson (1973) termed 'failure and surprise' in the execution of their planning programs, due to the practical exigencies of action in an unpredictable environment (Suchman 1987). Clemons (1986) suggested that '…most of the successes in IS application have been accidents: they were in response to a real and pressing need of line management, but their strategic significance was not initially recognised'.

Bijker (1995) applied the concept of 'relevant social groups' to demonstrate how technologies become *sites* where constituencies or groups negotiate the meaning attributed to a particular artefact. The relative success of a new technology resulted from the negotiations of these relevant social groups rather than from the design features of the technological artefact itself (Bijker 1995). Orlikowski (1995) defined 'technological improvisation' as a technology-in-use which involves use of the artefact in response to unexpected breakdowns, exceptions, slippages, or opportunities within the workplace. Her interpretation echoed Weick's (1993) metaphor of theatrical improvisation in organisation design, where 'design is more emergent, more continuous, more filled with surprise, more difficult to control, more tied to the content of action, and more affected by what people pay attention to' (p.348). The notion of technology use as ongoing improvisation resonates with the focus on *situated action* taken by many practice researchers (e.g. Suchman 1987, Hutchins 1991, Lave 1988). Hutchins (1991) introduced a technological parallel to Schumpeter's (1934) 'creative destruction' by arguing that 'several important aspects of a new organisation are achieved not by conscious reflection but by local adaptations' (p.14) (see Table 15.1).

'Surprise' in IS Implementation – interpretations from IS literature		
Author, Year	*Term*	*Meaning*
Nilsson (1973)	'failure and surprise'	problems of artificial intelligence researchers in the execution of their planning programs
Mintzberg (1978)	'emergent IS strategy'	a pattern in a stream of decisions regarding IS
Rice and Rogers (1980)	'reinvention'	the degree to which an innovation is changed during adoption and implementation
Clemons (1986)	'accidents'	most of the successes in IS application: responses to a real and pressing need of line management; their strategic significance was not initially recognized
Suchman (1987)	'situated action'	actions taken in the context of particular, concrete circumstances

Ciborra and Lanzara (1991)	'designing in action'	a practical, situated, context-sensitive mode of variability, experimentation, and cognitive transactions that may occasionally coalesce into more stable and persistent structures, which are continuously reconfigured by a never ending activity of bricolage
Hutchins (1991)	'local adaptations'	important aspects of a new technological organization that are achieved not by conscious reflection but by local adaptations
Orlikowski (1995)	'technologies-in-use'	technology use departing from a priori expectations, prescribed features, or intended outcomes
Orlikowski (1995)	'technological improvisation'	technology-in-use which involves use of the artefact in response to unexpected breakdowns, exceptions, slippages, or opportunities within the workplace
Bijker (1995)	'technological sites'	technologies become sites where constituencies or groups negotiate the meaning attributed to a particular artefact
Ciborra (1996)	'drifting'	a change of the role and function of the technology in the real use situation, as opposed to the planned ones
Ngwenyama (1998)	'bricolage'	creative and resourceful use of technology regardless of its original purpose

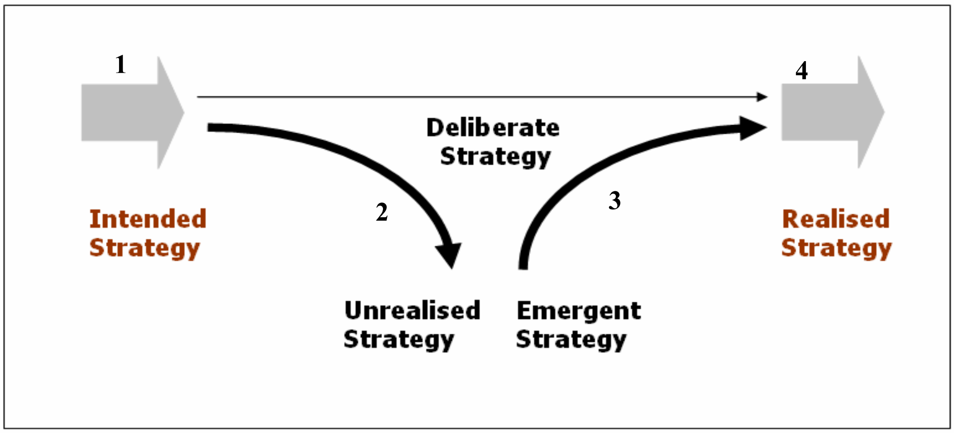
Table 15.1. 'Surprise' in IS Implementation as Reflected in Literature

Rice and Rogers' (1980) notion of 'reinvention' and Ciborra and Lanzara's (1991) concept of 'designing-in-action', similarly echo some of the improvisational and situated ideas invoked here. Ciborra (1996) refers to the same idea as 'drifting' – a drift in technology is a change of the role and function of the technology in the real use situation, as opposed to the planned ones. Ngwenyama (1998) points out that the emergent nature of these change processes is exactly due to improvisation, bricolage, and drifting.

The field of CIT has attracted significant investments of thousands of man-years and millions of dollars for the development of proprietary, formal collaborative technologies. The intended strategy was for the planned intervention of the research to yield considerable organisational impact and to visibly improve the properties of the organisations' collaborative reality. Apart from e-Mail distantly followed by Audio Conferencing, however, no other CIT has reached mass uptake or high utilisation levels within organisations (see Content-Analysis Findings 2, 3, and 4 – Appendix IVb and MM2 – Figure 6.2). The planned intervention did not generate largely diffused effective enterprise CITs. The potential benefits of most higher-level CITs (i.e. those requiring significant collaboration and cooperation among users) are far from fully realised due to lack of user acceptance.

Instead, a different type of groupware concurrently emerged: user-created and community-driven groupware, produced by volunteer contributors, and offering more involvement, participation and global scale of experience for the user. *Social CITs* made their bottom-up, un-steered ***transition from the Internet into commercial and business organisations*** (see Content-Analysis Finding 5 – Appendix IVb, Chapter 14/ Section 14.6 and MM2 – Figure 6.2). The diffusion was a response to absorption – a kind of social osmosis – of pressing events in the consumer Internet world, the strategic significance of which was not initially recognised in the enterprise world (see 'bottom-up diffusion path' – CFØ – Figure 6.3, Section 6.6, Chapter 12, CF1 – Figure 12.2, CF2 – Figure 12.4, CF3 – Figure 12.5 etc.).

Numerous individual decisions of individual humans – Internet consumers and employees at the same time – to bring social CITs into their workspace, turned into a 'strategy' in a broader sense. That strategy gradually matured from emergent to realised, with the decision of some businesses to accept social CITs as supported components of their organisational IT infrastructure (see Figure 15.1 below).



Key:

Arrow 1: Intended Strategy
Arrow 2: Unrealised Strategy } mass uptake of formal CITs

Arrow 3: Emergent Strategy
Arrow 4: Realised Strategy } transition of social CITs into the enterprise

Figure 15.1. Failure and Surprise in CIT Diffusion. Interpretation on Mintzberg (1978)

Undoubtedly, the transition of social CITs into the enterprise was not an intended strategy, but rather, an emergent 'defacto' realised strategy which was un-steered, self-supporting and self-organising. A sensible way to think about this development may be Mintzberg's model of IS strategy types (see Figure 15.1). Mintzberg (1978) discerned between *intended* and *emergent* strategies, where he described intended strategies as subsequently realised deliberate strategies, and opposed them to emergent strategies, i.e. those that were non-planned or were modified during implementation. In this sense, Mintzberg distinguished between conventional definitions of 'strategy', which imply deliberative guidelines that determine decisions, and a broader definition, which simply sees 'strategy' as 'a pattern in a stream of decisions'. Mintzberg also noted that the strategies resulting from a deliberate strategy formulation process may *not* be realised for several reasons including unrealistic expectations, mistaken judgments about the environment, or changes during strategy implementation.

Clemons (1986) suggested that '…most of the successes [in IS application] have been accidents: they were in response to a real and pressing need of line management, but their strategic significance was not initially recognised'. Quite in line with this thought, the diffusion pattern of contemporary CITs we have witnessed over the past few years, has been primarily accidental. Like most social collaborative tools, blogs for example, started in their incarnation in the late 1990s as teenager diaries of daily experiences, passions, and frustrations. They emerged as an ***exception*** (Roush 2006), and it was somehow ***accidentally*** when enterprises eventually realised that the benefits of their authorised usage may outweigh the risks.

The ability of CITs to support collaborative work has been assumed to be beyond dispute, irrespective of the concrete circumstances. In thinking of CIT, people are typically concerned about the *collaboration claim* (see Section 3.4.3). At the same time, experience has shown that what we have to be concerned about in thinking of CIT is not the 'collaboration claim', but first of all ensuring that the computer does not disrupt the existing level of collaboration.

15.2 Human Freedom in Business

One of the great IS scholars, Tom Malone, said in his speech for the 'Collaborative Technologies Conference 2005' that mass-collaboration social CITs like wikis, Web.2 social-networking tools, freelance e-networks, etc. were more significant than we tend to expect. Owing to the proliferation of such tools, and their transition into the enterprise world, he said:

'…***we are in the early stages of an increase in human freedom in business and that may be as important as the change to democracies has been for governments***' (Malone 2005).

The latter is true (and I have shown in this Thesis ***why*** it is true) for the following reasons.

1. As we saw in this Thesis, the transition of social CITs from the Internet public space into the workspace was an expression of the freedom of choice of individual employees to decide how to get their work done – a unique process of ***'liberation'*** of the workforce from the constraints of legacy communication and productivity tools. Many organisations were not ready (and still are not ready) for a bottom-up approach in which individuals sought to affiliate with others of similar interests. Empowerment of this type was thought of as reducing management's ability to exert unilateral control (see Section 14.6.1 – 'Rejection and Banning of Social CIT' etc.). The latter is undoubtedly true: with social CITs, each user decides who he/she wants to network with, when, and how often; she is creating her own groups, and organising them to meet her personal and work goals at the same time.
2. This 'liberation' is in the sense of user empowerment and freedom that goes well beyond the narrow confines imposed by restrictive CITs. One

such 'narrow confine' imposed by system restrictiveness is, inter alia, a sequential interaction pattern[83]. As we saw above, a sequential interaction pattern leaves no freedom to deviate from a system-defined linear interaction procedure, and interaction is reactive to what is required by this procedure (see Section 14.1.1).

3. 'Freedom' in CIT use I have analysed in this Thesis in terms of '***user control***' and '***sense of ownership***' over the technology. As we saw in see Section 14.1.1 above, excessive restrictiveness may cause groups to lose their sense of ownership and control over technology and, thus, may reduce consensus. On the other hand, collaborative ensembles with less restrictive coordination structure adopt a ***cyclical interaction pattern*** and tend to generate better group outcomes (see Section 14.1.1).
4. I have found that the use of social CITs hands on control over to users and is therefore probably capable of causing ***decentralisation*** (flattening of hierarchy) within organisations (see Section 14.6 and Hypothesis 11.1a).
5. Social CITs (e.g. wikis, mashups) are completely unstructured. Structure emerges and evolves in a bottom-up, self-organising fashion, in accordance with the evolving needs and capabilities of the users. ***Use prior to providing structure*** is encouraged. Structure is created by active involvement from users in ways of organising and creating their own information architecture (see Section 3.3.1, Section 6.2.3, and Section 14.6.3 above).
6. Social CITs pose ***no constraints*** on the type or quantity of user input in form of 'content' (see Section 3.3.1).
7. The kind of 'free-form authoring' enabled by social CITs may be contrasted to the common practice of imposing a lot of structure on user interactions – i.e. giving users a bunch of fields to fill in, creating organisational 'taxonomies', the requirements-engineering idea of 'meta-data' (the 'data about data', and the orthodox maxim that experts should be thinking in advance of meta-data, and then sliding over content in pre-defined schemes). Social CITs introduce ***a nuance of egalitarianism*** in system use by 'trusting' the user to be able to create the 'meta-data' (see Section 3.3.1, Section 6.2.3, and Section 14.6.3).
8. Social CITs differ from formal software through the conversational, authentic way of supporting human interaction, communication and coordination (see Section 3.3.1). Social software supports – through authentic and unrestricted conversation – the occurrence of a ***self-organising group formation process*** (see Section 13.7.2).
9. Mass-collaboration networking tools allow for ***'micro-management'*** – exercised autonomously by individual employees who now have all the resources and information available to make their own decisions instead of following orders (see Section 14.6).

[83] Also called 'sequential coordination mode'.

In the beginning of this Thesis, I promised to look more deeply (than do strict constructionists) into the fundamental constraints on how collaboration occurs today: the kinds of collaboration structures that have emerged and why some computer-based technologies are providing adequate support for those structures and others are not. My focus was to *understand*, so as to better support, collaborative work (see Chapter 1). By analysing, consolidating and organising the observational experience from more than a decade of collaboration-technology developments and adoption trials (Empirical Study II, Chapters 7-11) and the findings of a decade of CIT research (Empirical Study III, Chapter 13), I have looked into the fundamental characteristics common to all collaborative work arrangements, irrespective of the technical facilities available now or in the future.

While trying to understand what kind of collaboration structures and ways of organising human activities have emerged in the electronically connected world, I have discovered the following.

- In Chapter 3, Section 3.4.1 ('Transformation of the Organisation of Work') I saw that substantial evidence existed that hierarchies are flattening and that the contemporary successful collaboration structures are informal, ever-shifting alliances of people and firms – variously called virtual organisations, networked organisations, business web, corporate kieretsu, ***high-trust/low-fear organisations***, multi-centred functionally differentiated spatial organisations etc.
- In Chapter 3, Section 3.4.2 ('Mass Collaboration') I saw that mass collaboration has brought about deep changes in the structure and modus operandi of collaboration. Despite its numerous drawbacks, mass collaboration provides greater freedom of expression and in general ***empowers*** the citizen and the consumer.

Having studied and understood what kinds of collaboration structures and ways of organising human activities have emerged in the electronically connected world, I then moved on to see which computer-based technologies are providing adequate support for those structures. I found, inter alia, the following: less restrictive (semiformal) systems seem to be more appropriate to capture the contextual information embedded in collaborative work, including of asynchronously interacting distributed groups (see Section 14.1.1).

One of the most important findings of this Thesis is that the only CITs that seem to be ***successfully*** supporting the newly-emerged structures and ways of organising human activities are light-weight (level-A) CITs. All other, 'more complicated' CIT types (i.e. higher-level CITs – those requiring significant collaboration and cooperation among users, like Meeting Support Systems, Group Decision Support Systems, etc.) are not diffusing successfully into organisations because of lack of user acceptance (see Content-Analysis Findings 2, 3, and 4 – Appendix IVb and MM2 – Figure 6.2).

Another contribution of this Thesis pertains to the 'process structure' of CIT diffusion. I have outlined two distinct paths of CIT diffusion – ***top-down*** *(authority-based)* and ***bottom-up*** (see 'bottom-up diffusion path' – CFØ – Figure 6.3, Section 6.6, Chapter 12, CF1 – Figure 12.2, CF2 – Figure 12.4, CF3 – Figure 12.5 etc.). The realisation of existence of a bottom-up diffusion path was rather unexpected. Initially, I was expecting to find what DoI research has claimed to be 'the most common pattern' of technology-innovation adoption (see Section 6.5) – i.e. a consensus-based primary adoption decision (at the management level), followed by authority-based secondary adoption – that is, mandated adoption at the individual user level. On the contrary, I found that:

- the authority-based organisational adoption decision does not guarantee that the CIT innovation will actually be adopted or implemented by the employees (i.e. adoption but no deployment – see Table 6.6 and Content-Analysis Findings 2, 3, and 4 – Appendix IVb);
- the authority-based diffusion path seems to be characterised by efforts aimed at 'imposing' technologies on employees, the primary concern being to make sure that technology seamlessly and easily integrates into the organisational IT infrastructure;
- on the other hand, the process of bottom-up diffusion of semiformal systems can be seen as closely related to 'decentralisation' (flattening of hierarchy in the organisation) – see Section 14.6 and Hypothesis 11.1a.

In seeking answers to the question 'why' CIT diffusion is structured as it is, i.e. with two orthogonal research communities, each associated with a distinct research/development process conceptualisation and diffusion path, I systematically outlined a multitude of factors (contextual, adaptation, or intervening – see Chapter 7, Table 7.4), and evolved grounded hypotheses of how these factors may determine CIT adoption and diffusion (see Hypotheses Overview – Appendix V).

The Hypotheses on 'decentralisation' (Hypothesis 11.1 and 11.2) are telling us, inter alia, the following: in order to achieve better CIT acceptability, it would probably be beneficial to stop thinking in terms of 'design' and 'use' as two different and separate activities. Instead, just like collaboration is 'achieved in practice', the appropriate and optimal design of a collaboration system for a particular context should (probably) be achieved in practice, through and during use. In other words, it would probably be beneficial if CIT designers allowed for more ***human freedom*** in CIT design. We saw this in the case of the 'SIGMA' freelance network (see ***Case 16*** – Appendix II), in the OSS case (see Section 8.1.3), etc. Just like human systems are self-organising, the role of collaboration-support systems should probably be to provide a 'virtual space' for people to meet and self-organise.

Through our everyday interactions, we gain collaborative experience in different societal roles. Whether in cyber or real life, whether collaborating with family members and friends or doing our professional duties, we perform the same types of collaborative functions. We seek or give communication support, information access support, and deliberation support. In situations of planned collaboration and occasional collaboration, the collaborating actors are all the same people. Only the platforms they choose for collaboration are different. The transition of Web 2.0 user community-produced CITs into the enterprise, i.e. their metamorphoses from employee-autonomous, sporadically-used background solutions (shadow CITs) into enterprise-supported infrastructures, may be contributed to a 'collaborative experience transfer' – the ***freedom*** to use the same tools one is accustomed to in his/her various societal roles.

To echo Orlikowski's (1995, p.30) point about technology in general, collaborative technology is a duality of collaborative action and artefact; if there is no collaborative action, there is no collaborative technology – only artefact. 'If we get the technology right, then cooperative working will follow' (see e.g. Ehn and Kyng1987, Kyng 1988, Bødker et al. 1988) – the above statement may be classified as 'most over-emphasised' within the CIT research community. Regrettably, nothing could be further from the truth. As we saw in Section 3.4.3 above, the 'collaboration claim' was found problematic in several respects, mainly based on the empirical evidence of ***non-prescribed use*** of formal collaborative technologies: i.e. limited assimilation, shunning, ironical use etc. (see e.g. MM2 – Figure 6.2). Meanwhile, the use of semiformal/social collaboration technologies was non-prescribed too. The usage of social collaborative platforms at the workplace began as a silent 'rebellion' against the constraints of formal CIT infrastructure. The strategic significance of that process was not initially recognised in the enterprise world.

My personal research journey through the history of research in the field of CIT has convinced me that a certain amount of humility is desirable in proceeding toward the goals of:

a) designing truly useful and highly acceptable collaboration technology, and

b) enacting truly successful organisational CIT strategies.

The historical record suggests that there are unrealistic expectations to which software designers and IS strategists are commonly vulnerable: software designers tend to overestimate their ability to predict all the ways in which people will (or, perhaps more arrogantly: *should*) want to use collaborative systems. Analogously, IS strategists tend to overestimate their ability to predict all the ways in which people will (or *should*) want to follow and execute their technology-adoption plans. Figure 15.2 below depicts a possible result of a poorly planned CIT diffusion process.

Figure 15.2 gives a visual idea of what the result of a poorly-planned CIT diffusion process typically looks like. In this Thesis, I have shown numerous cases of poorly-planned CIT diffusion – i.e. incentives for using CITs have chronically been missing, collaborative structures have been either too restrictive or too light-weight, CITs have chronically been lacking clear identity, champion and mediator support have been either missing or counter-productive etc. In other words – CIT research has concentrated exclusively on 'design' issues, while 'strategy' and 'learning from theory' have been the missing base of the iceberg (see Figure 15.2).

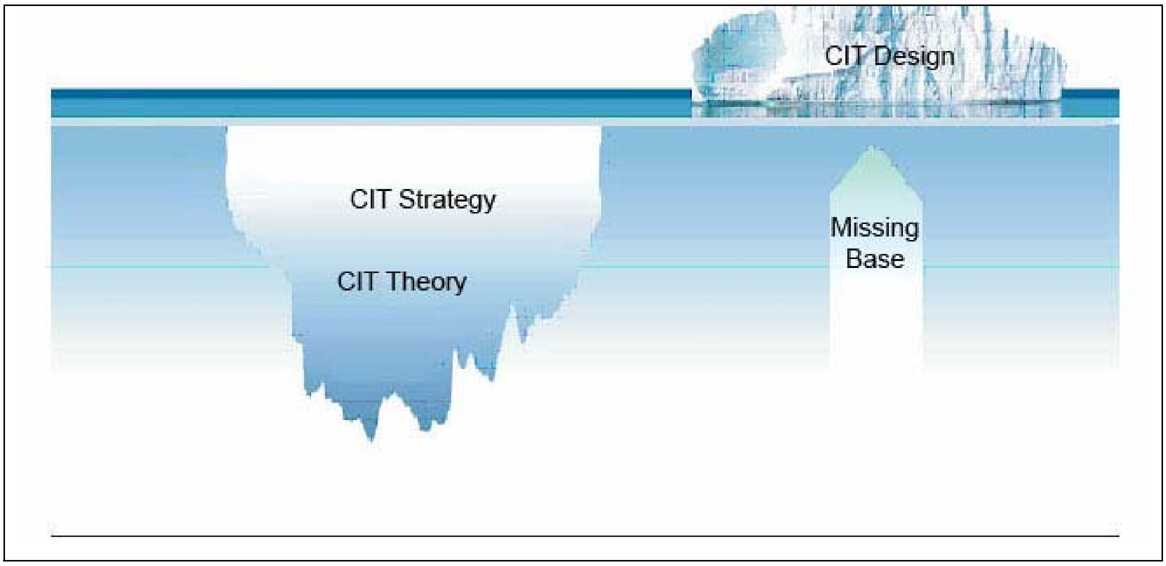


Figure 15.2. Result of a Poorly Planned CIT Diffusion Process

15.3 The Knowledge-Action Gap

In this Thesis, I have revealed some ***persistent problems*** and reported persistent barriers to the adoption of, especially higher-level, collaboration technologies (see CF3 and CF4 – Figure 12.5, Figure 14.7 and Hypotheses Overview – Appendix V). These problems have been repeatedly observed in practice, though the pattern does not seem to have been recognised and internalised by the community. Many of these problems have been observed in cases of CIT use one decade ago, five years ago, three years ago, and continue to be observed today in structurally the same form despite what is unarguably 'rapid technological development' (see Chapters 7-11). The latter is illustrative of a fundamental ***disconnect*** between the empirically grounded theoretic understanding we do have and the design of CIT tools/the design of CIT strategy. My historical review of CIT diffusion has revealed an almost missing practice of 'learning':

- from decades of CIT developments and adoption trials;
- from Theory (as we saw above, there is very scarce use of theory in CIT, no consensus on what CIT theory is and whether it is needed etc.).

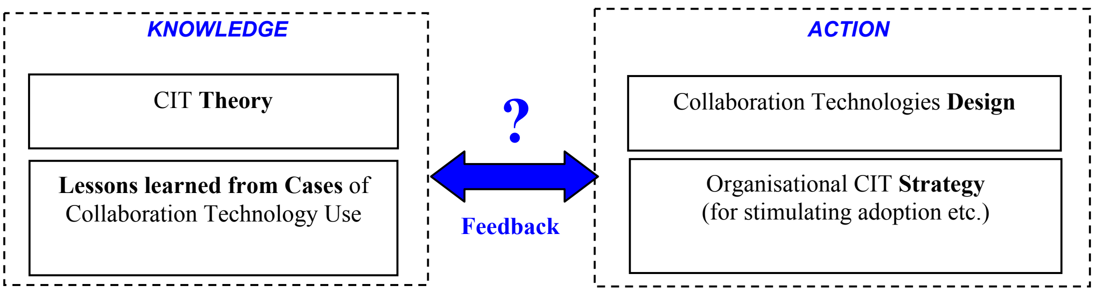


Figure 15.3. The Knowledge-Action Gap in Collaboration Information Technology

Figure 15.3 illustrates the situation as, what I choose to describe as, 'the knowledge-action gap' in CIT – meant is the discrepancy (lack of feedback) between our 'CIT knowledge' and our 'CIT action'. CIT knowledge is the knowledge gathered from theory and the lessons learned from cases of collaboration technology use. CIT action comprises intellectual activities like CIT design and the conscious implementation of organisational CIT strategies (for stimulating adoption etc.) – see Figure 15.3.

