Preconditions and characteristics of videoconferencing

"Work is something you do, not something you travel to"

Author

S.E.C Hamers

Student 0128406

Business Administration

Name	Sebastian Hamers
Education	Master: Business Administration Track: Innovation and Entrepreneurship
Field of study	Business Development
Name of organisation	Inventive Europe
External supervisor	Herbert Silderhuis Managing Director
First supervisor	Prof. Dr. Hans Roosendaal
Discipline	Strategic Management
Second supervisor	Dr. Ir. Jeroen Kraaijenbrink
Discipline	Industrial Engineering and Strategic Management

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LIST OF ABBREVIATIONS

IP	Internet Protocol, computer networking procedure used for the Internet.
LAN	Local Area Network, computer network covering a small geographical area, enabling high data transfer rates.
WAN	Wide Area Network, computer network covering a wide geographical area, enabling (lower than LAN) users to transfer data. WAN is used to connect LAN and other types of networks together.
VoIP	Voice over Internet Protocol, voice communications over Internet Protocol
HD	High definition, television formats that have a higher resolution in projection
SaaS	Software-as-a-Service, business model for a videoconferencing system, software technology leased by customer.
On-premises	Business model for a videoconferencing system, delivered by the wholesaler to be used by customer.
Open Codec	Encryption key that codes and decodes information enabling communication between different VCON system.
IM	Instant Messaging, a form of real-time communication online using typed text.
VCON	Videoconferencing
C-level	Corporate title used by company officials indicating higher management, such as corporate executives (CEO, CFO etcetera).
ISDN	Integrated Services Digital Network, telephone system network. Integrates speech and data on the same lines, adding features that were not available in the classic tele-phone system.
SRE	Socially Responsible Enterprise, responsibility and obligation of organisations to take action, in enhancing the welfare of employees and interests of society.
Open Codec	Encryption key that codes and decodes information enabling communication between different VCON system.
IT	Information Technology, department covering a broad subject concerned with aspects of managing, editing and processing information.

Management Summary

The coordination of communication and dispersed activities is an important subject for organisations. Especially in organisations who want to compete on an international level. However the cost of (inter)national travel can be a burden on the annual company budget. This is why new computer mediated technologies such as videoconferencing, have seen a steady growth in application. Videoconferencing offers potential users the potential to avoid unnecessary travel, cost savings and time efficiency. In order to achieve the maximum benefit of videoconferencing, some requirements must be met or satisfied.

Videoconferencing systems come in different sorts, shapes and sizes. The focus of this research is on organisations, which use videoconferencing systems for business-to-business purposes. The information for this research is obtained through the use of interviews, exploring different viewpoints of the vendor and the organisation on the use of videoconferencing. To understand what is meant with the term videoconferencing, data is being used from literature and interviews.

Videoconferencing is *a software based system that incorporates IP networks, which can be used as a communication tool to coordinate distributed business activities.* Organisations use videoconferencing to be able to:

- *Operate and compete on a global market, by means of working with geographically distributed groups;*
- *Whereby certain individuals or groups of people have to travel (inter)nationally, on a regular basis;*
- *Making use of a combination of communication tools, being able to make quick decisions and transfer information;*
- *To do this every target user has agreed upon using this communication technology and is able to do so.*

When wanting to send information, a person has to decide which communication channel suits best to transmit this information. Videoconferencing as a communication method has to compete with email, phone and fax. These methods are widely recognised, accepted and adopted. The process of selecting a communication method to transmit information, is dependent on a subset of factors. According to the different theories on communication technologies these factors are:

- *Different organisation cultures and shared practices;*
- *Task selection;*
- *Suitability of the media;*
- *Use of systems by co-workers;*
- *Capacity to transmit non verbal expression.*

The organisations that were examined are characterised by one headquarter, with multiple (inter)national geographical distributed offices. For these organisations videoconferencing mediates as an internal communication tool between (inter)national projects, work groups or interdepartmental managers (groups). The emphasis of these videoconferencing sessions is on discussing quarterly reviews, business meetings, presentations and training sessions. It can be concluded that videoconferencing is applied as an internal communication tool, when face-to-face communication is not an option.

The success of videoconferencing is greatly dependent upon the acceptance of its potential users. Literature review shows that in some cases videoconferencing will fail to function as an effective communication tool, when applied to international meetings. This is due to the fact that face-to-face meetings can be a more effective method to communicate and to close (inter)national deals. Face-to-face meetings form a more personal setting, which can shape a bond (trust) between business men and organisations. This is hard to achieve in an international videoconferencing meeting. However, videoconferencing does function well when it is used as:

- *An internal communication tool;*
- *Between interdepartmental project groups, or managers;*
- *Sharing the same cultures, beliefs and procedures.*

The interviewed vendors and organisations accentuate that the process of implementation and technical integration needs to be clearly structured. This is needed in order to avoid videoconferencing bottlenecks. These bottlenecks are:

- *International time barriers;*
- *Cultural and language barriers between (inter)national organisations;*
- *Different organisational processes and methods;*
- *Ensuring that there is a suitable LAN or WAN connection, which provides sufficient bandwidth and capability to handle isochronous data streams;*
- *Providing an affordable system for each participant;*
- *Systems cannot interact with each other without an open codec;*
- *System training, using the system to its full potential.*

To increase the use of videoconferencing application the following is recommended:

- *Acceptance and standardisation*

  One of the most important issues of videoconferencing is its acceptance as a communication channel. It does not function as a mutually shared (standard) communication method, similar to phone and email. In order to become standardised communication tool, videoconferencing has to manifest itself on a prominent place. In order to generate more users, videoconferencing should not be tucked away in a conferencing room. If people are confronted on a daily basis with the use videoconferencing, then they will be more likely to accept it as a communication method. Therefore it is suggested that videoconferencing has to be integrated on the desktop. As a result videoconferencing becomes a standard in office equipment;

- *Technique and training*

  Organisations depend on hardware and installation that is provided by others: from videoconferencing apparatus, to internet bandwidth and systems training. The implementation of videoconferencing covers such a broad arsenal of technical requirements that it becomes an obstacle in terms of costs and user friendliness. Thereby, videoconferencing users want an easy, preferably one touch system, which need no extra training or manuals. Adequate training sessions need to be planned during the first few months when videoconferencing is implemented. This is a cyclical process, whereby new potential users need to be trained. Stipulating which meetings are best held via videoconferencing. Alternative solutions can be a manual guide, user friendly software or a helpdesk;

- *Mapping out potential users*

  In order to apply videoconferencing in an international setting, an organisation must analyse the cultural differences of the other participant first. Clearly map out which customers, clients or partners are ideal for communicating via videoconferencing. This will benefit the successful use of the system. The more often videoconferencing is used the more comfortable people will get using it.

- *Stimulating personnel*

  Management has to limit the total amount of (inter)national travel by motivating people by underlining the advantages of using videoconferencing. The way an organisation can stimulate personnel can vary per organisation. Also by formulating rules and regulations when travel is acceptable and when this is not suitable, then the use of videoconferencing will increase.

