

Master Thesis Economics & ICT

Factors affecting the decision of organizations to adopt Unified Communication & Collaboration Software

5/24/2012

Author: G.A. Bakker

Student number: 337495gb

First supervisor: Dr. Ing. R. Mersel

Second supervisor: Dr. L. van Hemmen

External supervisor: Javier Leonor

This document contains the result of the research performed for graduating for the Master Economics & ICT of the Erasmus University

This page is intentionally left blank.

PREFACE

This thesis is the final element of finishing my master Economics & ICT at the Erasmus University. I've written this thesis as part of my internship at Accenture Netherlands, which gave me new experiences, a chance to look inside a large consulting firm and above all, a nice time with many new people that I have added to my social network.

The process of writing a thesis can best be described as continuously searching what your thesis is about and what and how you are going to research this. Ironically, in my case, my final vision on this was also my first vision. All the side steps in between, were full of interesting topics and gave me unlimited new ideas and an unlimited broad scope. Countless times of being unsure what to do, write or which direction to go can block progress. Looking at myself and my personality I can say, this big search in the middle was needed to teach me a lesson about myself.

The subject Unified Communications & Collaboration is about many developments in the work environment and the way people collaborate in an organization. The enhancements UC&C may bring to people's work-life balance can really be beneficial, but the benefits come from changes in the way people collaborate and communicate and its shared norms and values on how work is done. As depicted in the PWC paper, the new world of work (dutch: *het nieuwe werken*), is typical a movement that needs to be supported by proper ICT equipment, in which UC&C can fulfill its role.

This written thingy below here could not be finished without the help of some people.

- Rob Mersel, my supervisor from the university. Thanks for all the nice conversations we had and the support, guidance and the tap on my shoulder.
- Accenture and Javier Leonor, my supervisor from Accenture
- My dad, for all the money he shoved to me to keep me alive and to do some nice things other than writing a thesis.
- My mom, for listening to all my dull complaints.
- My ex-girlfriend, for all the free time I had when she broke up.
- All the other Accenture interns for the nice Friday after noon drinks and the hours after 7.30 p.m.

TABLE OF CONTENTS

Preface	0
Summary	4
List of figures and tables	6
1 Introduction	7
1.1 Context of the Study.....	7
1.2 Problem statement	7
1.3 Research objectives.....	8
1.4 Research questions	9
1.5 Outline of the thesis.....	9
2 Research Framework and Design.....	10
2.1 Existing Literature.....	11
2.2 Semi structured interviews	12
2.3 Questionnaire.....	13
2.4 Limitations.....	13
3 UC&C Revealed	14
3.1 Defining UC&C.....	14
3.2 UC&C Modules and Applications.....	17
3.3 Benefits & Burdens of UC&C	19
3.3.1 Benefits of UC&C.....	19
3.3.2 Burdens of UC&C	23
3.4 Pre implementation conditions of UC&C	24
3.4.1 Geographical Dispersion of activities.....	24
3.4.2 Organizational Size.....	24
3.4.3 Type of Industry	24
3.4.4 Organizational Function and Type of Work	25
3.4.5 IT-infrastructure	25
3.4.6 Culture and Structure.....	25
3.5 Conclusion	26
4 Adoption of ICT systems	27
4.1 Diffusion of ideas.....	27
4.2 Adoption at the organizational level	28
4.3 Adoption at the individual level	29
4.4 Conclusion	30

5	Factors Driving Adoption and Use of the UC&C paradigm	31
5.1	Inter-organizational Perspective	31
5.2	Organizational perspective.....	32
5.3	Technological Perspective	36
5.4	Perceived Benefits.....	39
5.5	Perceived Burdens.....	40
5.6	Conclusion and Proposed Model.....	41
6	Empirical Part.....	42
6.1	Explorative Interview results.....	42
6.1.1	Cultural Differences in Multinational Organizations.....	43
6.1.2	Governance in Multinational organizations.....	43
6.2	Questionnaire.....	44
6.3	Questionnaire structure	45
6.3.1	Classification questions.....	45
6.3.2	Developments driving adoption of the UC&C paradigm	45
6.3.3	Inter-organizational perspective.....	46
6.3.4	Organizational perspective	46
6.3.5	Technological perspective.....	47
6.3.6	Economical perspective	47
6.4	Results	48
6.4.1	Classification questions.....	49
6.4.2	Inter-organizational perspective.....	51
6.4.3	Organizational perspective	52
6.4.4	Technical perspective.....	54
6.4.5	Economical perspective	55
6.4.6	Developments driving adoption.....	58
6.5	Conclusion	59
7	Conclusion.....	60
7.1	Answers to sub questions	60
7.1.1	What is UC&C?.....	60
7.1.2	Benefits and Burdens	61
7.1.3	Factors driving adoption	61
7.1.4	Factors influencing the decision	61
7.1.5	Pre implementation conditions	62

7.2	Answers to research questions	62
7.2.1	Factors driving the decision of organizations to implement UC&C solutions.....	62
7.2.2	What are pre implementation conditions of an UC&C solution?	63
7.3	Final conclusion and recommendations.....	63
	References	64
	Appendix A - Expert selection for interviews.....	67
	Appendix B – Interview Reports	68
	Appendix C – Questionnaire	77

SUMMARY

This research attempts to discover factors that drive adoption of UC&C solutions at organizations. Several theories with a general view well describe factors that influence adoption and use of technology. Literature exists on what UC&C is and what it may bring to an organization, but little research exists on exact factors that are of influence to the decision to adopt and use UC&C solutions. This research tests found factors over a group of Accenture professionals that have done projects. It specifically asks if respondents have observed situations at clients. The following paragraphs elaborate on what the research exactly entails, how it is done and the results.

The research questions are aimed at following

- Finding out what UC&C is;
- What drives adoption;
- Benefits and burdens of UC&C;
- Which factors influence management in the decision to implement an UC&C solution;
- Pre implementation conditions of a UC&C solution.

The research design consists of several steps that have been taken to gather theories and empirical knowledge. A literature study, explorative interviews and a questionnaire have been conducted to answer the research questions.

UC&C may be described as a collection of technological innovations which are combined in packaged software. These innovations bring changes in the way people are able to communicate, collaborate and do their work place and time independent in a device independent way. Common or 'essential' elements of an UC&C solution are a converged infrastructure with VoIP speech communications, advanced conferencing support, Instant Messaging, advanced office software tooling and integration, communications integrated in business processes and mobile telephony integration. Numerous vendors across the globe provide UC&C solutions.

UC&C can bring several benefits. These benefits may be tangible or intangible. The former may exist in benefits in reduced costs of telephone charges, IT management expenses, travel expenses, cost reduction of the IT infrastructure or reduced real estate due to working from home. The latter consist of benefits in terms of increased collaboration effectiveness, increased user productivity, security. Burdens may exist in terms organizational and behavioral change, systems integration issues, system interoperability, employee irregular work hours, fear of surveillance through presence information, prior investments in telephony infrastructure.

Factors that influence the adoption of an idea or innovation in a social system is described by Rogers (1995). Rogers describes that adoption and use of technology depends on *the relative advantage, compatibility, complexity, trialability and observability* of an innovation.

Developments that drive adoption of the UC&C paradigm can be split up in the inter-organizational, organizational, technological and economical perspective. A questionnaire spread under professionals at Accenture that have done implementation projects with UC&C. This questionnaire was used to test found literature and data from exploratory interviews. The purpose of the questionnaire was to gather observations from the consultants on projects in which they

participated. The units of measure consisted of several factors that were selected from literature and exploratory interviews. These are divided over several perspectives.

Analysis of the questionnaire found that the adoption of UC&C solutions is driven by five factors, these five factors are:

- Globalization of organizations
- Consumer technology
- Quality of the internet in terms of bandwidth, availability and connection speed
- Convergence of networks
- Next generation networks
- Cost reduction

LIST OF FIGURES AND TABLES

Figures

Figure 1 – Research framework	10
Figure 2 – Literature search process (Blumberg et al. 2005)	11
Figure 3 – Gartner Hype Cycle (Gartner 2011)	16
Figure 4 – Diffusion of Ideas according to rogers (1995)	27
Figure 5 – Phases of innovation adoption (Rogers 1995)	29
Figure 6 – Trends driving the emergence of eCollaboration (Riemer et al. 2009).....	32
Figure 7 – Adoption model UC&C.....	41
Figure 8 – Largest organizations of respondents.....	50
Figure 9 – Smallest organizations of respondents.....	50

Tables

Table 1 – Structured and unstructured interviews (blumberg et al. 2005)	12
Table 2 – Reduced international telephone charges (Forrester 2007)	19
Table 3 – Reduced costs of dial in conferencing (Forrester 2007).....	20
Table 4 – Security Threats to UC&C Services (Almeida, F. & Lourenco, J. 2011)	22
Table 5 – Main elements (Rogers 1995)	28
Table 6 – Types of innovation decisions (rogers 1995).....	28
Table 7 – Factors determining individual adoption (Rogers 1995).....	30
Table 8 – Effects of new world of work	35
Table 9 – Interview subjects analysis.....	43

1 INTRODUCTION

The following two chapters will sketch the context, scope and framework of the study and are meant to give an introduction to the thesis and its subject.

The way people communicate inside an organization is changing rapidly. The classical company now has 'flex working' areas and employees that travel around the world. Especially so called 'knowledge workers' seem to benefit from new forms of communications and collaboration (Poot, de H., et al. 2005). Multiple forms of communications are now here to aid mobile workers and the internet makes it possible to attach all devices, such as laptops, PDA's and mobile phones onto the same network and interconnect anytime and anywhere (Evans, D. 2004). This offers a variety of new possibilities.

Unified Communications and Collaboration (UC&C) is the integration of different communication channels into one environment or software package. It typically combines speech, text and video with devices and presence information. These devices can be a smartphone, laptop, desktop or telephone. It offers benefits in how individuals and groups communicate and collaborate with each other. Introduction of new hardware, software and interfacing between different business information systems eases the way how people communicate in an organization (Riemer, K. 2009). Multiple vendors have stepped into the market of UC&C and see business opportunities. They offer products that range from total solutions that combine hardware and software or dedicated UC services as UCaaS. See section 3.1 for a description of UCaaS.

1.1 CONTEXT OF THE STUDY

The study is performed as part of an internship at Accenture Netherlands. The study is done within a group of consultants that have – to greater or lesser extent – affinity with the subject. The Master thesis is written to graduate for the Master Economics & ICT at the Erasmus University Rotterdam and is the last course of the Master. This thesis is graded by a supervisor from Accenture and co-supervisor of Erasmus University.

Accenture Netherlands is part of the international Accenture and delivers consultancy, technology and outsourcing to clients. Within Accenture separate business units deliver specialized services to different sectors. The thesis is performed within the group Network Enabled Solutions.

1.2 PROBLEM STATEMENT

Many organizations are now dealing with the decision to implement UC&C solutions. Market research from UCstrategies.com shows that organizations cope with "finding ROI", "understanding what Unified Communications is" and "complex integration for interoperability between various components and elements of UC solutions". A survey from the networks systems supplier Avaya (April 2010) shows the same findings, organizations are aware of all new products, but are reluctant because of "no education about the ROI of UC products".

Rierner (2009) shows that UC&C solutions have several potentials and challenges at different levels in the organization, respectively: the organization, group and process, individual and infrastructure. Gartner (2010) shows that UC&C solutions still face some barriers to implementation, as well as other consultancy firms. These all relate to technical, culture, organizational and individual context.

Several suppliers of UC solutions expect markets to grow. A forecast from UCstrategies.com shows that the market for UC solutions will grow from \$ 9.52 billion in 2007 to \$15.9 billion in 2012. Gartner (2010) also predicts 'a sunny future' for UC&C suppliers.

An organization can have multiple reasons to implement new ICT equipment such as cost reduction, increase sales, or process improvements. Reasons to implement UC&C solutions may vary significantly, depending on the level of implementation, yet UC&C solutions can come with a comprehensive context, especially for large enterprises with an international aspect.

1.3 RESEARCH OBJECTIVES

The objective of this thesis is to research:

Factors that are of influence to the decision to implement an UCC solution in an organization.

In high level steps, the objectives of this research are the following:

1. Analyze the UC&C paradigm
2. Address factors that are of influence to the motivation to implement an UC&C solution in an organization
3. Study which pre implementation conditions are important to an implementation strategy
4. Setup model which identifies factors that affect the decision to implement an UCC solution

The empirical part of the study gives insight on projects done at clients and observations of consultants and has the following objectives and will consist of:

- Conduct explorative interviews with experts to review the research problem in a broad way
- Setup a questionnaire for experts to verify found items and measure the influence of different factors.

The results of the empirical part will test found factors. UC&C should be part of a broad context in which it will prevail.

1.4 RESEARCH QUESTIONS

In order to sketch this context and know what the big picture looks like, several research questions have been formulated:

1. *What factors drive organizations in the decision to implement UC&C solutions?*
2. *What are pre implementation conditions of an UC&C solution an organization needs to comply with?*

Sub questions:

0. What is Unified Communications & Collaboration?

Sub question 0 will be used to discover what UC&C is as a new technology and what is considered part of a UC&C solution. Also new developments in network infrastructure, businesses and visions that play a major role for new clients will be discovered. History, technological improvements and fields of application will be discovered.

To answer the first main research question, it is split into three sub questions. These sub questions make it easier to conduct literature research and to conduct the questionnaire.

- 1a. Which benefits and burdens an organization is likely to receive with an UC&C solution?*
- 1b. Which factors drive adoption of the UC&C paradigm?*
- 1c. Which factors influence the decision of management to implement UC&C solutions?*

An important part of the research is to discover which benefits and burdens an organization may receive from UC&C solutions and in which way. Creating the business case for UC&C solutions requires investigating factors that influence the decision of management to implement UC&C. This study will focus on the business case & context that organizations use for the decision to implement UC&C solutions.

- 2a. What are pre implementation conditions?*
- 2b. What may be pre implementation conditions of UC&C solutions?*

Not all organizations are considered eligible for UC&C solutions. Question 2a & b are meant to discover conditions that determine which organizations are eligible for UC&C solutions.

1.5 OUTLINE OF THE THESIS

The outline of the thesis starts with chapter 1 the introduction to the study for background, motivation and context. Chapter 2 shows the research design and evaluates the literature study, explorative interviews, the questionnaire and limitations of this study. Chapter 3 will elaborate on what UC&C is by definition and context, including benefits and burdens. Chapter 4 will zoom in on decision making inside organizations and how innovation adoption develops inside an organization by showing this process with the theory of Rogers – *Diffusion of Innovations*. After chapter four, chapter five will zoom in on found literature that describes factors that drive adoption of the UC&C paradigm. Chapter 6 sketches the design and purpose of the questionnaire. Ending with chapter seven, conclusions and answering of the research questions.

2 RESEARCH FRAMEWORK AND DESIGN

This chapter continues from the previous chapter and reveals the research framework. The research framework is the visual representation of the research process that has been followed.

The research framework of this thesis is showed below:

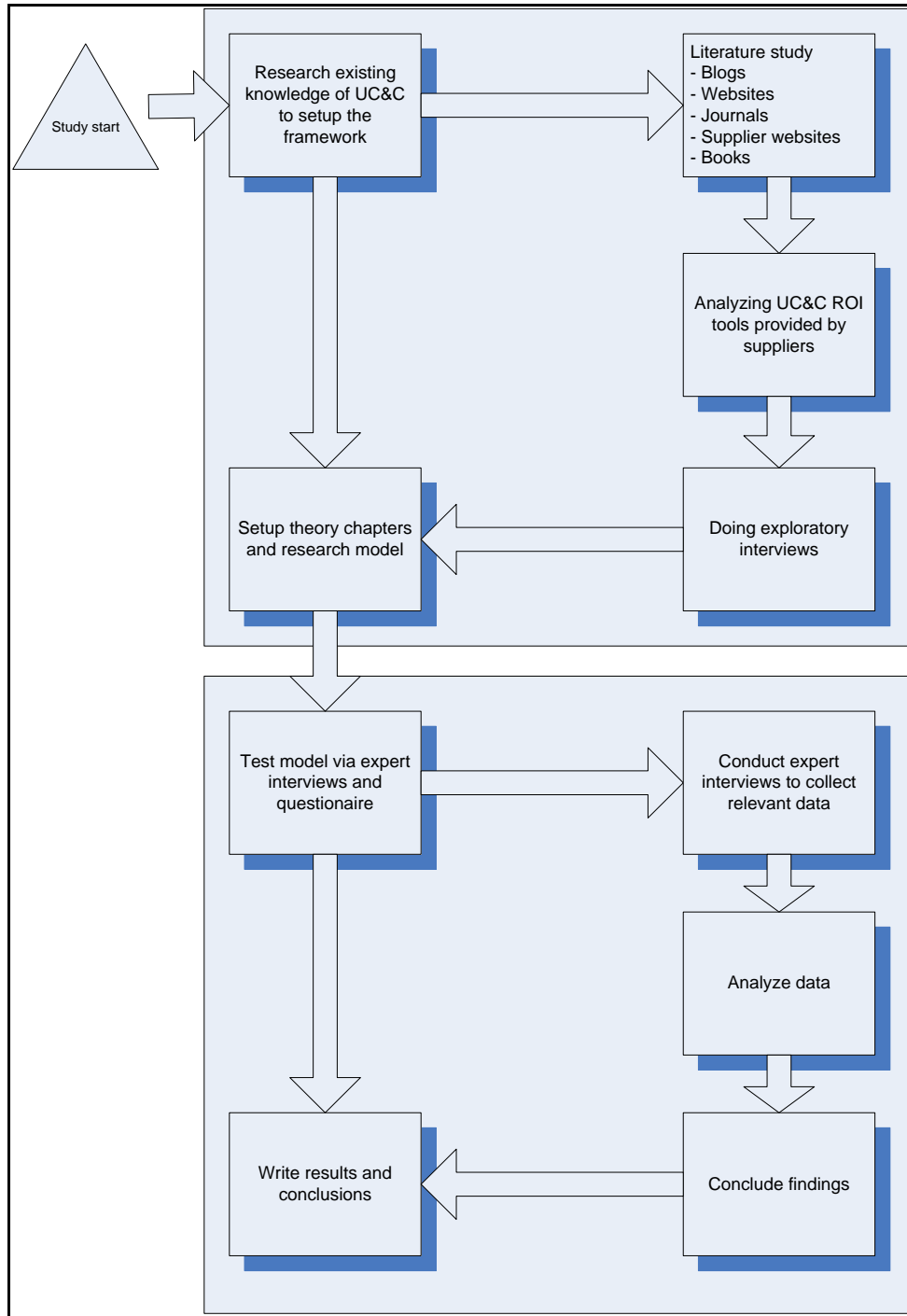


FIGURE 1 - RESEARCH FRAMEWORK

2.1 EXISTING LITERATURE

A literature study is performed to discover related topics of UC&C solutions. Existing literature should function as the foundation for the designed model and research. According to Blumberg et al. (2005), a literature review is meant to establish the following objectives:

- *Establishing the context of the problem by reference to previous work;*
- *Understanding the structure of the problem;*
- *Showing the reader what has been done previously;*
- *Rationalizing the significance of the problem and study presented.*

Also there are generally some problems that arise with doing a literature study. Blumberg says that these come when reviewing subjects from different scientific schools. These may all have their own styles, ways of thinking and writing which, during a literature review, the researcher needs to deal with.