15.4 Recommended Action Plan and Research Agenda

In this Section I identify a roadmap for future work, and show how the 'formal' contributions of this study (the generated Hypotheses and Findings) fit into this roadmap. An overview of the Findings is available in Appendix IVa and Appendix IVb. An overview of the generated Hypotheses is available in Appendix V. Through my comparison of the two distinct diffusion paths – authority-based and bottom-up – I have attempted to make my resulting hypotheses more persuasive and, thus, to increase the motivation of the community to 'care about' and test them. I recognise that I have generated 'grounded hypotheses' rather than definitive statements – and that, in future work, these hypotheses must be tested.

A closer look at all Hypotheses generated in this Thesis (see Appendix V) reveals that of 16 generated Hypotheses altogether, 14 (more than 87%) are thematically concerned with issues of 'human motivation'. Only 2 generated Hypotheses are concerned with issues of CIT design (see Figure 15.4 below). The latter may be indicative of a situation where:

motivational issues may be more important for CIT acceptance/diffusion than issues of design.

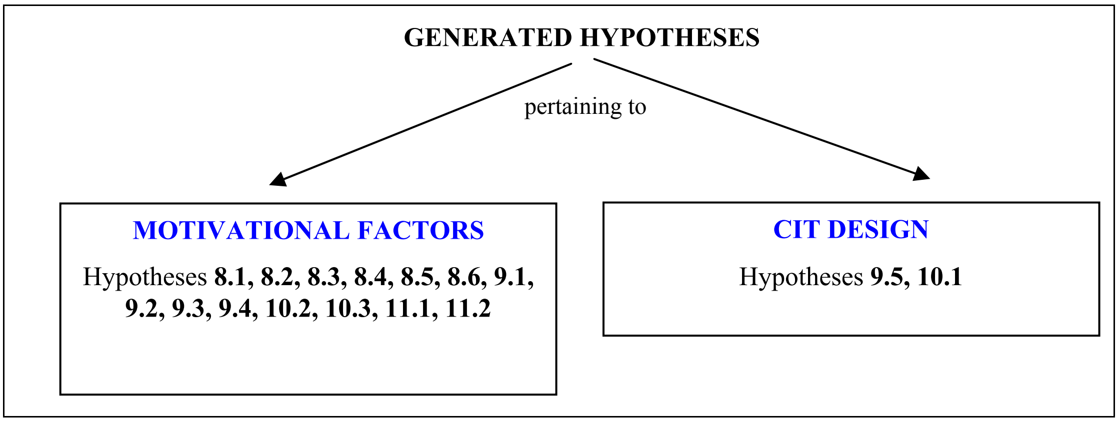


Figure 15.4. Thematic Focus of Generated Hypotheses

Based on the above observation, and what I said in the previous Sections, I have structured this Section as follows:

(1) recommendations on CIT design,

(2) recommendations on CIT organisational strategy,

(3) roadmap for future research.

15.4.1 Recommendations on CIT Design

For the goal of designing truly useful and highly acceptable collaboration technology, and based on the observations, analyses, findings and hypotheses generated in this Thesis, I am recommending the following 'CIT design' improvements.

a) ***Adopt a semiformal approach to designing CITs*** – just like collaboration is 'achieved in practice', let the design of collaboration systems for a particular contexts be achieved in practice, through and during use.

This recommendation is based on the observations and findings presented in Chapter 3/Section 3.3.1, Chapter 14/Section 14.6, Section 14.1 above, Content-Analysis Finding 5 (see Appendix IVb), and Hypothesis 9.5 (see Appendix V).

b) Try to ***design CITs that do not require (do not depend on) too many mediator or facilitator actions*** – i.e. in order to balance the degree to which a facilitator can influence the CIT diffusion process and to prevent counterproductive facilitator actions.

This recommendation is based on Hypothesis 10.1 (see Appendix V).

c) Try to ***design CITs that are able to capture as much contextual information (embedded in collaborative work) as possible.*** For example, more history tools could be embedded as part of CITs to alleviate the long-term unpredictability of collaborative work and to support the durability of the cooperative relationship.

This recommendation is based on the observations and findings presented in Sections 11.2 and 11.2.2.

d) Try to offer ***adequate levels of articulation possibilities by providing multiple alternative channels of conversation*** (e.g. chat combined with audio, voice mail, video etc.).

This recommendation is based on the observations and findings presented in Section 13.7.2.

e) ***Design CITs that require as little 'conceptual load' as possible*** – in terms of the amount of effort required from users to understand what the technology is supposed to do for them.

   This recommendation is based on the observations and findings presented in Section 13.7.1.1.

f) ***Introduce 'partial anonymity' as a design principle for e.g. meeting support systems*** – i.e. try to balance between the positive and negative effects of anonymity by manipulating varying degrees of anonymity of e.g. MSS membership.

   This recommendation is based on the observations and findings presented in Section 14.8.2 above.

15.4.2 Recommendations on CIT Organisational Strategy

For the goal of enacting truly successful organisational CIT strategies, and based on the observations, analyses, findings and hypotheses generated in this Thesis, I am recommending the following 'CIT strategy' improvements.

a) ***Accept social CITs as part of the organisational/enterprise mainstream IT infrastructure*** – the risks may outweigh the benefits.

   This recommendation is based on the observations and findings presented in Chapter 3/Section 3.3.1 and Chapter 14/Section 14.6. As we saw in Section 14.6, only few innovative companies have already acted as 'early adopters' and have accepted social CITs as part of their organisational/enterprise mainstream IT Infrastructure. The majority of companies, however are still rejecting or are sceptical toward social CITs (see 'Strategy of Rejection and Banning', 'Strategy of Limitation and Regulation' – Sections 14.6.1 and 14.6.2).

b) ***Provide incentives for using CITs – both tangible and intangible (intrinsic).***

   Tangible incentives: for example, it might be desirable to include, as part of an employee's performance appraisal, a record of how often their contributions to the collaboration database were used by other people in the organisation (see Section 8.1.2).

   Intangible incentives: non-economic motivations like 'egoboo', personal recognition, a grand vision/mission, personal satisfaction etc. (see Sections 8.1.3 and 10.4).

This recommendation is based on the observations and findings presented in Chapter 8/ Sections 8.1.2 and 8.1.3, and Chapter 10/Section 10.4.

c) ***Provide for a clear CIT Identity*** – in terms of a clear nature, root definition and socially constructed image of the CIT application.

This recommendation is based on Hypotheses 9.1, 9.2, 9.3, and 9.4 – see Appendix V.

15.4.3 Roadmap for Future Research

With the goal of strengthening the conceptual-theoretical apparatus for the field of CIT, I recommend the following research directions.

a) ***Use more theory for CIT research*** – instead of relying on intuition only. Serious attention needs to be paid, at the conceptualisation and design stages of CIT artefacts and their surrounding 'model processes', to the broad range of theory which informs our understanding of what will motivate potential users to try, to continue to use and to influence others to use, potential innovations. The CIT community should apply lessons from our attempts to diffuse our CITs in the enhancement of the theories which drive our conceptualisations of CIT and those which drive our design of CIT artefacts. Sadly, the literature – historically and currently – shows only very weak evidence that we do so (see Section 15.3 above). To improve this situation, CIT design and implementation should cease depending solely on the intuitions of designers and implementers but should also be guided by a coherent underlying theory of how people collaborate with (or without) computer support.

b) ***Refocus research attention on motivation theory/social psychology and anthropology*** – instead of exclusively CIT design and requirements engineering.

This recommendation is based on the observations and findings presented in the whole Thesis, and – in particular – on Hypotheses 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 9.1, 9.2, 9.3, 9.4, 10.2, 10.3, 11.1, 11.2 – see Appendix V.

In my future work, I intend to refocus my research on motivation theory. The reason for that are the results of this Thesis. As mentioned above, a closer look at all Hypotheses generated in this Thesis (see Appendix V) reveals that of 16 generated Hypotheses altogether, 14 (more than 87%) are thematically concerned with issues of 'human motivation'. Only 2 generated Hypotheses are concerned with issues of CIT design (see Figure 15.4 above). The latter may be indicative of a situation where motivational issues may be more important for CIT acceptance/diffusion than issues of design or requirements engineering.

c) ***Study 'diffusion' and not only 'adoption' (testing and implementation) of CITs*** – in order to evaluate CITs' organisational impact.

This recommendation is based on Content-Analysis Finding 2 – see Appendix IVb.

d) ***Refocus on studying multiple CIT solutions in a variety of organisational contexts*** – a shift toward a macro-view on eCollaboration, beyond the single organisation/workplace.

This recommendation is based on the observations and findings presented in the whole Thesis, in particular – the Content Analysis of CIT Literature, as well as the general observations presented in Chapter 3 (e.g. Table 3.1).

Table 15.2 depicts an overview of the recommended action plan and research agenda.

	Recommendation
CIT Design	• Adopt a semiformal approach to designing CITs. • Design CITs that do not require too many mediator/facilitator actions. • Design CITs that are able to capture as much contextual information embedded in collaborative work as possible. • Provide multiple alternative channels of conversation. • Design CITs that require as little 'conceptual load' as possible. • Introduce 'partial anonymity' as a design principle.
CIT Organisational Strategy	• Accept social CITs as part of the organisational mainstream IT infrastructure. • Provide incentives for using CITs – tangible and intangible (intrinsic). • Provide for a clear CIT identity.
CIT Research	• Use more theory for CIT research. • Refocus research attention on Motivation Theory. • Study CIT 'diffusion'. • Refocus on studying multiple CIT solutions in a variety of organisational contexts

Table 15.2. Recommended Action Plan and Research Agenda

Appendix I

ILLUSTRATIVE EXAMPLES (Ch.1-3)

Illustrative Example 1.1 – Efficiency Improvements through CIT

Efficiency was studied in terms of time savings, and in comparison to CIT-unsupported methods (manual and FtF). Many of the time savings reported were quite impressive. For example, Bikson (1996) described CIT use in 102 sessions at the World Bank as 'vastly more efficient' than other meetings. Dean et al. (1995) quantified efficiency in a business process reengineering task using IDEF [Integrated DEFinition] tools, finding that participants produced '251% more activities and 175% more ICOMS per day'. In another study using IDEF, Dennis et al. (1993) found that completed models took only one week for the CIT-supported groups, versus 6 weeks for traditional processes. Effectiveness was similarly studied in comparison to CIT-unsupported methods. For example, Post's (1993) study of 64 sessions in a major manufacturing company claimed that CIT saved $432,260 while improving the quality of decisions. Van Genuchten et al. (1998) counted code defects found during software inspection meetings and found the number to be 'considerably' higher than for traditional meetings (Fjermestdad and Hiltz 2001, pp.122, 123).

Illustrative Example 3.1 – Google's Decentralised Business Model

What makes Google, the Web search firm, unique is less its Web-centric business model than its brink-of-chaos management model. Key components include a water-thin hierarchy, a dense network of lateral communication, a policy of giving outsized rewards to people who come up with outsized ideas, a team-focused approach to product development, and a corporate credo that challenges every employee to put the user first. In many ways, Google is organised like the Internet itself: it is highly democratic, tightly connected, and flat. As you might expect, decision making at Google is highly consultative (Hamel 2007, p. 102, 109, 110).

Illustrative Examples 3.2 – Peer-to-peer Networking

Maybe one of the most important peer-to-peer networking collaborative projects of this century has been the discovery of the SARS virus. In 2003, the World Health Organisation (WHO) called upon 11 laboratories in 9 countries to join a collaborative multi-center research project on SARS diagnosis. The laboratories were collaborating as peer-network partners: although the WHO orchestrated the creation of the network of labs, they were not strictly 'in charge' of it, and they were not dictating what different labs would do. Every day the labs took part in daily teleconferences, and posted virus analyses and test results on the WHO Web site. Thus, they were 'able to work at the same time on the same samples, multiplying their speed and effectiveness' (Surowiecki 2004, p.159). Most importantly, they were getting a diversity of perspectives on the same problem – by having different labs testing the same samples simultaneously – and were thus profiting from 'the wisdom of crowds' (see Surowiecki 2004) in an optimal way.

Another example is the automotive industry. A growing number of cars 'are not made by car companies anymore, at least not the companies most consumers recognize' (Tapscott and Williams 2006, p.217). BMW, for example, works with a peer network of suppliers like Magna International, who are highly specialised and can assemble the vehicles faster and cheaper since they make most of the components. The latter allows BMW to focus on critical activities like maintaining the core engineering expertise, customer relationships, and marketing.

The same sort of thing applies in the aircraft industry. A modern aircraft consists of tens of thousands of high-tech parts. In the past, companies like Boeing wrote detailed specifications for each part and asked suppliers to build to plan. Boeing gathered the parts on the plant floor and spent weeks assembling a single airplane. Today suppliers codesign airplanes from scratch and deliver complete subassemblies to Boeing's factory, where a single plane can be snapped together like Lego blocks in as little as three days (Tapscott and Williams 2006, p.217). This is not simple outsourcing. This time around, Boeing has built a broad horizontal network that treats suppliers as true partners and even peers, bringing them much earlier in the process (Tapscott and Williams 2006, p.225).

Illustrative Example 3.3 – Open Platforms

eBay's web-based retail system is one example. 40% of the goods on eBay are now uploaded automatically from the inventory systems of third-party stores that use eBay as an alternative sales channel. Another example is Amazon which enables 140,000 software developers to access its product database and payment services to create their own new offerings. 'We're all building this thing together,' is the motto of Amazon's customers, Web sites with Amazon associate stores, and outside software developers (Tapscott and Williams 2006, p.184).

The Human Genome Project – certainly among the most important scientific endeavours of our time – has been functioning as an open platform too. Thanks to this platform, we are now much further ahead than we were in 1986 in our efforts to map the human genome. By sharing basic science and collaborating across institutional boundaries, the participating companies challenged a deeply held notion that their early stage R&D activities are best pursued individually and within the confines of their secretive laboratories (Tapscott and Williams 2006, p.163).

Illustrative Example 3.4 – InnoCentive Network

For example, now anyone can potentially work for P&G without being on their payroll. Through the InnoCentive network ninety thousand scientists around the world can help solve tough R&D problems for a cash reward. In early 2000, after its stock price had tumbled on Wall Street, P&G realised that its army of nine thousand [internal] researchers was no longer sufficient to keep the firm at the forefront of innovation in consumer products. For example, when P&G set out to launch a new line of Pringles potato chips with trivia questions and animal pictures printed on each chip, it quickly discovered that producing sharp images on thousands upon thousands of chips each minute was a highly complex endeavour. A solution popped up in a small bakery in Bologna, Italy, where a university professor was printing edible images on cakes and cookies. P&G acquired the technology through the InnoCentive prosumer community, and quickly adapted it to its requirements (Tapscott and Williams 2006, p. 106, 107, 108). In a similar vein, through the new Lego Factory (http://factory.lego.com/) system launched in 2005, customers can get access to a virtual warehouse of Lego elements with which to design, share and purchase custom models. Another example is Linden Labs which harnesses prosumption by enabling its customers to cocreate Second Life in a very meaningful and ongoing way. It produces less than 1% of its game content, and instead gives powerful scripting tools to its members (Tapscott and Williams 2006, p.131, p.279).

Appendix II

BACKGROUND INFORMATION ON THE CASES

The following list briefly describes each case I have included in Empirical Study II (Critical Meta-Analysis of Case-Study Reports), in chronological order.

Case 1. *Social Networking at Accenture*. This is a case describing the bottom-up diffusion path of Social Networking Software (SNS) – 'People Pages' – at Accenture Ltd. The idea to adopt a SNS was inspired by the enormous success of Internet platforms like Facebook and XING. Accenture consultants were trying to adapt the principles of internet-based SNS in a similar manner within the company's Intranet (Koch and Richter 2009, www.accenture.com).

Case 2. *IBM's SNS 'Bluepages'*. The case of the application and usage of the 'Bluepages' SNS within IBM. The idea emerged in 2005 when the IT-services profit share was reported to have risen from 15% in 1993 up to 52% in 2005. As a result, the expectations laid on company-internal knowledge management and collaboration rose as well. With the aim of managing those expectations, Intranet 'white pages' were implemented within IBM in the mid-90s. The Intranet 'white pages' were the predecessor of IBM's SNS named 'Bluepages' (Richter and Koch 2009, www.ibm.com).

Case 3. *SAP's SNS 'Harmony'*. The case of the application and usage of the 'Harmony' SNS within SAP. The SNS was designed to inherit elements from popular (mainly in the US) public SNS like facebook und LinkedIn. The goal was to support the private as well as the business exchange among all SAP employees (Richter and Koch 2009, www.sap.com).

Case 4. *Geek Squad Company*. This is a case of a bottom-up unsteered diffusion and self-managed use of Massive Multiplayer Online Games (MMOG) as a collaboration support system at the Geek Squad company – a computer-related services company (Tapscott and Williams 2006).

Case 5. *Open Source Software Development.* The case of the worldwide 'movement' of a community-based model of software development, denoted as 'open source'. A world-wide decentralised community of programmers voluntarily contribute to the development and ongoing maintenance of free code (redistributed without royalties). Well-known and established projects are Linux and Apache (Bonaccorsi and Rossi 2004).

Case 6. *ComNotes*. The case of the use of Lotus Notes as a unique and integrated business application at ComNotes – one of IBM's distributors in Thailand. The company provides business solutions such as e-procurement, CRM and document management, based on Notes and Domino infrastructure (Panyasorn et al. 2006).

Case 7. *Procom*. The case of the use of Lotus Notes as a replaceable communication tool at Procom – an IT organisation that provides harware, software, and integration services to satisfy all types of business needs. The company offers solutions such as Notes for communication and document management (Panyasorn et al. 2006).

Case 8*. Comtech.* The case of the use of Lotus Notes as a reporting tool at Comtech – an organisation that belongs to a large software business group, Thaitech (Panyasorn et al. 2006).

Case 9*. Chemhouse*. The case of the use of Lotus Notes as complementary tool to other IT tools at Chemhouse (Thailand) – a subsidiary of a multinational group in Thailand, whose core competencies are chemical products (Panyasorn et al. 2006).

Case 10*. Blogging*. The case of discussing the implementation and use of web logs (blogs) by employees of different companies at their work space – for example hundreds of Sun Microsystems employees who started writing public blogs at work, about work, which violated every traditional percept of corporate communication (Roush 2006, Cooke 2006, Gely and Bierman 2006).

Case 11*. SODA: North Ayr Partnership in Europe*. The case of the application and usage of Strategic Options Development and Analysis (SODA) (a group support method and software). The SODA method was replicated using the SODA group software, allowing electronic entry and structuring. North Ayr, a town in South West Scotland, was suffering from social and economic deprivation. The Town Council was keen to break the cycle and work to improve conditions through the Priority Partnership Initiative, as part of the UK Government's effort to facilitate social and economic regeneration (Ackermann et al. 2005).

Case 12*. Strategic Choice: Whitbread Partnership in Europe*. The case of the application of Strategic Choice (a group support system approach) used in manual mode by representatives of Whitbread PLC – the UK' largest hotel and restaurant company. The aim was to improve the level of collaboration in a series of construction projects within the company's hotels division. The focus was on capitalising upon the potential for learning from issues arising during a project and their resolution which could be shared by members of project teams and transferred to other situations (Ackermann et al. 2005).

Case 13*. GroupSystems: Lanark County Communications Network Alliance in North America*. The case of the application and usage of GroupSystems (a group support system) by the Lanark County Communications Network Alliance (LCCNA), with the intent of combining any and all telecommunications applications in Lanark County, enhancing these applications and creating economies of scale by providing a common network infrastructure and a common set of network applications. Lanark County is a rural county in the eastern part of Ontario, Canada (Ackermann et al. 2005).

Case 14*. ThinkLets*. This case is illustrative of how economic and political causes can make GSS facilities self-extinguishing. The focus is on 'collaboration engineering' (the development of repeatable collaborative processes that are conducted by practitioners themselves) with 'ThinkLets' (a codified packet of facilitation skills) to pursue sustained success with group support systems (Briggs et al. 2003).

Case 15*. OptionFinder*. This is a case study of the continued and discontinued use of 'OptionFinder', a group support system implemented at IOTA – a large diversified, technology-based Fortune 500 conglomerate involved in design, development and manufacture of a wide variety of products and services (Pollard 2003).

Case 16. *SIGMA*. The case of the evolving use of groupware in a service network of freelancers (SIGMA) (Törpel et al. 2003).

Case 17. *GSS Market in the Netherlands*. A case revealed a picture of the business market for group support systems in the Netherlands (Gordebeke 2002).

Case 18. *Alpha Alliance*. The case of using a facilitated group support system at Alpha Alliance. The Alpha Alliance was composed of seven managers from two organisations, called Alpha One and Alpha Two, manufacturing and marketing telecommunications hardware (Alpha One) and software (Alpha Two). The facilitated group support system was used when they began the process of planning for launch of an integrated product line aimed at Internet Service Providers (ISPs) (Parent and Gallupe 2001).

Case 19. *BABBLE*. The case of The Adoption and Use of 'BABBLE' – a novel, chat-like system for computer-supported collaborative working within six different groups at IBM Corporation (USA). The technical properties of the system enable different types of communicative practices (Bradner 1999).

Case 20. *CCC*. A case discussing the implementation and use of Lotus Notes at CCC – a small computer consulting company. Several Notes applications (business and customer databases, discussion and news databases) were used by the 10-14 consultants (Karsten 1995a, Karsten and Jones 1998, Karsten 1999).

Case 21. *Ministerial Strategy Development.* The case of the application and usage of GroupSystems (a group support system) by a Ministry of Housing, Physical Planning, and the Environment for the purpose of developing a long-term strategy (De Vreede and De Bruijn 1999).

Case 22. *Optimisation of Waste-Recycling Chains*. The case of the application and usage of GroupSystems (a group support system) by a number of waste processing organisations for the purpose of optimizing the waste/recycling chain. A secondary goal was to deal with the strong opposition from waste disposal companies, waste transport companies, and certain municipalities with the help of the group support system (De Vreede and De Bruijn 1999).

Case 23. *Inter-municipal Cooperation.* The case of the application and usage of GroupSystems (a group support system) by a municipality which wanted to take a stand with respect to regional cooperation with other municipalities. The group support system was believed to be able to alleviate the conflicts of interest which existed among the municipalities, and within the organizing municipality, about the most desired form of cooperation (De Vreede and De Bruijn 1999).

Case 24. *Oil and Gas Supply Industry*. The case of the application and usage of GroupSystems (a group support system) by the Oil and Gas Supply Industry for the purpose of bringing forward a unified standpoint for the European Commission about the impact of this industry on the European economy and environment (De Vreede and De Bruijn 1999).

Case 25. *Strategy Development University Board*. The case of the application and usage of GroupSystems (a group support system) by the board of a university which had to develop a long-term strategy (De Vreede and De Bruijn 1999).

Case 26. *Environmental Law Enforcement*. The case of the application and usage of GroupSystems (a group support system) by a national province which had to enforce environmental laws (De Vreede and De Bruijn 1999).

Case 27. *National Physical Planning*. The case of the application and usage of GroupSystems (a group support system) by the national government of a country who wanted to restructure the physical planning of the country, leading to new roles for municipalities and provinces. (De Vreede and De Bruijn 1999).

Case 28. *Provincial Working Procedures*. The case of the application and usage of GroupSystems (a group support system) by a number of departments of a province which wanted to change their working procedures. The intention was to arrive at a more participative approach to work instead of a hierarchical top-down approach (De Vreede and De Bruijn 1999).

Case 29. *Prison Privatisation*. The case of the application and usage of GroupSystems (a group support system) by the representatives of various ministries who had to take a stand on the privatization of a prison system. In the country concerned, this is a very sensitive topic with passionate advocates and opponents (De Vreede and De Bruijn 1999).