Go/no go for videoconferencing

Organisations faced with the consideration of investing in a videoconferencing system, should do so based on an assessment of the present employee travel situation. The aim of this assessment is to specify what the organisation spends on employee business travel. In this manner a cost-benefit estimation can be made, based on how often interdepartmental meetings take place and how many employees have to travel to such meetings. For this approach an organisation needs to know beforehand what the total cost of videoconferencing apparatus and maintenance will be. This is needed to calculate the return on investment, comparing the possible cost of videoconferencing and the cost of employee travel. An organisation must consider the following questions in order to map out if videoconferencing is a viable option:

- *What is the total cost of (inter)national employee travel per year?*
- *How many international trips per year are needed to fulfil projects or customer relations?*
- *How many employees that travel for interdepartmental meetings does the organisation have?*
- *How many employees travel on average per trip?*
- *Which are the most important clients that need to be visited on a regular basis?*

If the cost of annual employee travel is high and interdepartmental meetings are frequent, then the organisation should integrate videoconferencing.

A ‘no go’ for videoconferencing has to be taken into account when interdepartmental meetings are very marginal. Or when there is no real need to coordinate geographical dispersed activities. Keeping in mind that such a need is a result of:

- *The scale of the organisation;*
- *Type of business activities;*
- *(Inter)National range of doing business.*

In conclusion, videoconferencing has much value to offer organisations in the form of time efficiency and benefits in travel costs. However organisations seem to disregard the potential commercial value of videoconferencing. Whereby videoconferencing can function in a different background, other than just as an interdepartmental communication tool.

Preface

The final step in order to achieve the title Master of Science in Business Administration, is a graduation assignment. Through the use of personal networking, an assignment was formed in association with Inventive Europe. Inventive Europe offered a unique opportunity to participate in a research project. The aim of this project is to analyse the requirements that one needs to apply videoconferencing for business meeting purposes. The main question for Inventive Europe from the business point of view is: *can we create a videoconferencing system that is easy to use, of high video and audio quality and offer it to the business market via a lease construction?*

Videoconferencing has not (yet) become a widely accepted, globally used, communication method. The American telecommunication company AT&T failed in their first attempt to market videoconferencing. Mainly due to the poor video quality. Nevertheless over the last decade the internet, the use of computers and digital communication has gone through a major technology improvement. Providing videoconferencing with better quality in sound and video. So why do people still travel to business meetings if technology has improved?

I would like to make use of this segment to thank the following people. Prof. Roosendaal and Dr. Ir Kraaijenbrink for their professional input and their patience. I would like to thank Herbert Silderhuis, helping me with my project and including me in the entrepreneurial process. Also, my thanks goes out to my sister and brother-in-law, taking the time to read and edit this thesis. My parents, making my study possible. And last but certainly not least, I would like to thank Moniek for her encouraging words.

CHAPTER 1: INTRODUCTION

1.1 RESEARCH MOTIVE

Organisations operating on global markets have seen their dependency of computer-mediated technology, internet, and other communication methods grow over the last ten years. This has also been the case for technological development in video hardware and audiovisual projection, by which videoconferencing (VCON) is made possible. In the last decade VCON technologies have seen a rapid growth in demand and technological advancements. Together with the use of the World Wide Web, VCON is now accessible via Internet Protocol, allowing organisations to keep in touch with employees and clients around the world, via live streaming (audio and video). More importantly it can be used as an alternative for employee travel. When applied correctly it can be responsible for a vast amount in cost savings. By researching the preconditions and characteristics of VCON, this thesis aims to show how these cost savings can be achieved.

1.2 PROJECT OWNER AND RESEARCH OBJECTIVE

A research project is formed in association with Inventive Europe, offering an unique opportunity to participate in the creation of a potential business concept regarding VCON. The prospect arose to gain experience in the field of business development and entrepreneurial know-how. With this in mind, the following objective was formulated:

"To analyse the VCON market, aimed at the business-to-business market, and evaluate the circumstances and preconditions that are needed, in order to use VCON successfully in an organisation"

In association with Inventive Europe and Prof.Dr.Roosendaal and Dr.Ir.Kraaijenbrink of the University of Twente, this research was started from the Master Business Administration, which interacts between managing innovation and entrepreneurial processes. The result of this research will be presented in public.

1.3 VIDEOCONFERENCING FLAWS AND SUCCESS

VCON enables participants to convey much of the information that characterises face-to-face interactive conversations. However face-to-face conversations are in certain cases still preferred to VCON (e.g. business meetings) in spite of extensive travelling, which requires considerable time and costs. This is because some of the nonverbal cues, that are important for facilitating smooth communication, are not preserved in many of the conferencing systems. They struggle with temporal cues, such as the duration of response latencies, crucial in preserving smooth face-to-face conversations. As a result, participants of VCON often complain about the temporal gap of back-channel responses, delayed by the network transmission among conferencing systems. Even if the temporal delay is about half a second. Subsequently, participants will become aggravated, when it becomes difficult to maintain natural turn-taking. This is because the speech and motion of each participant are presented to the other with a time lag, which induces a temporal gap in estimating the appropriate timing of turn-taking.

People who want to transfer information, do so by making a weighted choice based on, the method that fits best for sending this particular information. Normally information is sent by using email, phone or fax. A person selects one of these methods by factoring in the task at hand. The suitability of each communication method. And the ease by which information is conveyed, keeping in mind which method is commonly used by others. Phone, email, and fax are important reasons why people are hesitant in using VCON, because they are commonly accepted and ubiquitous.

Organisations utilise communication technologies due to the 'easy' way of sharing information. Information tools like phone, fax, e-mail, instant messaging, chat rooms, and more importantly VCON are used for day-to-day communication needs. Allowing organisations to act 'quickly' on external factors, enabling organisations to make important decisions in shorter time. This process of gathering information and making a well-considered decision is usually done through the use of business meetings. These business meetings are characterised by employees travelling to a predetermined (inter)national location. The problem with employee travel is that it is very costly for an organisation. The cost of Dutch traffic and transportation in 2005 were 40.4 billion, and in 2006 43 billion Euro[1].These costs include loss of labour time, inefficiency, cost of travel, Co2 emissions and traffic congestion. Figure one demonstrates another factor affecting travel costs, in the form of average loss of time (in hours) due to congestion. When an organisation integrates VCON as a communication tool in a proper manner unnecessary travel can be avoided.