According to Blumberg (2005), literature search process consists of certain steps. The figure below shows them.

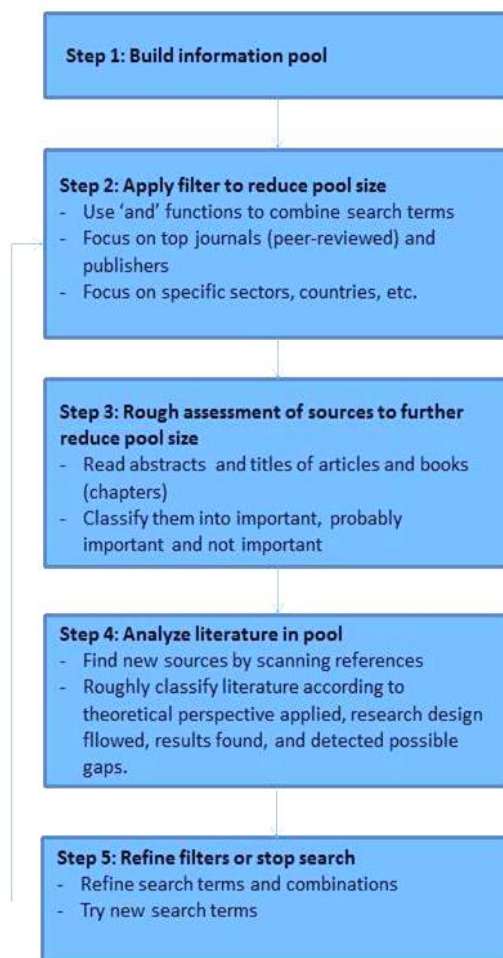


FIGURE 2 - LITERATURE SEARCH PROCESS (BLUMBERG ET AL. 2005)

Overall, literature with the following topics has been studied:

- Literature concerning what UC&C is, benefits and burdens, implementation, pre implementation conditions and technological developments that drive changes in organizations
- Literature on collaboration and information technology in organizations
- Literature about the adoption and acceptance of information technology
- Literature on work habits and changes in society
- Literature on factors that are of influence to procurement of new ICT technology in organizations.

Sources that are used consist of the following:

- Books and Articles found via Google and Google scholar
- Books and articles found via other Dutch Universities
- Academic sources provided by the Universities library
- Digital sources at Accenture of other projects
- Digital sources at the Erasmus University

2.2 SEMI STRUCTURED INTERVIEWS

Below the research method of the empirical part is explained. After reading literature, websites and whitepapers, I started doing exploratory interviews to get a view from practice on certain parts. After that, the interviews became more explanatory because of the familiarity with the subject. The table below from Blumberg et al. (2005) shows the type of study and what type of interviews are needed to gain knowledge about the subject.

	Structured	Semi-structured or Unstructured
Type of study	Explanatory or descriptive	Exploratory and explanatory (semi-structured)
Purpose	Providing valid and reliable measurements of theoretical concepts	Learning the respondents viewpoint regarding situations relevant to the broader research problem
Instrument	Questionnaire (i.e. specific set of predefined questions)	Memory list Interview guide
Format	Fixed to the initial questionnaire	Flexible depending on the course of the conversation, follow-up and new questions raised

TABLE 1 - STRUCTURED AND UNSTRUCTURED INTERVIEWS (BLUMBERG ET AL. 2005)

According to Blumberg, semi-structured interviews are a good method to research a problem that affects a wide-ranging problem area and if the researcher needs to identify issues relevant to understanding the situation. The nature of this study is exploratory and explanatory. The semi-structured interviews will be done with a memory list and/or interview guide. The interviews may become more structured after a while, but will always be done with a certain amount of flexibility. Blumberg describes that conducting interviews with a flexible interview guide is bad for comparability. This is a tradeoff which the researcher needs to keep track of.

Via the literature study and explorative interviews a model is created to address the context in which UC&C solutions can prevail. This model can act as a conceptual framework for UC&C adoption. UC&C solutions can be characterized as a radical change in organizations that may affect structure, way of doing business, culture and technology.

Testing the validity of the model is done via qualitative testing and semi structured interviews. The objects of studies are SME's (Subject Matter Experts) from Accenture that have implemented UC&C modules or entire solutions. Other research objects can be suppliers of UC&C solutions. Yet, these may have a biased vision on the solutions, but do see a lot of customer cases. The objects of research are treated as cases and an interview guide will ensure all topics are addressed.

2.3 QUESTIONNAIRE

The model created will be tested through a web based questionnaire. This survey is spread among 650 SME's who will give their view on the objects found from literature and explorative interviews. The survey tests factors that drive adoption and factors that influence the business case on a larger population of SME's that have implemented UC&C solutions at organizations.

2.4 LIMITATIONS

Limitations of the study lay in the following facts:

- The research is done within limited time.
- The research is done with limited empirical sources.
- The research is done within the context of one consultancy firm. This can deliver a biased measure due to knowledge sharing focused on selling.

3 UC&C REVEALED

The following paragraphs will elaborate on different aspects of UC&C. First, I will zoom in on elaborating on the definition of UC&C. Second, on infrastructural developments that allow using of UC&C solutions and play a major role in the acceptance. Third, I will look at UC&C and what it is solution wise.

In literature there is a distinction between 'Unified Communications' and 'Unified Communications & Collaboration'. This distinction can be made but is starting to disappear, as a common goal among organizations is integrating communications in business processes and vendors are integrating collaboration tools into their UC products. In my opinion UC&C (or UCC) is a better match to reality nowadays and UC comes from the first generations of UC products. The abbreviation UC&C shows where the market is going and adds the idea of collaboration tools that are integrated in business processes. (Gartner 2011)

3.1 DEFINING UC&C

In its simplest form, UC&C is *"Communications integrated to optimize business processes"* (UCstrategies.com 2010). Although this definition is rather short, it does entail the two major parts of the purpose of UC-systems: communication and optimizing business processes. But from a technological and business perspective this does a little short looking to all developments and what is needed for successful UC&C usage and implementation.

UCStrategies.com describes that Unified Communications shows its roots somewhere in the 1990s, where the softphone¹ client was combined and integrated with desktop functionality of e-mail, unified messaging and voicemail. Because of this integration, people started to talk about Unified Communications.

In literature, Riemer (2009) describes Unified Communication as:

"UC systems are the result of the convergence of telecommunications and information technology; they integrate traditional and novel communication media (speech, text, video) and devices (phone, computer) with presence information and further collaboration features Unified Communications" (Riemer, K. 2009)

In the definition of Riemer UC-systems consist of the combination of communication media that share the same medium Internet Protocol (IP). The user gets a single consistent interface. This can be altered on different technology devices. These technology devices can consist of great variety and is not limited to any pre-defined set, but in a typical setting can consist of: PC or laptop, tablet PC, mobile (smart) phone, desk phone.

The International Engineering Consortium (IEC) has a somewhat more nuanced definition:

"The integration of several different communications media, such that users will be able to retrieve and send voice, fax and e-mail messages from a single interface, whether it be wire line phone, wireless phone, PC or Internet-enabled PC." (IEC 2003)

¹ A softphone can be described as normal phone functionality as a software program on a computer, connected with the conventional telephone network.

Many definitions exist in the form that point towards some technical developments that are now integrated. Which technologies, varies greatly. Usually, most common communication techniques used by large enterprises such as fax, e-mail and telephony combined with newer forms like SMS, instant messaging (chat), video chat and VoIP.

The consultancy firm (Aspect Software Inc. 2009) has the following to say about UC:

“What should be clear at this point is that unified communications is not a thing, provided by a single vendor. Instead unified communications is a way of approaching how communications capabilities can help streamline processes to achieve business goals. The concept relies on bridges being built among many types of enterprise applications and communications capabilities.” (Aspect Whitepaper 2009)

The quote above gives a good overview. It is not restricted to some technological developments of the last decade and the last sentence adds an important notion: *building bridges among many enterprises applications* or, interconnecting people that use these applications. This emphasizes on an important goal of many organizations: *How can we achieve effective and efficient collaboration among workers that are spread over the organization or the world?* (Smith, H.A. & McKeen, J.D) Besides this it treats UC&C as a *concept or way of thinking*.

What’s important to keep in mind is that at some point all communicational forms supported by ICT started to be send over the IP-network, which cleared the path for some forms of integration due to sharing of the same medium. This will be elaborated in the next chapter which will entail technical developments that play a major role in the adoption of the subject.

Another important item of the definitions is that UC&C is part of a movement that realizes business communications nowadays can exists in many more forms than just voice. Technology can be used to increase efficiency and effectiveness of business communications. Organizations are realizing that a well thought communications strategy roadmap is needed to valuate new technologies for their organization. (Gartner 2008) UC&C can also be seen as the (buzz) word that represents this awareness.

Several consultancy and/or research firms expect the market to grow due to several developments. Their forecast of enterprises adopting UC&C solutions is positive and see UC&C as an entity that stays. Figure 2 shows Gartner’s’ hype cycle which shows several communication technologies. Note that UC and UCC are seen as two different technologies in the adoption scheme. (Gartner 2011)

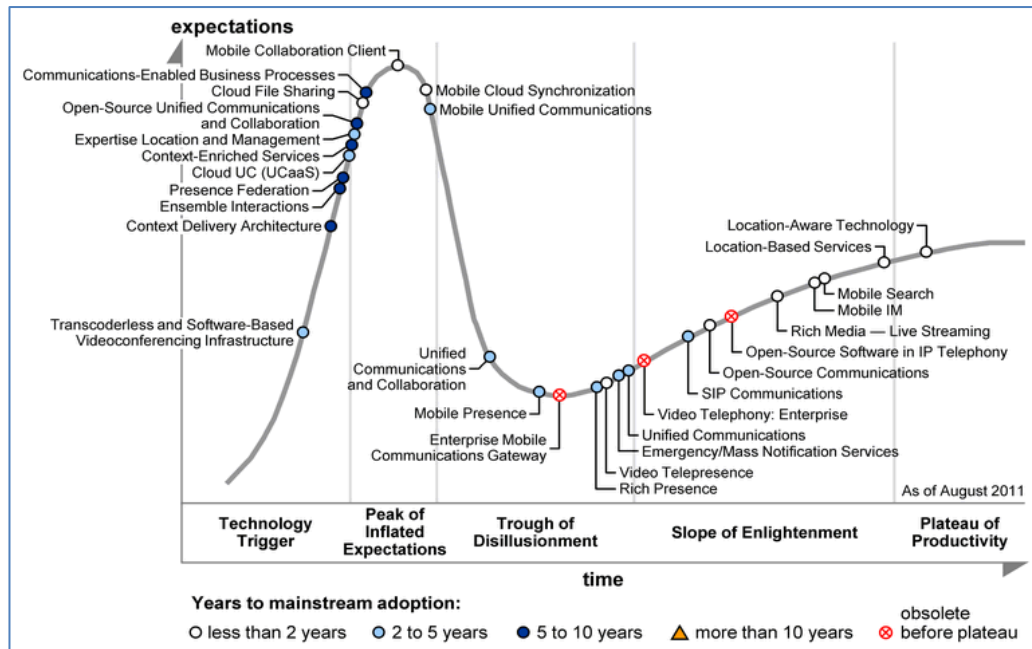


FIGURE 3 - GARTNER HYPE CYCLE (GARTNER 2011)

Some researchers setup a link between people that use social software in private and want to use or expect to use these new communicational forms inside the organization. (Sena. J et al. 2008) Burns et al. (2011) speak of 'the blending of social networking and unified communications'. He sees great changes in the way people communicate, interact at the office and deal with informational objects.

A rather new development is UCaaS. UCaaS (Unified Communications as a Service) is the delivery of a UC solution through a service based model. A solution provider may achieve better economies of scale and scope, delivering benefits to clients in terms of cost and risk. A UC&C solution can be delivered as managed or unmanaged and exist inside the organization or outside the organization as a cloud based service, which due to the mobility aspect of UC&C services is expected to become increasingly popular. (Gartner 2011)

3.2 UC&C MODULES AND APPLICATIONS

Riener (2009) researched which key modules take part of UC&C solutions and came up with six modules. Applications of UC&C solutions are technically supported by different (conceptual) modules that need to be placed in the organizations' infrastructure environment. The six modules that build the foundation of UC&C solutions are:

- IP-infrastructure
- Communication media
- Media channel integration
- Presence signaling
- Collaboration
- Contextualization

The *IP-infrastructure* module consists of routers, servers, switches and end user devices. This module provides the physical data streams. Softphones are also part of the infrastructure model because they replace hardware-based phones. The IP-infrastructure may also consist of a PBX that connects legacy infrastructure to the new IP-infrastructure, leveraging old investments and allowing seamless transitions if necessary.

The *communication media module* provides synchronous communication media. This consists of telephony, video communications or instant messaging. Communication is allowed from one-to-one or multi person conferencing.

Media channel integration refers to the integration of the different kinds of media. An integrated message handling component and a rule based coordination-layer. The message handling component allows voice mails to be delivered as audio files, such as in unified messaging systems or an E-mail reader. Rule based call diversion allows routing of calls through different channels. A user can setup the system that all calls need to be forwarded to a mobile number under certain conditions. These conditions can be time of day, dependent on location or usage of different end devices.


Presence signaling is the ability to setup a status (like *available* or *busy*) in the Instant Messaging feature. A user can choose to setup this by himself or to let this be managed by the system. This area is promising, because this can be automated based on location, time of day, user defined or aggregated from other systems and software, like the agenda.

The *Collaboration module* helps enabling communication richness. Users are able to add certain services and sharing to the conversation. Like screen sharing or application sharing, but also co-editing a document.

Contextualization refers to embedding UC&C functionality in business process and systems. In this way, conversations can be started from an application or website, the number isn't important anymore and is not necessary to remember.

Table 5 shows the different modules with examples. Notice that integration costs and potential value increases when more modules are implemented.

Key Modules	IP-infrastructure	Communication media	Media channel integration	Presence signaling	Collaboration	Contextualization
Details	IP based telephony	Unified Messaging	Rule-based call diversion	Presence status	Conferences	Integration of UC functionality with business processes
	Extension of traditional telephony	Asynchronous media and synchronous media	Follow-me feature	Automatic generation of signals on the device/media level	Ad-hoc application sharing Group calendar	Integration with enterprise and office software
	VoIP over W-lan	Instant Messaging	Preference group concept	Individual signaling	Shared file storage	
Examples	Softphones VoIP Phones	Softphone with Video, email, IM and voicemail integration	Single number reachability Softphone with rule editor	Cisco presence AOL Messenger Skype	Meetingplace Webex Lotus Sametime	SAP Integration Office integration
Focus	Hardware and Infrastructure	Media and devices	Individual and group-oriented communication management		Teamwork	Organizational integration



Integration cost and potential value increases

TABLE 2 - UC&C KEY MODULES (RIEMER 2007)

Riemer (2007) shows several key elements with applications. Table 2 on the next page shows a more simplified view of functional areas that organizations may implement under the UC&C umbrella supporting business needs.

A key part of UC&C solutions is integration of functionality. A more consolidated and centralized business IT system gives key benefits in terms of information retrieval and availability. Where former solutions had all these functionality in silos, UC&C typically provides an integration of these information services. Suppliers typically offer solutions that benefit from tight integration in the different applications.

3.3 BENEFITS & BURDENS OF UC&C

Benefits & burdens of UC&C point to what an organization generally spoken may expect when implementing such a solution. Benefits can be expressed as the positive effects that may come when implementing an UC&C solution. Expressing expected monetary benefits can be difficult. Especially with UC&C, most business cases are built upon *soft dollars* or behavioral change of users. Organizations find it difficult to match monetary values to these expected returns, due to uncertainty whether users really adjust their habits. (Gartner 2011)(Riemer 2007) Besides this, not all organizations are the same, implement solutions the same way or have the same contingencies in terms of strategy, structure, culture and technology in place.

3.3.1 BENEFITS OF UC&C

Telephone expenses & dial in conferencing costs

With an UC&C solution an organization can achieve cost reductions on their telephone charges. This is achieved via *toll bypass* and *Tail end hop off*. The first method is bypassing telephone expenses achieved by using VoIP communications instead of the fixed telephone line for long or short distance calls. VoIP communications occur over the data network which is not metered per minute, but maximum amount of bandwidth and a monthly amount of data. *Tail end hop off* is using VoIP communications to the area where the fixed telephone or mobile phone is positioned. From here communications occur via the telephone network. The result is you only pay local rates instead of international rates. For domestic calls several key experts argued that this will not work, because suppliers of conventional methods of calling are competing with the business case of UC&C solutions. Note that these benefits scale better with international organizations that have a lot of international telephone charges. In other terms, organizational size and geographical dispersion are important factors in this benefit. The technical infrastructure needs to comply with some conditions to deliver high quality VoIP communications. (Forrester 2007)

Forrester research (2007) shows that with a Microsoft OCS solution, substantial savings can be made in the international calling rate. Table 3 shows an example of an organizations reduction in telephone charges.

Metric	Year 1	Year 2	Year 3	Total
Annual spending on toll calling	\$1.000.000			
Reduction via Unified Communications	30%	40%	50%	
Reduced international and long distance telephone charges	\$300.000	\$ 400.000	\$500.000	\$1.200.000

TABLE 2 – REDUCED INTERNATIONAL TELEPHONE CHARGES (FORRESTER 2007)

Dial-in conferencing can be purchased via teleconferencing vendors. Via an UC&C solution, it is possible to avoid these costs associated with dial-in conferencing. An example is made in the same Forrester research.

Metric	Year 1	Year 2	Year 3	Total
Annual spending on dial in conferencing	\$400.000			
Reduction via Unified Communications	30%	40%	80%	
Reduced pay-per-minute dial-in charges	\$120.000	\$ 160.000	\$320.000	\$600.000

TABLE 3 – REDUCED COSTS OF DIAL IN CONFERENCING (FORRESTER 2007)

Cost reduction of total cost of ownership and IT infrastructure

A reduction in TCO can be achieved in several areas. These are voice, conferencing, IT management and support. A study of Forrester (2007) shows that savings may occur due to reduction of the following equipment:

- *Fax machines*
- *Desktop telephone sets*
- *PBX equipment*
- *UM systems*
- *Antivirus, anti-spam solutions*
- *Compliance solutions*
- *Tape back-ups*

Further savings from improved administration may occur because centralized telephony management and simplified directory maintenance. Besides this, management of an UC&C environment eliminates certain labor intensive work. Because workplaces become flexible, management of this can be done centralized from one location. Patching of the infrastructure becomes no more than a mouse click instead of switching cables and traveling to the location of the IT infrastructure chambers. These are savings from telephony administration.

Managing one infrastructure for all services is more cost effective than managing two separate infrastructures. An organization that uses UC&C solutions has the ability to ban the separate telephone infrastructure and equipment; creating more free resources and focus on the IP-infrastructure. (Riemer 2007)(Forrester 2007)

Travel Expenses

Many firms have a workforce that is often on the road, travelling for meetings or client conversations. The idea of UC&C technology is that it delivers maximum flexibility to the user and allows employees to work time and place independent. In this way, a user is encouraged to think about its travel time and it is not necessary to work from an office. An employee has the ability to work from home which results in lower travel costs. Travel expenses are also lowered due to the formation of virtual teams. (PWC 2011)(Riemer 2007) (Majchrzak et al. 2004) A reduction in travel will lead to free time for the employee or more free time for other work.