Case 30. *Process Industries.* A case discussing the implementation and use of Lotus Notes at Process Industries – a large paper mill, paper production group. The Notes application was used for recording problem situations and their solutions in running a paper machine. The goal was to support the factory floor management of the paper production process (Kovatainen et al. 1998).

Case 31. *Statoil*. A case discussing the implementation and use of Lotus Notes at Statoil – a Norwegian oil producer and exporter. Various Notes corporate applications such as for experience transfer, quality management in archiving, and project management, were applied. Notes was implemented as a part of the IT infrastructure in Statoil (Monteiro and Hepse 1998, Munkvold 1998).

Case 32. *Eiger*. A case discussing the implementation and use of Lotus Notes at Eiger – a software division located in the U.S., Asia, and Europe. An APMS (Automated Performance Measurement System), based on Notes, was used to support the annual revision of a manufacturing management software package (Ngwenyama 1996, Ngwenyama 1998).

Case 33. *Global Investment Bank*. The case of the implementation of Lotus Notes (a client-server collaborative application) at GIB (Global Investment Bank). The case study shows that GIB is quite ambivalent about Lotus Notes and the Web, they are heavily invested in Notes but will also invest in Web projects (Ginsburg and Duliba 1997).

Case 34. *Valmet*. A case discussing the implementation and use of Lotus Notes at the delivery project department of Valmet – a large paper machinery manufacturer. The Notes applications used were document archives, providing some support for constructing the documents (Karsten et al. 1997).

Case 35. *Midwest Insurance*. A case discussing the implementation and use of Lotus Notes in its organisational and work context at Midwest Insurance – a 'one step' quick implementation to a large number of people. The goal was broad coverage, and the result was limited to use of Notes mainly to communication (electronic mail, some discussion databases, some databases for browsing). Unlike the Alpha case, here there were also document databases (Vandenbosch and Ginzberg 1997).

Case 36. *SH*. A case discussing the implementation and use of Lotus Notes at SH – a small consulting company with a hierarchical structure. 17 Notes business management applications, including e-mail, were used for all aspects of business and project management, with the emphasis on reporting and monitoring (Tung and Turban 1998).

Case 37. *HDB*. A case discussing the implementation and use of Lotus Notes at HDB – the Housing and Development Board of Singapore. An Integrated Office System (IOS), based on Notes, was used to support the core functions of the HDB of providing housing in Singapore (Tung and Turban 1997).

Case 38. *THC*. A case discussing the implementation and use of Lotus Notes at THC – a small holding company with a relatively flat hierarchy and team-based project-centered environment. Several Notes applications (Work Manager, information distribution applications, meeting coordination, etc.) were used as a conduit to business units, for their reports and for coordinating meetings (Ruhleder and Jordan 1997, Ruhleder et al. 1996).

Case 39. *Unilever*. A case discussing the implementation and use of Lotus Notes in its organisational context at Unilever. Unilever built a Notes innovation management application for collecting and distributing information about a new product initiative and its progress through an evaluation ‘funnel’ (Ciborra and Patriotta 1996).

Case 40. *Fortune 500 Company*. The case of a Fortune 500 company using an electronic meeting system for an annual tactical planning meeting. Satisfaction with the outcome was high. Nonetheless, lower levels of ‘affective reward’ were reported (Reinig et al. 1997).

Case 41. *EDF*. A case discussing the implementation and use of Lotus Notes at the newly launched international distribution department (ID) of the French energy provider EDF working in over 80 countries. The collaborative capabilities of Notes were still largely unexplored and limited to electronic mail, an interactive company newsletter, and a resource directory (Ciborra and Suetens 1996).

Case 42. *Insurance*. A case discussing the implementation and use of Lotus Notes at a regional health insurer. The approach was exploratory and included experimenting with Notes application building (a workflow application for insurance policy enrolment) (Wynn 1996).

Case 43. *Roche*. A case discussing the implementation and use of Lotus Notes at a diagnostics division of Roche – a large multinational pharmaceutical company. Notes was implemented in the form of an electronic notebook application, including databases used as a discussion forum (Ciborra 1996).

Case 44. *Consulting Firm*. A case of the implementation and use of the Notes artefact within a large, multi-national consulting firm (known in the study as Alpha) (Orlikowski 1995).

Case 45. *Zeta*. A case of the implementation and use of Lotus Notes within the customer support department (CSD) of Zeta, one of the Top 50 software companies in the US, with $100 million in revenues and about 1000 employees (Orlikowski 1995).

Case 46. *Technical Research Centre (TRC)*. A case discussing the implementation and use of Lotus Notes at the materials testing unit of a Technical Research Centre (TRC) in Finland. TRC built a Notes workflow application for managing testing activities, assuming a highly structured way of cooperating in running the tests. The application was built to automate existing processes (Karsten 1995b).

Case 47. *Petro*. A case discussing the implementation and use of Lotus Notes at the Information Services Unit at Petro, a major petrochemical company in Finland. Petro built experimental news-feed Notes applications for collecting external intelligence and news information and feeding it to company executives (Karsten 1995b).

Case 48. *Plywood Plants.* A case discussing the implementation and use of Lotus Notes at the Plywood Plants – eight wood production industry plants. The Notes applications used were document archives, providing some support for constructing the documents (Karsten 1995b).

Case 49. *Small Government Agency's Deployment of Groupware*. The case of a small government agency which deployed groupware. The study highlighted many potential problems that occurred when the agency implemented the groupware application (Bowers 1994).

Case 50. *Implementation of CAD/CAM*. The case is an example of technology-led change in the computer supported working of an engineering company. The company, of approximately 2000 employees, was implementing a state-of-the-art collaborative design and manufacturing (CAD/CAM) system with a view to achieving a number of objectives (Clegg et al. 1994).

Case 51. *Implementation of Information Engineering*. This case study is concerned with the implementation of Information Engineering (IE) in the IT development department of a large UK corporation. IE is a software development methodology, according to which most of the work is carried out using on-line CASE (Computer Aided Software Engineering) tools. The latter have played the role of a shared information space, collaboration arena, and group support system (Clegg et al. 1994).

Case 52. *Alpha*. A case discussing the implementation and use of Lotus Notes in its organisational and work context at Alpha – a 'one step' quick implementation to a large number of people. The goal was broad coverage, and the result was limited to use of Notes mainly to communication (electronic mail, some discussion databases, some databases for browsing), and no specific applications (Orlikowski 1993a).

Case 53. *Implementing Lotus Notes in a large Services Organisation*. A case study examining the impact of implementing Lotus Notes (a client-server collaborative application) on work practices and social interaction in one branch office of a large services organisation (Orlikowski 1992).

Appendix III

CIT TYPES/APPLICATIONS DISCUSSED IN THE CASE-STUDY REPORTS

CIT Identity		
CIT Type/Application as in Report	*No of Case-Study Reports*	*%*
Lotus Notes	11	69
Social CIT	3	19
CAD/CAM System	1	6
CASE Tools	1	6
Total	16	100
System Customisation		
CIT Type/Application as in Report	*No of Case-Study Reports*	*%*
Lotus Notes	9	60
GSS/EMS/MSS	2	13
CASE Tools	2	13
Chat-like System	1	7
various CITs	1	7
Total	15	100
Mediator Role		
CIT Type/Application as in Report	*No of Case-Study Reports*	*%*
GSS/EMS/MSS	15	79
Lotus Notes	4	21
Total	19	100
Number of System Users		
CIT Type/Application as in Report	*No of Case-Study Reports*	*%*
Social CIT	4	45
Lotus Notes	1	11
Chat-like System	1	11
CASE Tools	1	11
CAD/CAM System	1	11
various CITs	1	11
Total	9	100
Support of a Champion		
CIT Type/Application as in Report	*No of Case-Study Reports*	*%*
Lotus Notes	3	60
Social CIT	1	20
GSS/EMS/MSS	1	20
Total	5	100
Affective Reward		
CIT Type/Application as in Report	*No of Case-Study Reports*	*%*
Social CIT	3	60
GSS/EMS/MSS	1	20
Social CIT	1	20
Total	5	100
Size of the Collaborative Ensembles		
CIT Type/Application as in Report	*No of Case-Study Reports*	*%*
Lotus Notes	4	80
GSS/EMS/MSS	1	20
Total	5	100
Collaboration History		
CIT Type/Application as in Report	*No of Case-Study Reports*	*%*
GSS/EMS/MSS	3	100
Total	3	100

Incentives for Using CITs		
CIT Type/Application as in Report	*No of Case-Study Reports*	*%*
GSS/EMS/MSS	13	45
Lotus Notes	8	28
Social CIT	4	14
CASE Tools	2	7
CAD/CAM System	1	3
various CITs	1	3
Total	29	100
Power-Structure Change		
CIT Type/Application as in Report	*No of Case-Study Reports*	*%*
Lotus Notes	6	55
Social CIT	3	27
CASE Tools	1	9
various CITs	1	9
Total	11	100
Long-term Unpredictability		
CIT Type/Application as in Report	*No of Case-Study Reports*	*%*
Lotus Notes	1	50
various CITs	1	50
Total	11	100

Table AIII.1. CIT Types/Applications discussed in the Case-Study Reports – Detailed

Appendix IV

FINDINGS OF THIS THESIS

Appendix IV a

Findings from Comparative Case Studies

Finding	… leading to Hypothesis:
I found the factor of 'Incentives for Using CITs' to be 'most dominant' – i.e. discussed in 55% of the case studies. **(Chapter 8)**	**Hypothesis 8.1**
Top-down Diffusion Path: In 78% of the cases, incentives for using CITs have been lacking. The lack of incentives for using CITs has played the role of a barrier for their diffusion in all of these cases. *Bottom-up Diffusion Path:* In 33% of the cases incentives for using CITs have been lacking. The lack of incentives for using CITs has played the role of a barrier for their diffusion. **(Chapter 8)**	**Hypothesis 8.2**
Top-down Diffusion Path: Only in 22% of the cases, incentives for using CITs have been available. **(Chapter 8)**	**Hypothesis 8.3**
Top-down Diffusion Path: The nature of the incentives has been prevailingly utilitarian, e.g. perceived efficiency gains in productivity and information sharing, perceived efficiency gains in communication, efficiency gains and perceived high return on investment, belief in long-term benefits achieved by keeping track of work done. **(Chapter 8)**	**Hypothesis 8.4**
Bottom-up Diffusion Path: In 50% of the cases, incentives for using CITs have been available. The nature of the incentives has been prevailingly intangible and intrinsic. **(Chapter 8)**	**Hypothesis 8.5**
The meaning of cooperation denotes 'associating with others for mutual benefit'; in order to cooperate, people need to recognise the benefits of cooperation; this benefit recognition, however, does not come automatically. Therefore, some incentives for using CITs – in terms of 'quick gains' offered to end users (by management etc.) as a reward for their efforts of working with a collaboration technology artefact – are necessary for successful adoption. Collaborative applications usually fail because of the disparity between those who benefit from them and those who must do additional work to support them. Therefore, some incentives for usage should be provided to all contributors to a computer-supported collaborative effort. Humans seem to care whether rewards are, in some sense, 'fair'. For CIT designers that should mean that not only should they build incentives to reward user effort into their systems, but those rewards should also be fair. **(Chapter 8)**	**Hypothesis 8.6**
Top-down Diffusion Path: In 86% of the cases, CIT Identity has been blurred. In all of those cases, blurred CIT Identity has played the role of	**Hypothesis 9.1**

a diffusion barrier. *Bottom-up Diffusion Path:* In 100% of the cases blurred CIT Identity has played the role of a diffusion barrier. **(Chapter 9)**	
Top-down Diffusion Path: In 14% of the cases, CIT Identity has been clear. In all of these cases clear CIT Identity has played the role of a diffusion accelerator. **(Chapter 9)**	**Hypothesis 9.2**
The case studies have shown that in most of the cases CIT identity was blurred – the 'image' of each CIT in the minds of its users was not clear (the tool was confused with other tools or was not compatible with them, companies were utilising an inappropriate 'root definition' of the tool etc.) and that hampered its diffusion. **(Chapter 9)**	**Hypothesis 9.3**
Top-down Diffusion Path: In 86% of the cases, CIT Identity has been blurred. **(Chapter 9)**	**Hypothesis 9.4**
Top-down Diffusion Path, Bottom-up Diffusion Path: Customisation practices have prevailingly played the role of a diffusion accelerator, along both the top-down and bottom-up diffusion path (in 66% of the 'top-down' cases, and in 100% of the 'bottom-up' cases). **(Chapter 9)**	**Hypothesis 9.5**
Top-down Diffusion Path: In 94% of the cases, the CIT mediator has played the role of a diffusion accelerator or a diffusion barrier. *Bottom-up Diffusion Path*: The need to understand what the CIT could do for the group, and the high conceptual load associated with that, meant dependence on expert mediators to operate the technology. In 50% of the cases, a skilled facilitator has played the role of a diffusion accelerator, etc. **(Chapter 10)**	**Hypothesis 10.1**
Top-down Diffusion Path: In 60% of the cases, a critical mass of users has been available. In all of these cases, the critical mass of users has played the role of a diffusion accelerator. *Bottom-up Diffusion Path:* In 100% of the cases, a critical mass of users has been available. In all of these cases, the critical mass of users has played the role of a diffusion accelerator. SAP's SNS 'Harmony': what mattered was not simply how many people were using the system, but how many 'friends' belonging to one's personal social network were using it. **(Chapter 10)**	**Hypothesis 10.2**
Top-down Diffusion Path: In 40% of the cases the lack of a critical mass of users has played the role of a diffusion barrier. **(Chapter 10)**	**Hypothesis 10.3**
Bottom-up Diffusion Path: In 87% of the cases, power-structure change has played the role of a motivational driver for CIT diffusion. **(Chapter 11)**	**Hypothesis 11.1**
Bottom-up Diffusion Path: In 12% of the cases, resistance to power-structure change played the role of a diffusion barrier.	**Hypothesis 11.2**

(Chapter 11)	

Table AIV.1. Findings from Comparative Case Studies and Hypotheses Arising from Them

Appendix IV b

Findings from Content Analysis

– by ‘Research Type and Method’ –

Finding 1: a slight preponderance of case studies (over 17%), followed by field studies (over 12%), experiments (over 10%), as well as technical tool descriptions and ethnographic studies (over 9% each);

– by ‘Focus of Research’ –

Finding 2: scarcity of research on ‘diffusion’ and abundance of reporting on ‘adoption’ (testing and implementation) of collaboration technologies;

– by ‘CIT Types’ –

Finding 3: preponderance of reporting on adoption of level-A CITs over others (higher-level CITs);

Finding 4: reported dissatisfactory diffusion of higher-level CITs versus reported satisfactory diffusion of level-A CITs;

Finding 5: abundant reporting on adoption of social CITs

Appendix V

HYPOTHESES GENERATED IN THIS THESIS

Chapter 8

Hypothesis 8.1. Whether organisational incentives for using CITs are provided or not has the greatest relevant influence on the process of CIT diffusion.

Hypothesis 8.2. Lacking incentives for use play the role of CIT diffusion barrier.

Hypothesis 8.3. The top-down (authority-based) CIT diffusion path is characterised by prevailingly lacking incentives for using CITs.

Hypothesis 8.4. When incentives for use are available for authority-supported CITs, they are prevailingly utilitarian.

Hypothesis 8.5. The bottom-up diffusion path is characterised by prevailingly intangible and intrinsic incentives for CIT use.

Hypothesis 8.6. To facilitate CIT acceptance and diffusion, we need to artfully design fair strategies of incentives for use. These strategies should be shaped in such a way as to bring the potentially conflicting values of CIT contributors into alignment. Not only should CIT designers and strategists build incentives to reward user effort, but those rewards should also be fair.

Chapter 9

Hypothesis 9.1. Blurred CIT identity – in terms of unclear nature, root definition and socially constructed image of the CIT application – plays the role of a diffusion barrier.

Hypothesis 9.2. Clear CIT identity – in terms of clear nature, root definition and socially constructed image of the CIT application – plays the role of a diffusion accelerator.

Hypothesis 9.3. Blurred CIT identity is typically caused by either compatibility issues or the presence of competitive CIT applications that erodes the notion of the CIT as a single groupware answer.

Hypothesis 9.4. The top-down CIT diffusion path is typically characterised by blurred CIT identity .

Hypothesis 9.5. System-customisation practices tend to stimulate (or enable) CIT adoption and diffusion.

Chapter 10

Hypothesis 10.1. The degree to which a mediator can influence the CIT diffusion process depends on the manner in which CITs are designed – i.e. what kind and what variety of mediator actions CITs are designed to allow for or to require.

> **10.1 a)** CIT complexity, and the high conceptual load associated with that, can mean dependence on expert mediators to operate the technology.
>
> **10.1 b)** When CITs are designed to allow for a great variety of mediator actions, that may have 'dominant mediators' as a consequence, and the negative effects associated with that (e.g. a dominant mediator using the CIT as

an instrument of imposing his/her position on the group, a dominant facilitator using the CIT as an instrument of creating a 'false consensus effect', thus reinforcing people's willingness to conform, etc.).

Hypothesis 10.2. A sufficient number of system users plays the role of a CIT diffusion accelerator.

10.2. a) What matters is not simply how many people are using the CIT, but how many 'friends' belonging to one's personal social network are using it or how many 'managers' (people with high positions in the hierarchy) are using it.

Hypothesis 10.3. The lack of critical mass of users plays the role of a CIT diffusion barrier.

Chapter 11

Hypothesis 11.1. The bottom-up CIT diffusion path is characterised by 'power-structure change' being a motivational driver for CIT diffusion.

11.1 a) The process of bottom-up diffusion of social CITs can be seen as closely related to decentralisation within organisations – handing on control over to users and is therefore capable of dismantling the traditional functional and hierarchical barriers in the company.

Hypothesis 11.2. Resistance to power-structure change may play the role of a diffusion barrier for the bottom-up CIT diffusion.

Appendix VI

PUBLICATIONS ARISING FROM THE RESEARCH REPORTED IN THIS THESIS

	Publication	Abstract	Main ideas are reflected in Chapter(s)
1	Elitsa Shumarova, Paul A. Swatman (2008), "Informal eCollaboration Channels: Shedding Light on "Shadow CIT", **21st Bled eConference eCollaboration: Overcoming Boundaries Through Multi-Channel Interaction**, Bled, Solvenia, June 15 – 18.	There is some evidence of the unabated proliferation of employee-autonomous, informal in an enterprise sense, collaborative information technologies (CITs) to perform collaborative activities despite huge investments in CIT enterprise systems. This article will introduce the metaphorical construct of "shadow CIT" (analogous to "shadow IT" – Raden, 2005; Schaffner, 2007) to describe the strategic choice to use autonomous CITs instead of formal enterprise CITs. "Shadow IT" has been defined by Raden (2005) as a set of IT tools used "for performing IT functions but not part of the mainstream IT organization" (p.1). Similarly, "shadow CIT" solutions are employee-autonomous: they are not implemented as part of the organisational IT infrastructure, neither have they received any targeted organisational investment. Several research questions are explored in this paper. The existence of "shadow IT" has been argued to imply a failure on the part of enterprise IT to provide all of the services to meet their users' needs. Does the existence of "shadow CIT" imply a failure of enterprise CITs of a similar kind? If shadow CITs are found to be [capable of] filling gaps within enterprise CITs, what kind of gaps are these? Often, without being able to articulate why, users appear to shun solutions and good architecture within enterprise CITs in favour of the ability to get their work done through autonomous "shadow" solutions. What kind of motivation may be driving such decisions?	Chapter 6, Chapter 13, Chapter 15
2	Elitsa Shumarova, Paul A. Swatman (2007), "eValue and Value-driven User Responses to Information Technology", **Electronic Markets – The International Journal**, Vol 17, No 1, 5-19, 2007.	This paper explores eValue creation, assessment and distribution within communities joined through the Web, and the possible implications on end user acceptance of information technology (IT). We undertake to theorize more richly than has heretofore been done on the decision processing perspective of user acceptance of IT and, based on that, analyze different types of value–driven user motivations. Specifically, we draw on two metaphorical constructs – „attention economy" and „high–tech gift economy" – in order to understand value–driven user responses to IT, and illustrate them through the example	Chapter 8/ Section 8.1.3, Chapter 13/ Section 13.8
3	Elitsa Shumarova, Paul A. Swatman (2006), "The New Economy, eValue adn the Impact on User Acceptance of Pervasive IT", **19th Bled eConference eValues**, Bled, Solvenia, June.		

		of Open Source Software (OSS) development teams. The focal point of interest is the adoption–diffusion continuum (from Prior Use to Post–adoptive Behavior) within the context of end user decision processing. A rough eValue anthology is introduced as a secondary epistemological level to aid clarifying when and how value–rational end–consumer action affects attitude toward use. The analysis is based on a unified view on user acceptance decision processing, combining the management perspective (Cooper and Zmud 1990), the user perspective (Rogers 1995), the organizational perspective (Swanson & Ramiller 2004), with emphasis on the decision processing perspective (Engel et al. 2001).	
4	Elitsa Shumarova, Paul A. Swatman (2006), "Diffusion of Socially Pervasive IT Innovation through the Lens of Cognitive Elaboration and Perceived Behavioural Control", **CollECTeR Europe 2006** (Collaborative Electronic Commerce Technology and Research), Basel, Switzerland, 9-10 June.	This paper explores the mutual influence of Cognitive Elaboration and Perceived Behavioural Control on user acceptance and usage of innovative in-formation technology (IT) applications. Cognitive Elaboration is being theorised as influencer and predictor of IT usage of focal interest and Perceived Behavioural Control is being built upon as a secondary (supporting) epistemic level. We draw on the Elaboration Likelihood Model (Cacioppo and Petty 1986) in order to understand the influence process by which percep-tions of innovation attributes are formed. We thereby assume that individual perceptions are a key trigger in the formation of attitude toward IT usage, and that acceptance is fundamentally an informational influence (persuasion) problem. We thus analyse the IT adoption-diffusion continuum, from pre-usage stage to post-adoptive behaviour, within the context of the quality of Cognitive Elaboration, exercised by the adopting subject (organisation or individual group member). The endeavour undertaken ventures on a ho-listic route of thought by weighing different perspectives on individual and group level, with the emphasis shift from pure instrumentalism toward cross-referential analysis of IT usage moderators.	Chapter 14
5	Elitsa Shumarova, Paul A. Swatman (2006), "The Dynamics of Innovation in Electronic Networks - a System Dynamics Perspective on IT Innovation Diffusion", **Proccedings of the 24th International Conference of the System Dynamics Society**, Nijmegen, the Netherlands, July.	This paper analyses IT innovation diffusion within communities joined through electronic networks. Emphasis is laid on qualitative system dynamics, as a methodology of structure and behaviour, in order to understand successful IT innovation. The focal point of interest is the adoption-diffusion continuum, from prior use to post-adoptive behaviour, analysed and modelled by means of "adaptive structuration" based on "duality of structure". We draw upon a structurationist system dynamics approach and extend it within the context of IT innovation in electronic networks.	none

		The aim is to begin the development of an integrative modelling base for IT innovation diffusion. “Cognitive model building”, and “information processing”, are secondary (supporting) epistemic levels, used to aid clarifying issues of collective sociality and group outcomes in innovation uptake. The endeavour undertaken ventures on a holistic route of thought, with the emphasis shift from pure subjectivism to “structuration”, moving beyond “intention” toward a system dynamics analysis of IT innovation.	