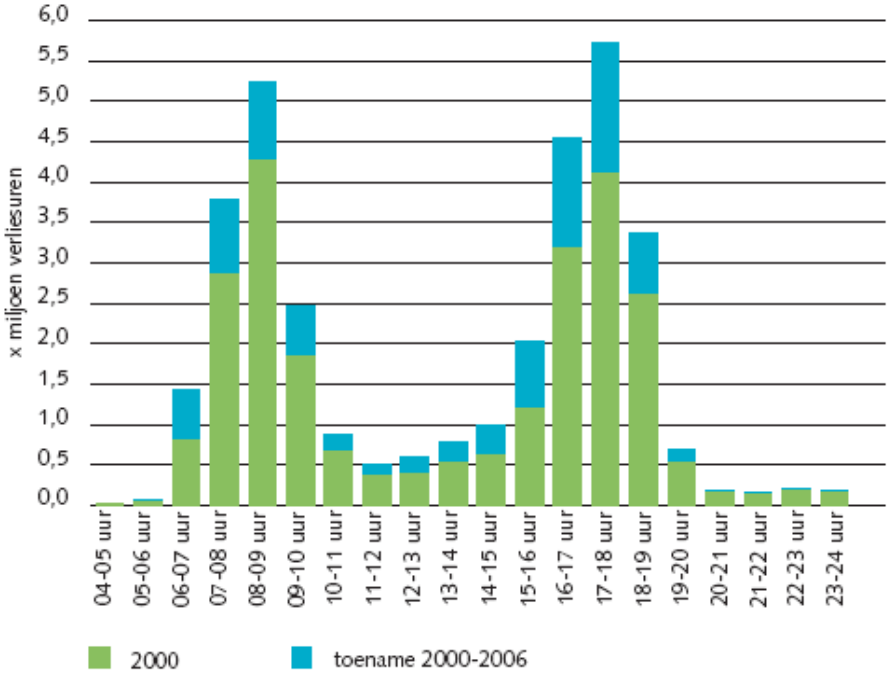

Fig1.: *Increase in Dutch Travel Time*

[1] Source: Mobiliteitsbalans 2008 Kennisinstituut voor Mobiliteitsbeleid

1.4 PRECEDING RESEARCH

Research on the subject of VCON, which will be discussed in chapter two, has focused on the possible effect that VCON has on geographically separated group members, more significantly the quality of decisions between VCON group users versus face-to-face meetings. Literature shows that VCON offers a subset of advantages to be made in timeline of decision making, relative travel costs and time savings. However the topic of VCON savings is one of further discussion. VCON calculations vary a great deal in approach, as well as in the total savings that can be achieved. It is the aim of this research to clarify which circumstances and preconditions are needed in order to enable VCON within an organisation. Defining these requirements will help to create criteria that can be weighed, in order to calculate the financial benefits of VCON and to establish a go/no go method for VCON.

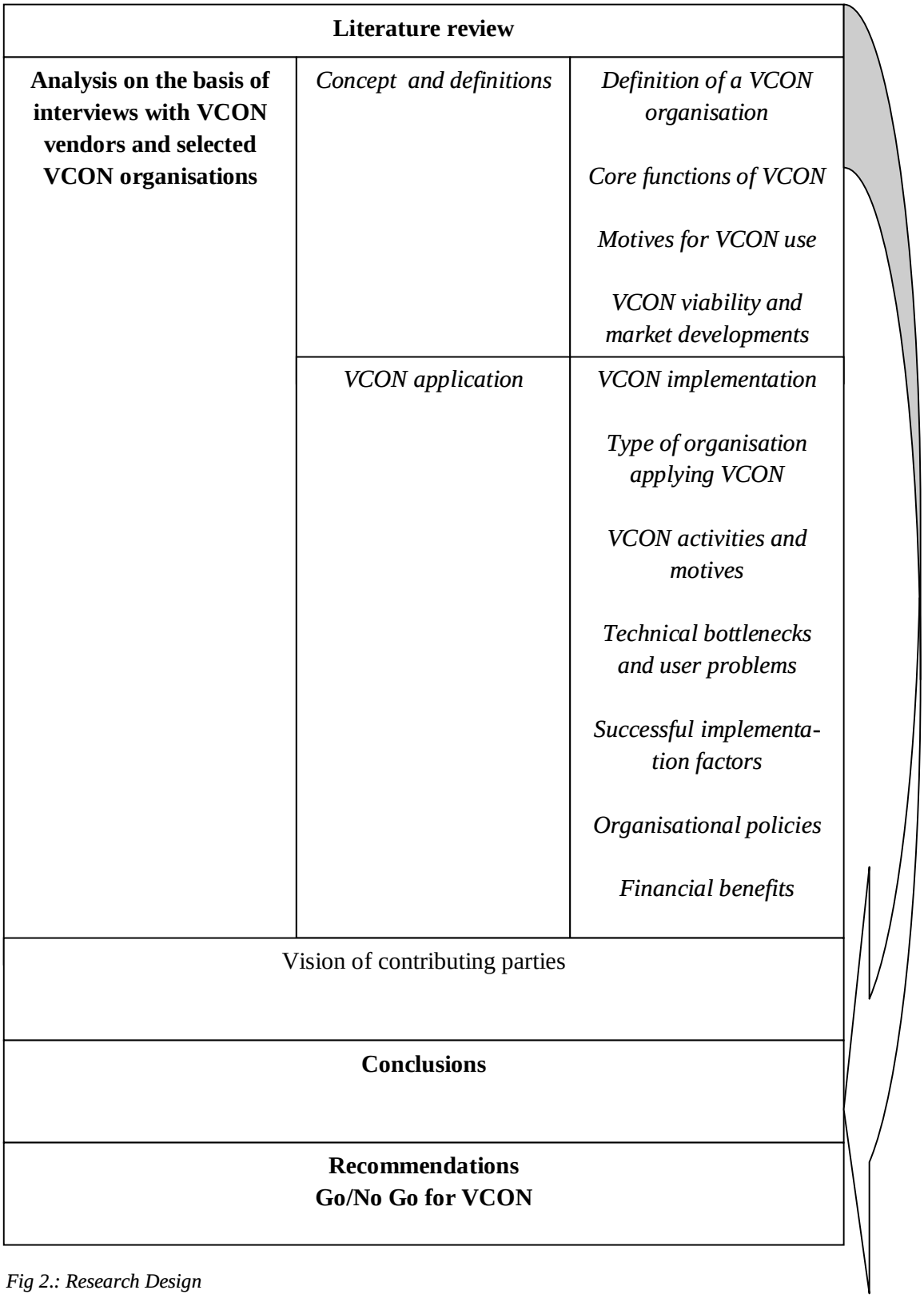

Fig 2.: Research Design

Chapter 2 LITERATURE RESEARCH AND THEORIES

In order to evaluate the findings of the collected research data, an examination of relevant VCON literature, theories, and results will be given. The main conclusions of this literature analysis will function as guideline and perimeter for a framework, from which relevant conclusions will be made. In the following chapter the concept of VCON and its most important definitions will be explained accordingly.

2.1 CONCEPT AND DEFINITIONS

The increasing globalisations of business, erosion of corporate hierarchies, and reliance on cross functional project teams, have placed tremendous demands on managers' abilities to coordinate distributed business activities (Chidambaram and Jones, 1993). The use of information and communication technology in organisations has expanded, with globalisation and new ways of organising work. The number of teleworkers and virtual workers is growing rapidly. Virtual workers is defined as a group of people who work closely together even though they are geographically separated, sometimes residing even in different time zones around the world. Their primary interaction takes place through a combination of technology, such as email, telephone, shared databases, VCON and conference calls (Sivunen and Valo, 2006).