Forrester research shows that travel costs avoided via online collaboration can be substantially. Their calculation is based on an organization of 2600 people, with 50% of it

traveling an average of 8 times per year. With an accruing percentage every year of 10, 25 and 30% of trips avoided via the usage of online collaboration, this results in avoided costs of respectively \$1.560.000, \$6.000.000 and \$7.200.000.

Reduced real estate

If employees are encouraged to work from home a few days of the week, this typically allows for downsizing the amount of office space and workplaces. Organizations can be flexible in the amount of office space required and share workplaces or create flex working areas. (PWC 2011)(Forrester 2007)

Collaboration Effectiveness

UC&C possesses the technology to employ virtual teams and enables them to easily share and create new information. (Majchrzak et al. 2004) The following capabilities of UC&C could increase collaboration effectiveness:

- Ability to search globally for skills and knowledge in the organization
- Ability to share screens, data and applications in an easy way
- Ability to easily conference (audio and/or video)
- Ability to easily startup virtual teams and projects

These efforts all contribute to the virtual workspace. Majchrzak (2004) researched virtual teams in some case studies and shows that virtual teaming can be very beneficial if supported with the right technology.

User productivity

The technology as a whole has not been researched in terms of measurements in user productivity. But some technologies used in UC&C, like instant messaging for example show benefits in communication practices. Research from Cameron et al. (2005) shows that instant messaging in organizations is increasingly being adopted due to critical mass, informality and because IM is perceived to be much less rich than face-to-face communications. (Cameron, A.F. & Webster, J. 2005)

Presence information is the possibility to show information about your status (either available/busy/not available etc...) or position. Knowing whether someone is available or not, can reduce the amount of communication attempts and saves time. Thus, innovations in technology can help increase user productivity, but measuring these benefits is difficult. Time saving and user productivity comes from the intelligence of the products and intuitive software. User productivity also resides from the integration of different user programs like integrated agenda functionality or presentations.

Part of the UC&C strategy is enabling better work-life balance for the employee. If an organization applies a UC&C strategy in which they motivate home working and be flexible with working hours, an increase in the quality of work-life balance may be the case which may result in higher user productivity due to more efficient use of time.

Security

Researched by Smith and Mckeen (2011), many organizations face a variety of used communication software in their organizations. This proliferation of communication methods used by employees comes with several security threats. For instance, the use of file transfer services or public messaging programs. UC&C is seen as a possibility to tackle these security risks and manage these services in-house and in a controlled manner. Controversially, UC&C may bring increased security or organizations may see UC&C solutions as a solution that brings more security threats. Researched by Almeida and Lourenco (2011), three categories of threat to UC&C are identified:

- Theft of service
- Denial of Service (DoS)
- Privacy and compliance

These threats may affect the services provided with UC&C solutions showed in the table below.

Service	Threat
Instant messaging	Identity theft Identity ambiguity Unauthorized disclosure of information
Unified messaging	DoS attacks
Risks of PBX	Distributed DoS attack Exposure of information
Risks of presence	Privacy risk Compliance of information
Risks of conferencing	Unauthorized access and listening

TABLE 4 - SECURITY THREATS TO UC&C SERVICES (ALMEIDA, F. & LOURENCO, J. 2011)

Reduced project completion time & Shortened sales cycle

Forrester (2007) shows from several cases that organizations that use UC&C technology, have a reduction in their project completion time. This is mainly due to improved communication between project team members, but also due to more direct collaboration among the firm. For example: a SME (Subject Matter Expert) that can be contacted directly for customer questions at location.

3.3.2 BURDENS OF UC&C

Burdens of UC&C solutions may be characterized as the negative impact on an organization that comes with the implementation of an UC&C solution.

Organizational and Behavioral Change

Implementing an UC&C solution comes with a certain amount of organizational and behavioral change. Not all benefits are clear or can be guaranteed, as they are based upon behavioral change. As shown by Riemer (2007), this depends on which modules that are implemented and how deeply they interact with the business processes. Implementing UC&C solutions needs proper change management in order to receive value. The change management needs to be aimed at existing communication culture. Rules and norms on UC&C usage are needed.

Systems Integration

Many organizations have legacy equipment in place which does not integrate with new UC&C systems. These systems are proprietary, which forms an obstacle in replacing. The systems may consist of existing fax, phone, e-mail or web interfaces. Organizations need to migrate from a PSTN situation towards an IP based solution. (Riemer, K. 2009)(Evans, D. 2004)

Systems Interoperability

Interoperability can be defined as *the ability of two or more systems or components to exchange information and to use the information that has been exchanged.* (IEEE 1990)

From the organizational perspective, many organizations procure, or have procured systems from different vendors. For instance: Cisco infrastructure with Microsoft services. Several researchers show that interoperability in UC&C solutions may be a challenge. This usually demands extra effort when a supplier updates its solution. This demands extra testing for compatibility between products. (Evans, D. 1994)(Riemer, K. 2009)

Employee irregular work hours

UC&C solutions make it possible to work time and place independent. This may result in irregular working hours. When an organization implements an UC&C solution and new methods of working, it needs to rethink its norms and values on working hours. (PWC 2011)

Fear of surveillance through presence information

Riemer (2009) shows that in some organizations people fear surveillance through presence information. This feeling may counteract UC&C adoption. An organization may want to take measures to take these barriers away.

Prior Investments

Many organizations have made large investments in its communication infrastructure and may find it difficult to write of these investments in order to implement technology that substitutes. (Gartner 2011)(Riemer 2009)

3.4 PRE IMPLEMENTATION CONDITIONS OF UC&C

Pre implementation conditions may be defined as conditions that determine to what extent an organization can be found eligible for UC&C solutions. Given the characteristics of UC&C solutions and the possibilities this may bring in terms of collaboration supported by communication technologies, UC&C solutions may prevail better in organizations with certain characteristics.

3.4.1 GEOGRAPHICAL DISPERSION OF ACTIVITIES

Geographical dispersion of activities is one aspect that comes forward in many UC&C cases. A lot of organizations try to improve collaboration among international dispersed teams. UC&C is a technology to foster collaboration among virtual teams, by using advanced communication & collaboration technology and applications. The characteristic geographical dispersion is a characteristic of the virtual networked organizations, which started to appear due to the possibility to transfer knowledge intensive work across the world in a split second. Therefore a geographical dispersed organization will likely benefit more from UC&C solutions than a smaller, one location organization. (Jägers, H.P.M. et al. 1998), (Verizon 2009), (Frost and Sullivan 2009)

3.4.2 ORGANIZATIONAL SIZE

Organizational size is stipulated in many studies as descriptive factor that may influence adoption of IT systems. Frost & Sullivan researched the Return On Collaboration (ROC) among small (SMB's 50-999 employees) and large organizations (enterprises +1000 employees) at different functional areas. Their research shows that larger organizations tend to receive much more value from UC&C solutions than smaller organizations. Although the side mark is made that this does not mean that smaller organizations do not benefit from UC&C solutions. (Frost and Sullivan 2009)

3.4.3 TYPE OF INDUSTRY

Some types of industry are further with implementation of UC&C systems. Frost and Sullivan show that three industries significantly show the best ROC scores compared to others. These are financial services, High tech and professional services. These industries may be characterized as sectors that are more ahead in technology adoption. The penetration rate of UC&C solutions in these industries is also higher than at others. (Frost and Sullivan 2009)

3.4.4 ORGANIZATIONAL FUNCTION AND TYPE OF WORK

Besides the type of industry, Frost and Sullivan show that the adoption and use of UC&C solutions differs at different parts in the organization. Frost and Sullivan researched the following organizational parts:

- Human Resources
- R&D
- Sales
- Marketing
- Investor Relations
- Public Relations

Their research shows that R&D and Sales significantly scores better on their ROC index. We could argue that some parts of the organization and in the sales process may explicitly benefit more from UC&C solutions. (Frost and Sullivan 2009)

3.4.5 IT-INFRASTRUCTURE

Bouwman Et al. (2005), show that existing infrastructure is an important factor that influences adoption of ICT systems. The conditions that influence adoption in the IT infrastructure may consist of (Gartner 2010):

- Current telephone infrastructure
- Capacity of LAN and WAN
- Enterprise application Architecture
- Active Directory
- Security
- DC
- Desktop
- Mobile Telephony

3.4.6 CULTURE AND STRUCTURE

Schein (1992) describes organizational culture as: *“the collective behaviour of humans that are part of an organization, it is also formed by the organization values, visions, norms, working language, systems, and symbols, it includes beliefs and habits”*

Culture is one of the important elements of the UC&C paradigm. Frost and Sullivan (2009) show in their research under 946 decision makers that Culture and structure are two important notions of UC&C that interact with each other.

Several researchers have written a lot about different structures and conceptual layouts. Henry Mintzberg is well known for his *structures of five* in which he describes situational factors which should be used to determine the perfect form.

Structure can be defined as the sum of different ways in which labor as separate tasks is divided and the way these tasks are coordinated. (Mintzberg 2004) In a simple way: splitting a task into separate parts needs coordination. This is the basic theory of structure. Important notions of structure are *centralization* and *decentralization*. A decentralized organization divides power and decision making over multiple canthers, because of the inability to process

all information needed for proper decision making. Especially in globalized enterprises, Frost and Sullivan (2009) show in their collaboration index that UC&C solutions are most profitable in organizations that have an *entrepreneurial open culture* and *decentralized organizational structure*.

3.5 CONCLUSION

UC&C is the buzz word that represents a movement of changes in the way we work, use technology and changes of technical infrastructure. It is not a fixed set of technologies, but the combination of real-time and non-real-time communication methods which may consist of data, video and audio. These methods of communication are not restricted to a device. One major part is the explicit usage of IP networks for all communication. The market for UC&C solutions is growing. Many analysts in literature believe that UC&C will become the dominant new paradigm in telecommunications in organizations. With UC&C several benefits and burdens are associated. These benefits may be based on technological enhancements and usability improvements, but also with users adjusting their habits. The latter is therefore a difficult benefit. Burdens may be technological, organizational or monetary of nature. Or can exist due to cultural changes that need to take place.

Pre implementation conditions may exist that depict which organizations are likely to benefit more. Various literature shows that organizational size, geographical dispersion, type of work, cultural differences, technological infrastructure and governance are conditions that may depict this.

4 ADOPTION OF ICT SYSTEMS

Diffusion of innovations theory shows a perspective from social science on how innovations are adopted in social systems and which relevant factors influence this process. For this study, I find this theory rather important because it shows how innovation may be adopted in a social system. The objective of the study (see section 1.3) is to *find factors that influence the decision of management to implement UC&C solutions*. Diffusion of Innovations theory provides a solid perspective on how innovations or ideas spread over a social system, showing that the proclaimed 'rational decision' of implementing UC&C solutions is subject to deeper processes that are usually out of sight for management and decision makers. This strengthens the idea that there are usually different ways towards the adoption of new technology or innovations, in other terms how a social system copes with organizational change due to innovations or technological improvements.

4.1 DIFFUSION OF IDEAS

Treating UC&C as an idea or innovation, the diffusion of innovation theory can provide a solid foundation in showing the process of acceptance and adoption. Rogers (1995) described the theory *diffusion of innovations* from 1962 throughout 1995. The theory describes:

'The process by which an innovation is communicated through certain channels over time among the members of social system.'

Rogers describes factors that influence the adoption both on an individual level and organizational level. He argues that an innovation spreads true a social system following the logistic function or the s-curve as shown in figure 4.

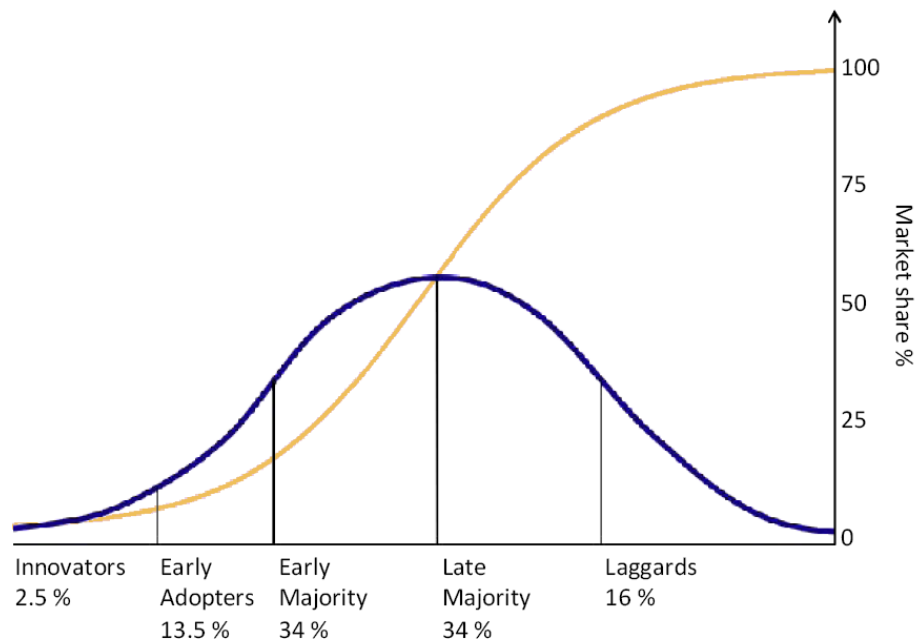


FIGURE 4 - DIFFUSION OF IDEAS ACCORDING TO ROGERS (1995)

Rogers divides adopters of an innovation in five groups: innovators, early adopters, early majority, late majority and the laggards. These all have their characteristics in how they cope with change and adopt new ideas or innovations.

Rogers proposes four elements that influence the spread of a new idea or innovation:

Element	Definition
The innovation	<i>"An idea, practice, or object that is perceived as new by an individual or other unit of adoption"</i>
Communication channels	<i>"the means by which messages get from one individual to another"</i>
Time (organizational perspective and individual perspective)	The innovation-decision period: <i>"the length of time required to pass through the innovation-decision process"</i> Rate of adoption: <i>"the relative speed with which an innovation is adopted by members of a social system"</i>
The social System	<i>"A set of interrelated units that are engaged in joint problem solving to accomplish a common goal"</i>

TABLE 5 - MAIN ELEMENTS (ROGERS 1995)

The social system may consist of a nation or organization, depending on the innovation. Considering organizations as social systems, diffusion of innovations shows insights on how innovations are spread with respect to relevant factors.

4.2 ADOPTION AT THE ORGANIZATIONAL LEVEL

At the organizational level, the way how a decision is made depends on two factors:

- *Whether the decision is made freely and implemented voluntarily*
- *Who makes the decision (Rogers 1995)*

This results in three types of innovations decisions:

Type	Definition
Optional innovation-decision	<i>This decision is made by an individual who is in some way distinguished from others in a social system.</i>
Collective innovation-decision	<i>This decision is made collectively by all individuals of a social system.</i>
Authority innovation-decision	<i>This decision is made for the entire social system by few individuals in positions of influence or power.</i>

TABLE 6 - TYPES OF INNOVATION DECISIONS (ROGERS 1995)

Above table shows where a decision find its roots and describes decisions can have a *top-down* approach or a *bottom-up*, based on how the innovation enters the social system. Usually, there are *opinion leaders* or *champions* that drive adoption through a social system and are of great influence. This may also be depicted as the *support of organizational change* in an organization.

Consequences of adoption

Wejnert (2002) describes two categories of consequences of adoption: public vs. private and benefits vs. costs. *Public consequences* refer to effects that occur to others than the actor

itself. These consequences affect collective social systems such as countries, organizations or social movements. The private consequences affect the quality of life or reforming organizations. Rationalizing a decision usually occurs via a business case in which benefits and costs are balanced towards each other. Costs can be monetary or non-monetary and direct or indirect. Direct costs usually come from financial uncertainty. Indirect costs are usually more difficult to identify. (Wejnert B. 2002)

4.3 ADOPTION AT THE INDIVIDUAL LEVEL

Assuming that the adoption of innovations in a social system stands or falls with the adoption at the individual level, we must look at what's important in this process. According to Rogers, an individuals' adoption process can be divided into five different stages showed in figure 5.

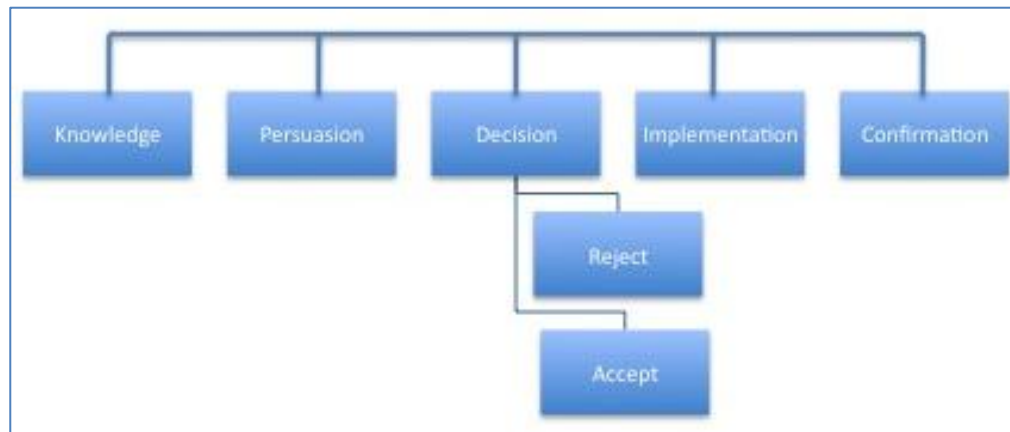


FIGURE 5 - PHASES OF INNOVATION ADOPTION (ROGERS 1995)

In the knowledge phase an individual is first exposed to an innovation. This phase has not inspired the individual and lacks information about the innovation. The persuasion phase has attracted the individuals' attention and now the individual actively seeks information. In the decision phase an individual conceptualizes the innovation and starts to weigh advantages and disadvantages against each other. In this phase the individual rejects or accepts the innovation. After the decision phase an individual implements the decision and searches for situations to employ the innovation. Usefulness is determined and more information may be searched. In the confirmation phase, an individual finalizes his/her decision to continue using the innovation.

Factors that determine adoption or rejection of an innovation are the following:

Factor	Definition
Relative advantage	<i>How improved an innovation is over the previous generation</i>
Compatibility	<i>The level of compatibility that an innovation has to be assimilated into an individual's life.</i>
Complexity	<i>If the innovation is too difficult to use an individual will not likely adopt it.</i>
Trialability	<i>How easily an innovation may be experimented with as it is being adopted. If a user has a hard time using and trying an innovation this individual will be less likely to adopt it.</i>

Observability	<i>The extent that an innovation is visible to others. An innovation that is more visible will drive communication among the individual's peers and personal networks and will in turn create more positive or negative reactions.</i>
----------------------	--

TABLE 7 – FACTORS DETERMINING INDIVIDUAL ADOPTION (ROGERS 1995)

4.4 CONCLUSION

The diffusion innovations theory shows how innovations are communicated over a social system and how this may be adopted. It shows that adoption of new technologies is subject to certain processes and factors. In relation to UC&C adoption we can say that UC&C is an idea that may follow the same adoption process and stages. Factors determined from this general theory find themselves on individual and organizational level.