Table AVI.1. Publications Arising from the Research Reported in This Thesis

Appendix VII

Ngwenyama and Lyytinen's (1997) original Social Action Framework for Analysing Groupware Technologies

Category of support	Action orientation	Constitutive resources	Groupware environments
Instrumental groupware	Transformation, Manipulation, and Control of Subjects	Tools, Shared Material Technical rules, Interaction Protocols	iCASE Group Editors Co-authoring Systems
Communicative groupware	Maintaining, Understanding and Coordinating Action	Communication Media, Interaction Interaction Protocols	CMC, E-mail E-conferencing
Discursive groupware	Restoring Agreement and Conditions for Coordinated Action	Communication, Media, DSS Tools Interaction Protocols	MSS, IBIS
Strategic groupware	Influencing and Transforming the Behaviour of Others	Tools, Shared Material, Interaction Protocols, Communication Media	NSS

Table AVII.1. Examples of groupware and primary action types they targe. Source: Ngwenyama and Lyytinen (1997)

Appendix VIII

CONTENT ANALYSIS - FINAL DATA SET OF 332 RESEARCH PAPERS

	Reference	Focus of study	Research type/method	Journal	Research context/ Arguments/ Findings
1	Sgouropoulou et al. (2000)	multimedia conferencing (asynchronous)	description of system design and implementation	Educational Technology and Society	This paper presents a Web-based system for the support of co-ordinated, asynchronous multimedia discussions, based on a video representation of real-world working practices.
2	Myers et al. (1998)	multiple Personal Digital Assistants (PDAs)	technical application description	ACM Conference on Computer Supported Cooperative Work, CSCW 98 Seattle Washington USA (Proceedings)	The Pebbles project, described in this paper, is creating applications to connect multiple Personal Digital Assistants (PDAs) to a main computer such as a PC.
3	Elbeltagi et al. (2005)	decision support systems	field study/ survey through interviews	Journal of Global Information Management	This study examines the usage of a decision support system (DSS) in Egyptian local authorities using and adapted Technology Acceptance Model (TAM).
4	Tung et al. (2000)	proprietary groupware tools (Lotus Notes)	field study/ survey through structured interviews and questionnaire	International Journal of Information Management	The results provide an insight about the adoption process of Lotus Notes: organizations with medium-technology levels are making significantly more use of Notes than organizations with high-technology levels. The study also indicated that organizations with a mechanistic culture use more of Notes for monitoring purposes while organizations with organic culture use it more for dissemination of information and for communication.
5	Jones and De Vreede (2000)	group support systems	case study/ focus groups	Local Environment	This viewpoint explores, through a case study in Malawi, the application of collaborative technology tools to support National Environmental Strategy Development initiatives with the public and private sectors in Africa. A particular type of groupware, Group Support Systems, is introduced as a technology and approach that enables large groups of stakeholders to be involved in efficient and effective decision making.
6	Reimer (2006)	instant messaging (Yahoo Instant Messenger and Windows Live Messenger)	market analysis	Ars Technica - the art of technology	The press report informs that the battle for supremacy in instant messaging has been a lively and hard-fought contest in the past few years. The report also give an account of collaboration between Microsoft and Yahoo.

7	Strupp (2005)	blogs	expert viewpoint/ ethnographic method	Editor & Publisher	Comparison of blogs and mainstream media in terms of ethical restrictions and relationship with their readers
8	Munkvold and Anson (2001)	electronic meeting systems versus group support systems (Lotus Notes and NetMeeting versus GroupSystems)	case study/ inquiry in line with a grounded theory approach[1]	Agder University College/University of New South Wales, Boise State University	The obvious benefits for team collaboration achieved through the use of Electronic Meeting Systems (EMS), do not appear to be so obvious on an organizational scale. After years of trying, there are relatively few published reports of rapid and broad adoption and diffusion of this technology. The broader class of Group Support System (GSS) technologies, that include highly successful products such as Lotus Notes and NetMeeting, has fared substantially better. This case study is of one large company that has been relatively successful in diffusing Lotus Notes and NetMeeting, while only slowly winning an uphill battle implementing GroupSystems, a popular EMS.
9	Agres et al. (2005)	*diffusion of* group support systems	case study/ cross-case comparison	Group Decision and Negotiation	This paper shows that, under certain circumstances, people using GSS can be substantially more productive than people who do not; however, GSS has been slow to transition into the workplace. This paper argues that the Technology Transition Model (TTM) may be a useful way to explain *this seeming paradox*. The paper presents a case study of GSS transition in two organizations – one where a self-sustaining and growing community of users emerged, and one where it did not.
10	Arthur (2006)	IBM Lotus Notes	expert opinion, interviews	The Guardian	This article describes Lotus Notes, IBM's "groupware" application, is – based on readers of Technology blog opinion – as the "world's worst application". It also suggests that the usage of Lotus Notes is restricted to email only.
11	Müller et al. (2003)	instant messaging (Lotus Sametime)	multiple case studies/ large-sample self-report survey data	IBM Research	The paper describes the introduction of Lotus Sametime™, an IM product, into three business organizations. Across the three organizations, substantially similar patterns were found in savings (reduced use of other communications channels), attitudes, and social networks.
12	IBM (2004)	instant messaging (Lotus Sametime and Lotus Web Conferencing)	case study/ project overview	IBM Research	A case study of Lotus Sametime and Lotus Web Conferencing implementation at FBD-Bildungspark.
13	Davison and Briggs (2000)	group support systems	quasi-experimental field study	Communications of the ACM	This quasi-experimental field investigation identifies positive and negative potential effects of GSS on presentation-style meetings, the positive being: more time for discussion, more even participation, increased participation in discussion, more feedback to presenters, permanent record of discussions, long-term post-session dialogue; and the negative being: distraction, digression, flaming, and loss of social cues.
14	__ (2004)	blogs,	case study/	Economist	A case study of a US company wanting to move blogging beyond its usual constituency of teenagers and political activists, and arguing that blogging

[1] where categories emerging from our data are being compared and contrasted with findings from previous research in order to extend existing knowledge related to the phenomenon under investigation.

		wikis	ethnographic method		might be a useful technology in business. *Finding*: Wikis offer a middle ground between email and a conventional web page, which makes them useful for collaborative projects. Wikis are now beginning to demonstrate the potential to replace other forms of groupware.
15	Lewis et al. (2004)	email, tele-conferencing, video-conferencing, data-conferencing, web-based collaboration tools, proprietary groupware tools, electronic meeting systems	field study/ survey	International Journal of Information Management	An attempt to build on existing research by focusing on the assimilation (acquisition and deployment) patterns of seven IT clusters to support task-oriented collaborative work in organizations, the perceived benefits across these IT clusters, and the relationship between perceived benefits and assimilation patterns of IT to support collaborative work.
16	Hewitt (2005)	asynchronous computer conferences	ethnographic observation/ team research, first-hand observation of conference log files, online questionnaire.	Journal of the Learning Sciences	The article examines how and why discussions shut down. A computer simulation of asynchronous threaded interaction suggests that certain common online habits, when practiced by many people, can adversely affect the lifespan of some threads. Specifically, the widespread practice of focusing attention on unread notes during computer conferencing sessions can produce a starvation condition that hastens the death of some threads and reduces the likelihood that inactive threads will become active again.
17	Karsten (2003)	IBM Lotus Notes	case study/ first-hand ethnographic observation of minutes of meetings and other memoranda	Computer Supported Cooperative Work	This paper reports organisational changes in a Finnish computer consultancy accompanying the introduction and use of Lotus Notes over a period of three years. The case shows that collaborative information technologies, such as Lotus Notes, are capable of supporting a variety forms of organisation. The uptake and use of Notes appeared to be more strongly influenced by aspects of the organisational context, internal social structure and the users' capabilities – in this case economic recession changing foci of control and the role changes in the company – than by any intrinsic logic of the technology.
18	Ginsburg and Duliba (1997)	Lotus Notes versus web-based collaborative software	case study/ cross-case comparison	Computer Supported Cooperative Work	This paper considers collaborative software at the enterprise level, specifically Lotus Notes and alternatives which use Intranet-based (World Wide Web) technologies. The study examines the strategic reasons, both short-term and long-term, motivating firms' choices in the decision phase and organi-zational issues in the implementation phase in three exploratory case studies.
19	__ (2007)	instant messaging	market analysis	PMR Business Services for Global Decision Makers	The press report presents a market analysis of the user base of top ten instant messengers in Poland in January 2007. At the moment, Polish companies use free messenger services such as Tlen.pl, Skype and Gadu-Gadu. As much as one-third of traffic generated via such software relates to business matters. Gadu-Gadu enjoys pride of place among instant messengers with a monthly range of 41.6% (the ratio of internet users who used the software at least once a month to the total number of internet users).
20	Rosenbloom (2004)	blogs	literature review	Communications of the ACM	A review of articles written on the "blogosphere"

21	Moran et al. (1998)	electronic whiteboard	technical application description	ACM Conference on Computer Supported Cooperative Work, CSCW 98 Seattle Washington USA (Proceedings)	This paper describes how the authors integrated structured “domain objects” into the whiteboard environment.
22	Obata and Kazuo (1998)	video mediated communication systems	experiment/ user experiment of the prototype system	ACM Conference on Computer Supported Cooperative Work, CSCW 98 Seattle Washington USA (Proceedings)	The authors propose an interaction model for video mediated communication systems that support informal communication among distribute groups. The paper is focused on two issues raised in previous research, the problem of intrusiveness that occurs when a caller glances at a recipient prior to conversation, and the failure of facilitating unintended interactions with unexpected partners. The proposed model addresses these problems by introducing “interactional distance” among users.
23	Roush (2005)	blogs	case study/ ethnographic method	Technology Review	Case study on Sun Microsystems employee blogging
24	Bajwa et al. (2005)	email, audioconferencing, videoconfe-rencing, dataconfe-rencing, web-based collaborative tools, proprietary groupware tools, electronic meeting systems	empirical field study/ survey	Journal of Information Technology	Empirical field study exploring the adoption and implementation of several information technologies to support task-oriented collaboration in organizations in the US, Australia and Hong Kong. *Data Collection* *US*: Data were first collected in the US using an electronic mailing to the members of SIM, a premier society for IT managers and executives with approximate membership of 1500 organizations. *Australia:* A mailing list of the largest 1000 organizations (measured by Gross Revenue) in Australia was used, based on the ‘BRW Top 1000’ – developed by Australia’s leading business magazine, the Business Review Weekly (BRW). A target sample of 500 randomly selected organizations from the Top 1000 was applied. *Hong Kong:* The subjects of the study were the MIS Directors of the largest 420 companies in Hong Kong. The names of these companies, along with their MIS Directors, were identified from Dun and Bradstreet Foreign Enterprises in Hong Kong (2002) and Dun and Bradstreet key Enterprise in Hong Kong (2002).
25	Pettersson et al. (2002)	CSCW, Computer Aided Dispatch (CAD) system	multiple case studies/ cross-case comparison	ACM Conference on Computer Supported Cooperative Work, New Orleans, LA (Proceedings)	This paper derives from a study undertaken at an emergency service centre in Sweden. The studies have focused on features of work familiar to the CSCW community, including the documenting and analysing current work practices, understanding the properties of the technology in question, and perhaps most importantly how the technology functions in and through use. Of particular interest here is listening-in, which is a function in the Computer Aided Dispatch (CAD) system and by contrast that of ‘overhearing’, which is not.
26	Nissen (2000)	proprietary groupware tools (knowledge-based	experiment	Journal of Management Infomation Systems	The research described in this paper is focused on testing the effectiveness of knowledge-based, process-redesign systems. One such system is employed, called "KOPeR-lite", as a platform for experimentation to assess the relative

		system)			efficacy of redesigns generated by computer versus those developed by people.
27	Smith (2005)	blogs	business analysis/ ethnographic method	eContent	Business analysis discussing content revenue model and business models that eventually emerge from blog media
28	Begole et al. (2002)	online calendars, e-mail, instant messaging	ethnographic study/ logs of computer interaction	ACM Conference on Computer Supported Cooperative Work, New Orleans, LA (Proceedings)	In light of the popularity of instant messaging, this research identifies some of the benefits and privacy risks associated with the uses of online presence and awareness information.
29	IBM (2005)	instant messaging (Lotus Sametime and Lotus Web Conferencing)	case study/ project overview	IBM Research	A case study of Lotus Sametime implementation at DOV Pharmaceutical: The case study reports that the Lotus Notes and Domino product set improved collaboration, communication among researchers and managers. More benefits of the Lotus Notes and Domino product set emerged during the application development and deployment phase.
30	Borovoy et al. (1998)	GroupWear	action research/ quantitative conference usage data & informal observations	ACM Conference on Computer Supported Cooperative Work, CSCW 98 Seattle Washington USA (Proceedings)	This paper presents results from a proof-of-concept trial of the Meme Tag technology undertaken at a MIT Media Laboratory conference. The informal observations suggest that the proof-of-concept trial of the Meme Tags was successful.
31	Fjermestdad and Hiltz (1999)	group support systems	meta-analysis (assessment of group support systems experimental research)	Journal of Management Information Systems	By mid-1998, approximately 200 different controlled experiments had been published in 230 articles in refereed journals or major conference proceedings, which examined processes and outcomes in computer-supported group decision making. This paper is a concise overview of what has been studied and how: the systems, independent, intervening, adaptation, and dependent variables, manipulated or measured, and experimental procedures employed.
32	Bossen (2002)	Common Information Spaces (CIS)	ethnographic field study (ethnographic fieldwork)	ACM Conference on Computer Supported Cooperative Work, New Orleans, LA (Proceedings)	The paper proposes a refinement of the concept of 'Common Information Spaces' (CIS), which has been proposed as a conceptual framework for the CSCW field in order to provide analyses of cooperative work. The refinement is developed through an introductory discussion of previous analyses of CIS and on the basis of a thorough description of the CIS of a hospital ward based on ethnographic fieldwork.
33	Achstetter (2004)	instant messaging	market analysis	Nielsen NetRatings	The press report informs that instant messaging has developed as a killer application on the Internet (March 2004).
34	Muller et al. (2004)	ad hoc collaboration systems: i.e., email and chat	ethnographic study/ first-hand observation data from the first 100 days of usage by 20 researchers and 13 interns: server logs and ethnographic interviews	Conference on Human Factors in Computing Systems (Proceedings), Vienna, Austria 2004	This paper describes a new collaboration technology that is carefully poised between informal, ad hoc, easy-to-initiate collaborative tools, vs. more formal, structured, and high-overhead collaborative applications. The approach focuses on the support of lightweight, informally structured, opportunistic activities featuring heterogeneous threads of shared objects with dynamic membership.
35	Reinhardt et al.	computer supported	technical model	Journal of Computing in	This paper describes construction site-based project management tasks and

	(2004)	project management	description	Civil Engineering	demonstrates how navigational models can facilitate efficient data access and data collection processes by customizing the presented information for a given task and environment of a user.
36	Fjermestdad and Hiltz (2001)	group support systems	meta-analysis/ descriptive evaluation	Journal of Management Information Systems	This paper presents a descriptive evaluation of 54 case and field studies from 79 published papers spanning two decades of group support systems (GSS) research.
37	Kraut et al. (2002)	shared visual workspaces	experiment	ACM Conference on Computer Supported Cooperative Work, New Orleans, LA (Proceedings)	This paper presents findings from an experiment investigating the effects of shared visual space on a collaborative puzzle task.
38	Chung et al. (2007)	decision support system (for quality assurance in production network)	case study	Journal of Manufacturing Technology Management	A DSS is proposed to capture exceptional signals from source on deterioration of product quality to alert preventive actions needed before the problems are getting out of hand. The supervisors are given a set of guidelines to support making the decision. A case study is described to show how this is implemented in a lens manufacturing company.
39	Rolland et al. (2006)	common information spaces	interpretive field study/ observations, in-depth interviews, as well as reading various documents	ACM Conference on Computer Supported Cooperative Work, CSCW, Banff, AB (Proceedings)	The paper develops a dynamic perspective on common information spaces (CIS) emphasizing how CIS is malleable, open and achieved in practice. Empirically, the research is grounded in extensive field work in a major international oil and gas company.
40	Debreceny et al. (2003)	group decision support systems	survey, focus group discussions, and computer-assisted qualitative analysis of the focus groups (Computer-Assisted Qualitative Data Analysis, CAQDAS)	Decision Support Systems	This research into electronic commerce (EC) inhibitor appraisal is conducted in Singapore, an appropriate environment for this purpose being both an island state and an active IT participant on the international stage.
41	Scott et al. (2004)	collaborative tabletop workspaces	two observational experimental studies	ACM Conference on Computer Supported Cooperative Work, CSCW, Chicago, IL (Proceedings)	Understanding the natural interaction practices that people use during tabletop collaboration with traditional media (e.g. pen and paper) can help to address issues of collaborative tabletop workspace design. To gain a deeper understanding of these interaction practices the authors conducted two observational studies of traditional tabletop collaboration in both casual and formal settings. The results reveal that collaborators use three types of tabletop territories to help coordinate their interactions within the shared tabletop workspace: personal, group, and storage territories.
42	Akkermans et al. (2003)	computer-supported collaborative supply chain planning	case study	European Journal of Operational Research	Describes a case study of supply chain collaboration facilitated by a decision support environment in a high-tech electronics supply chain with multiple independent companies.
43	Haga and Kaneda (2005)	contents-based video retrieval system	usability survey	Internet and Higher Education	This article describes the survey of the usability of a novel content-based video retrieval system. This system combines video streaming and an electronic bulletin board system (BBS). Comments submitted to the BBS are used to

					index video data.
44	Ligorio et al. (2005)	collaborative writing tool	action research	Computers and Education	This paper introduces *intersubjectivity* as a concept playing a crucial role in collaborative tasks, even when performed between partners at a distance. Two 5th grade classes from two European countries (Italy and Greece), collaborated in writing fairytales inspired by philosophically relevant issues.
45	Crabtree et al. (2004)	(passing of photoware through) email, webpages, and mobile phones	ethnographic study	ACM Conference on Computer Supported Cooperative Work, CSCW, Chicago, IL (Proceedings)	This paper explores the embodied interactional ways in which people naturally collaborate around and share collections of photographs. Ethnographic studies of paper-based photograph use are employed to consider requirements for distributed collaboration around digital photographs.
46	Heldal et al. (2005)	virtual collaborative environments systems	ethnographic study/ observations, analysis of video and audio recordings, questionnaires and debriefing interviews	Presence	Virtual environments systems based on immersive projection technologies (IPTs) offer users the possibility of *collaborating intuitively* in a 3D environment. A study of collaboration is presented where two partners worked together using networked IPT environments. The data collected included observations, analysis of video and audio recordings, questionnaires and debriefing interviews from both IPT sites. This paper focuses on the successes and failures in collaboration through detailed examination of particular incidents during the interaction.
47	Kreijns et al. (2003)	computer-supported collaborative learning environments	meta-analysis (review of academic research)	Computers in Human Behavior	Computer-mediated world-wide networks have enabled a shift from contiguous learning groups to asynchronous distributed learning groups utilizing computer-supported collaborative learning environments. Although these environments *can* support communication and collaboration, both research and field observations are not always positive about their working. This article focuses on factors which may cause this discrepancy, centering on two pitfalls that appear to impede achieving the desired results, namely taking for granted that participants will socially interact simply because the environment makes it possible and neglecting the social (psychological) dimension of the desired social interaction.
48	Ho et al. (1999)	group decision-making tools	literature review	IIE Transactions (Institute of Industrial Engineers)	This study modifies the Nominal Group Technique (NGT) to build a structured communication system to obtain customer requirements.
49	Tollinger et al. (2004)	collaborative software tools	action research	ACM Conference on Computer Supported Cooperative Work, CSCW, Chicago, IL (Proceedings)	This paper describes the design and deployment of a collaborative software tool, designed for and in use on the Mars Exploration Rovers (MER) 2003 mission. Two central questions are addressed. Does collaborative content like that created on easels and whiteboards have persistent value? Can groups of people jointly manage collaboratively created content? Based on substantial quantitative and qualitative data collected during mission operations, it remains difficult to conclusively answer the first question while there is some positive support for the second question. The MER mission provides a uniquely rich data set on the use of collaborative tools.

50	Brewer and Klein (2006)	asynchronous, collaborative learning environment	field study/ action research (4×2 factorial data-analysis design)	Educational Technology Research and Development	This study investigates the effect of type of positive interdependence (roles, rewards, roles-plus-rewards, or no structure) and affiliation motives (high vs. low) in an asynchronous, collaborative learning environment.
51	Paul et al. (2004)	web-based group decision support system (GDSS)	laboratory experiment	Information and Management	The paper reports the findings of a laboratory experiment in which homogeneous and heterogeneous virtual teams, consisting of subjects from the USA and India, worked independently on a decision task involving the adoption of a computer use fee by an online university. Team members, used a web-based group decision support system (GDSS) that allowed them the opportunity to discuss task options, critique suggestions, and vote on the result. The data analyses suggested that collaborative conflict management style positively impacted satisfaction with the decision making process, perceived decision quality, and perceived participation of the virtual teams. There was weak evidence that links a group's heterogeneity to its collaborative conflict management styles.
52	Cano (2003)	collaborative groupwork	content analysis of literature	IASTED International Conference on Computers and Advanced Technology in Education (Proceedings)	This paper examines the impact of the three components on Moore's transactional distance model, dialogue, structure and learner autonomy, on educational research papers. Evidence of these components were searched in the sample of 30 randomly selected research papers on e-collaborative learning.
53	Murillo et al. (2005) Murillo et al. (2005)	audio/ video-conferencing packages	technical evaluation report	International Review of Research in Open and Distance Learning	This report compares two integrated course delivery packages: Centra 6 and WebEx. The criteria used in the current evaluation include capacity, interactivity features, integration with learning management systems, technical specifications, and cost. The report ends with a short analysis of the currently emerging audio-conferencing software, Google Talk.
54	Murphrey and Coppernoll (2006)	(*adoption of*) online conferencing system	adoption process description	Journal of Extension	The adoption of an Online Conferencing System by Texas Cooperative Extension has provided a way to meet challenges of geographic distance, time, and resource limitations in providing professional development. While the use of Online Conferencing Systems offer new and innovative ways to meet needs while reducing travel time and cost, implementing and gaining acceptance of this technology requires purposeful and planned efforts.
55	Morris et al. (2004)	single display groupware	action research/ user study with session feedback survey	ACM Conference on Computer Supported Cooperative Work, CSCW, Chicago, IL (Proceedings)	This paper introduces a system that allows four users to each receive sound from a private audio channel while using a shared tabletop display. In order to explore how private audio channels affect a collaborative work environment, the authors conducted a user study with this system.
56	Reinig et al. (1996)	group support systems	laboratory investigation	Journal of Management Information Systems	Research shows that group support systems (GSS) have dramatically increased group productivity. However, researchers in the field discovered that users sometimes find themselves feeling emotionally unfulfilled despite exceptionally good results: users report a loss of the affective reward often associated with a challenging meeting where they struggle and succeed. This lack of engagement has been shown to be a cause of user resistance to adopting GSS technology.

57	Auyeung (2004)	collaborative information technology	ethnographic study/ case study, summative evaluation of messages	J. Educational Computing Research	This article reports on how a social sciences instructor teaching contemporary global issues implemented collaborative learning among students in a virtual environment.
58	Crossland et al. (2000)	interactive tutoring system	case study/ project description	Educational Technology & Society	This case study describes Project FORESEE, a tutoring system utilizing a computer-based network under development at North Carolina State University in Raleigh, North Carolina. The project is a collaboration among university faculty and students in the Colleges of Engineering and Education and Psychology, teachers, administrators, students and parents in a public school system, and a cadre of volunteer tutors.
59	Kethers et al. (2004)	NetMeeting™ (NM)	case study/ participatory action research	ACM Conference on Computer Supported Cooperative Work, CSCW, Chicago, IL (Proceedings)	This paper describes the preliminary analysis of the use of NetMeeting™ (NM) to share outputs of a simulation model between farmers and researchers at a distance. The authors mainly describe issues relating to the asymmetries between the two groups, which lead to different technology preferences and needs.
60	Stevens et al. (2003)	collaborative scientific workspaces (room-based computing environments)	technical application description	Internet Computing	Several research groups are exploring the concept of "smart spaces" or "active spaces," which aim to create work environments with embedded computing capabilities that support a broad range of user tasks. The Access Grid provides an important class of collaboration services that can be incorporated into these advanced environments.
61	McFadden et al. (2002)	collaborative information technologies	multiple case studies/ project reviews	International Journal of Human-Computer Interaction	This article describes some collaborative software that allows remote evaluations, along with the necessary hardware, to reproduce, as closely as possible, traditional evaluation techniques.
62	Bradner (1999)	chat	field study/ interviews, conversation logs	European Conference on Computer Supported Cooperative Work	The paper describes the adoption and use of a novel, chat-like system called BABBLE. Drawing on interviews and conversation logs from a 6-month field study of six different groups at IBM Corporation (USA), the authors examine the ways in which the technical properties of the system enable particular types of communicative practices such as waylaying and unobtrusive broadcast. The authors then consider how these practices influence (positively or negatively) the adoption trajectories of the six deployments.
63	Yankelovich (2004)	collaboration tools	technical application description	ACM Conference on Computer Supported Cooperative Work, CSCW, Chicago, IL (Proceedings)	This paper presents the Meeting Central prototype – a suite of collaboration tools designed to support distributed meetings.
64	Yoo (1998)	(*usage of*) groupware	longitudinal field study/ action research	Hawaii International Conference on System Sciences (Proceedings)	In a longitudinal study with 108 senior executives, *intentions to use* a specific groupware system, measured two weeks after the training and initial introduction of the technology, were found *not* to be correlated with system use eight weeks later.
65	Chen and Lou (2002)	(*intention to use/ acceptance of*) a groupware application	experiment (judgement modelling exercise)	Journal of End User Computing	This study examines the use of expectancy theory in explaining the behavioural intention (motivation) to use a groupware application.