Having highlighted these points mentioned above, the following assumption can be made:

Coordinating distributed business activities is an important reason to incorporate information and communication technology. VCON as a way of communication will occur more in organisations that interact between cross functional project teams.

There is an expectation that there will be a link between the use of VCON and the way that an organisation coordinates distributed business activities. In particular coordinating activities between separated groups of people, specifically cross-functional project teams.

Nota Bene this analysis will not include Skype, because it does not comply with the Communications Assistance for Law Enforcement Act of 1994 (CALEA). The law defines the existing statutory obligation of telecommunications carriers to assist law enforcement in executing electronic surveillance pursuant to court order or other lawful authorization. The objective of CALEA implementation is, to preserve law enforcement's ability to conduct lawfully-authorized electronic surveillance, while preserving public safety, the public's right to privacy, and the telecommunications industry's competitiveness. Skype uses robust encryption (end-to-end) that protects its Internet-based phone calls from eavesdroppers. Its design includes no provision for a lawful wiretap, such as those that are routinely conducted over cellular and landline based phones. This results in organisations being hesitant in using Skype, fearing that they are not complying with CALEA.

2.2 VIDEOCONFERENCING

Until recently VCON remained in the domain of universities and multinational corporations. The private market was reluctant in applying VCON, due to high cost of system maintenance (Cobbley, 1993). Although many issues have stood in the way in the past, the technology of VCON has evolved and is now widely accessible. Advances in video hardware and projection have increased the capability to process more demanding algorithms for both video and audio. Improving the amount of bandwidth needed to send and receive video, which means that systems are able to offer HD video and audio quality. User experience is now better than ever before (Allan, 2008).

"*High performance IP networks are enabling new technological advancements in speed, quality and ease of use in the conferencing arena to become reality*" explains John Short senior product manager at BT Conferencing (Allan, 2008).

Consequently these advancements have changed the appearance (exterior) of VCON. VCON rooms with sophisticated equipment are now being turned into HD or immersive suites. The improved visual impact of HD and immersive suites make participants feel like they are in the same room with their fellow attendees, whereby the traditional paper-based War Room/Project Room will be transformed forever (Renambot, Jeong, Hur, Johnson and Leigh, 2008).

VCON is:

- *A software based system that enables geographically distributed users to conference/meet with each other;*
- *Using IP networks for live data streaming;*
- *Confined in a specifically designed and decorated conference room or desktop surrounding;*
- *Including multimedia, such as text, whiteboard and presentation applications;*
- *High definition cameras, microphones and flat panels for presentation and viewing purposes;*
- *Delivering multimedia data to the conference participants efficiently and securely. (Du, Yin, Lin and Hu, 2008).*

2.3 CORE FUNCTIONS OF VIDEOCONFERENCING

Enabling individuals or groups to meet, communicate and collaborate with each other seamlessly and instantly, is becoming a primary requirement for efficient organisational communication. VCON allows people in groups to collaborate virtually and share information, it also provides facilities to record and capture formal or ad hoc collaborative interactions for later tracking and reuse, as organisations develop their collaboration strategies from a technical and people perspective (Gartner, 2008).
Here we see that VCON is applied by certain individuals forming a group, whereby VCON applications will be effective when each target user agrees to use them (Cobbley, 1993).

The practical reasons for an organisation to apply VCON are:

- *Decision timeliness*
  An important contributing factor of virtual collaboration is the timeliness of making decisions, enabling users to gather information from others and making swift decisions based on these findings. This is especially important in the case of managers' abilities to coordinate distributed business activities.
- *Enhance productivity*
  VCON allows individuals to collaborate quickly, so quality decisions can be reached faster than through traditional means. All participants can view the same information, interactively discuss the business topic and come to collaborative conclusions (Ogren, 2008).
- *Time and money*
  The direct and indirect costs associated with travel for face-to-face meetings can be substantial.
- *Broadening reach*
  VCON can include participants who are geographically distributed. These may be key aides resembling: specialists with expert knowledge, respected advisors who could bring different perspectives to the virtual table or someone "on the scene" of developments under discussion.
- *Responsiveness*
  Virtual meetings can be assembled far more quickly than physical meetings. Fast action can be essential in times of crises or market competition.
- *Adaptiveness*
  New people can be added quickly, sometimes in a matter of minutes, when the need for their participation is recognised (Wainfan and Davis, 2005).

When evaluating the criteria points mentioned above, it can be concluded that VCON will more likely be applied by organisations that:

- *Operate and compete on a global market, by means of working with geographically distributed groups;*
- *Whereby certain individuals or groups of people have to travel (inter)nationally, on a regular basis;*
- *Making use of a combination of communication tools, being able to make quick decisions and transfer information;*
- *To do this every target user has agreed upon using this communication technology and is able to do so.*

2.4 VIDEOCONFERENCING ORGANISATION

Modern organisations are increasingly integrating various forms of computer-mediated communication into work practices to meet the challenges of a global economy (Markman 2009). Here we find that dynamic alliances, between organisations, is a natural product of fierce competition in economic globalisation, which has become the mainstream operational model of the twenty-first century organisation, thanks to its flexibility, agility, adaptability and quick response to external environment and opportunities. Dynamic alliances are formed by coordinating distributed activities between different offices or external participants, as organisations grow and expand, they may shift from a single office to a multi-office environment, often spread over a wide geographical area (Sun, Wang, Li and Huang, 2008).
In order to manage this growth of distributed activities, coordinated communication is needed. These activities are allocated amid distributed project groups, defined as distributed if participants are more than fifty feet apart, as can be seen in the figure below.

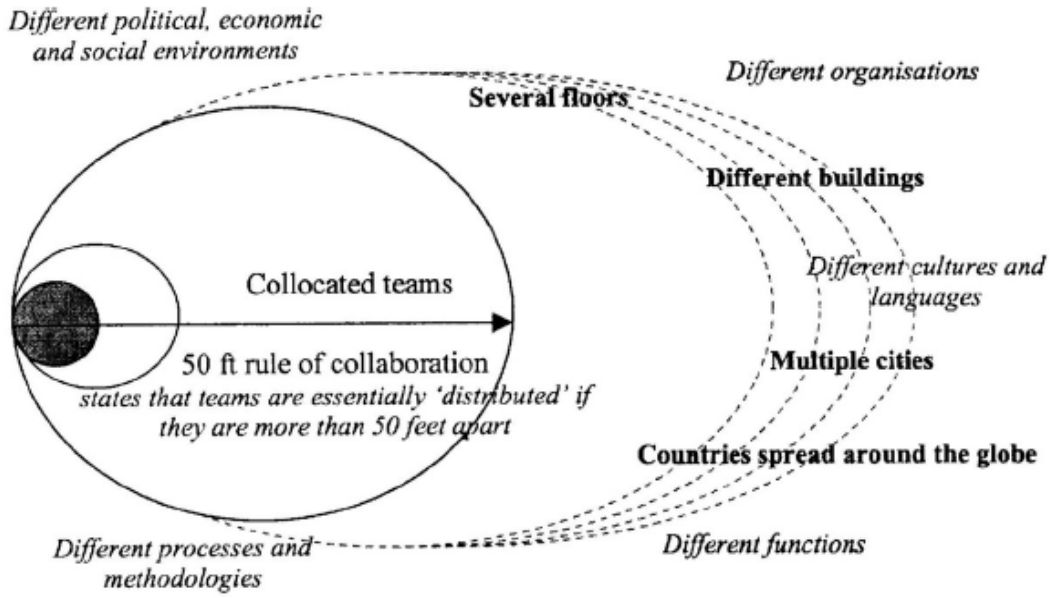

Fig 3.: Distribution Scales and Variables (Thomson, Stone, Ion, 2007).