From an organizational perspective the decision can be made on an optional, collectively and authority basis, depending on who makes the decision in an organization. Assuming that acceptance and usage is based upon the individual that finds himself in a social system, we can say that certain factors working on the individual level play a role in the collective decision. These consist of *relative advantage, compatibility, complexity, trialability and observability*.

As showed by Rogers (1995) the decision to implement a UC&C solution may come from a top-down or bottom-up approach. The first approach is coming from higher management and the latter from the group of the social system. This depicts that the decision to implement a certain solution does not necessarily have to follow a linear path. Looking at the comprehensiveness of UC&C solutions this specifically may be the case due to the great impact and variety of functionality.

5 FACTORS DRIVING ADOPTION AND USE OF THE UC&C PARADIGM

The following sections provide the basis for a research framework to setup a questionnaire. To develop the framework, the different factors have been split up in several perspectives. Respectively: the inter-organizational, organizational, technical and economical perspective. The economical perspective is split up in benefits and burdens, which may also be seen as positive and negative effects of using UC&C systems. Due to the collaborative nature of UC&C systems the inter-organizational perspective was added. The selection is based upon found literature, Accenture internal documents and exploratory interviews.

5.1 INTER-ORGANIZATIONAL PERSPECTIVE

As UC&C is a technology that may change the way organizations collaborate and partner, the following factors are selected as drivers that may influence adoption.

Pressure from partners

Pressure from partners is seen as a factor that motivates organizations to start with certain technologies. This is due to influences that may come from, partners, clients and/or suppliers. Research shows that organizations and its relationships with partners may benefit due to better support of the collaboration between the organizations. (Bouchbout, K. and Alimazighi, Z. 2009), (Chwelos et al.2001)

Pressure from competitors

Several researchers indicate that there is a relationship between competitors behavior. Because UC&C is becoming a trend, the decision of management may be influenced by competitor behavior. (Premkumar and Ramamurthy 1995) (Interview 6)

Factor	Description	Source
Pressure from partners	Pressure from partners is seen as a driver which may influence the decision of management.	(Bouchbout, K. and Alimazighi, Z. 2009), (Chwelos et al.2001)
Pressure from competitors	Research shows that management may be influenced by competition to start with UC&C solutions. UC&C is becoming a trend.	Interview(6), Premkumar and Ramamurthy 1995,

5.2 ORGANIZATIONAL PERSPECTIVE

Organizational factors consist of developments that drive adoption seen from an organizational perspective. The following factors have been chosen from exploratory interviews and existing literature.

Globalization, Informatization & Knowledge Intensity, Innovation Pressure

In the work of Riemer et al (2009) called: *eCollaboration: On the nature and emergence of communication and technologies*, trends of the market, organization and technology are described which are shown in figure 1.

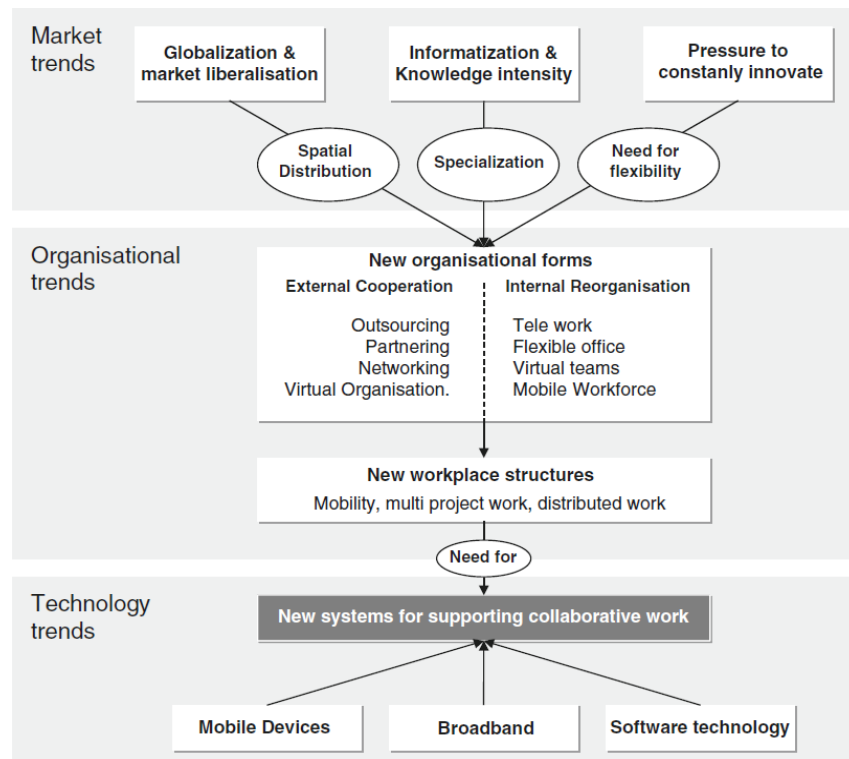


FIGURE 6 – TRENDS DRIVING THE EMERGENCE OF ECOLLABORATION (RIEMER ET AL. 2009)

Riemer (2009) shows that globalization & market liberalization drives organizations to ‘venture into new (geographical) areas, which results in new organizational structures that span national and geographic boundaries and spurs the emergence of multinational alliances’. He further emphasizes on work done by (Ciborra 1992; Ireland et al. 2002; Prahalad and Hamel 1990) which shows that due to increasing informatization and knowledge-intensity of products and processes, no company is able to develop and own all knowledge required for designing, marketing and providing its products or services. Consequences of this described by Powell in 1987, are that organizations are ‘teaming up with external partners for organizing innovation and knowledge creation processes’, resulting in specialization. The last market trend is the pressure on organizations to constantly innovate. As a result, organizations require to be

flexible in order to quickly adapt products and services to customer demand with supporting new virtual organizational forms (virtual teams) and outsourcing non value adding processes (Franke 2001). Mentioned market trends provide a stimulant for organizations to come up with new organizational forms to make it possible to collaborate without caring about location and time.

In Riemers model, new organizational forms are a direct result of the market trends. As a result, new demands for new workplace structures are evolving. Organizational forms can exist as external, internal or hybrid. These new organizational forms need systems and tools to support collaborative work. Technology trends of the last year show developments in mobile devices such as laptops, tablet PC's and smart phones. Developments in networking both wired and wireless in terms of availability and capacity clear the path to be connected anytime anywhere. Finally, new software technology supports better resource usage and process support.

Scientific literature from the schools of supply chain management shows that organizations are searching for technology that can enhance cooperation among partners horizontal or vertical in the supply chain. Formerly known or described as EDI (Electronic Data Interchange), which is used to exchange data electronically in a standardized format between organizations, now possesses the image to be expensive. (Bouchbout, K. & Alimazighi, Z. 2009)

A fairly new phenomenon being researched by the name of IOS (Inter-Organizational Information Systems) focuses on the role of information systems in inter-organizational relationships. It is argued that such situations could improve the competitive position of firms. Such systems should enhance data integration among chain partners and collaboration among employees (Chatterjee, D. & Rivachandran, T. 2004).

Collaboration and communication across organizational boundaries is something which will happen more. As described, increasing globalization, specialization and demand for innovation force organizations to cooperate with other firms and centralize core units. Together, these drivers lead to an increase of international alliances and collaboration.

Development	Description
Globalization & market liberalization	Globalization leads to spatial distribution of knowledge and skills that cross national boundaries which demands new efficient collaboration tools.
Informatization and Knowledge intensity	Informatization and knowledge intensity leads to specialization of organizations and multinational alliances.
Pressure to innovate	Shorter lifecycles and increased customer demand towards services and products, demands organizations to be flexible and innovative.

New World of Work

In line with Riemer's organizational trends from the previous model and a rather new development in the way people tend to do their work is called "New World of Work" (NWW) (Dutch: "Het Nieuwe Werken"). Originally introduced in 2005 by Bill Gates of Microsoft, it refers to recent developments in the way we look at and do our job. TNO has a definition of *new world of work* which sounds like the following:

*"Multiple measures that focus on freedom of choice of the employee. Work when and where people want. Control is based on trust, with good support of needed facilities."*²

An important characteristic of NWW is the possibility to work time and place independent. The employee will receive freedom to do his or her job with discretion. In this way, people are encouraged to do their job in a most efficient way determined by them. There is no obligation to be at the office at normal hours. People are charged on output and what they deliver rather than at hours spent on the work floor, because in many professions time is often seen as an ineffective measurement for payments. NWW is supported by developments in ICT and ICT is seen as the enabler of collaboration and communication independent of time and place. The office is becoming a meeting place instead of working place. (PwC 2011)

New world of work proposes some effects that can occur on different levels in society. Prior research is done to scout new effects of this new development. The table below shows a summary on what is involved with new ways of working.

Level	Subject	Effect
Macro	Labor productivity	Flexible and effective usage of time
		Less interruptions
		Feeling of trust
		Less absence due to illness and stress
		More time for activities (sport)
	Labor participation	NWW supports easier entrance to the labor market for young mothers, handicapped and older people.
	Travel time	Home-to-work traffic reduction
		Home-to-work travel time reduction
	Emission reduction	Lower cost of healthcare
		Life expectancy
Loss of harvest		
Environmental damage		
Loss of biodiversity		
Noise reduction	reduction of stress and healthcare cost	
Reduction in Traffic accidents	Reduction in traffic accidents	
Meso	Reduction in costs	Office space: reduction in workplaces
		Energy costs
		Mobility costs
Micro	Productivity	Flexible and effective usage of time

² http://www.tno.nl/content.cfm?context=thema&content=innocase&laag1=891&laag2=904&item_id=1288&Taal=1

	More productive hours
Reduction of 'lost' time	Less travel time
	Less time spent in traffic jam
Work-life balance	More time spent on private matters
	More time spent on care

TABLE 8 – EFFECTS OF NEW WORLD OF WORK³

The table shows possible effects that come with NWW. Many researchers believe that technology; especially communication and collaboration technology is the enabler for NWW, thus will show substantial benefits for many stakeholders. (PwC 2011) The research of PwC suggests a win-win-win situation for respectively the employer, employee and government.

Not all sectors will benefit from this movement. One could imagine that workers in a factory operating machines cannot work place and time independent. But the so called group of “knowledge workers”, or “new workers” seem to have benefits in certain scenarios of work-life-balance. (Peters et al. 2011)(Poot, H. de 2005)

Several organizations that have introduced the NWW concept to its employees have seen a productivity gain. Microsoft has noticed a productivity profit of 28 minutes per day. Research among medium-sized companies showed an increase of productivity of 18% (Werken Nieuwe Stijl 2010).

Development	Description
New ways of working	New World of Work demands flexibility and technological advances to support new work styles and new work-life integration.

Reduce Carbon Footprint

Organizations today are facing developments that force them to think of new ways to reduce its carbon footprint. These developments, like rising petrol prices and global warming forces them to come up with strategies that reduces the use of energy and greenhouse emissions. Organizations are seeking ways to reduce their greenhouse gas emission and see increased collaboration and more efficient interaction among its employees and suppliers and customers as a serious possibility in reducing its carbon footprint. (Alphawest 2007, Accenture internal research)

Development	Description
Reduce carbon footprint	Organizations are seeking opportunities to lower their carbon footprint.

Top management support

Several researchers have indicated that top management support is an important factor to the adoption of ICT systems. This is due to the fact that top management often acts as a role

³ Extracted from: PwC, “Een verkenning van macro-economische effecten van het nieuwe werken”, 2011

model for subordinates in an organization. (Bouchbout, K. and Alimazighi, Z. 2009), (Pijpers et al. 2002)

Development	Description
Top management support	Support and use of top management is crucial for adoption

5.3 TECHNOLOGICAL PERSPECTIVE

From the technological perspective several factors have been selected that influence adoption of UC&C systems. The technological perspective shows factors that are related to what the technology brings when implemented.

Reduce management of Infrastructure

UC&C may reduce administrative overhead and allows for easier maintenance of PBX's and telecommunication systems. This is done via simplifying tasks such as directory management. UC&C allows centralized IT-management which may result in a reduction of FTE's on a global scale. Evans, D. (2004), Flanagan (2000) (interview 4)

Development	Description
Reduce management of infrastructure	UC&C tools may reduce management of infrastructure

Complexity reduction

Riemer (2009) shows that switching towards an IP based solution unifies corporate networks and may result in a reduction of complexity. The benefits occur due to simpler management and tasks of IT-personnel.

Development	Description
Complexity reduction	UC&C tools may reduce complexity of the tasks of IT personnel

Security

Security wise, UC&C may bring different pictures. On the one hand organizations may implement UC&C solutions in order to achieve a controlled and secured environment for information exchange. UC&C may tackle unsecure public services used in organizations. On the other hand UC&C systems may bring more security threads due to easier sharing and more copies that exist of important enterprise information. History shows that UC&C technology comes with new threads to security. Almeida et al. (2011) show that risks of UC&C can be identified in three categories:

- Theft of services - *such as toll-fraud or unauthorized use of UC resources;*
- Denial-of-service (DoS) - *implies a deliberate or accidental attack against services and applications that render them unusable for IT user;*

- Privacy and compliance - *focuses on interception of communications and confidentiality challenges associated with the conformance of corporate compliance policies and legislation.*

Eavesdropping, unauthorized listening to communications, is considered the biggest security threat by administrators. (M. Bloch et al. 2008) Due to IP-technology that is in use, UC&C systems can be vulnerable to Denial-of-Service attacks. If properly configured, the risk of DoS attacks can be minimized. Besides this, there exist tools and programs that can monitor the network for certain attacks which can be used. Privacy and compliance entails the violation of personal privacy. Unauthorized access to messaging servers, the interception of voice packets, and physical access to voice gateways or analogue devices to install spy equipment are the most common threats. (Almeida F. & Lourenco J. 2011)

Development	Description
New security threats	New security threats may arise with UC&C systems that influence adoption of UC&C systems and services.

Consumer IT

Social software such as MySpace and Facebook is something that nowadays is widely spread in the public environment. It can't be unnoticed that corporations are also looking at these developments. How these technologies have to be deployed in order to develop value for an organization is something that organizations struggle with. (Smith, H.A. et al 2011) Despite this we can see a development that the Enterprise Information Systems are becoming more social. UC&C tools are seen as evolving platforms to support these developments. (Burns, M.J. Et al. 2011)

Drivers for these developments can be found in people that are familiar with social software from home use and increasing globalization of organizations. Employees have certain expectations from the use of consumer IT, which needs to be equaled in organizations. (Riemer, K. Et al. 2009) In the work of Sena some benefits of corporate social networking are revealed. A study examining financial contributions of social software in enterprises revealed an increase in 'productivity, retention and contribution and in new business'. Besides this, organizations seem to benefit via fostering of personal connections through corporate social networks. These can help break down informational silos. (Sena, J. & Sena, M. 2008)

Besides developments in social software, the proliferation of usage of technical devices such as smart phones and tablet pc's is also seen as a driver for the adoption of UC&C technology. Suppliers of UC&C software are increasingly building applications for smartphones which ties different devices and information together.

Development	Description
Consumer IT	IT developments and familiarity with IT outside the organization have raised employee expectations around user experience, mobile access and real time responsiveness

The Internet, Convergence of Networks and Next Generation Networks

The availability of broadband internet is seen as an enabler and driver for developments surrounding collaboration solutions. Developments in both fixed and wireless internet are a foundation for advances in collaboration and communication software. (Riemer 2009)

Convergence of networks refers to the 'merger of legacy-based time division multiplexing (TDM) architecture with today's packet-switching technology and call-control intelligence which allows commercial carriers and service providers to consolidate voice and data networks to provide integrated communications services.' (Ellis, J. et al. 2004)

'Next Generation Networks' (NGN) more or less refers to the same revolution and convergence of the PSTN and IP-network. Starting point is that all communicational forms (voice, data and video) travel over the same network and handle all forms of communications as packets. NGN is sometimes also referred to as all-IP. (Douglas, C. et al. 1998) Because of the expectation that one network is more manageable and better scalable, what we typically have seen the last decade is the convergence of voice, data and video networks. (Ellis, J. et al. 2004)

An important part of voice communications is ensuring quality or QoS (Quality of Service). QoS is defined by the ITU (International Telecommunication Union) as:

'Totality of characteristics of a telecommunications service that bear on its ability to satisfy stated and implied needs of the user of the service.'

Managing QoS is becoming more important as bandwidth is scarce. Especially with Voice as data stream which demands a direct and low latency connection with no packet loss. Offering a QoS on UC&C services is vital for replacement of PSTN equipment. PSTN equipment typically gave a high QoS on voice services. Managing QoS on the IP-network demands handling different types of packets in different ways and prioritizing traffic. Voice traffic typically needs to be prioritized above all to guarantee proper operation for example. (Ellis, J. et al. 2004) For proper operation, large organizations need to have guaranteed QoS from telecom providers. New protocols such as MPLS have provided network traffic management tools to provide these demands in QoS. (Douglas, C. et al. 1998) MPLS is a method to direct data from one node to another based on shortest path labels rather than long network addresses. In this way complex routing lookups are avoided.

Existing infrastructures that are in place at enterprises and ISP's or telecom operators can exist of singular, ATM, Frame Relay, or IP. IP technology is becoming more dominant to achieve the converged network. Enterprises are pushing towards a managed IP infrastructure that supports voice, data and video. To support the existing infrastructures and to allow for newer infrastructures, enterprises use a *media gateway*. This allows for interfacing between both infrastructures. In this way enterprises are able to use both infrastructure and prepare for migration to an all IP solution. (Riemer 2009) (Ellis, J. et al. 2004)

Most organizations still have PBX's that connect phones with the PSTN system and apply TDM (Time Division Multiplexing) for their communications. Organizations are considered to be reluctant in replacing old PBX's due to prior investments.

Development	Description
The Internet	The increased availability of high speed internet drives adoption of new communicational forms
Advances in IP infrastructures	Technical advances in the IP networks and the migration of all communicational forms towards an managed all-IP solution

5.4 PERCEIVED BENEFITS

The benefits that will be tested are based upon chapter 3.3. Below the benefits are summed up for information purposes and the reason why these are selected.

Factor	Why selected?
Reduce telephone expenses	Several studies show that there may be a reduction in telephone charges, besides this several interviewees also confirmed this.
Reduce travel expenses	Studies show that in combination with changes in work habits, UC&C may deliver possibilities to reduce travel expenses. Interviewees confirmed this, but pointed towards the soft element and risk of this factor for the business case.
Reduce real estate	Reducing real estate is seen as a possibility to include as a benefit, although this depends on the chosen strategy of the organization and on general and organizational culture.
Increase collaboration effectiveness	UC&C is seen as a possibility to speed up business processes and increase effectiveness due to several technological innovations. Literature and case studies show that this factor is important in the decision.
Increase user productivity	UC&C may increase user productivity due to integration of communication streams, software innovations and integration of devices. (Riemer 2009)
Improve user experience	UC&C products may increase the user experience and create a more attractive workplace. (Interview 1)
Improved Security Control	UC&C may increase security control and measures; it may provide tools to increase security and ease of use for mobile workers. (Interview 2 , Verizon 2011)
Cost reduction IT infrastructure	Riemer (2009) shows that organizations tend to implement UC&C solutions in order to achieve a cost reduction by reducing its infrastructure.
Cost reduction due to IT centralization and consolidation	A cost reduction is achieved when an organization reduces FTE's by centralizing and consolidating its global IT infrastructure and contracts with suppliers. (interview 4) (Riemer 2009) (Evans 2004)

5.5 PERCEIVED BURDENS

The perceived burdens are based upon chapter 3.3.2. Below, the selection for information purposes with the reason why this factor is selected.