66	Lai et al. (2006)	(*use of*) computerized decision support systems	case study	Human Factors	The results of this study indicate that there is a potential for a relatively brief tutorial to increase acceptance and use of decision support tools for medical diagnosis.
67	Basharina (2007)	international tele-collaboration	process-oriented exploratory field study	Language Learning and Technology	This process-oriented study focuses on contradictions that emerged in a WebCT bulletin board collaboration among English learners from Japan, Mexico and Russia, and explains them from the perspective of activity theory.
68	Reinig (2003)	collaborative technologies, group support systems	multiple laboratory experiments (26 groups, 15 meeting in a computer lab receiving GSS support and 11 meeting FTF in a conference room)	Journal of Management Information Systems	This paper presents a causal model of meeting satisfaction derived from goal setting theory. The model is tested with an empirical study consisting of 15 GSS groups and 11 face-to-face (FTF) groups engaged in the "lost at sea" task. The results of analysis using structural equation modelling indicate support for the model's integrity across both GSS and FTF groups.
69	Bendoly and Bachrach (2003)	multi-period group decision-making	experimental model validation	European Journal of Operational Research	This work investigates an extremely basic process approach to multi-criteria multi-period group decision-making.
70	Bishop et al. (2004)	ICTs for supporting communities of inquiry	field study/ action research	Journal of Digital Information	The Inquiry Page project supports a set of ICTs that have been developed by a community of inquiry in order to support communities of inquiry.
71	Tremblay et al. (2005)	audio/ video-conferencing packages	technical evaluation report	International Review of Research in Open and Distance Learning	A comparison was conducted of Voxwire MeetingRoom and iVocalize v4.1.0.3, both Webconferencing products using voice-over-Internet protocol (VoIP) to provide unlimited, inexpensive, international audio communication, and high-quality Web-conferencing fostering collaborative learning. It is concluded that these two highly competitive products provide a serious challenge to the markets of their highly priced rivals.
72	Briggs et al. (1999)	(*use of*) group support systems	observational field investigation/ theoretical argumentative	Journal of Management Information Systems	There are several thousand group support systems (GSS) installations worldwide, and, while that number is growing, GSS has not yet achieved critical mass. One reason may be that it can take one to three years for an organization to complete a transition to GSS. This article presents a thirty-two-month qualitative field investigation of an effort to introduce GSS into the daily work of the staff of the U.S. Navy's Commander, Third Fleet. Throughout the study, building on a base of experience developed in other private and public-sector transition projects, the authors revised and extended TAM based on insights that emerged in the field. The resulting model, the Technology Transition Model (TTM), frames *acceptance* as a multiplicative function of the magnitude and frequency of the perceived net value of a proposed change, moderated by the perceived net value associated with the transition period itself. TTM frames net value as having a number of dimensions, including cognitive, economic, political, social, affective, and physical. It posits that cognitive net value derives from at least three sources: changes in access, technical, and conceptual attention loads.

73	Matsushita et al. (2004)	face-to-face collaboration support system	technical application description	ACM Conference on Computer Supported Cooperative Work, CSCW, Chicago, IL (Proceedings)	This paper proposes the Lumisight Table. This is a system capable of displaying personalized information to each required direction on one horizontal screen simultaneously by multiplexing them and of capturing stakeholders' gestures to manipulate the information.
74	Kim (2002)	distributed group support systems	experiment (2 × 2 factorial)	Group Decision and Negotiation	This study examines the effect of system restrictiveness of coordination structures in an asynchronous environment. A 2 × 2 factorial experiment was designed with two independent variables – *sequential* vs. *parallel* coordination mode, and *with* vs. *without* a leader – to construct coordination structures with varying degrees of restrictiveness. The study finds that less restrictive coordination structures are more appropriate to support asynchronously interacting distributed groups. Objective decision quality is equal for both parallel and sequential coordination mode, but is significantly better with a group leader. Groups with parallel coordination mode have a stronger belief that the decisions they made are of higher quality than those of groups with sequential coordination mode. In groups with a leader, communication effectiveness is better. Satisfaction with a decision process is higher in parallel coordination groups and in groups with a leader. There is also a significant interaction effect. Satisfaction with the decision process is higher in sequential coordination groups with a leader than sequential coordination groups without a leader.
75	Christensen and Fjermestad (1997)	group support systems	content analysis of academic literature	Group Decision and Negotiation	Strategic decision making (SDM) often occurs in groups that can benefit from the use of group support systems (GSS). This article explores this intersection by viewing GSS research through the lens of SDM.
76	Stanoevska-Slabeva and Hoegg (2006)	collaborative working environments	multiple case studies (twelve brief cases)/ cross-case comparison	Collecter Europe 2006, Proceedings	This paper presents a taxonomy for collaborative working environments (CWEs). It describes a matrix consisting of two axes: "level of human interaction" and "collaboration context" of different CWEs. Based on twelve brief cases, it illustrates the different categories of CWEs and elaborates on potential implications.
77	Lee et al. (1999)	collaborative systems and technology	meta-analysis	Hawaii International Conference on System Sciences (Proceedings)	Much of the available literature on collaborative systems and technology implementation tends to focus on functional design and application issues. There is relatively little on general frameworks and empirically validated theories explaining (and predicting the outcomes of) the adoption and diffusion processes.
78	Parent and Gallupe (2001)	*use of* group support system	case study/ participatory action research (the researcher being the facilitator)	Group Decision and Negotiation	This paper reports on a research case study in which the use of a Group Support System (GSS) by a multi-organizational alliance failed. The paper argues that the leadership style of the meeting champion may be a much greater moderating factor in GSS meeting success than previously thought. Transformational Leadership Theory is used to explain the results, and implications for both researchers and managers are drawn. Two themes emerge: first, the case shows where the concept of "phony democracy" may or may not occur. Second, the case illustrates conditions under which a GSS may generate, as opposed to mitigate conflict. For managers, it suggests that using a GSS may not be optimal if they choose to adopt a Transactional leadership

					style. For researchers, this work offers insights into boundary conditions affecting GSS usage, extending a paucity of research in negative GSS-usage cases.
79	Özdamar et al. (1998)	proprietary groupware tools/ decision support systems	case study/ system development project review	European Journal of Operational Research	Case study describing the development of a Hierarchical Decision Support System (HDSS) for production planning which enables production planners to utilize complex and structured planning algorithms interactively with no difficulty.
80	Lim (2003)	(*adoption of*) negotiation support systems	exploratory theoretical study through questionnaires	Information and Software Technology	An exploratory study was conducted to identify factors affecting the intention to adopt negotiation support systems (NSS) by managers and executives. Drawing from past literature, the Theory of Planned Behaviour and the Technology Acceptance Model provided basis for analyzing the results. Overall, subjective norm and perceived behavioural control emerged as strongest determinants of intention to adopt NSS. Further probing of subjective norm revealed organizational culture and industrial characteristics to play significant roles. A new conceptual framework is proposed which would be of both theoretical and practical importance.
81	Bindels et al. (2003)	proprietary groupware tools (clinical decision support systems)	*Part 1*: case study/ laboratory experiment *Part 2*: field study/ questionnaire, in-depth interviews	International Journal for Quality in Health Care	The results show that the GPs in the laboratory experiment had more positive attitudes towards the system compared with participants in the field trial. All discussion groups and most of the GPs in the field trial regarded receiving the immediate feedback during the test ordering process as an important advantage.
82	Crabtree et al. (2005)	CSCW	ethno-methodological study	Computer Supported Cooperative Work	This paper seeks to address the boundaries of CSCW and the ability of CSCW to respond to contemporary research agendas. The essay presents an ethnomethodological study of a location-based mixed reality game to demonstrate the continued relevance of CSCW approaches and concepts to contemporary agendas in IT research.
83	Herrmann et al. (2003)	groupware applications	meta-analysis	International ACM SIGGROUP Conference on Supporting Group Work, Sanibel Island, FL (Proceedings)	On the basis of a summary of the concept of patterns – as elaborated by the architect Christopher Alexander – its adoptions within computer science are retraced and relationships to the area of groupware are described.
84	Power (2000)	web-based decision support systems	literature review	American Conference on Information Systems	New technologies, especially the World-Wide Web technologies, have created many opportunities for research about Decision Support Systems. This paper reviews key concepts and technical issues.
85	Chun and Park (1998)	group decision support systems	content analysis of academic literature	Information & Management	GDSS research is now rare. One possible reason is the difference between field experience and many experimental studies. Another reason is that GDSS research over the past years mainly focused on decision rooms. The important question posed is: what are the reasons for the conflicting results of GDSS research? Thus, this study systematically reviews existing GDSS studies and explores the probable reasons for inconsistent findings.

86	Glezer (2003)	calendar and scheduling systems	ethnographic investigation/ in-depth interviewing	Journal of Strategic Information Systems	This article reviews the prevailing literature on interoperability standards for calendar and scheduling systems. It then proposes and evaluates comprehensive agent-based architecture for an IIMS that incorporates interoperability standards and mechanisms in all three aspects inherent to the meeting-scheduling process: calendar-, scheduling- and communication-management.
87	Palen (1999)	groupware calendar systems (GCSs)	ethnographic field study /survey through interviews as well as email; in-office observation through video recording	Conference on Human Factors in Computing Systems - Proceedings	A field study on social, individual & technological issues for Groupware calendar systems (GCSs).
88	Fitzpatrick et al. (2006)	concurrent version systems (CVS), chat	longitudinal ethnographic study/ statistical analysis of CVS logs, qualitative analysis of tickertape logs, interview data	ACM Conference on Computer Supported Cooperative Work, CSCW, Banff, AB (Proceedings)	Code management systems like Concurrent Version System (CVS) can play an important role in supporting coordination in software development. The focus of this paper is one team's long term use of a solution where CVS is augmented with a lightweight event notification system. Developers used the close integration of CVS with chat for growing team culture, stimulating focused discussion, supplementing log information, marking phases of work, coordinating and negotiating work, and managing availability and interruptibility. This has implications for consideration of more lightweight solutions for supporting collaborative software development, as well as managing awareness and interruptions more generally.
89	Kienle and Ritterskamp (2007)	discussions moderation tools	field study/ action research	Behaviour and Information Technology	This article presents an approach for supporting moderators of asynchronous processes in learning communities. This approach follows the socio-technical perspective: it includes a theory-based development of moderator tasks and the technical features designed to support these tasks.
90	Dennis et al. (2001)	group support systems	meta-analysis	MIS Quarterly	This paper develops a model for interpreting GSS effects on performance (a Fit-Appropriation Model), which argues that GSS performance is affected by two factors. The first is the *fit* between the task and the GSS structures selected for use (i.e., communication support and information processing support). The second is the *appropriation* support the group receives in the form of training, facilitation, and software restrictiveness to help them effectively incorporate the selected GSS structures into their meeting process.
91	Powell (2007)	blogs	case study/ ethnographic method	Library Journal	A case study of library staff using a blog to disseminate information and exchange library materials.
92	Nunamaker et al. (1997)	group support systems	meta-analysis/ descriptive evaluation	Journal of Management Information Systems	During the past dozen years, researchers at the University of Arizona have built six generations of group support systems software, conducted over 150 research studies, and facilitated over 4,000 projects. This article reports on lessons learned through that experience. It begins by presenting a theoretical foundation for the Groupware Grid, a tool for designing and evaluating GSS. It then reports lessons from nine key domains: (1)GSS in organizations; (2) cross-cultural and multicultural issues; (3) designing GSS software; (4) collaborative writing; (5) electronic polling; (6) GSS facilities and room

					design; (7) leadership and facilitation; (8) GSS in the classroom; and (9) business process reengineering.
93	__ (2006)	blogs, podcasts	field study/ conference report	Strategic Direction	The potential of blogging for business is not to be underestimated.
94	Gilbert and Dabbagh (2005)	online discussions	case study/ content analysis of online discussion transcripts	British Journal of Educational Technology	This study examined the impact of structuredness of asynchronous online discussion protocols and evaluation rubrics on meaningful discourse. Transcripts of twelve online discussions involving 87 participants from four sections of a graduate course entitled Instructional Technology Foundations and Learning Theory were analysed across four semesters.
95	De Wever et al. (2006)	online discussion groups	meta-analysis (of content analysis research techniques)	Computers and Education	Research in the field of Computer Supported Collaborative Learning (CSCL) is based on a wide variety of methodologies. This paper focuses upon content analysis, which is a technique often used to analyze transcripts of asynchronous, computer mediated discussion groups in formal educational settings. This article presents an overview of different content analysis instruments, building on a sample of models commonly used in the CSCL-literature.
96	Gutwin and Greenberg (2002)	real-time groupware	laboratory observational experiments	Computer Supported Cooperative Work	This paper presents a descriptive framework of workspace awareness for real-time groupware.
97	Munkvold et al. (2006b)	electronic patient record	interpretive field observation/ workplace study	ACM Conference on Computer Supported Cooperative Work, CSCW, Banff, AB (Proceedings)	This paper reports from an introduction of the electronic patient record for nurses in a Norwegian hospital.
98	Shirani et al. (1999)	technologies for synchronous and asynchronous group communication: email and a group support system	experiment	Information and Management	An experiment was conducted to examine the interaction between task structure and technology to support synchronous and asynchronous group communication. Two communication technologies, e-mail and a group support system (GSS), and two levels of task structure (less structured and more structured) were used. Group outcomes were measured as total number of unique ideas generated, which were further decomposed into basic and inferential idea categories. Results indicate that GSS supported groups generated more total and basic ideas. However, groups using email performed a deeper problem analysis as indicated by a higher proportion of inferential ideas generated by these groups.
99	De Vreede et al. (1998)	group support systems	field study (cross-cultural)/ descriptive field explorations	Journal of Management Information Systems	The study reported here represents the first detailed descriptive field study of GSS application in Africa. A grounded theory approach was used to collect and analyze data on eleven projects in which GSS meetings were organized in Malawi, Zimbabwe, and Tanzania. From the data emerged a model of GSS acceptance in the cultures investigated that extends the Technology Acceptance Model (TAM) in terms of a specification of a number of relevant external factors.
100	Guariso and Rinaldi	decision support systems (for water	case study/ project	European Journal of	The article reviews an application-oriented study on the management of lake Como, a natural multipurpose reservoir in Northern Italy. The emphasis is on

	(1985)	management)	overview	Operational Research	the Decision Support System that resulted from this study and which is now being used by the manager to take his decisions on the amount of water to be released each day from the lake. The decision support system is based on the optimal solutions of complex multiobjective mathematical programming problems.
101	Siu et al. (2006)	email	ethnographical observation/ first-hand observational data, questionnaire	ACM Conference on Computer Supported Cooperative Work, CSCW, Banff, AB (Proceedings)	Email use in the context of everyday work practices, or email flow, has not been heavily studied. This paper presents the results of a pair of studies examining how users interlace email with their day-to-day, ongoing work processes. The study demonstrates that the subjects use email as a tool for managing moment-to-moment attention and task focus.
102	Johnston and Bowen (2005)	proprietary groupware tools (electronic records management system or an electronic document management system)	multiple case studies/ literature review	Records Management Journal	This paper discusses case studies of proprietary groupware tools use. Few case studies were found in which clear, quantitative benefits are described.
103	Scheets et al. (2005)	video-conferencing	case study/ technical description	IEEE Transactions on Education	This paper discusses changes made to a same-time–same-place tele-communications laboratory that have allowed experiments to be offered in a same-time–different-place manner. Some of the key lessons learned to date are also presented.
104	Treese (1997)	IBM Lotus Notes	interviews	The Risks Digest	This article reports that one of the world's most widely used e-mail programs, the American Lotus Notes, is not so secure as most of its 400,000 to 500,000 Swedish users believe.
105	Turel and Yuan (2007)	web-based negotiation support systems (WNSS)	field study/ survey through phone interviews	Group Decision and Negotiation	This study extends the technology acceptance model (TAM) for the context of e-negotiation through the inclusion of perceptions regarding the intention of the negotiating partner to use WNSS (i.e. perceived intentions). A telephone-based survey among 500 randomly selected senior managers of companies in Ontario, Canada was conducted.
106	Fjeld et al. (2002)	groupware	theoretical/ argumentative	Computer Supported Cooperative Work	The paper discusses the application of activity theory applied to the design of groupware.
107	Madden (2005)	blogs	case study/ ethnographic method	Technology Review	A case study of a growing blogging franchising chain.
108	Cooke (2006)	blogs	expert viewpoint (observational arguments)/ ethnographic method	International Journal of Market Research	The paper discusses the potential of blogging for market research. Finding: blogs as the dataset of a 'virtual ethnography' (opposed to traditional market research with falling response rates).
109	Davis and Rouzie (2002)	computer mediated conferencing	experiment	International Review of Research in Open and Distance Learning	This essay discusses a two-year experimental course conducted between two college classes in Karlskrona, Sweden and Ohio, in the United States. The goal of this course was to use online debate to augment intercultural understanding.
110	Simone and Bandini	cooperative applications	theoretical/ argumentative	Computer Supported	The paper discusses the notion of *awareness* from the point of view of the

	(2002)	(CSCW)		Cooperative Work	design of a supportive technology.
111	Trauth and Jessup (2000)	group support systems, discussion groups	multiple study techniques: ethnography, hermeneutics, and grounded theory/ case study	MIS Quarterly	This research considers whether interpretive techniques can be used to enhance our understanding of computer-mediated discussions. The case study considered in this research is the use of a group support system (GSS) to support employee discussions about gender equity in a university.
112	Sikkel et al. (2002)	web-based collaborative tools (BSCW)	multiple case studies/ ethnographic observation (cross-case comparison)	Innovations in Education and Teaching International	The use of BSCW shared workspaces in higher education is evaluated by means of a comparison of seven courses in which this environment was used. A number of different functions for which the BSCW environment has been used are identified and the relative success of these functions across the cases is discussed.
113	Rogers (2000)	on-line learning tools	case study	Educational Technology and Society	This paper presents a case study of an on-line workshop that was conducted via the WWW. The results indicate that participants interactions in the workshop demonstrated the characteristics of mutual engagement, joint enterprise, and shared repertoire.
114	Haythornthwaite (2000)	online personal networks, egocentric networks	social network analysis	New media & Society	This paper presents an analysis of personal ties and relationships in online personal networks.
115	Fichter (2003)	blogs	expert viewpoint/ ethnographic method	ONLINE	Blogging software overview based on expert's experience.
116	Fono and Baecker (2006)	chat	technical system description	ACM Conference on Computer Supported Cooperative Work, CSCW, Banff, AB (Proceedings	Persistence of conversations has been found to be a useful feature in group chat tools. When conversations are stored and made accessible to all members of a group, they can facilitate organizational memory, group awareness, and other beneficial practices. However, the lack of structure in chat conversations makes it difficult for users to read and keep track of lengthy conversation histories. To contend with this problem, the authors present a persistent chat system that incorporates a number of features which facilitate participation in long, ongoing conversations.
117	Den Otter and Emmitt (2007)	electronic tools for synchronous and asynchronous team communication	multiple case study/action research	Engineering, Construction and Architectural Management	The paper reveals a review of research conducted into the use of two relatively new electronic tools for team communication by design teams in the Netherlands. The research results revealed that a collective framework for team communication and collaboration using electronic tools was missing. There was also evidence of a lack of understanding by the users of the proper use of the tools, a lack of training, poor management competences to stimulate proper use. There was also evidence that the rivalry of tools tended to hinder, rather than improve, effectiveness of team communication.
118	Halverson (2002)	CSCW	Computer Supported Cooperative Work	Computer Supported Cooperative Work	This essay compares activity theory (AT) with distributed cognition theory (DCOG), asking what each can do for CSCW.
119	Brezillon and	knowledge-based and decision support	theoretical/ argumentative	LAFORIA-IBP	An evaluation of the number of expert systems or knowledge-based systems (KBSs) that are operational within companies or administrations.

	Pomerol (1997)	systems			
120	Tammaro et al. (1997)	collaborative writing tools	field study/ test	Computer Supported Cooperative Work	This paper documents the results of a field test of Instant Update, a collaborative writing tool by a geographically dispersed department at the MITRE Corporation.
121	Kohrs and Merialdo (2001)	(*use of*) collaborative filtering	observational case study	Interacting with Computers	This article identifies filtering, especially collaborative filtering, as a key technology for the creation of user-adapted Websites.
122	Rowe (2005)	decision support systems	longitudinal case study/ 45 observations and qualitative interviews	Journal of Information Technology	Are decision support systems getting people to conform? This paper explores the impact of work organisation and segmentation on user behaviour in a French bank.
123	Ngwenyama and Lyytinen (1997)	groupware environments, groupware technologies	theoretical/ argumentative	Computer Supported Cooperative Work	This paper proposes a social action framework for analyzing groupware technologies. The framework is based on Habermas's theory of social action and four action categories, and the idea that groupware applications serve as sets of rules and resources which mediate group interactions.
124	Munkvold (2005)	collaborative information technologies (permanent e-collabo-ration infra-structures)	case study/ cross-case comparison	IEEE Transactions on Professional Communication	This is a cross-case comparison of experiences from organizational adoption and use of e-collaboration technologies in two large, global companies. The study increases our understanding of the adoption and use of permanent e-collaboration infrastructures at the organizational level, thus expanding the focus of global e-collaboration research beyond the level of ad hoc, virtual teams.
125	Laff (2007)	blogs	interviews/ ethnographic method	T and D	*Paper Finding*: Blogs are a new medium for shaping company culture and breeding better management. The vigilant nature of blogging means that any attempt by a company to deceive its audience could become newsworthy. Corporate blog policies: companies should put their blog policy in writing in the same fashion they would with other personnel issues.
126	Mosier and Tammaro (1997)	group scheduling tools	field study/ test	Computer Supported Cooperative Work	This paper documents the results of their use of a group scheduling tool, Meeting Maker Version 1.5. Research in the late 1980s showed that early group scheduling tools were not useful, in part because they only benefited some users and hence critical mass could not be attained.
127	Di Eugenio et al. (2000)	human-human computer-mediated collaborative dialogs	experiment/ content analysis of computer-mediated design dialogs	International Journal of Human Computer Studies	The main contribution of this paper is an empirical study of some of the components of the agreement process.
128	McNichols and Brennan (2004)	collaborative supply chain systems	longitudinal field study/ observations, questionnaires	17th Bled eCommerce Conference eGlobal, Proceedings	Based upon previous research and empirical data, the authors have devised a positioning framework for prospective adopters to illustrate the potential impact of a collaborative supply chain system.
129	López and Skarmeta (2003)	CSCW environments	technical application description	IEEE Computer Society	The article describes the ANTS CSCW component framework (http://ants.etse.urv.es/). Several projects were implemented using ANTS, including a shared whiteboard, multi-user games such as Pong, and a MOO text interface.