Organisations that find themselves in a dynamic alliance, find it very important to coordinate and exert control over their communication. In this context, VCON is used to function as a communication tool between geographically distributed groups of people, who are interdependent and share responsibilities for possible outcomes. These groups are persuaded to use VCON, because the distance between participants is too large and costly for travel. Adding to this is the need of participants to share visual information, for example product demo's and visual presentation.

The life cycle of a dynamic alliance can be short or long lived, depending on the longevity of a project and is divided into three stages: establishment, operation, and termination. Of these stages, establishment is both the very initial and the most important stage of the entire lifecycle of dynamic alliance. Establishment can be further divided into three phases: objective identification, project decomposition and partner selection.

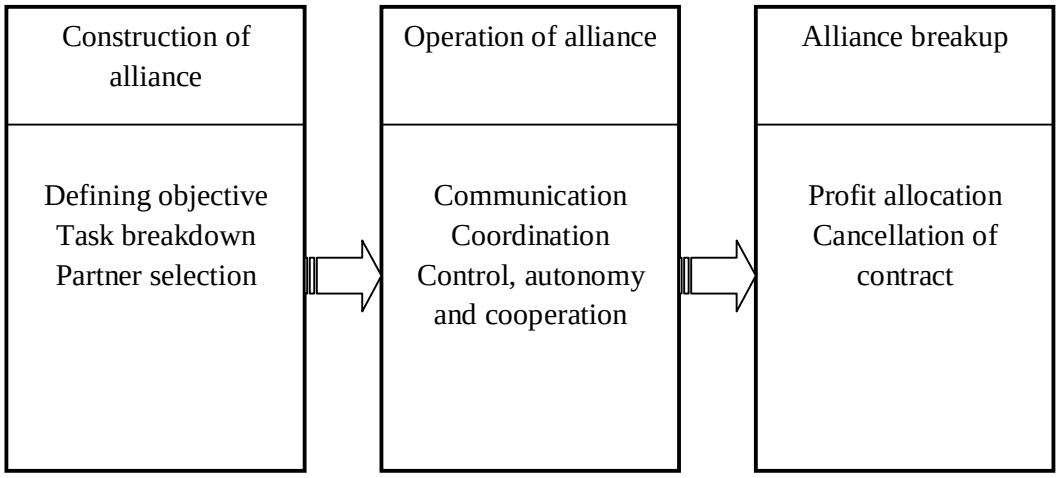

Fig 4.: Dynamic Alliance Lifecycle

The figure portrayed above accentuates that VCON is to be used, functioning as a project based communication tool. In particular when a partnership, or in this case a dynamic alliance, is struck between different organisations, suppliers or customers. Whereby the leading organisation exerts control over allies, coordinates communication and conflicts among allies, while independently performing the core tasks according to the contract concluded at the time of establishment (Sun, Wang, Li and Huang, 2008).

2.4.1 UNDERSTANDING WHY ORGANISATIONS USE VIDEOCONFERENCING

Researchers have tried to shed light on the complex processes regarding preferred communication selection. Sivunen and Valo (2006) discuss the different theories of selecting communication channels from a staff member perspective, whereby the traditional way to theorise the use and choice of communication technology is either on a rational or a social basis.

Rational technology

Rational technology means that the communication will be most efficient, when the communication technology is selected on the basis of rational criteria. Which technology will suit the task best. The rational technology perspective includes two approaches. These approaches contain two well-known theories in communication sciences, called media richness theory and theory of social presence. Both perspectives explain the media selection on the basis of traits and suitability of the media for different communication tasks. The media richness theory categorises different technologies, according to the availability of immediate feedback, nonverbal back channelling cues, personalisation, and language variety. It suggests that when messages are very simple, a lean medium such as email, is sufficient for effective communication. When the message is more equivocal, ambiguous or emotional, a richer medium should be used.

- *Social presence theory*

  In social presence theory, technologies are sorted according to their capacity to transmit information about expressions, gestures and vocal cues. These characteristics should be considered when choosing the technology.

- *Access/quality approach*

  According to this theory, media selection is a function of a cost-benefit analysis in which users try to gain an acceptable quality of information exchange through the use of media that requires the least amount of effort to access.

The theories of rational technology choice suggest that media selection is based on a rational thinking process about the situation at hand and the characteristics of the technology that fit best to exchange such information.

Social interaction theories approach

Another way to analyse the use of technology in organisations is called the social interaction theories approach. The values and attitudes of other people, regarding different kinds of tools, affect which medium an individual sees as best in a given situation. This perspective includes two theories, the social influence model and symbolic interactionism.

- *Social influence model*

  The social influence model refers to the influence of co-workers in media perceptions and therefore also in media choice. The perceptions of various technologies are not fixed and objective, but they vary across different people, contexts and situations.

- *Symbolic interactionism*

  The symbolic interactionism stresses the importance of organisational culture, practices and shared opinions in the choice of communication technology.

Theory of adaptive structuration

Besides the two major approaches, the rational technology choice and the social interaction theories approach, a third model explaining the use of technology has been developed, the theory of adaptive structuration. It explains the use of technology as a product of the particular culture using this technology, not as the choice of an individual. According to this theory the technology cannot be analysed, without first studying the culture or organisation using it, because both the organisation and the technology have an impact on each other.

Conclusion

Selecting a communication method to transfer information is dependent on a subset of factors. According to the different theories on communication technologies these factors are:

- *Organisation cultures and shared practices;*
- *Task selection;*
- *Use of systems by co-workers;*
- *Suitability of the media;*
- *Selection based on cost benefit analysis;*
- *Capacity to transmit non verbal expression.*

People who want to transfer information do so by making a weighted choice based on the above mentioned factors. VCON as a communication method has to compete with email, phone and fax, which are widely recognised, accepted and adopted. Important to comprehend is that the theories mentioned above discuss variables which affect the choice to use VCON. More importantly people go through a thought process when selecting a communication method. Usually this is done by a process of elimination. The task at hand will be completed on the basis of selecting the most suitable method or best fit.

What can be learned from these variables is that VCON is selected to complete a special need, which other communication methods cannot accomplish. However the majority of communication can be completed with existing communication methods. What the existing theory fails to discuss is the value of communication selection. To illustrate, certain people prefer to discuss certain issues via phone. In other words a person values a phone conversation above an e-mail. In the following segment an examination is given of when people are more likely to use VCON application.