Factor	Why selected?
Organizational change and behavioral change	Riemer (2007) (interview 4) show that introducing UC&C systems comes with certain organizational change which may affect the adoption and decision to implement.
Integration issues	(Riemer 2009)(Evans, D. 2004) show that integration of different proprietary systems do not integrate well.
Interoperability	Organizations usually have separate systems that form a UC&C solution. Interoperability between these systems of different vendors plays a major role in the adoption of new versions or updates. (Evans, D. 1994)(Riemer, K. 2009)(interview 4)
Employee work hours	Employees may be encouraged to work on abnormal times and places. An organization should rethink its norms on this. (PWC 2011)
Fear of surveillance through presence information	Riemer (2009) shows that this factor may influence adoption and use of UC&C systems.
Prior investments	Gartner (2011), Riemer (2007), Evans, D. (2004) show that prior investments play a large role in the decision to implement UC&C systems.
Price of the solution	Higher total price of the solution will affect the decision to implement UC&C solutions in a negative way.

5.6 CONCLUSION AND PROPOSED MODEL

According to literature and explorative interviews, several factors are responsible for adoption of UC&C systems. We may distinct factors from different perspectives. The factors that drive adoption may be exogenous or endogenous. For this research, I do not make a distinction. Several other factors may be found in literature, but due to the disability to research these factors they are left out of scope.

The following conceptual model shows the factors which influence the decision to adopt and use UC&C solutions. The model is used as a framework to analyze the adoption of UC&C systems. The next chapter will elaborate on the questionnaire to test the model.

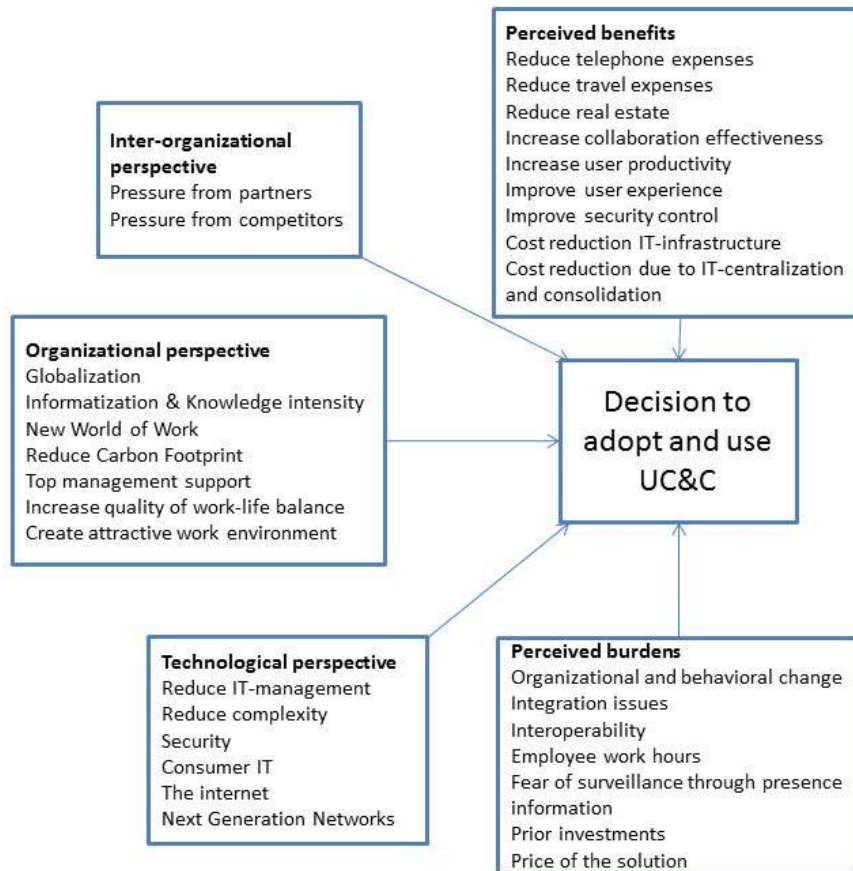


FIGURE 7 – ADOPTION MODEL UC&C

6 EMPIRICAL PART

The following section shows the results of the explorative interviews and questionnaire.

6.1 EXPLORATIVE INTERVIEW RESULTS

The explorative interviews have been held among participants that have different backgrounds and are placed in different contexts. The explorative interviews were meant to scope the broad research problem and to set direction. Below table shows subjects that passed by during the interviews.

Subject	Noted in interview	Explanation
Strategy	1, 2, 3	UC&C is part of a bigger picture, it should be part of the strategy of an organization
Structure	2	UC&C allows organizations to decentralize and flatten its organizational structure.
Culture	1, 2, 3	An organization should rethink its culture and norms and believes on how work is done, trust between employees, working at home, communicational structures and forms.
Globalization	1, 3	Globalization is seen as a driver of UC&C adoption
Informatization	-	
Knowledge intensity	-	
Innovation pressure	-	
New world of work	1, 2	New world of work demands new ICT to support new ways of working
Consumer IT	1, 2, 3	Young employees demand new forms of communications, Consumer IT makes new employees expect services
Reduced GHG	2	Not used in business cases, seen as positive effect.
Internet as driver	2,3	Is seen as a condition. Bandwidth, availability and high speed connections are
Developments in infrastructure		Next generation Networks,
Pressure from partners	2	Seen at some projects as a motivation to start with UC&C tools
Pressure from competition	-	
Industry pressure	2,3	Interviewee 2 and 3 have noted that there is pressure from suppliers of business software to upgrade.
Mergers and acquisitions	2	Interviewee 2 notes that this is often done because changes need to occur anyway and due to the possibility of creating synergy between two cultures by implementing new ways of working.
Organizational structure	2	Notes that organizations become flatter and borders are less visible, ad-hoc communication is taking place more and more due to the technology.
Attract new employees	1,2	Note that organizations and HR want to strive to a nice work environment
Geographical	2	Is not seen as a driver, but characteristic. Not used.

dispersion		
Interoperability	2,3	Not seen, but does pay a role. Often a managed solution is chosen.
Security	2,3	UC&C may bring new security threats because of information sharing.
Integration issues	2,3	Not seen that much, but can be common.
Cost of solution	2,3	Depends on whether an organization outsources. Otherwise, hardware, software, costs of change management en professional services
Sunk costs	2,3	Hardware in place plays a role, most organizations have old telephone systems that work proper, but are depreciated.
Cost reduction	2,3	Conference costs, international calls, national calls, improved collaboration, improved user productivity
Benefits		Can be various, usability, collaboration effectiveness.
Drivers of UC&C adoption	2,3	Business asks for new functionality, technological developments like tablet, phone and laptop (devices). Consumerization of IT. Vendor push. Governance on IT budget in a global organization.

TABLE 9 – INTERVIEW SUBJECTS ANALYSIS

Besides above subjects, during several interviews the following important parts were told.

6.1.1 CULTURAL DIFFERENCES IN MULTINATIONAL ORGANIZATIONS

Depicted by several interviewees (1 and 3) and shown in research, differences in work habits and culture in multinational organizations may affect adoption and use. There may be differences in the way managers and subordinates work together and how employees are controlled on their work. These work habits may affect how UC&C solutions are used and adopted.

6.1.2 GOVERNANCE IN MULTINATIONAL ORGANIZATIONS

Interviewee 3 depicted that a common case at large, geographical dispersed enterprises is that they need to adjust its governance. Enterprises that have decentralized telecommunications departments need to adjust its governance concerning this design of the organization. To create cost savings, organizations need to centralize IT-management and consolidate its IP infrastructure. UC&C solutions demand centralized services and infrastructure for outsourcing.

6.2 QUESTIONNAIRE

According to Blumberg (2005) a good questionnaire is designed with some steps in mind. From the dilemma question one should derive investigative questions. The investigative questions should lead to a preliminary analysis plan, which in turn should lead to measurement questions. The measurement questions should be pre-tested, which eventually will result in an instrument design.

Measurement questions are derived from investigative questions which in turn are derived from the research questions. Measurement questions are concerned with subject topics. The research questions for this questionnaire are: “Which factors that drive adoption of the UC&C paradigm?” and “Which factors are of influence to the decision of management to implement UC&C solutions?” Assuming management will base its decision on a decent business case, the second goal of this part of the questionnaire is to test found factors that are used in business cases over a larger population.

To develop investigative questions, exploratory interviews were conducted in order to receive a broad view of the research dilemma. Based on the explorative interviews, literature and Accenture internal documents a research model is created (see chapter 5.6). The research model acts as a base for the investigative and measurements questions. The goal of the questionnaire is to test whether factors found play a role or not.

The questionnaire is spread among Accenture consultants that have experience with UC&C projects. This is therefore not a random sample. The respondents are experts in the field of UC&C that have practical experience and observations. It also has the risk of a bias in the observations. Only experience from Accenture projects is analyzed. The target participants are consultants of Accenture which are selected based upon their interest in UC&C. They are selected because they are member of the UC&C COP (Community Of Practice), consultants are member of this group because they lead UC&C projects at clients. The sample is a selected sample due to the nature of the target group.

The questionnaire (see appendix 3) is built with online software from Qualtrics (www.qualtrics.com). This software provides comprehensive tools to setup online questionnaires.

The design of the questionnaire is based upon the selection of different perspectives, respectively: developments, inter-organizational, organizational, technical and economical. The questions and/or statements in the questionnaire are meant to address the relevance of the selected factors by measuring the attitude of the participant towards these factors. The factors consist of developments or driving forces that may influence adoption and use. The individual context has been left out due to reasons of scope. In the next chapters the questionnaire design per perspective is shown.

The level of information this questionnaire is looking for is *willingly, shared, conscious-level information*. This type of information does not require questions that are disguised.

The questionnaire was designed in a way that people that did not have done any projects, could not answer the questions, because the purpose was to receive real observations and not

opinions or knowledge. The respondent had the opportunity to answer *don't know* to discourage guessing.

6.3 QUESTIONNAIRE STRUCTURE

According to Blumberg, several types of questions can be distinguished. Administrative questions are questions that may be used to identify study patterns within data and possible error sources. For this questionnaire, these questions are not apparent. Classification questions are used to identify the respondent and characterize groups of respondents so that patterns can be revealed. Target questions are questions address the investigative questions. The complete questionnaire can be found in appendix C.

6.3.1 CLASSIFICATION QUESTIONS

In this questionnaire the following subjects as classification questions are used:

- Country of residence
- Amount of projects done
- Size of the organizations
 - o Largest
 - o Smallest

6.3.2 DEVELOPMENTS DRIVING ADOPTION OF THE UC&C PARADIGM

The following factors are chosen that may drive adoption of the UC&C paradigm. A 5-point Likert scale is used to measure the respondents' opinion regarding statements that are based on previous literature and interviews showed in the table below. According to Blumberg et al. (2005), a Likert scale is a good instrument to measure a participants' attitude.

Perspective	Factors	Measurement statements
Developments driving adoption	Globalization	Globalization of organizations drives adoption of the UC&C solutions.
	Increased Informatization and knowledge intensity	Increased informatization and knowledge intensity in organizations drives adoption of UC&C solutions.
	Consumer technology	Developments in consumer technology or 'the consumerization of IT' drives adoption of UC&C technology
	New world of work	The phenomenon 'New world of work' drives adoption of UC&C technology.
	Reduce carbon footprint	Organizations see the UC&C paradigm as a method to reduce greenhouse gasses.
	The internet quality	The quality of internet - in terms of availability, bandwidth and connection speed - drives the adoption of UC&C solutions
	Advances in	Convergence of networks and Next generation

	global it infrastructure	networks drives the adoption of UC&C solutions.
--	--------------------------	---

6.3.3 INTER-ORGANIZATIONAL PERSPECTIVE

The factors from the inter-organizational perspective are measured via questions showed in the table below. The purpose of the questions is to ask the respondent whether he/she has observed certain situations with clients. The statements are measured with a scale consisting of a 4 categories with possible answers: *yes, maybe, no, don't know*.

Perspective	Factors	Measurement statements
Inter-organizational	Pressure from partners	Clients procure UC&C systems to increase collaboration effectiveness between them and its partners (customers & suppliers).
		Clients see UC&C as a method to improve collaboration in the supply chain.
	Pressure from competitors	Competition behavior is an influential factor among clients to procure UC&C solutions.
		Clients procure UC&C systems, because it's a trend in the industry.

6.3.4 ORGANIZATIONAL PERSPECTIVE

The following factors represent developments from the organizational perspective that may drive adoption. Again, the same four answering categories are used.

Perspective	Factors	Measurement statements
Organizational	Globalization	Globalization drives the adoption of UC&C systems.
		Globalization of organizations plays a major role in the adoption of UC&C solutions.
	Increased Informatization and knowledge intensity	Increased informatization in organizations drives adoption of UC&C solutions.
	New world of work	The phenomenon 'New world of work' drives adoption of UC&C technology.
	Reduce carbon footprint	Organizations see the UC&C paradigm as a method to reduce greenhouse gasses.
	Top management support	Top management using UC&C technologies improves the adoption process in organizations.
	Increase quality of work-life balance	Organizations see UC&C as a solution to improve the work-life balance of its employees.
		Organizations use UC&C systems as part of their strategy to create an attractive work environment.

6.3.5 TECHNOLOGICAL PERSPECTIVE

The technological perspective consists of factors that are related to technology itself. Technological factors are measured through categorical data with 4 possibilities.

Technological perspective	Factors	Measurement statement
Technological	Reduce IT-management	Organizations see UC&C as a way to reduce the management of infrastructure.
	Reduce complexity	UC&C and unifying corporate networks leads to reduced complexity for organizations
	Security	Organizations procure UC&C systems to increase their security measures
		Organizations do not procure UC&C systems due to security threats.

6.3.6 ECONOMICAL PERSPECTIVE

The economical perspective measures perceived benefits and burdens. These may consists of benefits, costs, negative effects and positive effects. The respondent is asked to indicate how often the factors (*always, usually, sometimes, never*) are used in the business case or play a role at client cases. The selection is based upon explorative interviews and prior literature.

Perceived benefits	Perceived burdens
Reduce telephone expenses	Organizational and behavioral change
Reduce travel expenses	Integration issues
Reducing real estate due to downsizing of offices	Interoperability
Reducing operational costs (i.e. amount of FTE's)	Employee work hours
Increase user productivity	Fear of surveillance from presence information
Increase collaboration effectiveness	Prior investments that need to be leveraged
Better user experience	Price of the solution (hardware and software licensing)
Reduced project completion time	
Shorter sales cycles	
Increased Security Control	
Cost reduction of the IT infrastructure	
Cost reduction due to IT centralization & consolidation	
Attracting new personal (i.e. create an attractive working environment)	

6.4 RESULTS

Below are the results of the questionnaire. The target group consisted of 632 persons that in some way could have a relation with the subject UC&C. The expectation was that a large portion of the consultants would share observations from projects, although we could not be sure to what extent the individuals in the target group have participated in UC&C projects.

Eventually 24 of the 63 responses were fully recorded, 39 were partially recorded. If applicable, the results below are presented without the *don't know* possibility.

The mean is calculated by the Arithmetic Mean with the formula:

$$\bar{x} = \frac{1}{n} \cdot \sum_{i=1}^n x_i$$

The scales used vary from 1 – 6. 1 corresponds with the possibility *always* and 6 with *don't know*. After filtering *don't know* as possibility, the scale was 1 – 5. The number 5 corresponds with the answer possibility *never*. In between are *more than half (2)*, *50/50 (3)* and *less than half (4)*. The mean of the observations shows the average of the observations, where a low number (<3) means more than half of the times on average and a mean above 3 (>3) shows that on average at more than half of the observations the factor was apparent. No weights are applied in the calculation.

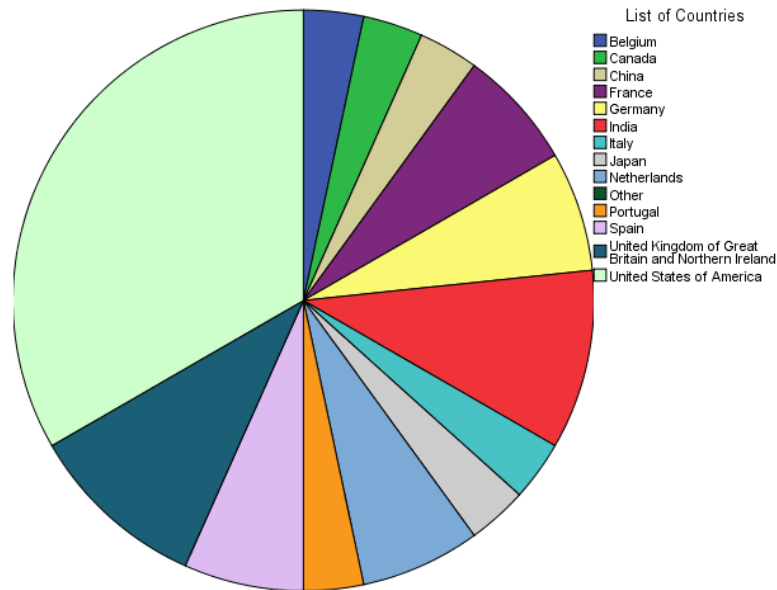
The standard deviation is calculated by the formula:

$$\sigma = \sqrt{\frac{\sum_{i=1}^n a_i^2}{n} - \left(\frac{\sum_{i=1}^n a_i}{n}\right)^2}$$

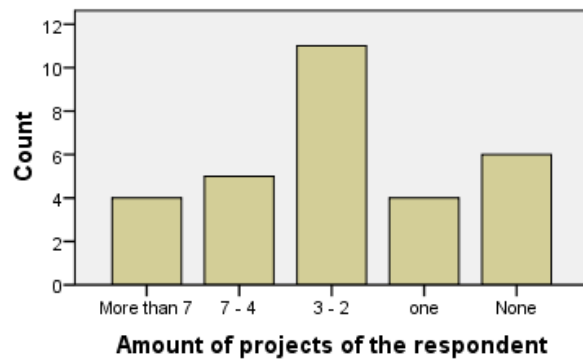
The standard deviation tells us something about the spread of the distribution. A larger standard deviation means a wider spread and thus the differences in measurements lay further away from each other.

6.4.1 CLASSIFICATION QUESTIONS

The classification questions consisted of the respondents country of residence, amount of projects he/she was involved in and the size of the organizations the respondent has worked with. The larger amount of the respondents are from the USA, together with India and the UK.



The response to the amount of projects in which the respondent have participated in, shows that most respondents have participated in 3 projects.