130	Mark and Poltrock (2003)	data-conferencing (Microsoft NetMeeting)	case study (Boeing Company)	International ACM SIGGROUP Conference on Supporting Group Work - Proceedings	Examination of Dataconferencing (Microsoft NetMeeting) adoption rates and patterns at two different sites of the Boeing Company (Seattle and Central City): the first site being comprised of geographically distributed (remote) teams, and the second being comprised of collocated teams.
131	Bachnik et al. (2005)	blogs	sociometric analysis (quantitative sociological analysis of blog networks)	Acta Physica Polonica	Examination of the emerging phenomenon of blogging, using three different Polish blogging services as the base of the research (blog.onet.pl, blog.gery.pl, jogger.pl).
132	Lea (2001)	computer conferencing systems	ethnographic observation/ student course	Studies in Higher Education	This article has looked at the relationship between the construction of academic knowledge, the use of rhetorical resources, reflexive learning practices and the ways in which all these are implicated in student writing.
133	Gear et al. (1999)	group decision support system	case study	International Journal of Technology Management	The paper describes this process as one of interactive communication and goes on to show how a group decision support system may facilitate the process. In the final part of the paper, a case study in which such a system was used is outlined and explained.
134	DeKoven (2000)	web conferencing, document storage/ sharing, instant messaging, group email, message boards, instant printing	technical tool descriptions	Intranet Journal	This paper has identified seven types of internet-based services, and featured one example of each.
135	Papadopoulos (2002)	CSCW	technical framework description	Computer Journal	In this paper, it is argued that temporal logic can be sufficiently expressive to specify such properties of CSCW. In particular, groupware temporal logic (GTL) has been developed as an extension of computation tree logic, to enable the specification of timing properties that characterise CSCW.
136	Bentley et al. (1997b)	BSCW	descriptive analytical	Computer Supported Cooperative Work	This paper illustrates the potential of the BSCW shared workspace system – an extension to the Web architecture which provides basic facilities for collaborative information sharing from unmodified Web browsers. The authors conclude that despite limitations in the range of applications which can be directly supported, building on the strengths of the Web can give significant benefits in easing the development and deployment of CSCW applications.
137	Jeong (2006)	computer-supported collaborative argumentation	field study/ action research sessions (event sequence analysis)	Instructional Science	Using event sequence analysis to analyze message response exchanges in eight online group debates, this study found that (a) arguments elicited 41% more challenges when presented with more conversational language, (b) challenges with more conversational language elicited three to eight times more explanations, and (c) the number of supporting evidence elicited by challenges was not significantly different from challenges that used more versus less conversational language.
138	Briggs et al. (2003)	collaborative information technologies	theoretical argumentative	Journal of Management Information Systems	Drawing on the Technology Transition Model, the paper argues that the *high conceptual load* of GSS (i.e. understanding of the intended effect of GSS functionality) encourages organizations to employ expert facilitators to wield

					the technology on behalf of others. Economic and political factors mitigate against facilitators remaining long term in GSS facilities that focus on supporting non-routine, ad hoc projects. This especially hampers scaling GSS technology to support distributed collaboration. An alternative and sustainable way for organizations to derive value from GSS lies in an approach called "collaboration engineering": the development of repeatable collaborative processes that are conducted by practitioners themselves.
139	Wilson (2006)	blogs	expert viewpoint/ ethnographic method	T and D	Observations on the legal rights on "the blogger at work"
140	Haskell and Martin (2004)	blogs	case study/ ethnographic method	Hospitals & health networks	A case study of a nurse on a medical-surgical unit who was keeping a Web log, a diary of her life. In her blog, she recounted experiences at work, and stories about the hospital. She mentioned patients, but her references were vague enough so that no one could identify them. The paper discusses the question of "Would you tell her to stop?".
141	Harper (2000)	CSCW	theoretical/ argumentative	Computer Supported Cooperative Work	This is a paper on the role of Ethnography as a key method in the field of CSCW.
142	Kear and Heap (2007)	educational discussion systems	action research/ interviews and observations (of the interviewees using the system)	Journal of Computer Assisted Learning	This research aims to identify features that increase the benefits of discussion systems and reduce the problems. The paper focuses on a major theme that emerged from interviews with learners and teachers: information overload.
143	Martin (2007)	email, wikis, blogs,	field study/ ethnographic method	eContent	Comparison of the advantages and disadvantages of corporate email, wikis, and blogs.
144	Hung et al. (2007)	decision support systems	experiment	Decision Support Systems	*Paper Finding*: DSS adoption may be motivated by avoiding decision errors or reducing decision cost, indicating that regret avoidance may be a useful measure of DSS success. *Regret* is a *post-decision feeling* regarding not having chosen a better alternative. Recent behavioural research has indicated that, in addition to pursuing higher performance and user satisfaction, reducing decision regret is another important consideration for many decision-makers.
145	Bentley et al. (1997b)	web-based collaborative tools (BSCW)	technical description	International Journal of Human Computer Studies	Technical description of BSCW (Basic Support for Cooperative Work) – a shared web-based workspace offering basic facilities for collaborative work.
146	Brabazon (2006)	blogs, wikis	expert viewpoint/ ethnographic method	Libri	Discussion on the "flattening of experience" of reading – through the proliferations of Blogs and Wikipedia, and the large quantity of low quality material which has emerged – raising stark questions about the value of reading, research, writing and scholarship.
147	Fine (2005)	blogs, wikis	expert viewpoint/ ethnographic method	Business Week	Viewpoint seeking to overlay organizing principles upon the fast-growing tendrils of the blogosphere.
148	Benbenishty and Treistman (1998)	proprietary groupware tools (decision support	case study/ ethnographic observation	Social Work Research	This article reports on the development, implementation, and evaluation of a decision support system (DSS) for the Israeli army.

		system)			
149	Schäfer (1997)	electronic meeting system	literature and market review	University of Hannover	This paper gives and overview of the EMS topic and examines the application opportunities for EMS in architecture.
150	Kock (2001)	collaborative technologies	action research study	Information Systems Journal	This paper investigates the effects of asynchronous group support systems (GSSs) on process improvement (PI) groups to redesign their processes.
151	Bardram (1997)	groupware	field study/ ethnographic investigations (data analysis based on interviews; participative observations of daily work, meetings and conferences, studies of different documents, records and other tools)	International ACM SIGGROUP Conference on Supporting Group Work, Phoenix, AZ, USA (Proceedings)	The paper reports on a field study of the differences in work practices of hospitals using a computer system and hospitals *not* using the system. The paper concludes that the design of groupware should recognize the multiplicity of artefacts in the workplace (both manual and computational) and the need for interconnecting groupware with Information Systems.
152	Salcedo and Decouchant (1997)	web-based cooperative authoring tool	technical application description	Computer Supported Cooperative Work	This article reports on designing and implementing Alliance: a structured cooperative authoring application that allows people spread out across different locations to work together on document production and maintenance.
153	Neus and Scherf (2005)	open-source collaboration systems	theoretical/ argumentative	IBM Systems Journal	As open-source software becomes accepted worldwide, open-source collaboration and development methods are also gaining greater momentum. Collaboration based on the open-source paradigm is increasingly being used to improve multisite development and teamwork inside companies. Drawing on experience in projects for improving multisite collaboration, this paper explains how we evaluate communication and collaboration problems, assess obstacles to change, and facilitate the change by introducing employees to the benefits of the collaborative model over traditional development projects in a workshop setting.
154	Brereton et al. (2000)	groupware	case study/ ethnographic study: questionnaire, observation of daily behaviour, expert opinions	IEEE Transactions on Education	This paper reports on work undertaken by three U.K. universities to provide computer science students with the opportunity to experience group working *across universities* using low-cost tools to support distributed cooperative working.
155	Grasso et al. (1997)	web-based workflow environment	technical tool description	Computer Supported Cooperative Work	This paper describes WebFlow, an environment that supports distributed coordination services on the World Wide Web.
156	Adetayo et al. (1999)	decision support systems	case study/ questionnaire	Technovation	*Paper Finding:* Improper planning of jobs could lead to time-wasting with electronic spreadsheets and decision support systems.
157	Crawford and Hasan (2006)	virtual collaborative environment	action research/ participatory, developmental method	19th Bled eConference eValues	This paper describes, analyses and interprets a research and development process taking place over several years concerning the evolution of a virtual collaborative environment.
158	Timpka (1989)	hypertext decision	survey	Computer Methods and	This survey of the a priori acceptance of decision support systems by general practitioners showed that 84% would use the computer support if it was

		support systems		Programs in Biomedicine	available today and that full-text databases, such as hypertext, were given highest priority for introduction.
159	Pervan et al. (2004a)	email, tele-conferencing, video-conferencing, data-conferencing, web-based collaboration tools, proprietary groupware tools, electronic meeting systems	field study/ survey	Group Decision and Negotiation	A large-scale study undertaken to explore the adoption and use of EMS, particularly in large organizations. Exploration possible barriers to EMS adoption and use across organizations.
160	Ginsburg and Duliba (1997)	IBM Lotus Notes	three exploratory case studies	Computer Supported Cooperative Work	This paper considers collaborative software at the enterprise level, specifically Lotus Notes and alternatives which use Intranet-based (World Wide Web) technologies. The authors examine the strategic reasons, both short-term and long-term, motivating firms' choices in the decision phase and organizational issues in the implementation phase in three exploratory case studies
161	Salmeron et al. (2001)	executive information systems	survey	Computer Standards and Interfaces	This paper intends to portray the present situation of Executive Information Systems (EIS) in Spain. For this purpose, the authors surveyed the three leading Spanish companies in every sector. This paper contains statistical material on EIS situation in Spain.
162	Sarter and Schroeder (2001)	decision support systems	two experimental studies	Human Factors	Operators in high-risk domains such as aviation often need to make decisions under time pressure and uncertainty. One way to support them in this task is through the introduction of decision support systems (DSSs). The present study examined the effectiveness of two different DSS implementations: status and command displays. The findings suggest that unless perfect reliability of a decision aid can be assumed, status displays may be preferable to command displays in high-risk domains (e.g. space flight, medicine, and process control), as the former yield more robust performance benefits and appear less vulnerable to automation biases.
163	Ocker and Yaverbaum (1999)	data-conferencing	experiments/ self-reported data + quiz	Group Decision and Negotiation	Following a repeated-measures experimental design, student groups collaborated on two case studies, one using face-to-face collaboration and the other using asynchronous computer conferencing technology as a means of collaboration.
164	Yam et al. (2007)	collaborative information technologies	case study/ ethnographic observation	Benchmarking	The case of Hasbro Far East Ltd is presented to depict the components of the information hub and why knowledge management can be effectively deployed in the management of the collaborative product development process.
165	Gely and Bierman (2006)	blogs	law review (court cases on workers' privacy)	Louisiana Law Review	Discussion on the development of blogs, and the virtual "space" where blogs and bloggers interact – the "blogosphere" and their impact on the issue of workers' privacy. *Main argument*: the importance of the development of blogs and the so called "blogosphere" lies in the fact that it has created a new "space", albeit a virtual one, where workers communicate.

166	Mark and Poltrock (2004)	data-conferencing (Microsoft NetMeeting)	case study (Boeing Company)	Information and Organization	The study contributes to developing the concept of *social worlds* as a way to explain groupware adoption across distance in a complex distributed organization.
167	Wang et al. (2007)	proprietary groupware tools/ decision support systems	case study/ simulation experiment	Industrial Management and Data Systems	With a designed simulation experiment, this paper describes how to use multi-agent simulation as a decision support tool.
168	Schellens and Valcke (2005)	computer supported collaborative learning (CSCL) environment	action research	Computers in Human Behaviour	This paper explores collaborative learning in asynchronous discussion groups, and the impact on cognitive processing.
169	Framingham (2006)	IBM Lotus Notes	expert opinion, interviews	Computerworld	*Paper's main argument*: IBM/Lotus hopes to finally attain what years of earlier efforts have failed to yield: widespread trust among Notes/Domino users that the company remains committed to the platform and its decade-long battle with Microsoft for collaboration-software supremacy.
170	Mark et al. (1997)	electronic meeting room environment	explorative experiment	Computer Supported Cooperative Work	Hypermedia structures have been integrated with CSCW functionality to develop the DOLPHIN system, an electronic meeting room environment. In this paper, a study is reported investigating how the DOLPHIN environment affects group work. Different aspects of group problem solving were examined to understand the effects of working with hypermedia: the group's product, cognitive factors, and the group process.
171	Itamiya et al. (2000)	collaborative tele-conferencing	technical system description	—	Although there has been a remarkable progress in network environments in recent years, such communication system in the field of medicine is yet to be established. This study develops a system by which two or more medical specialists in remote places can communicate comfortably while operating 3D model simultaneously. This system enables specialists to work collaboratively from remote places.
172	Burrell and Duan (1997)	proprietary groupware tools (knowledge-based system)	case study/ ethnographic observation	Failure and Lessons Learned in Information Technology Management	This article examines the characteristics of the strategic planning domain and discusses why a knowledge base system, as a single system, has failed to tackle this complex planning process. The study follows the development of a hybrid system that integrates knowledge base technology with decision support tools. It was found that this type of hybrid system produces better results when supporting various types of decision-making tasks.
173	Kock (1998)	group communication media	action research study	Information and Management	A study of five process improvement groups in a New Zealand university. The groups, which redesigned typical university processes, voluntarily conducted most of their interactions through an e-mail conferencing system developed by the author.
174	Mark (2002)	CSCW	case study/ action research through workshops, site visits, design-team-user discussions, and user interviews	Computer Supported Cooperative Work	This paper explores conventions and commitments in distributed CSCW groups.

175	Neale et al. (2004)	computer supported cooperative work	literature review	Computer Supported Cooperative Work	In this paper, the problems involved in evaluating remote collaborations are described, and some of the more prominent conceptual frameworks of group interaction are reviewed that have driven CSCW evaluation in the past. A multifaceted evaluation framework is presented that approaches the problem from the relationships underlying joint awareness, communication, collaboration, coordination, and work coupling.
176	Power (2001)	decision supports systems	theoretical/ argumentative	Informing Science	In this paper, a conceptual framework for Decision Support Systems (DSS) is developed based on the dominant technology component or driver of decision support, the targeted users, the specific purpose of the system and the primary deployment technology.
177	Jefferies and Constable (2000)	web-based collaborative tools (BSCW)	field study/ ethnographic observation	Educational Technology and Society	The paper reports on some of the issues encountered in implementing the use of a particular collaborative working tool – Basic Support for Collaborative Working (BSCW) – as an integral part of the learning experience within a particular module. The paper also reflects on the comments given by the students at the end of the experiment in order to provide an insight into some of the pedagogical and other issues which need to be considered to enable collaborative methods to be effective.
178	Hartswood and Procter (2000)	collaborative work settings	ethnographic investigation	International Journal of Human Computer Studies	This paper gives some design guidelines for dealing with breakdowns and repairs in collaborative work settings.
179	Kumar et al. (2004)	blogs	content analysis	Communications of the ACM	Content analysis of one million livejournal.com bloggers and 25,000 blogs drawn from a variety of worldwide sources. Insights into blogger behaviour were obtained.
180	Vandenbosch and Ginzberg (1997)	proprietary groupware tools (Lotus Notes)	case study/ quasi-ethnographic method: usage statistics + survey through interviews and questionnaire	Journal of Management Information Systems	Case Study of Lotus Notes (large American insurance company). Results: while almost everyone was quite pleased with the Lotus Notes implementation and its perceived impact, there was no evidence of a change in the degree of collaboration among organization members. Two key themes are explored as possible explanations for this result: fit of the technology to the organization, and limited training in how best to use this new technology.
181	Brusco and Jacobs (2001)	groupware (labor scheduling system)	case study/ experimental study	European Journal of Operational Research	The importance of effective starting-time selection is supported by this case study that describes a spreadsheet-based program designed for scheduling customer service representatives in the System Support Center.
182	Whittaker and Schwarz (1999)	electronic group tools, material group tools	ethnographic study	Computer Supported Cooperative Work	Despite a wealth of electronic group tools for coordinating the software development process, instead we find technologically adept groups preferring to use what seem to be outmoded “material” tools in critical projects. This ethnographic study investigates this apparent paradox.
183	Jeusfeld and Bui (1997)	decision support systems	case study/ system development project review	Decision Support Systems	Case study describing the development of a Decision Support System with the help of a proposed script language.

184	Bragge et al. (2006)	group support systems	action research/ qualitative analyses (session transcript reports, interviews, and observations); quantitative analyses (session feedback survey)	Group Decision and Negotiation	This paper reports on an action research (AR) intervention with a consortium of Finnish universities that needed to revise its joint strategy. The process was built using the Collaboration Engineering (CE) approach with thinkLets, which provides expert-level advice for novice facilitators, and it was powered by Group Support Systems (GSS).
185	Auyeung (2004)	collaborative information technology	case study/ descriptive and evaluative examination of a critical instance	J. Educational Computing Research	This article reports on how a social sciences instructor teaching contemporary global issues implemented collaborative learning among students in a virtual environment. In light of the present results, factors that would promote online collaboration among students were explored.
186	Munkvold et al. (2006)	collaborative information technologies (Lotus Notes, Sarepta Arena, Lotus Notes, Microsoft NetMeeting/ Lotus Sametime, Tandberg, GroupSystems, Confirmit)	case study/ ethnographic observation (first-hand observation of project phases and decision points)	International Journal of Cooperative Information Systems	A Case Study of Statoil – a Norwegian oil company. The study contributes to increase our understanding of collaborative IS decision-making processes, and the role of collaboration technologies for supporting these. A combination of different technologies for supporting multimode interaction was identified as a potential way of enabling more effective interaction in time pressed activities.
187	Munkvold and Anson (2001)	electronic meeting systems	case study	2001 International ACM SIGGROUP Conference on Supporting Group Work - Proceedings	A case study is of a large company (Statoil, a large Norwegian oil company) that has been relatively successful in diffusing Lotus Notes and NetMeeting, while only slowly winning an uphill battle implementing GroupSystems, a popular EMS.
188	Kirkpatrick and Roth (2005)	blogs	market analysis/ ethnographic method	Fortune	Market analysis of the “blogosphere”
189	Patterson et al. (1999)	auditory groupware technology	analytical descriptive	Computer Supported Cooperative Work	This paper suggests reasons for why the voice loop system is a successful medium for supporting coordination in space shuttle mission control based on over 130 hours of direct observation. Voice loops allow practitioners to listen in on relevant communications without disrupting their own activities or the activities of others. In addition, the voice loop system is structured around the mission control organization, and therefore directly supports the demands of the domain.
190	Mills (2006)	email	multiple case studies/ literature review	Interacting with Computers	In this paper, evidence from the Foot and Mouth epidemic of 2001 in the UK is used to investigate the usage of ICT in a real situation where distance pastoral care was essential. Data were gathered from the various official reports published in the aftermath of the FMD crisis. The findings show that the telephone was by far the best ICT tool although e-mail and the Internet were used in more formal business situations.

191	Gross et al. (2005)	computer-supported cooperative work-systems	theoretical/ argumentative	International Journal of Human-Computer Interaction	In this article, a structured embedding of findings in social sciences is proposed. It reveals the variety of approaches in technology-driven CSCW developments featuring *awareness*, as well as the variety of empirical evidence in small-group research with respect to awareness.
192	Nardi et al. (2000)	instant messaging	ethnographic study	Computer Supported Cooperative Work	The article discusses findings from an ethnographic study of instant messaging (IM) in the workplace and its implications for media theory. It describes how instant messaging supports a variety of informal communication tasks. It documents the affordances of IM that support flexible, expressive communication. It describes some unexpected uses of IM that highlight aspects of communication which are not part of current media theorizing. They pertain to communicative processes people use to connect with each other and to manage communication, rather than to information exchange. The authors call these processes “outeraction.” They discuss how outeractional aspects of communication affect media choice and patterns of media use.
193	Schrire (2006)	computer-supported collaborative learning (CSCL)	case study/ content analysis of the verbal data	Computers and Education	On the basis of a study of online discussion forums used in a higher education context, a model for the analysis of collaborative knowledge building in asynchronous discussion is presented.
194	Bal and Foster (2000)	collaborative information technology	ethnographic study/ literature survey, practical trials and observations	International Journal of Production Research	This paper describes current collaborative practices in the automotive supply chain, and identifies some crucial issues that need to be addressed for successful implementation of virtual teams.
195	Dourish (2003)	flexible CSCW toolkits	multiple case studies/ cross-case comparison	Computer Supported Cooperative Work	Based on an analysis of the basic issues of flexibility in toolkit design, the authors explore opportunities for the design of toolkits which avoid application style commitments, with illustrations from two toolkits.
196	Shakun (1999)	group support systems	theoretical/ argumentative	Group Decision and Negotiation	*Paper Finding*: Intercultural problem solving and negotiation involves interaction of two or more cultures. These processes may be formally modelled using the Evolutionary Systems Design (ESD) framework implemented by appropriate computer group support systems (GSS).
197	Bajwa et al. (2004)	email, audio conferencing, video conferencing, data conferencing, web-based collaborative tools, proprietary groupware tools, electronic meeting systems	empirical field study/ survey	Decision Support in an Uncertain and Complex World: The IFIP TC8/WG8.3 International Conference – Proceedings	Empirical field study exploring the adoption and implementation of several information technologies to support task-oriented collaboration in organizations in the US, Australia and Hong Kong.
198	Nardi et al. (2004)	blogs	ethnographic investigation	Communications of the ACM	Ethnographic investigation of blogging in a sample of ordinary bloggers.
199	Carroll et al. (2006)	computer-supported	theoretical/ argumentative	Interacting with Computers	This paper describes a framework for understanding joint endeavour in terms of four facets of activity awareness: common ground, communities of practice,

		collaborations			social capital, and human development.
200	Tse et al. (2004)	single display groupware (SDG)	laboratory experiments	ACM Conference on Computer Supported Cooperative Work (Proceedings)	Single Display Groupware (SDG) lets multiple co-located people, each with their own input device, interact simultaneously over a single communal display. While SDG is beneficial, there is risk of interference: when two people are interacting in close proximity, one person can raise an interface component (such as a menu, dialog box, or movable palette) over another person's working area, thus obscuring and hindering the other's actions. Consequently, researchers have developed special purpose interaction components to mitigate interference techniques.
201	Wong et al. (2000)	clinical decision support systems	field study/ multiple data sources (interviews with key industry informants, review of trade and scientific literature, site visits to facilities with cutting-edge CDSS systems)	Journal of Healthcare Management	The study reviews historic patterns of CDSS adoption, analyses barriers and enabling factors, and draws three lessons.
202	Wang and Haake (2000)	groupware	theoretical descriptive	Computer Supported Cooperative Work	Tailoring groupware has to deal with adapting properties of a shared information space as well as with adapting properties of the cooperation support to the group's needs. In this paper, an approach for tailoring both aspects of groupware in an integrated fashion is proposed.
203	Vincent (2000)	data-conferencing	multiple case studies/ longitudinal ethnographic research	Journal of Geography in Higher Education	Web-based, asynchronous conferencing was introduced on a trial basis, as part of the coursework for a final-year undergraduate course. The trial, which ran over two teaching years (1997– 99), was evaluated by a short electronic questionnaire.
204	Sampson (2005)	IBM Lotus Notes	expert opinion	Research Viewpoint	The article speculates upon IBM's denial over the death of Lotus Notes.
205	Miller (2003)	blogs	market analysis	eContent	Market analysis of the "blogosphere"
206	Gans et al. (2005)	clinical decision support systems	field study/ survey	Health Affairs	*Paper Findings*: the results suggest that adoption of Clinical decision support systems (in particular, electronic health records) is progressing slowly, at least in smaller practices, although a number of group practices plan to implement an CDSS within the next two years.
207	Lilien et al. (2004)	decision support systems (model-based)	laboratory experiment	Information Systems Research	*Paper Findings*: the results suggest that what managers get from a high-quality DSS may be substantially better than what they see. To increase the inclination for managerial adoption and use of DSS, we must get users to "see" the benefits of using a DSS.
208	Bardram (2000)	coordination tool	workplace action research, technical tool description	Computer Supported Cooperative Work	The paper introduces the PATIENT SCHEDULER, which is a prototype designed during this project to illustrate how aspects of temporal coordination can be supported by computer technology.