2.4.2 WHEN IS VIDEOCONFERENCING APPROPRIATE

The way that organisations use and apply communication technology can be different in the essence of its application. Building intranets, knowledge repositories and other tools come to mind. A person who wants to send information is faced with a decision: which communication channel fits best to send this information? VCON can be a possible solution, though a person has more options to choose from, to be exact:

- *Face-to-face*
  Participants meeting in real life, involving close contact.
- *Audio-conferencing*[2]
  Participants are on the telephone with one or a number of other people. They may also use computer displays to see shared briefings or whiteboards.
- *Computer-mediated technology*
  Is typically text-based, although it can include drawings, photos, and other images such as "emoticons", which are symbols that portray emotions. This can be done either synchronous (i.e.: chat rooms or instant messaging) or asynchronous (i.e.: email, discussion boards, application specific groupware or shared databases).
- *VCON*
  Participants face a video image of another member or multiple video images of other members. They may also use common graphics, such as a shared briefing or a shared whiteboard.
- *Web-conferencing*
  Here participants can brief each other via shared documents, but are also able to make use of whiteboard application. These meetings are discussed in real time (using IP) with an audio link (Wainfan and Davis, 2005). Web-conferencing products support real-time collaboration interactions over a network between participants in multiple meeting formats (Gartner, 2008). This may include subgroups meeting face-to-face in the same room.

Although different communication channels exist, VCON as a standalone application has not been as successful as organisations were hoping for. Wainfan and Davis (2005) describe a scheme of displaying the relationships among various communication channels, showing each of the methods as points on a canvas, defined by the presence of nonverbal and paraverbal cues (x axis) and the degree of synchronisation (y axis).

[2] Note: video - and audio conference may include subgroups meeting face-to-face in the same room.

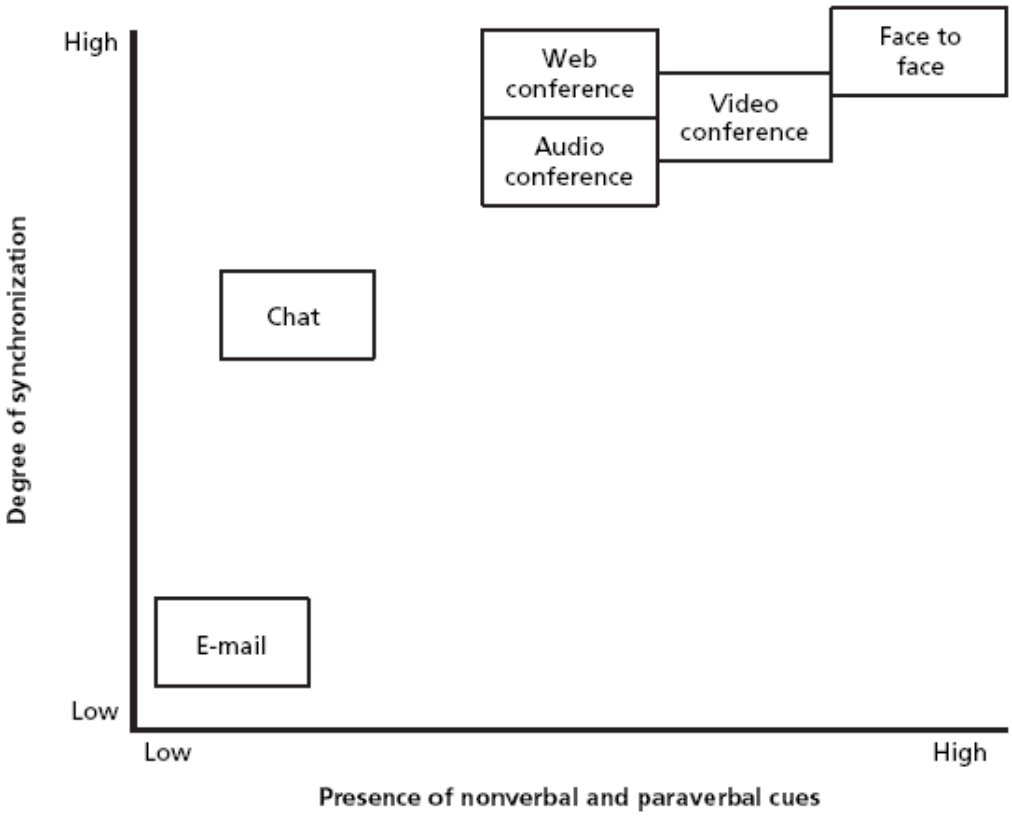

Fig 5.: Placement of Communication Methods[3]

Adding to figure five is the notion that when people send information they weigh the importance of the message. The more important a message the richer the medium will be, by which this information is sent. The poorest being email and the richest face-to-face.

[3] Note: Due to technical improvements, web-conferencing nowadays includes video and audio. Therefore the position of the web-conference box has become obsolete to videoconferencing.

In order to understand why and when VCON is put to use, above any other communication method, first an analysis is given regarding what it can do. VCON is equipped with the following minimum set of functions, as described by Gartner (2008):

- *Desktop or application sharing*
  All participants can see, but not directly interact with or modify, the presenter's desktop or a specific application on the presenter's system. Some conferencing products deliver presentations by sharing a presentation application, rather than using embedded presentation facilities;
- *Presentation delivery*
  All participants can see an online presentation (usually delivered by Microsoft PowerPoint), which is under the control of one participant designated as the presenter;
- *Text chat*
  Participants can exchange real-time messages with other participants or the presenter using an instant message like interface;
- *Shared whiteboard*
  A participant can add annotations, that can be viewed by all, by typing or drawing on a specific whiteboard application, or on top of a presentation or shared application window;
- *Remote control*
  Remote control is useful for technical support. It gives one participant control over system applications;
- *Basic security*
  In ways of encrypting data transfer and password-protected meetings.

VCON is used as a communication tool, when face-to-face communication is not an option. When wanting to send information, a person has to decide which communication channel is best to transfer this message. Wainfan and Davis (2005) propose a strategy for selecting the best medium to communicate with, see figure six. The left column distinguishes among different objectives for a given collaborative session. The logic tree in the middle suggests the preference order in which one might choose for a given objective and the different types of medium. The right column summarises important challenges associated with each.