Size of the organizations in which the respondent has participated was also recorded. They were asked to show their largest smallest organization of their UC&C projects. The graphs below show the distribution of the respondents' largest organization and the smallest. Most respondents have participated in projects that are larger than 25.000 employees.

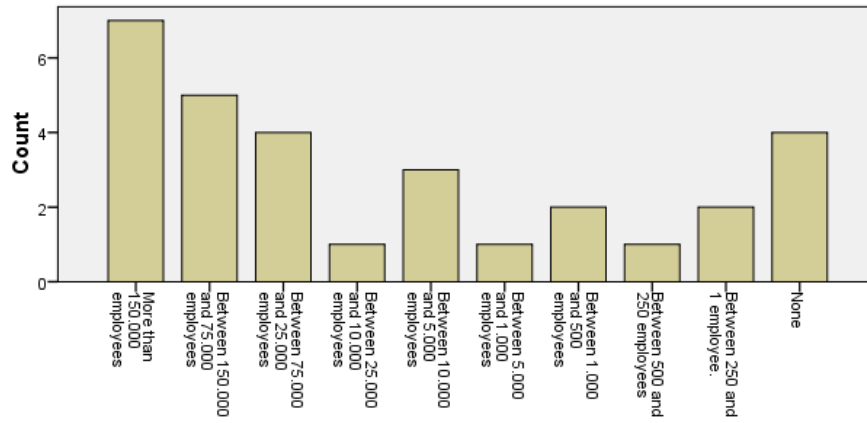


FIGURE 8 – LARGEST ORGANIZATIONS OF RESPONDENTS

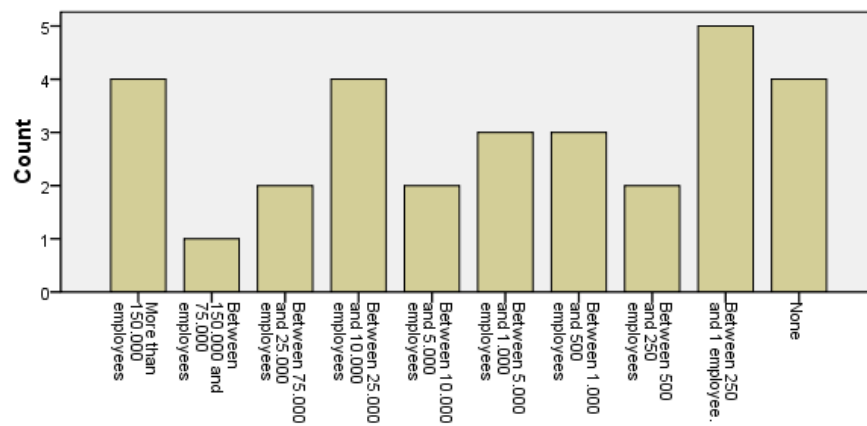


FIGURE 9 – SMALLEST ORGANIZATIONS OF RESPONDENTS

6.4.2 INTER-ORGANIZATIONAL PERSPECTIVE

Below the statistics of the data. 24 respondents have provided their data, the sixth answering possibility (don't know) was not used in the results for the statistics, but are showed as missing.

Descriptive statistics

		Increase collaboration effectiveness among partners	Competitor pressure	Industry trend	Improve collaboration effectiveness along supply chain
N	Valid	23	20	22	21
	Missing	1	4	2	3
	Mean	2,78	2,95	2,50	2,90
	Std. Deviation	1,166	1,276	1,012	1,375

The table below shows a summary of the answers per factor and answering category.

Factor	Always	More than half	50/50	Less than half	Never
Increase collaboration effectiveness among partners	13.0%	34.8%	17.4%	30.4%	4.3%
Competitor pressure	15.0%	20.0%	35.0%	15.0%	15.0%
Industry trend	18.2%	31.8%	31.8%	18.2%	-
Improve collaboration effectiveness along supply chain	23.8%	14.3%	19.0%	33.3%	9.5%

The inter-organizational perspective was measured with four items. The first item asked whether respondents have observed organizations that procure UC&C solutions to increase collaboration effectiveness among them and their partners. 23 results were valid with a mean of 2,78 (1 = always, 5 = never). The results show that in the projects of the respondents increasing collaboration among partners is more than 50% of the times a motivation to start with UC&C.

Competitor pressure was the second item measured. 20 respondents were able to answer. The results show a mean of 2,95, which shows that half of the respondents have seen this during projects, but in line with the percentages and the high amount of missing values, there is a high level of uncertainty.

The third item, industry trend, asks the respondent for behavior of clients concerning UC&C procurement due to developments in the industry. With a mean of 2,50, this shows that more than half of the respondents have observed client behavior being influenced by the industry.

The last item, improving collaboration along the supply chain, shows that it plays a role at clients. The mean of this item is 2,90. The results show that some clients see UC&C as an opportunity to improve collaboration along the supply chain.

6.4.3 ORGANIZATIONAL PERSPECTIVE

Below the statistics of the organizational perspective.

	Globalization	Increased informatization	knowledge intensity	New world of work
N Valid	21	18	19	21
Missing	3	6	5	3
Mean	2,52	3,06	3,21	2,90
Std. Deviation	1,250	1,305	1,134	1,261
	Reduce carbon footprint	Top management support	Work-life balance	Attractive work environment
N Valid	20	22	22	22
Missing	4	2	2	2
Mean	3,25	2,27	3,18	2,86
Std. Deviation	1,209	1,316	1,140	,941

Factor	Always	More than half	50/50	Less than half	Never
Globalization of operations	23.8%	33.3%	14.3%	23.8%	4.8%
Increased informatization	11.1%	27.8%	22.2%	22.2%	16.7%
Intensified knowledge creation	5.3%	26.3%	21.1%	36.8%	10.5%
New World of work	19.0%	14.3%	33.3%	23.8%	9.5%
Reduce carbon footprint	10.0%	20.0%	15.0%	45.0%	10.0%
Top management support	40.9%	18.2%	18.2%	18.2%	4.5%
Work-life balance	9.1%	22.7%	13.6%	50.0%	4.5%
Create attractive workplace	9.1%	18.2%	54.5%	13.6%	4.5%

The respondents were asked how many times clients procure UC&C systems due to globalization of operations. With a mean of 2.52, respondents show that most UC&C projects at clients are started due to globalization of operations, but not all. We may assume that this depends on the size of the organization and its geographical dispersion. Not all organizations have global operations.

Increased informatization is less seen as a driver or motivation to start with UC&C solutions, due to the fact that a large amount of respondents filled in never or don't know. The respondents to less extent see intensified knowledge creation as a driver of UC&C solutions at clients. The mean of 3,21 lays above the average of 3, which shows the tendency that less than half of the UC&C projects at clients start due to intensified knowledge creation.

New world of work is often seen as the surrounding paradigm that drives adoption of UC&C solutions. The results show that of 21 of the projects, more than half (mean = 2,90) was started due to the phenomenon new world of work. Which is strange, UC&C is a typical technology which is driven by the new ways of working. Large vendors like Microsoft and Cisco preach this new method supported with their technology.

The results of the question whether organizations start UC&C solutions with the intention to reduce its carbon footprint shows a fairly low tendency with a mean of 4. This shows that more than half of the clients do not see UC&C as a solution to reduce its carbon footprint. This is remarkable due to the fact that in most business cases reduced travel is seen as a real cost saving opportunity. This may depict that most organizations find it risky to use this in the business case or other factors play a role.

The results of the question about the support of top management for UC&C adoption shows that this plays a significant role in user adoption. The mean of 2 shows that on average, at more than half of the projects at clients, the role of top management in using UC&C solutions plays a significant role.

The results show that quality of work life balance is less important in the decision to implement UC&C solutions. Creating an attractive workplace is on average half of the times used as a factor in the decision to implement UC&C solutions. This shows that it does play a role or is considered as a beneficial element to the organization.

6.4.4 TECHNICAL PERSPECTIVE

The technical perspective consists of measuring whether projects are started due to the reduction of infrastructure expense and complexity and security. Below the results of the questionnaire.

	Reduce IT- infrastructure management expense	Reduce IT- infrastructure complexity	Procurement of UC&C to increase security control	Security issues affecting procurement negatively
N Valid	23	23	22	19
Missing	1	1	2	5
Mean	2,96	3,22	3,77	3,74
Std. Deviation	1,364	1,126	1,066	1,195
Minimum	1	1	1	1
Maximum	5	5	5	5

Factor	Always	More than half	50/50	Less than half	Never
Reduced IT- infrastructure management expense	17.4%	21.7%	26.1%	17.4%	17.4%
Reduced IT- infrastructure complexity	4.3%	26.1%	26.1%	30.4%	13.0%
Increase security control	4.5%	9.1%	13.6%	50.0%	22.7%
Security issues affecting procurement negatively	5.3%	10.5%	21.1%	31.6%	31.6%

Respondents show that UC&C solutions are for half of the times seen as a method to reduce IT-infrastructure management expense. Reducing IT infrastructure complexity is less than half the times a motivation to start with UC&C solutions. This could be explained due to the fact that most organizations see the convergence of their voice and data infrastructure as a separate project from UC&C.

The questions on security control and UC&C adoption show an interesting outcome. The projects of the respondents show that clients to lesser extent procure UC&C solutions to tackle security issues. The second item strengthens this, because known security issues with UC&C solutions do not affect procurement of UC&C systems in a negative way.

6.4.5 ECONOMICAL PERSPECTIVE

The economical perspective is based upon business case elements. These may be tangible or intangible. Several aspects of UC&C found in literature and gathered during explorative interviews were tested via the respondents. The respondents had the opportunity to reply with five predefined answer possibilities. The number 1 corresponds with 'Always' and the number 6 (left out of the analysis) with 'don't know'. A low mean means that the factor is often used as a business case element. First, the benefits that are associated with UC&C solutions.

	Reduce telephone expenses	Reduce travel expenses	Reducing the cost of real estate	Reducing operational costs	Increased user productivity	Increased collaboration effectiveness	Improved user experience
N Valid	23	23	22	20	23	23	23
Missing	1	1	2	4	1	1	1
Mean	2,00	2,17	3,00	2,95	2,13	2,00	2,17
Std. Deviation	1,279	1,302	1,380	1,432	1,180	1,128	1,114
	Reduced project completion time	Shorter sales cycles	Increased security control	Cost reduction of the IT infrastructure	Cost reduction due to IT centralization & consolidation	Attracting new personal (i.e. create a good working environment)	
N Valid	23	18	20	23	23	22	
Missing	1	6	4	1	1	2	
Mean	3,09	3,44	3,30	2,65	2,52	3,23	
Std. Deviation	1,535	1,294	1,380	1,301	1,344	1,631	

Factor	Always	More than half	50/50	Less than half	Never
Reduce telephone expense	47.8%	30.4%	-	17.4%	4.3%
Reduce travel expenses	43.5%	21.7%	13.0%	17.4%	4.3%
Reducing real estate	22.7%	9.1%	27.3%	27.3%	13.6%
Reducing operational cost	25.0%	10.0%	25.0%	25.0%	15.0%
Increased user productivity	34.8%	39.1%	8.7%	13.0%	4.3%
Increased collaboration effectiveness	39.1%	39.1%	8.7%	8.7%	4.3%
Improved user experience	30.4%	39.1%	17.4%	8.7%	4.3%
Reduced project completion time	21.7%	17.4%	17.4%	17.4%	26.1%
Shorter sales cycles	11.1%	11.1%	22.2%	33.3%	22.2%
Increased security control	15.0%	15.0%	15.0%	35.0%	20.0%
Cost reduction of the IT-infrastructure	26.1%	17.4%	30.4%	17.4%	8.7%

Cost reduction due to IT centralization & consolidation	30.4%	21.7%	21.7%	17.4%	8.7%
Attracting new personnel	22.7%	13.6%	13.6%	22.7%	22.7%

The first three elements in the table above show that most UC&C business cases are based upon the reduction of telephone expenses. With a mean of 2, we can say that 80% of the times, based upon the projects, telephone expenses play an important role in the business case. Further, we see that the reduction in travel expenses also plays a major role in the business case. Which is rather strange in comparison with the reduction of greenhouse gasses in the organizational context, which shows that this is not a common goal of organizations to start with UC&C. Reduction of real estate is used in somewhat lesser extent at clients in the business case, probably because this depends on other factors than UC&C technology.

The next three elements show some interesting figures. Reducing operational costs is nearly half of the times a goal of UC&C projects. Increasing user productivity, with a mean of 2,12, is very often a goal of UC&C solutions together with increasing collaboration effectiveness. The two last factors are also often preached as business case factors. Improved user experience also shows up as a common factor in the business cases. With a mean of 2,17. This may show that organizations tend to attach value on the working environment of its employees, hypothesized that UC&C solutions bring an enhanced user experience.

Reduced project completion time & shorter sales cycle does not show up as a significant factor in the business cases. There even is a tendency towards never. This shows that organizations to less extent use this factor. To higher mean (=4) of security control shows that organizations to less extent see UC&C solutions as a way to improve security, which is in line with the first question from the technical perspective. Cost reduction of the infrastructure and due to centralization and consolidation also plays a larger than average role in the projects of the respondents.

The second part consists of the burdens associated with UC&C solutions. The descriptive statistics are shown below and on the next page.

	Organizational and behavioral change	Integration issues in existing environment	Interoperability between products from different suppliers	Employee irregular work hours
N Valid	22	22	22	19
Missing	2	2	2	5
Mean	2,14	2,05	2,14	3,37
Std. Deviation	1,283	1,133	,834	1,212

	Employees' fear of surveillance through presence information	Leveraging prior investments in IT infrastructure	Cost of the solution (hardware and software licensing)
N Valid	20	22	22
Missing	4	2	2
Mean	3,15	2,50	1,95
Std. Deviation	1,268	1,144	1,046

The low means of the first three factors show that these burdens do play a major role at clients. Organizational and behavioral change depends on the amount of impact of the implementation in the organization. Some results show that organizations do not see organizational and behavioral change as a burden may be explained by the amount of components installed at the level in the organization.

Further, integration issues in the existing environment plays a major role at client implementations, together with interoperability between products from different suppliers. 'Irregular work hours' is not seen as a burden at most clients. This may be due to the fact that this is a result of norms and values on how work is done and should not be seen as a result of UC&C implementation or use.

Factor	Always	More than half	50/50	Less than half	Never
Organizational and behavioral change	45.5%	18.2%	18.2%	13.6%	4.5%
Integration issues in existing environment	36.4%	40.9%	9.1%	9.1%	4.5%
Interoperability between products from different suppliers	22.7%	45.5%	27.3%	4.5%	-
Employee irregular work hours	10.5%	10.5%	26.3%	36.8%	15.8%
Employees' fear of surveillance through presence information	15.0%	10.0%	35.0%	25.0%	15.0%
Leveraging prior investments in IT infrastructures	22.7%	27.3%	31.8%	13.6%	4.5%
Cost of the solution	40.9%	31.8%	22.7%	-	4.5%

Fear of surveillance through presence information is on an average amount of projects seen as a burden. The numbers of leveraging prior investments in IT infrastructures shows that many organizations deal with legacy equipment. The clients that do not see this as a burden may be dealing with 'greenfield' locations. These are implementation that are built from scratch. At last the cost of the solution is often seen as a burden, which shows that clients face prices that may be perceived as too high to justify the investment.

6.4.6 DEVELOPMENTS DRIVING ADOPTION

The last part of the questionnaire was concerned with the respondents' opinion towards several factors that are commonly named as driving forces of UC&C adoption. The table below shows descriptive of the results. The complete statements can be found in appendix C.

		Globalization of organizations	Increased informatization and knowledge intensity	consumer technology or 'the consumerization of IT'	The phenomenon 'New world of work'
N	Valid	23	23	23	23
	Missing	1	1	1	1
	Mean	1,70	2,39	2,04	2,09
	Std. Deviation	,822	,839	,825	,848
		Method to reduce greenhouse gasses.	The quality of internet	Convergence of networks	Next Generation Networks
N	Valid	23	23	23	23
	Missing	1	1	1	1
	Mean	2,43	1,70	1,87	1,96
	Std. Deviation	1,037	,703	,869	1,065

Factor	Strongly agree	Agree	Neither agree nor disagree	Disagree	Totally disagree
Globalization of organizations	52.2%	26.1%	21.7%	-	-
Increased informatization and knowledge intensity	13.0%	43.5%	34.8%	8.7%	-
Consumer technology	21.7%	60.9%	8.7%	8.7%	-
New world of work	26.1%	43.5%	26.1%	4.3%	-
Reduction of GHG	21.7%	26.1%	43.5%	4.3%	4.3%
Quality of internet	43.5%	43.5%	13%	-	-
Convergence of networks	34.8%	52.2%	4.3%	8.7%	-
Next generation Networks	43.5%	30.4%	13.0%	13.0%	-

Clearly, globalization of organizations with a mean of 1,70 shows that most respondents see this as a driver of UC&C adoption. Which could be explained by that for a globalized, geographical dispersed organization, collaboration is much needed, which thus creates demand for innovative methods to collaborate. Remarkably, increased informatization and knowledge intensity is seen as a driver by the majority, but was not observed as an organizational factor at client cases. Next, most respondents agree with the statement that

consumer IT and the new world of work are drivers of adoption of UC&C solutions. Reduction of GHG is not significantly found as a driver by the respondents. This again shows that organizations may be reserved seeing UC&C as an enabler of lowering energy usage.

Quality of internet, in terms of availability, bandwidth and connection speed, is by most of the respondents found as a driver of UC&C solutions (mean = 1,70). This could be explained by the fact that UC&C solutions typically work over a data connection. Convergence of networks, the incorporation of speech networks in data networks is also seen as a driver together with next generation networks. Differences between convergence and NGN are strange, because next generation networks are considered to have converged networks.

6.5 CONCLUSION

The questionnaire results show some things. First, from the inter-organizational perspective, we see that collaboration effectiveness among partners is seen as a common driver towards the decision of management to start with UC&C solutions. Which is in line with several papers that depict strategic advantages of UC&C solutions when partnering. (Bouchbout, K., Alimazighi, Z. 2009) (Smith, H.A., McKeen, J.D. 2011).

Further, the organizational perspective shows that globalization of operations plays a dominant role in the procurement of UC&C solutions. Which, as stated before, can be explained due to the fact that globalized organizations need collaboration due to differences in 'function vs. geography'. Besides this, the respondents find 'top management support' essential for the adoption of UC&C solutions in organizations.

The technical perspective shows that reducing IT management expense is less than half of the times the goal of UC&C implementation, next to reducing complexity of the IT infrastructure. Which shows that this may not always be the goal with UC&C projects, stated by Riemer (2009). Further, the questions on security show that organizations less than half of the times procure UC&C systems to increase security measures.

The economical perspective shows some expected and remarkable outcomes. First, the business case elements of reducing costs of telephone expenses and travelling were expected. Although the reduction of GHG does not show up as a driver for organizations, which explains that this is more seen as a positive side effect and not as a goal. Further, increased user productivity and collaboration effectiveness are put on the business case more than half of the times. This can also be depicted as remarkable, because of the risk that is involved. This depends on users adjusting their habits. The outcomes show that organizations rely on changing work habits.