209	Schwarz and Schwarz (2007)	group decision support systems (GDSS)	laboratory experiment	Small Group Research	In this article, the authors focus on determining whether a group's attributes influence the effectiveness of the group's use of group decision support systems (GDSS). Specifically, their research objective is to understand the impact of the perception of the GDSS and group cohesion on outcomes of enjoyment with the process, enjoyment with the decision, the effectiveness of the decision, and efficiency of the decision. To test their hypothesis, the authors conducted a lab experiment.
210	Pargman (2003)	collaborative writing computer system	multiple case studies/ action research (observations, videotapes, and interviewes)	Interacting with Computers	This paper presents an analysis of the modifications that a synchronous computer support for collaborative writing introduces into the organization of co-authors' writing. The analysis is grounded in case studies of different groups of co-authors writing a report together face to face and at a distance through a collaborative writing computer system.
211	Gopal (1997)	group support systems	literature review	Group Decision and Negotiation	Organizations are successfully using group support systems (GSS) to improve efficiency, effectiveness, and satisfaction in organizational meetings. Meeting success relies on making an appropriate match between group, task, and technology. This responsibility often falls to the meeting facilitator. This article draws upon GSS and facilitation literature to develop a framework for the discussion of effective facilitation in workstation and keypad meeting environments.
212	Grinter (2000)	workflow systems	multiple case studies/ cross-case comparison	Computer Supported Cooperative Work	Workflow technologies have created considerable discussion within the computer supported cooperative work community. Although a number of theoretical and empirical warnings about the difficulties of workflow systems have appeared, the technologies continue to be built and sold. This paper examines the use of one workflow-like system and outlines three cases when the technology supported the work of its users. Comparing these successful occasions with some reports of difficulties, this paper draws conclusions about the circumstances that led to tool usage.
213	Olguin et al. (2000)	collaborative environments	technical application description	Educational Technology & Society	In this paper, a model is proposed to set collaboration profiles that would enable to identify potential collaborators, and an agent-based infrastructure is presented to support this model in an on-line learning environment.
214	Kamel and Davison (1998)	CSCW systems	survey	Information and Management	As a result of an extensive review of the literature and a large-scale survey of meeting participants in a University setting, the authors believe to have identified the most important problems in group interaction. These are matched with specific features of CSCW technology, as well as with their potential drawbacks. This problem-solution-drawback arrangement is posited as a point of departure for a common knowledge base for future CSCW development.
215	Morken et al. (2007)	shared display systems	ethnographic study/ individual semi-structured interviews	Journal of Computer Assisted Learning	This paper investigates the usage of shared display systems to promote cooperation among students in practice-based education. Our focus is on teacher education and the paper is based on our experiences with the teacher education programme at our university.
216	Pomerantz and	blogs,	conceptual paper	Reference Services Review	This paper explores the potential of blogs for providing community reference

	Stutzman (2006)	wikis			service.
217	Chalmers (2002)	collaborative filtering system	system architecture outline + theoretical/ argumentative	Computer Supported Cooperative Work	This paper describes a prototype collaborative filtering system. Later sections take a broader view of how systems and theory in CSCW have generally approached representation and awareness.
218	Snyder and Kurtze (1997)	bulletin boards	content analysis of discussion group messages	Information Processing and Management	This paper examines the use of chaos theory in modelling time series data generated by computer mediated communication (CMC). Data generated by CMC bulletin boards is examined for the presence of chaotic behaviour and to assess the variance which can be accounted for by the deterministic mechanism.
219	Schrire (2004)	computer conferencing systems	multiple case studies/ cross-case comparison	Instructional Science	The reported study represents a continuation of past research into the interactive and cognitive dimensions of computer conferencing. Basing itself on existing models for the assessment of the cognitive dimension of learning, the study examined the connection between interaction and cognition in three asynchronous computer conferences.
220	Fall et al. (2001)	collaborative information technology	case study/ model description	Transactions in GIS	In this paper, a framework for collaborative model building is proposed that can address these issues, and has its roots in adaptive management, computer-supported collaborative work and landscape ecology.
221	May and Carter (2001)	computer-supported collaborative working	ethnographic observation/ case study	International Journal of Industrial Ergonomics	This paper presents a case study of virtual team working in the European automotive industry. Workplace-based user evaluations took place with this demonstrator, involving approximately 40 engineers in four countries. A non-intrusive, user-centred evaluation approach encompassing real working during the product introduction process (PIP) was used. Results indicate the potential to increase the efficiency and the flexibility of working of distributed engineering teams, with potential time savings of between 10 and 50% for different stages in the PIP. In terms of cost savings, it was found that a potential overall saving of 20% in development time could increase sales volume by about £1 billion, and cut costs by about £90 million.
222	Cheng et al. (2007)	proprietary groupware tools (performance management system)	case study/ longitudinal research	International Journal of Productivity and Performance Management	This paper presents the findings of case study research in which the implementation of a new performance management system for improving individual project manager performance is evaluated. A framework is developed for guiding the implementation of similar change initiatives in other project-based organizations.
223	Hornecker (2005)	collaboratively used tangible interaction systems (Tangible User Interfaces (TUIs))	conceptual descriptive	European Conference on Computer Supported Cooperative Work	This paper presents parts of a design framework for collaboratively used tangible interaction systems, focusing on the theme of Embodied Facilitation. Systems can be interpreted as spaces/structures to act and move in, facilitating some movements and hindering others. Thus they shape the ways we collaborate, induce collaboration or make us refrain from it. Tangible interaction systems provide virtual and physical structure - they truly embody facilitation. Three concepts further refine the theme: Embodied Constraints, Multiple Access Points and Tailored Representations. These are broken down into design guidelines and each illustrated with examples.

224	Wöber and Gretzel (2000)	marketing decision support systems	field study/ survey through interviews	Journal of Travel Research	This article draws on a survey among tourism managers located in 30 different European countries to explain key factors affecting the success of an Internet-based marketing decision support systems. A structural equation model that extends the generally accepted Technology Acceptance Model is proposed and tested.
225	Stephens and Gordon (2006)	blogs	implementation guide	Computers in Libraries	This paper presents technical tips for librarians how and why to try a blog for staff communication.
226	Heath et al. (2002)	CSCW	theoretical/ argumentative	Computer Supported Cooperative Work	This paper focuses on a particular aspect of awareness, the ways in which participants design activities to have others unobtrusively notice and discover, actions and events, which might otherwise pass unnoticed. The authors consider for example how participants render visible selective aspects of their activities, how they encourage others to notice features of the local milieu, and how they encourage others to become sensitive to particular events.
227	Groth and Bowers (2001)	CSCW	field study	European Conference on Computer Supported Cooperative Work	The paper presents an examination of potential technology development programs to support people in finding things out in organisations while suggesting the re-specification of research on "organisational memory", "knowledge management" and allied notions in CSCW.
228	Frohberg and Schwabe (2006)	mobile collaborative technologies	two exploratory experiments	Collecter Europe 2006, Proceedings	Mobile technologies offer the opportunity to collaborate spontaneously any time and any place. While researchers have begun to understand the skills and motivational consequences of distributed office meetings, we are only beginning to understand them for ad-hoc collaboration. This paper reports on an analysis of two exploratory experiments dating from 2004 and 2005. *Finding*: Ad-hoc collaboration requires specific skills for process facilitation, communication, planning, media usage, multi-tasking, as well as specific social skills.
229	LaMarca et al. (1999)	CSCW	meta-analysis	European Conference on Computer Supported Cooperative Work	This paper describes an alternative approach that makes coordination and collaborative functionality an aspect of the collaborative artefact rather than a collaborative application. The authors present an infrastructure and a series of application examples to illustrate the idea of *document-centered* collaboration, in which coordination and collaboration are separated from and independent of applications.
230	Patnayakuni and Patnayakuni (2003)	instant messaging	theoretical/ argumentative	Dept. of MIS, Temple University, Philadelphia, PA	Instant messaging, after its widespread adoption for recreational use, is making inroads into the workplace. Drawing upon work in designing communication and collaborative systems, the paper proposes that perceived visibility, awareness, and accountability as characteristics of socially translucent systems influence the use context for instant messaging.
231	Kear (2001)	computer conferencing systems	first-hand observation through conference transcripts, and 'message maps'	Computers & Education	This paper discusses an investigation of students' use of threading in two different conferencing systems. The context for the study was a small-group collaborative assignment in an Open University course. Conference transcripts were studied, and 'message maps' were created, in order to investigate the threading links made by students, in relation to the semantic links between the

					messages.
232	Chari et al. (1998)	decision support system (for partial drug testing)	technical description of DSS application	Decision Support Systems	This paper presents a Decision Support System DSS for the application of partial drug testing to a population of individuals with a history of drug abuse.
233	Leith (1998)	proprietary groupware tools/ decision support systems	case study/ survey	Artificial Intelligence and Law	The Sentencing Commission has informally surveyed probation officers at training sessions to determine the usefulness of the ASSYST decision support software. On the whole it was found that the ASSYST program is not frequently used.
234	Gordon-Murnane (2007)	wikis, blogs, mashups	field study/ ethnographic method	Searcher: Magazine for Database Professionals	Review of data sources and methodologies applied by mashups, blogs, or wikis using government data.
235	Holsapple (1999)	group support systems	exploratory experiment	Group Decision and Negotiation	This paper reports on an exploratory experiment designed to compare the effects of three distinct experience-based work patterns on group decision quality, efficiency, and participant satisfaction in the case of GSS usage.
236	Simpson et al. (1999)	web-based decision support system (for evidence-based medicine)	field study/ survey	Knowledge-Based Systems	Evaluation of a Knowledge-Based System was carried out by asking potential users with a range of expertise (ENT surgeons, junior doctors and medical students) to answer questions about the need for the system; the expertise level of the system; the usability of the system; the likely impact on patient management and well-being; and the cost-effectiveness of the system. The results show high opinions of the usability, expertise level, and desirability of the system; cost effectiveness was more difficult to estimate. Perhaps the most compelling argument for the system, however, is the need for better availability and application of clinical protocols.
237	Büscher et al. (1999)	3D groupwork environment	field study	European Conference on Computer Supported Cooperative Work	This paper describes an early prototype of a 3D environment to provide a digitally-enhanced work setting.
238	Tu (2002)	email, bulletin board, real-time discussion tool	ethnographic study/ casual conversation, in-depth interview, direct observation, document analysis, questionnaire	Journal of Interactive Online Learning	This study examines how three CMC systems, email, bulletin board, and real-time discussion, influence the level of online social presence and privacy.
239	Antunes et al. (2007)	collaborative systems (distributed)	system description	European Journal of Operational Research	This paper presents the Collaboration Studio (CS) system, its argumentation and data-structuring models and gives some insights for dealing with information divergence. The system allows discussions among a group of participants that includes a coordinator.
240	Wang et al. (2005)	clinical decision support systems	field study/ ethnographic observation (multiple data sources)	Health Care Management Review	A study of the number of health decision support systems (HDSSs), applicable to *administrative*, *clinical*, and *executive* decision support functionalities, adopted by acute care hospitals and to examine how hospital market, organizational, and financial factors influence HIS adoption. A cross-sectional analysis was performed with 1441 hospitals selected from metropolitan statistical areas in the United States.

241	Carletta et al. (2000)	data-conferencing, audio-conferencing, video-conferencing	case study/ first-hand ethnographic team observation	Ergonomics	Two automotive supply chain teams were observed while they were experimenting with multimedia conferencing in order to determine what support non-collocated teams need and the potential effects of introducing technologies on their group processes. The observations included meeting recordings and other sources that show the organizational factors affecting teams.
242	Van Dolen and De Ruyter (2002)	chat	laboratory experiment	International Journal of Service Industry Management	In this paper, the focus is on a new type of electronic service encounter called Moderated Group Chat (MGC).
243	Van Aalst (2006)	asynchronous learning networks (ALNs)	interviews	British Journal of Educational Technology	Research on asynchronous learning networks (ALNs) has indicated that there are problems with both the quantity and quality of online interactions that can undermine the aim of inquiry. This paper offers a new way of thinking about these problems in the context of knowledge building, a specific form of collaborative inquiry supported by an ALN.
244	Anderson and McCarthy (2005)	data-conferencing (WowBB, Invision Power Board, and vBulletin)	product comparison/ ethnographic observation (team research)	International Review of Research in Open and Distance Learning	This paper presents a feature-by-feature comparison of text-based conferencing products.
245	Gunter and Butler (1999)	web-based collaborative tools	case study/ comparison of two case studies	International Journal of Technology Management	The two case studies used in this paper consider the benefits of a collaborative information system (groupware combined with Web technology) to manage information that could lead to a competitive advantage. The results of these case studies serve to illustrate the approaches that must be taken to ensure the successful implementation of a collaborative information system.
246	Barley et al. (2004)	CSCW	meta-analysis	ACM Conference on Computer Supported Cooperative Work (Proceedings)	The question addressed in this panel is whether CSCW as a field is ready for theory – whether theory is needed to move the field along, or on the contrary, whether the problems and the technology are still too new or are changing too fast to accommodate theory. The panelists describe some of the organisation theories that could be applied to CSCW, and debate their usefulness, taking both sides of the question.
247	Lewis et al. (2007)	electronic meeting systems	empirical field study/ survey	Group Decision and Negotiation	A Cross-Regional Exploration of Barriers to the Adoption and Use of Electronic Meeting Systems in the US, Australia, Hong Kong, and Norway.
248	Ericsson et al. (2005)	decision support system (for the diagnosis of Parkinson's disease)	technical description of DSS application	Springer-Verlag Berlin Heidelberg	A computer aided automatic decision support system was developed in attempt to facilitate the diagnosis of Parkinson's disease from the acquired SPECT images. A rigid model was used for the segmentation of the basal ganglia of the human brain. This study develops an automated method for quantification and classification of the images.
249	Dewan (2001)	collaborative applications and infrastructures	theoretical argumentative	Computer Supported Cooperative Work	Collaborative systems include both general infrastructures and specific applications for supporting collaboration. Because of the relative newness and complexity of these systems, it has been unclear what approach should be used to design and evaluate them. Based on the lessons learned from previous work on collaborative systems, the authors have derived an integrated approach to

					researching collaborative applications and infrastructures.
250	Sharrock and Button (1997)	CSCW	theoretical/ argumentative	Computer Supported Cooperative Work	This is a paper on the relevance of Habermas' Theory of Communicative Action for CSCW.
251	Fitzpatrick (1999)	bi-directional chat-like facilities, WWW and email, version control tools	technical (one) tool description	European Conference on Computer Supported Cooperative Work	We report the adoption story of our content-based pure notification service, called Elvin.
252	Dewiyanti et al. (2007)	computer-supported collaborative environments (asynchronous)	Ethnographic study/ participant observation through questionnaires, content analysis of students' messages	Computers in Human Behavior	*Paper Findings*: The finding revealed that distance learners appreciate the opportunities to work collaboratively. They show positive experiences and are quite satisfied with collaborative learning. This study also sought to explore individuals as well as course characteristics that influenced aspects of collaborative learning, and to search aspects of collaborative learning that influenced students' satisfaction.
253	Dennis et al. (2003)	electronic meeting systems (Group-Systems and VisionQuest)	multiple case studies/ ethnographic data-collection method through first-hand observation and interviews	Decision Support Systems	This paper examines the successes and failures of groupware-supported BPR processes in four organizations. Two were successful and two were failures.
254	Cook (2002)	decision support systems	field study/ survey	Journal of Information Science	This study considers what factors influence whether decision-makers in an organisation will accept a decision aid. Specifically, the study considered the information gathering and planning systems used to support resource allocation decisions in a higher education college.
255	Ferguson (2004)	collaborative information technologies for social services and nonprofit management	case study/ descriptive retrospective examination of a governance body	Administration in Social Work	*Paper Findings*: Four lessons are evident. First, a formal structure and process appears to be a critical component for increased levels of organizational functioning and longevity. Second, the executive director is an important component in the process of governance. Third, an information feedback system that includes the frontline service level can provide necessary information for policy decision making. Finally, the legitimization of client group representation is important for continued representation, equality, and diversity.
256	Lyons (2005)	IBM Lotus Notes	expert opinion	Forbes	The article speculates upon IBM's denial over the death of Lotus Notes.
257	Beise et al. (2004)	collaborative information technologies	case study/ ethnographic observation through interviews	Information Resources Management Journal	*Paper Findings*: successful project managers and teams become skilled at adapting a variety of existing communication technologies to match the project task or process, the receiver, their own role as sender, and the content of the message.
258	Shepherd (1997)	expert Systems	case study/ ethnographic observation (meetings, project overview)	Computers, Environment and Urban Systems	This article examines how and why an expert system is implemented and accepted by a public works agency.

259	Turner (1997)	shared notebooks	experimental pilot trial	European Conference on Computer Supported Cooperative Work	This paper discusses the use of a shared cooperative notebook by a group of software engineers and support staff distributed over two sites The design of the notebook is described and results of the pilot trial reported.
260	Wierenga and Oude (1997)	marketing decision support systems	field study/ survey through interviews (via computer-assisted telephone interviewing)	International Journal of Research in Marketing	This paper deals with marketing decision support systems (MDSS) in companies. In a conceptual framework five categories of factors are distinguished that potentially affect adoption, use, and satisfaction. On the basis of a commercially available database, which contained information about all enterprises with 10 or more employees in the Netherlands, a sampling frame was selected which consisted of 2924 companies that had a designated marketing manager.
261	Cortes et al. (2001)	decision support system (for planning tele-communication networks)	technical description of DSS application	The Journal of the Operational Research Society	This paper presents an operations research application to the design of an optic fibre network for the Andalusian region. A decision support system with a graphic interface that allows interactive analysis of different scenarios is presented.
262	Agostini and De Michelis (1997)	CSCW systems	technical system description	European Conference on Computer Supported Cooperative Work	This paper presents the prototype of the MILANO system: a CSCW platform integrating in the user workspace a workflow management system (MWMS) with a multimedia conversation handler (MCH), and, finally, an object repository (MOR).
263	Sheffield (2004)	group support systems	ethnographic study/ first-hand observation (of GroupSystems Topic Commenter tool usage patterns)	Group Decision and Negotiation	This article frames GSS-enabled interventions as electronically supported discourses, designed and evaluated against a gold standard of ideal speech in a perfect communication environment.
264	Chang et al. (2003)	web-based collaborative system (tutoring)	experiment/ one control group and one experimental group	IEEE Transactions on Education	A tutoring system for recursion concept learning is proposed. The system integrates different modes of learning, synchronous and asynchronous, collaborative and individualized, into a WorldWideWeb environment.
265	Yang et al. (2007)	web-based collaborative tools (IBIS)	multiple case studies/ ethnographic observation	Industrial Management and Data Systems	This study explores the feasibility of applying an internet-based information system (IBIS) to facilitate business alliance activities. A case study of six firms was conducted to understand current business alliance practices in Taiwan and to investigate the demand for applying IBIS systems in business alliance activities.
266	Kreutz (2000)	chat	technical system description	Educational Technology & Society	This article presents a chat component that allows students in a web-based educational scenario to communicate and cooperate with their professors and colleagues while they are online.
267	Correa and Marsic (2004)	mobile collaborative systems	technical description of software framework	Computer Supported Cooperative Work	This paper describes a software framework that supports mobile collaboration by managing several aspects of heterogeneity.
268	Bussen and Myers (1997)	proprietary groupware tools (executive information system)	case study/ interviews with main stakeholders	Journal of Information Technology	This paper reports on a case study of a failed EIS in a large New Zealand organization and compares this case with the success factors found in the research literature.

269	Vogel et al. (2004)	email, shared workspaces	technical description of working prototype	Computer Supported Cooperative Work	The authors describe a new collaborative technology that bridges the gap between ad hoc collaboration in email and more formal collaboration in structured shared workspaces.
270	Dennis et al. (2003)	groupware	multiple case studies/ cross-case comparison	Decision Support Systems	This paper examines the successes and failures of groupware-supported BPR processes in four organizations. Two were successful and two were failures. Groupware allowed certain tasks to be performed faster, added structure to the BPR process and facilitated participation by more people. The key difference between the successful and the unsuccessful cases was when and how senior management was involved.
271	Kerr (2003)	proprietary groupware tools (an expert system for production scheduling)	case study/ first-hand ethnographic team observation	Journal of Systems and Software	This article describes an attempt to implement an expert system for production scheduling in a small manufacturing company. The approach adopted was to attempt to capture the heuristics and constraints used by the human scheduler.
272	Milton-Smith et al. (1999)	decision conferencing, group decision support systems	case study	International Journal of Technology Management	Curtin Business School (CBS) attempted to determine its future in a far more deliberate and 'intentional' mode than had previously been the case, by initiating a regular and formal process of strategic planning. This paper traces the trials and errors of that process over a five-year period from 1990-1998.
273	Henning et al. (1997)	computer supported collaborative work	experiment/ laboratory Test	International Journal of Industrial Ergonomics	This paper compares working relationships in the serial condition to those in the parallel condition. *Paper Finding*: while teams reported more comfortable working relationships in the serial condition than in the parallel condition (strong trend), they also showed trends for increased impatience and lower productivity.
274	Leinonen et al. (2005)	CSCW	ethnographic study/ data gathered through questionnaires, log-files of the shared virtual workspace and collected company documents	Computer Supported Cooperative Work	The results presented in this paper give guidelines for discussing what the awareness of collaboration means in the context of distributed collaboration. The data were gathered by means of questionnaires, log-files of the shared virtual workspace and collected company documents in order to find out how team members perceive their collaboration. Based on qualitative data analysis, three different aspects of collaboration awareness were identified: an awareness of the possibility for collaboration, an awareness of the aims of collaboration, and an awareness of the process of collaboration.
275	Lim and Benbasat (1997b)	group technology	theoretical/ argumentative	Journal of Management Information Systems	This paper presents a framework for addressing group judgment biases with group technology.
276	Moon et al. (2003)	group decision support systems	multiple case studies/ cross case comparison	Organizational Behaviour and Human Decision Processes	In two studies examining resource allocation, support is found for the notion that group decisions are affected in systematic ways depending on whether or not there was individual consideration of the problem before meeting as a group.
277	Dewiyanti et al. (2005)	asynchronous computer-supported collaborative learning	field study/ two action research sessions (with questionnaire and content analysis of electronic	British Journal of Educational Technology	*Paper Finding*: asynchronous CSCL environment was not advantageous for collaboration because people could collaborate in a face-to-face context too. Findings left an open question: Is asynchronous collaborative learning a feasible learning method for campus-based students?