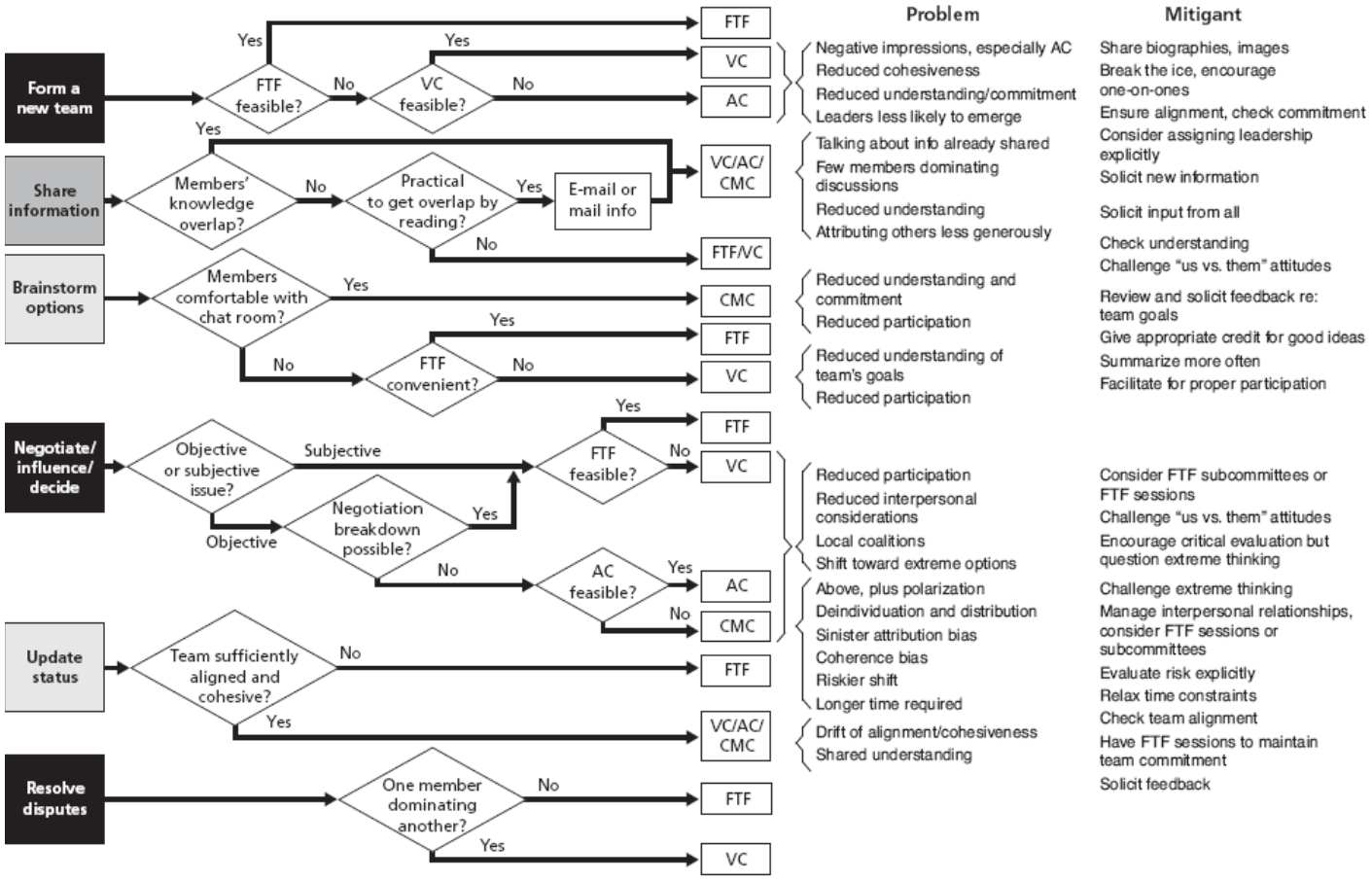

Fig 6.: Strategy for Selecting the Best Communication Method

When VCON is applied by distributed group members, it is stated that other communication methods come to the forefront when conflicts arise. The success of integrating VCON in an organisation is largely due to the acceptance by its participants. Participants are influenced by:

- *Dissimilar political, economic and social environments;*
- *Organisational culture;*
- *Different processes and methods;*
- *Language barriers.*

Analysing factors that influence communication between groups is not the goal of this research. However, it is an important topic to mention for VCON implementation.

2.4.3 VIDEOCONFERENCING IMPLEMENTATION

VCON communication can be distinguished in three main groups, depending on the interaction level of participants and the manner in which information is being transferred. A distinction can be made between (Cobbley, 1993):

- *Multipoint conferencing*
  This type of meeting includes three or more participants with roughly equal participation capabilities. One participant at a time may control or dominate the meeting, but that role can move between the different attendees;
- *Broadcast conferencing*
  This meeting involves three or more participants, with the emphasis on one participant addressing multiple receivers. The receivers have limited participation abilities;
- *Point-to-point*
  Conferencing involves only two participants in a setting similar to an enhanced telephone call.

VCON is presented in three deployment models (Gartner, 2008). These models are:

- *Software-as-a-Service (SaaS) model*
  VCON software runs on the vendor's (or a partner's) systems on a multitenancy[4] basis, and the user accesses the capabilities over the Internet.

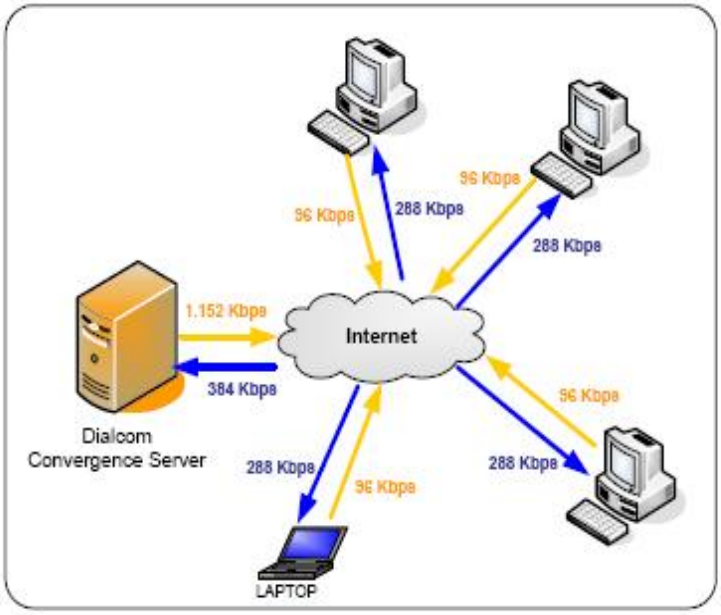

Fig 7.: SaaS Model

[4] Refers to a principle in software architecture where a single instance of the software runs on a server, serving multiple client organisations (tenants).

- *On-premises model*
  Installs software on systems owned and operated by the vendor.

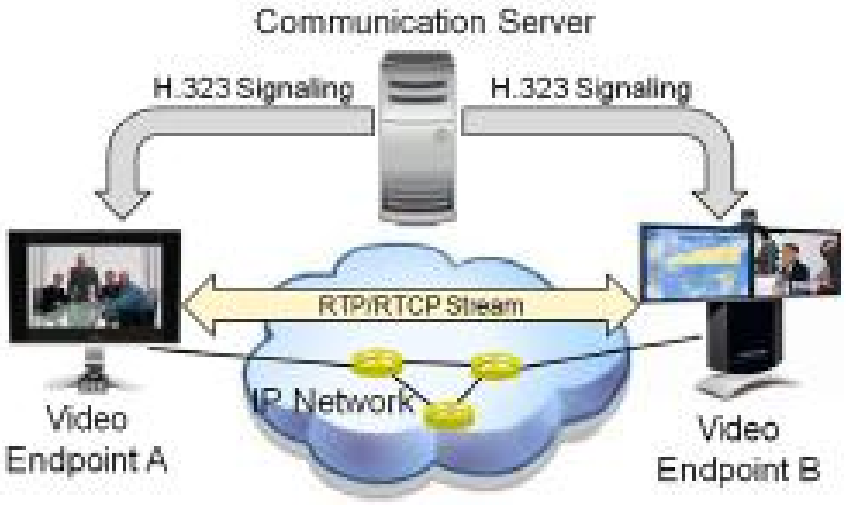

Fig 8.: On-Premises Model

- *Blended model*
  Combines the SaaS model and the On-Premises model.