Organizational and behavioral change, as expected, are often found as a burden at organizations together with integration issues and interoperability. Interestingly, prior investments do not play a large role at most of the clients. The price of the solution is perceived as a burden at most clients, which could mean that this is perceived as too high.

7 CONCLUSION

The objective of this thesis is to research:

Factors that are of influence to the decision to implement an UCC solution in an organization.

In high level steps, the objectives of this research are the following:

- Analyze the UC&C paradigm
- Address factors that are of influence to the motivation to implement an UC&C solution in an organization
- Study which pre implementation conditions are important to an implementation strategy
- Setup model which identifies factors that affect the decision to implement an UCC solution

The empirical part of the study gives insight on projects done at clients and observations of consultants and has the following objectives and will consist of:

- Conduct explorative interviews with experts to review the research problem in a broad way
- Setup a questionnaire for experts to verify found items and measure the influence of different factors.

The results of the empirical part will test found factors. UC&C should be part of a broad context in which it will prevail. In order to sketch this context and know what the big picture looks like, several research questions have been formulated:

- *What factors drive organizations in the decision to implement UC&C solutions?*
- *What are pre implementation conditions of an UC&C solution an organization needs to comply with?*

To answer these main research questions, several sub questions needs to be answered first. In the sections below, I will answer these sub questions. Finally I will answer both the research questions and give recommendations for subsequent research.

7.1 ANSWERS TO SUB QUESTIONS

7.1.1 WHAT IS UC&C?

0a. What is Unified Communications & Collaboration?

UC&C can be seen as the paradigm that embodies changes in the way we work supported by information and communication technology. It is not a single technology or solution, but has its origins in the convergence of audio, video and data networks. Handling these different information streams over the same IP network has benefits in terms of manageability and compatibility worldwide. UC&C technology consists of functionality in the areas of: audio, video and text and integrates different devices (like tablets, smartphones and laptops) and uses new wireless technology for mobility.

The UC&C umbrella may consist of applications that find themselves under themes like collaboration, messaging, social networking, media services, knowledge discovery and presence information. The most important areas of UC&C solutions are audio and videoconferencing, using soft phones and intelligent calendaring.

7.1.2 BENEFITS AND BURDENS

1a. Which benefits and burdens an organization is likely to receive with an UC&C solution?

Benefits of UC&C solutions depend on the chosen strategy of the organization. Generally found benefits are the following:

- Reduced telephone & conference call expenses
- Reduced travel expenses
- Increased user productivity
- Increased effective collaboration
- Improved user experience
- Cost reduction due to IT infrastructure centralization & consolidation

Burdens that may come with UC&C solutions are the following:

- Organizational and behavioral change
- Integration issues in existing environment
- Interoperability issues between products of different suppliers
- Cost of the solution

7.1.3 FACTORS DRIVING ADOPTION

1b. Which factors drive adoption of the UC&C paradigm?

Factors that drive the adoption of the UC&C paradigm are found by the questionnaire and are the following:

- Globalization of organizations
- Consumer technology
- Quality of the internet in terms of bandwidth, availability and connection speed
- Convergence of networks
- Next generation networks

7.1.4 FACTORS INFLUENCING THE DECISION

1c. Which factors influence the decision of management to implement UC&C solutions?

Based upon the questionnaire and literature, generally spoken, the following factors influence the decision of management:

- Increased collaboration effectiveness among partners
- Industry trends
- Globalization of the organization
- Cost reduction of travel, communications and infrastructure (management)
- Productivity increase
- Improved user experience

- Organizational and behavioral change
- Integration issues in existing environment
- Interoperability issues among different products of suppliers
- Cost of the solution

Above factors are in the questionnaire appointed as the factors that are named in most of the client cases.

7.1.5 PRE IMPLEMENTATION CONDITIONS

2a. What are pre implementation conditions?

Pre implementation conditions can be defined as the conditions that determine the eligibility of an organization for a certain implementation. In this case for UC&C solutions. Literature shows that the following factors may play a significant role.

2b. What may be pre implementation conditions of UC&C solutions?

- Geographical dispersion of activities
- Organizational size
- Type of industry
- Organizational function and type of work
- Cultural differences in multinational organizations
- IT-infrastructure
- Governance

7.2 ANSWERS TO RESEARCH QUESTIONS

The research questions are answered through answering of the sub questions. The following part is a follow up.

7.2.1 FACTORS DRIVING THE DECISION OF ORGANIZATIONS TO IMPLEMENT UC&C SOLUTIONS

Several forces drive development and adoption of UC&C systems. Found by the questionnaire and strengthening literature of Riemer et al. (2009), globalization of organizations leads towards decentralized organizational structures in which employees need tools to effectively collaborate. Developments in technological devices, such as smart phones, laptops and tablets open up new possibilities in terms of mobility and availability. Lastly, technological developments in infrastructure, the internet and wireless connections are key to developments in the UC&C paradigm. Also, the consumerization of IT drives the expectation of the employee to higher levels.

Factors that influence the decision of management are found in cost reductions of communications and IT-infrastructure & management, new ways of working, increases in productivity and collaboration effectiveness. Also showed by Riemer (2009), UC&C has these potentials in distributed work processes.

On the burdens side we find that these changes may come with a respectable amount of organizational and behavioral change, depending on the level of implementation and amount of components. Organizations also experience issues of integration and

interoperability between products from different suppliers. Lastly, the questionnaire shows that cost of the solution plays is seen as a burden at most organizations. This could mean that total cost is experienced as too high and does not justify the expected ROI.

7.2.2 WHAT ARE PRE IMPLEMENTATION CONDITIONS OF AN UC&C SOLUTION?

Pre implementation conditions can be defined as the conditions that determine the eligibility of an organization for a certain implementation. From literature and interviews, several factors are described that show differences in characteristics of organizations.

- Organizational size; larger organizations tend to benefit more from UC&C solutions
- Type of industry; professional services and financial services have higher collaboration rates and implementation rates
- Organizational function/type of work; there is a difference in use of UC&C technology depending on the function of the organization. For instance, a sales department may use UC&C solutions more extensively than in a production environment
- Cultural differences may influence use of technology and methods of working
- IT-infrastructure that is in place affects replacement and changes
- Governance on IT department and procurement affects implementation.

7.3 FINAL CONCLUSION AND RECOMMENDATIONS

This research has sketched a broad context on what organizations use in the decision to procure UC&C solutions. UC&C may affect several levels in the organizations and work process. Yet, other parts on how the work is done are also affected. UC&C can be seen as a response towards new methods of working and the demand of business for new functionality. This research has summarized factors from different perspectives that may affect adoption and use of UC&C solutions. As UC&C can be very broad in terms of functionality, it can be difficult to generalize UC&C as a package.

Shortcomings of this research may be found in the way the questionnaire is done. Accenture consultants may have a biased vision. Yet, they do possess observations on projects done. Besides this, the low amount of respondents is not enough to reach statistically proven answers.

Further research may be done on researching multiple organizations that have or are implementing UC&C solutions and characterizing these organizations to discover correlations in characterizations of these organizations. Modeling these differences based on organizations could give interesting insights.

Practical use of this study may be found in the model, which shows factors that organizations tend to use for rationalization of UC&C solutions. Besides this, it shows – based on the questionnaire - which factors are often used in the business case.

REFERENCES

Books

Blumberg, B.Cooper, D. & William E.C., 2005, *“Business Research Methods”*, McGraw-Hill Education, Europe Edition, 770p.

Ellis, J., Pursell, C., Rahman, J. 2003, *“Voice Video and Data Network Convergence”*, Academic Press, California, 330p.

Bradley, T. & Shah, S. 2010, *“Unified communications for dummies”*, Wiley Publishing, Indianapolis, 312p.

Articles

Almeida, F., Lourenco, J. (2011), *“Security Issues in unified Communications”*, International Journal of Research and Reviews in Computer Science, Vol. 2, No. 2, April 2011

Bates, M. (2009), *“Unified Communications”*, Insurance Brokers’ Monthly, April 2009 Vol. 59, Issue 4 p.22

Bouchbout, K., Alimazighi, Z. (2009), *“A Framework for Identifying the Critical Factors Affecting the Decision to Adopt and Use Inter-Organizational Information Systems”*, International Journal of Human and Social Sciences, 4: 7 2009

Burns, M.J., Craig, R.B., Friedman, B.D., Schott, P.D., Senot, C. (2011), *“Transforming Enterprise Communications through the Blending of Social Networking and Unified Communications”*, Bell Labs Technical Journal 16(1), Wiley Periodicals

Ciborra, C. U. (1992). *“Innovation, networks and organizational learning”*, In C. Antonelli (Ed.), *The economics of information networks* (pp. 91–102). Amsterdam

Elliot, B. (2008), *“Developing an Enterprise Unified Communications Road Map”*, Gartner Research

Elliot, B. & Blood, S. (2010), *“Magic Quadrant for Unified Communications”*, Gartner Research

Evans, D. (2004), *“An introduction to unified communications: challenges and opportunities”*, New Information Perspectives, Volume 56 Number 5

Franke, U. (2001), *“The concept of virtual web organisations and its implications on changing market conditions”*, eJoV—Electronic Journal of Organizational Virtualness, 3(4), 43–64

Jarvenpaa, S.L. & Leidner, D.E. (1998), *“Communication and Thrust in Global Virtual Teams”*, JCMC 2 (4), June 1998, <http://jcmc.indiana.edu/vol3/issue4/jarvenpaa.html>

- Ireland, R. D., Hitt, M. A., & Vaidyanath, D. (2002). *"Alliance management as a source of competitive advantage"*, Journal of Management, 28(3), 413–446
- Lazar, I. 2006, *"Integrating Telephony, IM, Video and Mobility with Presence"*, Business Communications Review, June 2006
- Luffman, G. et al. (1996), *"Strategic Management: An Analytical Introduction"*, Blackwell Publishers Ltd, Oxford
- Parker, M. (2007), *"The ROI of Business Communications"*, Internet Telephony, Issue: January 2007
- Poot, H., Mulder, M., Kijl, B., *"How do knowledge workers cope with their everyday job?"*, The electronic Journal for Virtual Organizations and Networks, Vol. 5-1 2005, Telematica Instituut Delft University of Technology
- Powell, W. W. (1987), *"Hybrid organizational arrangements: new form or transitional development?"*, California Management Review, 30, 67–87
- Prahalad, C. K., & Hamel, G. (1990), *"The core competence of the corporation"*, Harvard-Business-School (Ed.), Competitive strategy (pp. 11–24). Boston: HBS
- PWC (2011), *"Een verkenning van macro economische effecten van het nieuwe werken"*, www.pwc.nl, 4-11-2011
- Riemer, K., Steinfield, C., Vogel, D. (2009), *"eCollaboration: On the nature and emergence of communication and collaboration Technologies"*, Elektron Markets, institute of Information Management, University of St. Gallen
- Riemer, K. (2009), *"Unified Communications"*, Business & Information Systems Engineering 4-2009, Ludwig-Maximilians-Universität Munchen
- Riemer, K. & Klein, S. (2009) *"Presence Signaling in Unified Communication Systems – A Framework For Customization in Context" (2009)*. Wirtschaftsinformatik Proceedings 2009. Paper 27
- Sena, J. & Sena, M. (2008), *"Corporate Social Networking"*, Issues in Information Systems, Vol. IX, No 2, 2008
- Smith, H.A., McKeen, J.D. (2011), *"Enabling Collaboration with IT"*, Communications of the Association for Information Systems: Vol. 28, Article 16.
- Steinmann, M.J. (2007), *"Unified Communications with SIP"*, ACM QUEUE, March 2007

Thankappan, J. (2009), *"Game plan for Unified Communications"*, Network World Middle East, May 2009

Thankappan, J. (2010), *"Exclusive Unified Communications Survey Results"*, Network World Middle East, September 2010

Whitepapers

Aspect Software (2009), *"Unified Communications...Keeping the Customer in the Equation"*, http://www2.aspect.com/eprise/main/server9/content/Library/whitepapers/UC_KeepingCustomerInEquation_WP_FINAL.pdf, Accessed 29-12-2011

Forrester Consulting (2007), *"Unified Communications Delivers Global Benefits - Study Indicates Major Savings For Organizations Across Three Key Industries"*, http://www.cisco.com/en/US/prod/collateral/voicesw/ps6882/ps6884/prod_white_paper0900aecd8073c9c3.pdf, Accessed: 29-12-2011

Forrester Consulting (2007), *"The Total Economic Impact of Microsoft Unified Communications Products and Services"*,

Frost & Sullivan (2006), *"Meetings around the world 2: Charting the Course of Advanced Collaboration"*,

Redshift Networks (2007), *"Comprehensive Security for VOIP, UC and CEBP Elements in Enterprise Networks"*, http://pablobrenner.files.wordpress.com/2010/02/redshift-uc-security-whitepaper_dec_091.pdf, Accessed: 10-11-2011

Hamilton, G. & Kerravala, Z. (2004), *"Unified Collaborative Communications for the Real-Time Enterprise"*, Yankee Group

Lazar, I. (2007), *"Unified Communications: What, Why and How?"*, Nemertes Research,

Internal Accenture Documents

Accenture UCC strategy overview, presentation

APPENDIX A - EXPERT SELECTION FOR INTERVIEWS

Below experts have contacted in order to select proper data.

No.	Practitioner	Expertise Description
1.	ICT manager Large corporation Benelux	ICT manager A - was involved with the Accenture implementation of the UC&C work environment.
2.	Senior Manager Infrastructure Consulting	Senior manager B - has done large implementations of UC&C solutions at NXP and at Orange in America.
3.	Director UC&C supplier	Director C - offers UC&C business solutions & services at Orange.
4.	Senior Manager UC&C solutions	Senior manager D - is expert on UC&C strategies and helps clients in finding the right solutions
5.	Senior Manager Infrastructure Consulting	Senior manager E - has done several UC&C projects and has experience at a large telecom operator.

APPENDIX B – INTERVIEW REPORTS

Gesprekslijst UC&C onderwerpen - ICT manager IT consultancy services kantoor Benelux

Hoe is UC&C ontstaan?

Vanuit de consultancy zitten we bovenop ontwikkelingen die gaande zijn. We zijn partner met Microsoft en Cisco en vanuit hen hebben we veel kennis over de producten. Als ... moeten we bovenop de nieuwste ontwikkelingen zitten. Maar UC&C is een klein gedeelte van een groter geheel, maar past goed bij de gekozen strategie.

Hoe zag de weg ernaartoe uit? Wat was die gekozen strategie?

Binnen ... hebben we in 2007-2008 samen met HRM, IT, Microsoft en Cisco een strategie ontwikkeld waar we over 5 jaar wilden zijn voor onze werknemers en hoe dit eruit zou zien. Wij hebben erg gekeken naar de ontwikkelingen die gaande zijn in de technologie. Daarnaast hebben wij een globaal netwerk en werknemers die op globaal niveau met elkaar moeten communiceren. Hier kwam dus een kostenfactor bij kijken, want de internationale telefoonkosten zijn niet gering. Met UC&C is het mogelijk om op volume basis te werken ipv per minuut te betalen. Wat we nu gebruiken als kostenbesparingsmethodieken zijn toll bypass en tail end hop off. Verder hebben we allemaal nog wel een mobiele telefoon, maar die kosten zijn erg gering vergeleken met de reductie die we behaald hebben. Overigens was het pas mogelijk zo'n globaal netwerk op te zetten na overeenkomsten met globale partijen zoals Verizon en Orange, die een internationaal netwerk aanbieden. Daarnaast dienen we ons verkeer te managen en intelligent te routen. Dit is mogelijk via MPLS.

Qua strategie hebben we gekozen voor een oplossing waarin we vooral jonge mensen zouden aantrekken. De mensen die niet bang zijn voor technologie. De zogenaamde Y-generatie. De gemiddelde leeftijd binnen ... is 31 jaar. Om die mensen aan te trekken moet je een omgeving aanbieden met de nieuwste technologie en die aantrekkelijk is om in te werken. Die technologie bieden wij, maar we wilden het ook mogelijk maken dat mensen hun eigen technologie mee konden nemen en aan sluiten. Het zogenaamde Bring Your Own Device. Hier zitten echter wel wat haken en ogen aan. De keuze voor een bepaalde telefoon of besturingssysteem is erg persoonlijk en de jonge generatie wil niet tegengewerkt worden door een IT-afdeling die van alles gaat verbieden. We geven ze hun eigen verantwoordelijkheid.

Waar is op gelet voor implementatie?

We wilden een plek creëren waar vooral goed kon worden samengewerkt, zowel virtueel als face to face. Again: Unified Communications is maar een klein gedeelte van de gekozen strategie. Het moest meer een ontmoetingsplek zijn. Bijna alle mensen zitten bij de klant om daar een opdracht te vervullen, er is in dit kantoor plek voor 850 personen, terwijl we in NL er ongeveer 3000 hebben. Dit is een grote kostenbesparing op kantoorruimte. De kantoorruimte moest open zijn met makkelijke mogelijkheden om naast elkaar te zitten of te socializen. UC&C maakt het mogelijk om gemakkelijk vanuit thuis te werken, onze werknemers verlangen dat ook dat dat kan op vrijdag of andere dagen. Veel hebben geen zin om in de file te staan. Unified Communications in combinatie met de laptop geeft iemand volledige bewegingsvrijheid.

Werden er veel problemen verwacht voor gebruik?

Dit heeft ook een beetje met cultuur te maken. Er zijn weleens wat issues, maar Fransen gaan daar bijvoorbeeld heel anders mee om, daar kan downtime echt niet. De Nederlanders zijn over het algemeen wat makkelijker en wachten een 10 minuten om dan te kijken of het weer werkt.

Interview verslag, 1-3-2012 – Senior Manager

Macro factoren

Hebben de volgende factoren invloed op de adoptie van UC&C?

Globalisatie

Ja, dit heeft zeker invloed. Vooral bedrijven die iets met kennis doen, bijvoorbeeld een R&D afdeling hebben. Het project dat ik heb gedaan bij NXP was hier een voorbeeld van.

Informatisering en kennis intensiteit

Ja UC&C is bij uitstek een techniek die het kennis delen ondersteund. Bij NXP was het logisch dat deze technologie ingezet ging worden. Er was vraag vanuit de organisatie.

Innovatiedruk

Niet echt waargenomen, geen bedrijven gezien die voorop willen lopen

Het nieuwe werken

Meeste bedrijven waar ik ben gekomen, is UC&C implementatie geïnitieerd vanuit het nieuwe werken. De technologie werd als voorwaarde gezien. Zeker in Nederland.

Consumenten software

Ja dit kun je wel aannemen dat bedrijven met vooral jonge werknemers een omgeving willen bieden die aantrekkelijk is om in te werken. Veel organisaties zien het als manier om jonge, nieuwe werknemers te trekken.

Vermindering CO2 uitstoot

Dit wordt vaak genoemd, maar de business case wordt hier niet sluitend op gemaakt. Dit is vaak een soft onderdeel van de business case. Het wordt vaak als mogelijk bij effect gezien. In het geval van Telepresence wordt dit wel als argument gebruikt. Daar kan je het echt hard maken. Bijvoorbeeld bij ING, zij gebruiken telepresence voor vergadering tussen de twee kantoren in Eindhoven en Amsterdam. De investering van één miljoen euro was er binnen 3 maanden uitgehaald, alleen al vanwege de treinkaartjes die niet meer gekocht hoefden te worden. Daarnaast werd het vervoer dus niet meer gebruikt.