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278	Daradoumis et al. (2003)	virtual groupware environment (Basic Support for Cooperative Work (BSCW))	field study/ action research	IASTED International Conference on Computers and Advanced Technology in Education (Proceedings)	This paper presents an approach to analysing and evaluating collaborative learning situations that take place in an asynchronous collaboration platform.
279	Bichler et al. (2003)	electronic negotiations	meta-analysis/ theoretical argumentative	Group Decision and Negotiation	Drawing on diverse streams of literature in different fields such as economics, management, computer, and behavioural sciences, the authors present an example of an integration of three significant streams of theoretical and applied research involving negotiations, traditional auctions and on-line auctions.
280	Raggad (1996)	(*adoption of*) decision-support systems	exploratory theoretical study through questionnaires	Industrial Management and Data Systems	This paper examines the effects of decision unstructuralness (unstructuredness + noisiness) on decision-support systems (DSS) adoption. The paper suggests that end-users are sensitive to "unstructuralness" when they select a decision-support approach.
281	Ogata et al. (2001)	collaborative help networks, computer supported on-line social networks	experiment	Computer Supported Cooperative Work	This paper describes PeCo-Mediator-II to seek capable cooperators through a chain of personal connections (PeCo) in a networked organization. Moreover, this system helps to gather, explore, and visualize social networks in an organization. The experimental results show that the system facilitates users' encounters with cooperators and develops new helpful connections with the cooperators.
282	Liker and Sindi (1997)	(*user acceptance of*) expert systems	model testing through questionnaire	Journal of Engineering and Technology Management - JET-M	This paper develops and tests a model based on the theory of reasoned action. The model is tested using a cross-sectional design based on a self-administered questionnaire completed by a sample of 94 users and non-users from two of the largest accounting firms in the U.S.
283	Doherty et al. (1998)	hospital information support systems	interviews	Failure and Lessons Learned in Information Technology Management	In-depth interviews with senior IT executives from 12 hospitals in the UK public healthcare sector were conducted to gain insights into the success of project teams in adopting best practice and to explore the relationship between their ability to adopt best practice and the overall success of the development process. The results demonstrate that the most successful operational systems enjoyed high levels of user and senior management commitment and had a strong focus on strategic and operational needs. The less successful systems often had problems in one or more of these important areas.
284	Mark (1997)	shared workspaces	case study/ action research (content analysis of from site-visits, workshops, project documentation, interviews)	European Conference on Computer Supported Cooperative Work	*Conventions* are an important part of articulation work. They are a means to merge the various perspectives and workstyles that are involved in handling shared objects in CSCW. This work reports on convention use with a groupware system used in a government ministry. The findings suggest that defining, establishing, and following conventions is aided by the visibility of other people's activities using the system. The paper describes a prototype that supports users in maintaining conventions by providing awareness facilities and an overview for shared objects.
285	Anderson et al.	video-conferencing	experimental observation	Computers in Human	This paper reports on a simulation study of virtual team meetings. Participants role-played companies collaborating on a design problem while supported by a

	(2007)			Behavior	range of IT tools, such as videoconferencing and shared applications.
286	Bernstein (2000)	collaboration support systems	theoretical/ argumentative	ACM Conference on Computer Supported Cooperative Work, CSCW 2000 Philadelphia, P.A. (Proceedings)	In the past, most collaboration support systems have focused on either automating fixed work processes or simply supporting communication in ad-hoc processes. This results in systems that are usually inflexible and difficult to change or that provide no specific support to help users decide what to do next. This paper describes a new kind of tool that bridges the gap between these two approaches by flexibly supporting processes at many points along the spectrum: from highly specified to highly unspecified. The development of this approach was strongly based on social science theory about collaborative work.
287	Brown (2000)	IBM Lotus Notes	ethnographic study/ participant observation	Behaviour and Information Technology	This paper uses the results from an ethnographic study of a groupware system in use to argue against two accepted views on groupware systems. Firstly, this paper argues that groupware is useful in how it supports existing everyday organizational processes, rather than as an agent of radical organizational change. Secondly, this paper argues that rigidity – the inability to change how a system works – can be a positive feature of a groupware system, or indeed, a very requirement of that system.
288	Cluts (2003)	CSCW software	case study/ action research	International ACM SIGGROUP Conference on Supporting Group Work, Sanibel Island, FL (Proceedings)	This is a two-year case study of cooperative work was inspired by the installation of CSCW software in a community bank. The framework for the research was developed by combining activity theory and the principles of communities of practice. This framework provided a useful model and insight into the evolution of artefact meaning, sharing, and credibility. In essence, users needed to experience results within the activity system and social structure of the community to establish meaning and credibility. The study applied the theory and language of activity theory and communities of practice to make sense of case phenomena and provide a richer context for understanding traditional principles.
289	Kruger et al. (2004)	tabletops with electronic displays	observational experiment	Computer Supported Cooperative Work	How do people actually use orientation on tables? To answer these questions, the authors conducted an observational study of collaborative activity on a traditional table. The results show that the strategy of reorienting objects to a person's view is overly simplistic: while important, it is an incomplete view of how people exploit their ability to reorient objects. *Orientation* proves critical in how individuals comprehend information, how collaborators coordinate their actions, and how they mediate communication.
290	Shipman and Marshall (1999)	interactive collaborative systems	analytical descriptive	Computer Supported Cooperative Work	This paper reflects on experiences designing, developing, and working with users of a variety of interactive computer systems. The authors propose, based on these experiences, that the cause of a number of unexpected difficulties in human-computer interaction lies in users' unwillingness or inability to make structure, content, or procedures explicit.
291	Riboulet et al. (2002)	internet collaboration tools	design experiment	International Conference on Computer Supported Cooperative Work in Design,	From the design experiment of an electromechanical plunger hold over Internet and involving mechanical and electrical engineers, this paper looks at their collaborative design activity.

				Rio de Janeiro (Proceedings)	
292	Pipek and Wulf (1999)	a groupware application	case study	European Conference on Computer Supported Cooperative Work	The paper describes a long-term study of a groupware application which covers the complete lifecycle from the groupware's introduction to its removal.
293	Mark et al. (1999)	desktop conferencing (Microsoft NetMeeting)	multiple case studies/ ethnographic investigation through content analysis of meeting agendas, minutes, chat windows, in-depth interviews	European Conference on Computer Supported Cooperative Work	This case study examines how desktop conferencing with application sharing, is used routinely by four groups within a major company. The authors discuss differing and evolving patterns of use. A range of difficulties arising from impoverished communication are documented. Success factors are identified, focusing on the use of technology facilitation and meeting facilitation.
294	Fitzpatrick (2002)	collaboration environment	case study/ action research	Social Thinking, Software Practice	This paper reports on a research group that was building a collaboration environment called wOrlds (Fitzpatrick, 1995) to support people working together across space and time.
295	Gill (1997)	(*use of*) expert systems	theoretical/ argumentative	MIS Quarterly	This paper synthesises findings from expert systems, information systems, and job design research to model how the task change experienced by an expert systems user during adoption can affect that user's motivation to continue using the system. Using existing task constructs from the job design literature, a simplified version of the model is operationalised and tested on a data set of expert systems.
296	Schmidt and Wagner (2004)	coordinative artefacts	field work/ workplace study	Computer Supported Cooperative Work	In their cooperative effort, architects depend critically on elaborate coordinative practices and artefacts. The article presents, on the basis of an in-depth study of architectural work, an analysis of these practices and artefacts and shows that they are multi-laterally interrelated and form complexes of interrelated practices and artefacts. In doing so, the article outlines an approach to investigating and conceiving of such practices.
297	Johnston et al. (2004)	handheld clinical decision support tool	post-randomised controlled trial survey	Medical Education	*Paper Finding*: the students found the CDSS⁄PDA useful. They were less satisfied with the functional features of the CDSS and the PDA. Utilisation was low, with the average frequency of use less than once per week. Multivariable regression shows that higher perceived CDSS⁄PDA usefulness was associated with more supportive faculty attitudes.
298	Chiasson and Lovato (2001)	(*diffusion of*) decision support systems	longitudinal interpretative case study/ participatory action research	Data Base for Advances in Information Systems	This paper reports on the experiences of a health planner using a DSS software tool for health planning over a 12-month period. The article shows how the user justifies her attitudes toward the technology using 5 important factors during 3-, 6- and 12-month interviews: stage of adoption, implementation processes, organizational factors, subjective norms, and user competence.
299	Brown (2001)	timesheets	ethnographic study	Computer Supported Cooperative Work	While the use of formal systems has been an important topic within CSCW, their use as *representations* has been relatively neglected. This paper, using ethnographic data from a British oil company, investigates how representations are used.

300	Fagrell and Ljungberg (1999)	mobile work tools	fieldwork study (from the electrical utilities industry)/ action research	European Conference on Computer Supported Cooperative Work	Reporting the results of the empirical study, the paper makes a distinction between four aspects of local and mobile "knowledge management" as it took place in the mobile work setting: *sharing*, i.e. several parties exchange knowledge; *indexing*, i.e. one party explains to another what knowledge to retrieve; diagnosing, i.e. two parties make sense of how to interpret a situation, and; *foreseeing*, i.e. one party (or more) uses knowledge to project the future.
301	Bansler and Havn (2006)	groupware technology	interpretive case study/ interviews and examination of archival data	Computer Supported Cooperative Work	This paper argues that the appropriation and adaptation of groupware and other types of advanced CSCW technologies is basically a problem of sensemaking.
302	Storey et al. (2006)	shared waypoints, social tagging	technical system description	ACM Conference on Computer Supported Cooperative Work, CSCW, Banff, AB (Proceedings)	This paper presents the conceptual design of TagSEA, a collaborative tool to support asynchronous software development. The design is inspired by combining “waypoints” from geographical navigation with “social tagging” from social book-marking software to support coordination and communication among software developers.
303	Poltrock and Grudin (1998)	CSCW, groupware	theoretical/ argumentative	Conference on Human Factors in Computing Systems (Proceedings)	Technology to support groups is rapidly coming into use and is starting to have an impact on us, our organizations, and society. This paper addresses recent experiences, current possibilities, and future trends and shocks.
304	Törpel et al. (2003)	*(use of)* groupware	ethnographic study/ semi-structured interviews, contents communicated via the organization-wide groupware systems, letters, contracts, business reports, data from meeting	Computer Supported Cooperative Work	This is a long-term study of the evolving use of the organization-wide groupware in a service network.
305	Zacklad (2003)	CSCW systems	theoretical/ argumentative	International ACM SIGGROUP Conference on Supporting Group Work, Sanibel Island, FL (Proceedings)	Most current theories about collective cognitive activities in limited groups apply to structurally closed co-operative situations. The authors of this paper propose to work in the framework of intellectual transactions and *communities of action* theory with a view to describing and designing CSCW systems which can be used in more structurally open situations.
306	Dix (1997)	World Wide Web as a collaborative environment	analytical	Computer Supported Cooperative Work	This paper investigates some of the issues which will determine the viability of the World Wide Web as an infrastructure for cooperative work.
307	Streitz et al. (1997)	roomware	multiple experiments	European Conference on Computer Supported Cooperative Work (Proceedings)	This paper reports about an empirical study that investigates the role of different “roomware” configurations on the products and processes of meeting room collaboration.
308	Huysman et al. (2003)	communication tools	interpretive ethnographic study/ weekly communication diaries, system logs, observations	Computer Supported Cooperative Work	This paper reports on an exploratory study of the evolving use of communication tools by six globally distributed teams. Based on an analysis of six US-Dutch virtual teams, the authors propose the notion of ‘media stickiness’, a phenomenon the teams experienced during the process of

			of team video meetings, transcripts of audio recordings, interviews, questionnaires, logfiles		structuring media-use patterns. The authors argue that in the case of virtual teams, the evolution of media usage seems to be path dependent.
309	Ackerman (2000)	CSCW	theoretical/ argumentative	Human-Computer Interaction	This article argues that there is an inherent gap between the social requirements of CSCW and its technical mechanisms. The social-technical gap is the divide between what we know we must support socially and what we can support technically.
310	Carroll et al. (2003)	notification systems	case study/ action research	International Journal of Human-Computer Studies	In this paper, the authors analyse awareness breakdowns in use of their Virtual School system – stemming from problems related to the collaborative situation, group, task and tool support – to motivate the concept of *activity awareness*. Activity awareness builds on prior conceptions of social and action awareness, but emphasises the importance of activity context factors like planning and coordination. This work suggests design strategies for notification systems to better support collaborative activity.
311	Dourish (2003)	interactive technologies	multiple case studies/ cross-case comparison	Computer Supported Cooperative Work	This paper is focused on understanding appropriation as a key problem for developing interactive systems, since it is critical to the success of technology deployment.
312	Kies et al. (1998)	computer-supported cooperative work	meta-analysis	Journal of the American Society for Information Science	In this paper, issues related to the fundamental communication channels, socio-technical factors, and task characteristics associated with collaborative work situations are discussed.
313	Bitter-Rijpkema et al. (2002)	knowledge elicitation support	Delphi study/ two sessions with a panel of independent experts	Educational Technology and Society	One pivotal issue is how to effectively support eliciting and sharing available but not yet articulated knowledge residing in the minds of individual team members. Suggestions derived from literature about knowledge elicitation point in different directions. In order to investigate knowledge elicitation support for professionals in virtual teams, an electronic Delphi study was executed. The objective was to gain insights regarding knowledge elicitation from a group of 16 representative experts.
314	Dennis and Reinicke (2004)	electronic brainstorming technology	survey	MIS Quarterly	This paper presents theoretical arguments and empirical evidence suggesting that electronic brainstorming is not as effective as verbal brainstorming at providing group well being and member support.
315	Kahai and Cooper (1999)	computer mediated communication systems (CMCS)	laboratory experiment/ hypotheses testing (data collected using group meeting transcripts and a post-test questionnaire)	Journal of Management Information Systems	This study develops and tests a model of relationships among computer mediated communication systems (CMCS), group processes, and group outcomes.
316	Gross and Prinz (2004)	cooperative environments	ethnographic longitudinal study/ log file data over 18 months, containing all events that are produced	Computer Supported Cooperative Work	This paper addresses the problem of contextualising event notifications enabling the presentation of notifications in the appropriate user situation. The authors describe a lightweight model and its integration into an event and notification infrastructure.

			by user actions over time		
317	Hill and Gutwin (2004)	Multi-User Awareness UI toolkit toolkit	technical tool description	Computer Supported Cooperative Work	Technical description of the Multi-User Awareness UI toolkit (MAUI) toolkit, a Java toolkit with a broad suite of awareness-enhanced UI components.
318	Wilson et al. (2006)	shared displays	qualitative study of an intervention to introduce	ACM Conference on Computer Supported Cooperative Work, CSCW, Banff, AB (Proceedings)	Large, shared displays are used in support of many forms of collaborative work and are generally assumed to benefit the work. This paper investigates this in a qualitative study of an intervention to introduce such a display to support the work of shift handover in a medical setting. Results suggest that the consequences of introducing a shared display can be more subtle than expected. In particular, we the fact is highlighted that the common distinction between private and public information is too coarse-grained. The paper also discusses the importance of considering how access to public information is initiated.
319	Dix (1998)	CSCW	exploratory case study	Interacting with Computers	This paper elaborates on “interaction in the large”: most work in HCI focuses on interaction in the small: where tasks take a few minutes or hours and individual actions receive feedback within seconds. In contrast, many collaborative activities occur over weeks or months and the turnaround of individual messages may take hours, days or even weeks.
320	Noel and Robert (2004)	collaborative writing tools	empirical study/ questionnaire	Computer Supported Cooperative Work	This study investigates the following questions: How do people work when they are collaborating to write a document? What kind of tools do they use and, in particular, do they resort to groupware for this task?
321	Vennix et al. (1992)	group decision support systems	review of academic literature + two case studies	European Journal of Operational Research	This article surveys the existing literature on mapping and eliciting knowledge for system dynamics modelling and also explores the literature in the broader fields of cognitive psychology and small group processes.
322	Whiteley and Garcia (1996)	group support systems	two case studies	Group Decision and Negotiation	This study investigates two roles in group support systems (GSS) meetings, those of the facilitator and the technical support person or “chauffeur”.
323	Wijekumar and Spielvogel (2006)	intelligent discussion boards	case study	Campus-Wide Information Systems	This paper explores deep conversations in asynchronous discussion boards through synchronous support.
324	Yager (1999)	information technology in a virtual work world	survey research	ACM SIGCPR Conference (Proceedings)	This study examines characteristics of both virtual and traditional, face-to-face (non-virtual) team members by addressing their perceptions of currently available and yet-to-be-released IT support mechanisms.
325	Zhu (2006)	online discussion tools	content analysis (of two discussion transcripts)	Instructional Science	This article analyses types of interaction that occur during online discussions, examines levels of student cognitive engagement in each discussion, and explores their effects on and implications for learning and teaching in higher education.
326	Kayler and Weller (2007)	online discussion groups	content analysis of online discussion postings	Educational Technology and Society	Online discussion postings and student self-assessment served as data sources for this study. The results showed that online Communities of Practice (CoP) support students’ professional sharing and the development of independent learners.

327	Herrmann and Hoffmann (2005)	workflow systems	longitudinal action research (seven companies during a 4-year period)	Computer Supported Cooperative Work	This study focuses on the problems that occur in the early stages of projects intended to introduce workflow systems but which do not inevitably succeed. In most cases the companies under investigation eventually introduced other types of software, or the business processes were merely analysed and improved but not automated during the project. The authors explain this phenomenon by referring to Orlikowski's concept of *metamorphoses* which analysed organizational change under conditions of groupware usage.
328	Terrell and McCrickard (2006)	semi-public notification system	interpretive field observation	ACM Conference on Computer Supported Cooperative Work, CSCW, Banff, AB (Proceedings)	This work seeks to strengthen interaction within a research community through a centrally-located physical device that presents online presence information in a semi-public space.
329	Yang and Li (2005)	structured collaborative workspaces	technical description of framework	Computer Supported Cooperative Work	This paper proposes a component-based framework that allows for the runtime plug-n-play of consistency protocols in collaborative systems.
330	Gueddana and Roussel (2006)	video communication system	technical system description	ACM Conference on Computer Supported Cooperative Work, CSCW, Banff, AB (Proceedings	This paper describes a video communication system that supports a variable degree of engagement.
331	Davies (2004)	virtual reality tools for participatory design	field study/ action research & multiple case studies/cross case comparison	Computer Supported Cooperative Work	This paper describes the evolution of a standard PC-based virtual reality tool which has been adapted for the participatory design of work environment
332	Bardram (1997b)	workflow systems	theoretical/ argumentative	International ACM SIGGROUP Conference on Supporting Group Work, Phoenix, AZ, USA	Based on experiences from designing a computer system that supports the collaboration within a hospital, this paper discusses how plans themselves are made out of situated action, and in return are realised *in situ*. Thus, work can be characterised as *situated planning*. This understanding is backed up by Activity Theory, which emphasises the connection between plans and the contextual conditions for realising these plans in actual work.

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Sept. 2001 – Mai 2003 MBA Diplom -With Merit-	Stuttgart Institute of Management and Technology, Deutschland (www.uni-simt.de) Abschluß: Master of Business Administration (MBA) Notendurchschnitt Studium: B+ /3.41 (höchste Note: 4.00) Note MBA Diplomarbeit: A /4.00 (höchste Note: 4.00, **entspricht 'Sehr Gut'**) Schwerpunkt: Management Information Systems
Sept. 1995 – Sept. 2000 Diplom-Kauffrau	Universität für Volks- und Weltwirtschaft, Sofia, Bulgarien (www.unwe.acad.bg) Abschluß: Diplom-Kauffrau Notendurchschnitt Studium: 5.17 (höchste Note: 6.00) Notendurchschnitt Staatsexamen: 6.00 (höchste Note: 6.00, **entspricht 'Sehr Gut'**) Schwerpunkt: Internationaler Tourismusmanagement

WISSENSCHAFTLICHE VERÖFFENTLICHUNGEN

2008 21st Bled eConference eCollaboration	1. Shumarova, E. and Swatman, P. A. 'Informal eCollaboration Channels: Shedding Light on Shadow CIT', 21st Bled eConference eCollaboration: Overcoming Boundaries Through Multi-Channel Interaction, June 15 - 18, 2008, Bled, Slovenia .
2007 Electronic Markets Journal	1. Shumarova, E. and Swatman, P. A. 'eValue and Value-driven User Responses to Information Technology', Electronic Markets, Volume 17, Issue 1 February 2007 , pp. 5 – 19.
2006 19th Bled eConference eValues, CollECTeR Europe, ICSDS	1. Shumarova, E. and Swatman, P. A. 'The New Economy, eValue and the Impact on User Acceptance of Pervasive IT', Proceedings of the 19th Bled eConference eValues, June 5–7, 2006, Bled, Slovenia – **nominiert**. 2. Shumarova, E. and Swatman, P. A. 'Diffusion of Socially Pervasive IT Innovation through the Lens of Cognitive Elaboration and Perceived Behavioural Control', Proceedings of CollECTeR Europe Conference – Collaborative Business, June 09–10, 2006, Basel, Switzerland. 3. Shumarova, E. and Swatman, P. A. 'The Dynamics of Innovation in Electronic Networks – a System Dynamics Perspective on IT Innovation Diffusion', Proceedings of the 24th International Conference of the System Dynamics Society, July 23–27, 2006, Nijmegen, the Netherlands.

TEILNAHME AN INTERNATIONALEN WISSENSCHAFTLICHEN KONFERENZEN

Juni 2008, Slovenien	21st Bled eConference eCollaboration, Bled, Slovenia Vortrag zum Thema 'Informal eCollaboration Channels: Shedding Light on Shadow CIT'

Juli 2006, Holland	24th International Conference of the System Dynamics Society, Holland Vortrag zum Thema 'The Dynamics of Innovation in Electronic Networks – a System Dynamics Perspective on IT Innovation Diffusion'
Juni 2006, Slovenien	19th Bled eConference eValues, Bled, Slovenia Vortrag zum Thema 'eValue and Value-driven User Responses to Information Technology'
Juni 2006, Schweiz	CollECTeR Europe Conference – Collaborative Business, Basel, Switzerland Vortrag zum Thema 'Diffusion of Socially Pervasive IT Innovation through the Lens of Cognitive Elaboration and Perceived Behavioural Control'

BERUFSERFAHRUNG (Deutschland, Australien)

Dez. 2007 – Dez. 2008 Web-Entwicklung, Symposiumsorganisation	Universität Stuttgart, Institut für Eisenbahn- und Verkehrswesen Web-Design, Symposiumsorganisation: 4th International Symposium 'NETWORKS FOR MOBILITY 2008', Sept. 25-26, 2008, Stuttgart
Mai 2007 – Nov. 2007 Kursmanagerin (Magisterlehrfach)	University of South Australia, Adelaide, Australien Kursmanagerin für 'Fundamentals of Information Systems M' (FISM), Magisterlehrfach Verantwortungen als Kursmanagerin: • Studium Unterricht (teilzeit), • Nachhilfeunterricht – alle akademische Fragen antworten, • Korrektur von Studienarbeiten – wöchentliche Seminararbeiten, sowie die Prüfungsarbeiten, • Lehrfach-Verwaltung – die Kurswebsite aktualisieren und pflegen, Anwesenheitslisten erstellen, Buch führen über Absenzen von Studenten sowie deren Unterrichts-Teilnahme.
Juni 2004 – April 2007 Internet Marketing	altenda GmbH, Stuttgart Internet Marketing: klassische Online-Werbung, Bannering, PPC-Werbung, E-Mail-Marketing, Affiliate-Marketing, Suchmaschinen-Marketing (inklusive Suchmaschinen-Optimierung) Messeauftritt: CAT.PRO International Trade Fair for Innovative Product Development, Data and Process Management, Okt. 04–07, 2005, Messe Stuttgart Vortrag zum Thema 'Vernetzte elektronische Geschäfts- und Projektabwicklung'
Okt. 2003 – Mai 2004 Forschung	Universität Hohenheim, Stuttgart, Lehrstuhl für Wirtschaftsinformatik Requirements Engineering Forschung, Übersetzungsarbeiten Deutsch-Englisch
Sept. 2002 – April 2003 MBA Abschlußprojekt	Siemens AG, ICN, München MBA Diplomarbeit: 'Innovative Anwendungen für Kommunikationsnetzwerke' Note MBA Diplomarbeit: A /4.00 (höchste Note: 4.00, **entspricht 'Sehr Gut'**)

May 2002 – Sept. 2002 MBA Praktikum	Robert Bosch GmbH, Schwieberdingen Konzeption und Erstellen von Intranetseiten für ein Projektmanagement-Informationssystem: die Arbeit beinhaltete sowohl das Content-Management, den Entwurf einer adäquaten Intranetstruktur, als auch das Erstellen der Intranetseiten in HTML.

EDV-KENNTNISSE

Betriebssysteme	Microsoft Windows, Apple Macintosh, MS DOS
Standardsoftware	Textverarbeitung, Tabellenkalkulation, Präsentation, Projektmanagement
Branchenlösungen	
Bibliography	ResearchSoft, EndNote, ProCite
Flash	Turbo-Demo Tutorial Creator
Web Design	HTML, XML
Content Management	Plone, Leximancer
Graphic Design	Adobe Photoshop, Adobe Illustrator, Corel Draw, Jasc Paint Shop Pro, MS Visio, MS Paint, MS Publisher
Internet Marketing	Internet Business Promoter, Arelis, MartTracker, eXTReMe Tracker
eCommerce	AVA
Web Programmierung	JavaScript, JavaServer Faces
Datenbanken	MS Access, MS SQL, MySQL

SPRACHKENNTNISSE

Bulgarisch	Muttersprache
Deutsch	fließend in Wort und Schrift
Englisch	fließend in Wort und Schrift
Russisch	fließend in Wort und Schrift
März 2001 – Juni 2001	‘Europa’ Sprachschule, Petrich, Bulgarien
Sprachlehrerin Englisch	Englisch Unterricht (Abendkurs)

HOBBYS

Home Fitness, Radfahren, Yoga, Musik hören

Koblenz, den 05 Oktober 2009