Het internet

Het is een vereiste, maar wordt in ieder geval niet bewust als stuwende factor gezien

Ontwikkelingen in de infrastructuur

Ja er zijn bepaalde ontwikkelingen die hebben bijgedragen, maar er is niet specifiek een techniek te noemen die verantwoordelijk is voor UC&C. Wat nodig is, is een datainfrastructuur. De meeste organisaties hebben dat al liggen. Vervolgens dient hier een bepaalde QoS op te zitten. Dit was vroeger wel nodig, zoals ATM, Frame Relay en MPLS. Maar specifiek één technologische ontwikkeling

is niet aan te wijzen. Daarnaast is het tegenwoordig niet meer nodig. Het internet op zich biedt genoeg capaciteit. Een 20 mbit verbinding kost je misschien 20 euro en daarmee kan je het hele internet op. Het is maar net hoe heel de situatie in elkaar steekt. Voor 2000 euro hebben organisaties een eigen verbinding, dedicated en gemanaged waarmee je kan peeren met locaties in de hele wereld. Dit hebben bedrijven vaak nodig in verband met het beheer, maar theoretisch hoeft het niet nodig te zijn. De techniek werkt ook op het publieke internet uitstekend, vaak nog wel beter dan in een kantoor.

Je ziet tevens een uitbesteding van de infrastructuur, deze diensten worden vaak niet inhouse geregeld. E-mail, voice en video communicatie verloopt vaak via de servers van microsoft. Die technische infrastructuur is er bijna niet meer.

Organisatiefactoren

Druk van partners

Ja dit kan een aanleiding zijn, ik heb dit tijdens een paar projecten in Amerika gezien.

Druk van concurrentie

Ja dit komt vaak voor, maar niet specifiek voorbeelden van. Maar ik weet dat het vaak zo wel werkt.

Druk vanuit de industrie

Ja er zijn zeker trends waarneembaar.

Fusies en overnames

Ja, dit wordt vaak gezien als een moment om dan maar meteen te consolideren en een aantal grote stappen voorwaarts te nemen. Het is vaak goedkoper om het dan in één keer goed te doen en mee te nemen.

Globalization

Ja, dit heeft vooral effect op virtual teaming wat organisaties willen supporten. Maar ik heb geen klanten gehad die dat als grote reden hadden.

Organisatievormen

Heeft UC&C een effect op de structuur van een organisatie? Laten we zeggen, de manier hoe taakspecialisatie en coördinatie plaatsvindt? *Ja ik denk dat op een bepaalde manier organisaties er platter van worden, de grenzen vervagen meer. Het is makkelijker nu om te overleggen en dingen te bespreken. Het is niet meer gebonden aan afgesproken momenten voor overleg, je kan snel gewoon even iets vragen. Dit is wel iets wat ik waarneem.*

Attract new employees

In veel organisaties kom ik tegen dat vanuit HR wordt gewezen op het feit dat het belangrijk is voorop te lopen qua werkomgeving voor het aantrekken van nieuwe mensen. Het wordt vaak meegenomen als argument.

Geografische verspreiding/aantal kantoren

Deze factor speelt zeker wel een rol, zeker voor virtual teams en ik snap ook dat dit een rol speelt in de business case. Echter zie ik dat er tijdens het maken van de business case niet zozeer op wordt gestuurd. Maar je ziet inderdaad, dat bepaald soort organisaties, die met verspreide kantoren en mensen zitten sneller op dit soort oplossingen overgaan. Het wordt echter niet als harde factor meegenomen in de business case, of berekend. Dit is vaak vrij complex om uit te rekenen, en ROI is ook van heel veel factoren afhankelijk.

Technische factoren

Interoperabiliteit

Hier heb ik niet veel voorbeelden van, er wordt vaak gekozen voor een managed service. Het speelt wel mee in het maken van de business case, maar is dus vaak uitbested. Het zijn vaak veranderingskosten.

Beveiliging

Ik denk dat UC&C op zich nieuwe beveiligingsproblemen met zich mee brengt, het ondersteunt het delen van informatie en elke keer dat er informatie verdubbeld wordt, neemt de kans toe op lekken.

Is het niet zo dat UC&C juist oplossingen biedt voor beveiligingsaspecten? In veel organisaties wordt wellicht gebruik gemaakt van een wildgroei aan diensten. UC&C kan dan een beter te beveiligingen omgeving bieden.

Ja dat kan ik mij inderdaad voorstellen, maar ik ben het nog niet zo tegengekomen.

Integratie

Ja dit wordt wel meegenomen tijdens een traject, maar ik heb daar niet zoveel zicht op gehad.

Kosten factoren

Hardware kosten

Het is natuurlijk zo dat veel UC&C oplossingen op de laptop draaien, bijvoorbeeld een softphone. Maar het kan ook zijn dat er IP-toestellen worden aangeschaft. Wat betreft de server hardware: vaak wordt er een managed solution gekozen. Hierbij wordt er dus geen infrastructuur aangeschaft.

Softwarekosten

Er zijn vaak licentiemodellen, je betaald per gebruiker een bedrag. Maar soms is het ook een vast bedrag, dit hangt van de oplossing en aanbieder af. Meestal speelt het een geringe rol.

Kosten van de organisatie verandering

Speelt wel een rol, maar geen speciaal iets.

Sunk costs

De meeste organisaties hebben oude telefooncentrales. Die zijn vaak al afgeschreven. Vaak zijn de beheer en service kosten gestegen, omdat de centrale erg oud is. Daarnaast bieden nieuwe centrales voordelen wat betreft beheer. Het patchen van telefoons bijvoorbeeld. Met een UC&C oplossing is dat allemaal niet meer nodig. Dat is dan een druk op de knop, vanaf afstand. Zo zijn er talloze voordelen, die in beheer zitten.

Benefits

Improved group productivity, collaboration, user experience and user productivity

Dit wordt wel veel gebruikt, maar valt niet hard te maken. Dit zijn de softe kanten van de business case en hebben meer te maken met gedragsverandering dan met IT.

Cost reduction – belminuten

Hier wordt wel rekening mee gehouden, maar er zijn een aantal kanttekeningen. Het is zeker zo dat er besparingen gemaakt kunnen worden. Meestal doen we hier een TEM-scan voor (Telephone Expense Management) Hier vandaan analyseren we belgedrag en zien we hoeveel internationale gesprekken er zijn. Hier valt de grootste winst te behalen. Het is namelijk zo dat domestic belverkeer zo goedkoop is dat dat niet uitmaakt. De aanbieders van normale diensten bieden namelijk zeer concurrerende alternatieven. Zij concurreren met de VoIP oplossingen en proberen de investering zo minder aantrekkelijk te maken.

Individual factors – Age, gender, experience, perceived usefulness

Spelen deze factoren een rol tijdens het maken van de business case?

Naar mijn weten wordt hier geen rekening mee gehouden, je zou verwachten dat dit zeker invloed heeft. Ik ben nog niet een situatie tegengekomen waarin er duidelijk hierop gestuurd werd of rekening mee gehouden. Meestal komt de vraag naar vernieuwing vanuit de organisatie zelf, bovenin of bij de mensen zelf. Het is moeilijk hier iets over te zeggen, maar je zou verwachten dat leeftijd zeker een rol speelt bij het gebruiken van nieuwe technologie. Bij ASML is er bijvoorbeeld een UC&C oplossing geïnstalleerd, maar daar gebruikt niemand de Instant Messenger, het is een campus, de mensen lopen liever bij elkaar langs. Bij NXP is dit ook het geval, de Instant Messenger wordt niet gebruikt.

Interview Guide UC&C services supplier, 20-3-2012

Which macro developments would you reckon as the primary drivers of UC&C adoption?

There are typical some areas that are responsible for adoption and demand or influence it. Factors that influence the adoption come from the business, governance, technology, trend and devices.

Business drivers

Business drivers can be seen as demand for new functionality. This comes from enhancements the work process and innovations in how the work is done. Usually there is demand to work on projects from different geographical locations. The business needs tools to this work. So this typically is something that comes from the end user that asks for new services in order to do its work properly and quickly. Here you see benefits that are intangible, but do exists.

Governance drivers

Governance is an important part. Most multinationals have decentralized organizations in which services and technology differ very much at different locations. Most multinationals have different locations and spend budget to arrange communications at the lower level. So there are some people that have arranged technologies, services and contracts. This typically is not the situation you want for an UC&C solution. A major condition is that you organize globally to realize the benefits. So, multinationals face changes that need to be made on an organizational level. They need to adjust its governance to match the Unified Communications picture, which is a consolidation and centralization of infrastructure, services and contracts. Suppliers typically respond to this demand in the delivery of global networks. The change of governance is typically a cost driven one. CIO's and CFO's aim at a reduction of FTE's and a consolidation standard to lower costs. After this step, an organization can decide to insource or outsource the services. None of the decisions can be appointed as cheaper, this usually is a matter of feeling of the decision maker.

Technology drivers

Technology drivers typically come from higher bandwidth that is available nowadays and better quality of the connections. Also the availability of internet is a condition.

Trends

There typically exists a 'consumerization' of IT. Employees know services and technologies from its consumer perspective and want to use these. Employees typically are smarter in using communication technology nowadays and expect the same at the firm in order to do its work properly.

Devices

New devices like smartphones and tablet pc's offer the same functionality and power as a PC, but are mobile. This typically drives adoption of the UC&C picture and thought.

Vendor push

There is a considerable amount of vendor push towards clients to start using an integrated solution. A lot of clients have created silos of communication functionality, which in case of upgrades from different suppliers, demands a lot of testing of interoperability. To minimize these efforts, clients are looking to upgrade to one vendor solution.

There are some plateaus of maturity that can be recognized on how far an enterprise is in implementing UC&C solutions. Most organizations start with rationalizing its infrastructure. Usually here starts the decision to consolidate and build a central ICT unit, this needs to be done before stepping up. This phase concerns with building a global communications platform, which eventually can deliver the services that the organization is aiming at, like VoIP, video, conferencing messaging and presence etc... The second phase can consist of user change programs. The last phase consists of business integration. But not many organization are there yet. The last phase can be seen as very mature and the ultimate UC&C goal.

On what premises the business case is usually made? What would this typically look like?

Cost reduction:

- Telephone expenses?
- Travel costs?
- Reducing office space?
- Management of infrastructure?

Benefits:

- Productivity improvements?
- Increased collaboration?
- Better user experience?

Some parts of the business case are very clear, like the reduction in telephone expenses. This typically exists in an organization which has multiple sites in multiple countries. New developments on the mobile phone make it possible to run VoIP over w-lan like the new Lync client. Which, for mobile workers can be great in terms of calling rates. Yet, the greatest cost reduction is made through SIP-trunking, especially for larger dispersed organizations. Like a chain of shops.

The next thing, already told, is the cost reduction due to rationalization of the global infrastructure. Creating a centralized IT department which procures its services in a global way. This can create revenue. Although, local IT departments may find a cheaper price for the procured services locally, the benefits lay in the integration and consolidation and the reduction of FTE's. So reduction of the management of infrastructure plays a crucial role.

Reducing office space is also often mentioned, but does not work in all countries. This is due to cultural differences. In the Netherlands for example, a lot of organizations steer its employees on output. Which is a new development and can be seen as a very mature way of working. This all has to do with trust between employer and employee. Southern countries for example do not have this employer-employee relationship. So the cultural difference eliminates this cost reduction.

Creating the business case on travel costs is typically the same as above. Many southern countries still have managers that need to have their employees around them, thus people still have to travel to work. These are intangible benefits, which are risky to make the business case upon. Rationalizing the IT-infrastructure is where the clear cost reduction is coming from. But before reaching that, an organization first needs to adjust its governance.

The benefits like productivity improvements, increased collaboration or better user experience are all there with the new products, but are not easily quantifiable.

The main tangible factors that are used, these usually come from IT and the business:

- *Reducing real estate*
- *Telephone expenses*
- *Cost of infrastructure*
- *Operational costs (reducing FTE's)*
- *Contract rationalization*

The main intangible factors that are used, these usually come from finance and business:

- *Productivity goes up*
- *Efficiency goes up*
- *End user satisfaction*

The intangible factors are risky to build the business case on, but the new software definitely is better than the old. Productivity is difficult to measure. But practical cases can be the following: in case of contract meetings or meetings about products to deliver, this can be done instantly and far more flexible. It is also possible to instantly work on the same documents. These kind of things ultimately deliver faster project delivery times.

Which type of organizations typically procures UC&C solutions? Do you see any similarities?

Large enterprises probably can have a lot of benefits, but small organizations that are geographically dispersed also need collaboration support tools and can rationalize its infrastructure and create cost savings. Thus, the size of the firm may influence but whether it really makes a difference... Important thing is that UC&C consists of technology to support communications and collaboration in a better way; it's really not more than that. Though, one should realize that the real benefits may arise from acceleration of the business processes. This in fact comes from changes in the organization and work culture, but for most organizations this change process takes about 5 years. So this is difficult to measure.

APPENDIX C – QUESTIONNAIRE

UC&C - Final Version

Q0

Hi! My name is Arnoud Bakker and I'm doing a graduation project for my master thesis to research factors that drive adoption of the UC&C paradigm. You have been selected to receive this invitation due to your subscription on the UC&C COP. I have developed a model to answer the following research questions:

- *Which benefits and burdens an organization is likely to receive with an UC&C solution?*
- *Which factors drive adoption of the UC&C paradigm?*
- *Which factors influence the decision of management to implement UC&C solutions?*
- *What are pre implementation conditions of the implementation of UC&C solutions?*

The short questionnaire asks for your concrete observation during several client projects. The objective is to test the model by asking which statements, based on the model, agree with your practical experience and which do not. The model being tested is shown below.

Your answers will be very helpful and will be processed anonymously.

Thank you for your help.

Arnoud Bakker,

Intern

Q1 In which country do you reside?

Q7 Amount of projects you where involved in?

	More than 7 (1)	Between 7 and 3 (2)	Between 3 and 2 (3)	one (4)	None (5)
How many projects involving UC&C have you participated in? (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q3 What was the size of the organizations?

	More than 150.000 employees (1)	Between 150.000 and 75.000 employees (2)	Between 75.000 and 25.000 employees (3)	Between 25.000 and 10.000 employees (4)	Between 10.000 and 5.000 employees (5)	Between 5.000 and 1.000 employees (6)	Between 1.000 and 500 employees (7)	Between 500 and 250 employees (8)	Between 250 and 1 employee. (9)	None (10)
What was the largest organization in number of employees where you did a UC&C project? (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What was the smallest organization in number of employees where you did a UC&C project? (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q4 In your observation, in how many projects did the inter-organizational factors below influence the steering committee, senior customer management when they decide to acquire and implement UC&C?

	Always (1)	More than half (2)	50/50 (3)	Less than half (4)	Never (5)	Don't know (6)
Have you seen clients that procure UC&C systems to increase collaboration effectiveness between them and their partners, respectively customers and suppliers? (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have you seen clients that setup UC&C systems to improve collaboration along the supply chain? (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you have clients that start with UC&C solutions due to competition starting with UC&C solutions? (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you think that clients procure UC&C systems because it is becoming an industry trend? (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q5 If you know any other inter-organizational factors that may be stipulated as driving factor of the UC&C paradigm, please write it down below.

Q6 In your observation, in how many projects did the organizational factors below influence the steering committee, senior customer management when the decide to acquire and implement UC&C?

	Always (1)	More than half (2)	50/50 (3)	Less than half (4)	Never (5)	Don't know (6)
Do clients procure UC&C systems due to globalization of operations? (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you see increased Informatization at clients which leads to procurement of UC&C systems? (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Does intensified knowledge creation in organizations lead to UC&C procurement? (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have you seen clients that procure UC&C solutions due to the phenomenon new world of work? (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do organizations see UC&C as a solution to reduce its carbon footprint? (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Did top management plays a crucial role in the adoption of UC&C solutions? (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are your clients procuring UC&C solutions to increase the quality of work-life balance of its employees? (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do organizations see UC&C solutions as a way to create a more attractive workplace? (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q7 If you know any other factors organizational that may be stipulated as driving factor of the UC&C paradigm, please write it down below.

Q8 In your observation, in how many projects did the technological factors below influence the steering committee, senior customer management when the decide to acquire and implement UC&C?

	Always (1)	More than half (2)	50/50 (3)	Less than half (4)	Never (5)	Don't know (6)
Have you seen clients that procure UC&C solutions to reduce IT-infrastructure management expense? (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do clients procure UC&C systems to reduce complexity of its IT-infrastructure? (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do organizations procure UC&C systems to increase their security control? (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have you seen organizations that do not procure UC&C systems due to security issues of the technology? (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q9 If you know any other technological factors that may be stipulated as driving factor of the UC&C paradigm, please write it down below.

Q10 In your observation, in how many projects did the benefits below influence the steering committee, senior customer management when the decide to acquire and implement UC&C?

	Always (1)	More than half (2)	50/50 (3)	Less than half (4)	Never (5)	Don't know (6)
Reduce telephone expenses (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduce travel expenses (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reducing the cost of real estate due to downsizing of offices (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reducing operational costs (i.e. amount of FTE's) (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased user productivity (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased collaboration effectiveness (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved user experience (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduced project completion time (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shorter sales cycles (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased security control (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost reduction of the IT infrastructure (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost reduction due to IT centralization & consolidation (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attracting new personal (i.e. create a good working environment) (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q11 Do you know any other benefits that have not been mentioned?

Q12 Please indicate based on your experience how often the following burdens exist at your clients and play a role in their decision to adopt and use UC&C solutions.

	Always (1)	More than half (2)	50/50 (3)	Less than half (4)	Never (5)	Don't know (6)
Organizational and behavioral change (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integration issues in existing environment (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interoperability between products from different suppliers (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Employee irregular work hours (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Employees' fear of surveillance through presence information (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leveraging prior investments in IT infrastructure (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost of the solution (hardware and software licensing) (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q13 Do you know any other burdens that have not been mentioned?

Q14 Based on your observations, do you agree or disagree with the following overall factors that influence the steering committee, senior customer management when they decide to acquire and implement UC&C?

	Strongly Agree (1)	Agree (2)	Neither Agree nor Disagree (3)	Disagree (4)	Strongly Disagree (5)
Globalization of organizations drives adoption of the UC&C solutions. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased informatization and knowledge intensity in organizations drives adoption of UC&C solutions. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Developments in consumer technology or 'the consumerization of IT' drives adoption of UC&C technology (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The phenomenon 'New world of work' drives adoption of UC&C technology (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organizations see the UC&C paradigm as a method to reduce greenhouse gasses. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The quality of internet - in terms of availability, bandwidth and connection speed - drives the adoption of UC&C solutions. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Convergence of networks drives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

the adoption of UC&C solutions. (7)					
Next Generation Networks drives the adoption of UC&C solutions. (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q15 If you know any other factors that may be stipulated as driving factor of the UC&C paradigm, please write it down below.

Q16 This is the end of the questionnaire. Thank you for your contribution! Please click the button below