The SaaS model has been the predominant model in the VCON market (Gartner, 2008). However point-to-point VCON meetings are run using the on-premises model. Interesting to see is that unusually large meetings use software running on external servers provided by vendors. The on-premises model can be seen as a total solution for organisations purchasing VCON products. The blended model functions as a model for every system that mediates between the two main models.

VCON users generally decide beforehand, which type of VCON model will be applied. This is dependent on:

- *The subject of discussion (how valuable is the information that will be discussed?);*
- *The purpose of the meeting (discussion of project progress, planning, presenting or sharing of information);*
- *The amount of participants (volume);*
- *(Inter)National conference (time difference);*
- *The extent to which the IT department can support the meeting.*

Conclusion

Having discussed different theories about VCON, it seems that VCON, like any other communication method, needs to be structured. Organisations incorporating VCON do so to enhance work flow between distributed project groups. In order to let VCON succeed, its processes need to be structured, mapped out clearly for use and communicated to its users, keeping in mind that people make a weighted choice in selecting a communication channel, by which information will be transferred.

2.5 VIDEOCONFERENCING VIABILITY

VCON vendors often specify the potential savings that can be achieved with VCON. A popular calculation method, used to justify savings, is based on cost efficiency. This method is used because direct financial figures can be produced to support VCON. It is also an easy concept to grasp, since most people are aware of the increasingly high cost of travel. In other words, the cost efficiency model is based on the economic premise that it costs less to transmit information to people than to transport people to obtain information. To illustrate this approach, an example from the Financiële Telegraaf[5] is used, the CEO of Unilever Paul Polman said: "Unilever has implemented VCON in seven headquarters distributed around the world. The goal of which is to save thirty percent on our travel budget". Philips is also implementing a VCON system with as main goal to reduce travel costs by twenty percent. Philips' main motivation being: "lowering our annual cost of travel expenses".

Forrester Research Company (2008) recently published findings discussing the cost saving potential of VCON, based on the TNT express group in the Netherlands. Forrester came to the conclusion that the total investment for VCON consists of three main categories, specifically:

- *Training;*
- *Hardware;*
- *Project management (managing system implementation).*

To estimate return on investment for TNT, Forrester employed the Total Economic Impact (TEI) method, factoring in:

- *The cost of VCON in correlation with the cost savings;*
- *The cost benefit;*
- *The risk factor;*
- *And hardware (apparatus) flexibility (future capacity and applications).*

Using this method, TNT calculated the viability of VCON based on the following:

- *Equipment costs;*
- *Installation and training costs;*
- *Maintenance and ongoing support costs;*
- *Managed service fees;*
- *External project management costs;*
- *Internal administration costs;*
- *And network (bandwidth) costs.*

[5] Visited on 15 February 2009, Financiële Telegraaf, page 19 http://www.telegraaf.nl/telegraafi/

Comparing cost of travel and cost of VCON is not as straight forward as the TEI method suggests. This is grounded on the base that there are several factors that have to be looked at in order to analyse the cost of travelling to a meeting. What the TEI method lacks in its calculation is the number of people travelling, the value of time lost due to travel, fare of transport, and subsistence costs. Subsistence costs are any costs spent on board and food. In comparison, the cost of VCON depends on the duration of a meeting and the cost of equipment. When weighing travel against VCON, this thesis suggests that the financial benefits of VCON should be calculated over the total loss of effective work time. This includes the time that one spends on travelling and what one does during travel. Versus the total time one spends on travelling to a VCON location and what one does to prepare for VCON. The aim of this comparison is to cross off equivalent loss of time that occurs with VCON as well as with travel.

Cost of travel	Cost of VCON
Roundtrip: cost of petrol, maintenance costs of vehicle and/or flight fare	Cost of equipment: tariff of VCON system and internet
Amount of people: loss of effective working hours	Duration of meeting: time of people who are in the meeting
Value of time: the value of employees per hour;	Value of time: time spent on travelling to VCON location
Subsistence costs: compensation expenses for hotel	

Table 1.: (in)Direct Costs of Travel versus Videoconferencing

To illustrate this point the following example is used. Imagine one person travelling to a business meeting from Amsterdam to Oxford, in opposition to the same person making use of VCON in Amsterdam. When comparing these two scenarios, a time schedule is constructed that illustrates the total time benefit of VCON versus travel. In this time construction the value of lunch is also calculated. Lunchtime is included because it is of great value for discussing work related issues and creating a business relationship in a (in)formal setting.

Travel to Oxford

The travel hours to Oxford, for someone who lives in the vicinity of Amsterdam, are vice versa and are set at nine hours total. However not all of the travel hours during travel are lost. This can be in the form of reading work related articles/journals or further meeting preparation, using laptop and so forth. An additional positive attribute of travelling to a business meeting is, the intrinsic worth of the informal gathering. Here important information is discussed “off the record” while having lunch or dinner. Thus the loss of valuable time will be reduced by deducting time spent on preparation (reading etcetera) and lunch or dinner. In this case the deduction for a person travelling to Oxford will be four hours (one hour for meeting preparation, one hour for reading and two hours for lunch).

The total loss of valuable time is (nine minus the four useful hours) a loss of five effective work hours. The total cost of travel to Oxford is, the cost of an airplane ticket, subsistence costs (hotel, food, drinks etcetera) and the loss of effective work time set at five hours multiplied by the wages of an employee (wage by the hour).

VCON meeting in Amsterdam

When the same person uses VCON, the total loss of effective work time will be lower. The total loss of valuable time of a VCON meeting is set at two hours. Travelling from home to office (vice versa) takes two hours. The preparation time for the meeting is also set at two hours, but this can be seen as effective work time. The total cost of VCON is the cost of the system per hour.

The difference between the total travel time to Oxford opposed to VCON in Amsterdam, offers a total savings of three hours. These three hours can be valued in[6]:

Hourly wage (400 x 3=)	**€1200**
Airplane ticket	**€ 200**
Extra costs	**€ 50**
- Apparatus costs	**€ - 40**

Total	**€1410**

Table 2.:Videoconferencing Cost Benefit

Via this estimation it can be concluded that VCON is more valuable when the loss of valuable time increases. This will more likely apply for international business meetings, where participants will travel more than twelve hours.

It is important to understand that not all travel time is lost. Certain sections during travel can be used as effective work time. However it is difficult to calculate how useful a person will be during travel. One can think of the inference that comes from flying through different time zones. The people travelling can suffer from jetlag or airsickness and sleep the entire flight. On the other hand, people travelling by night have to sleep no matter if they are travelling. Important is to find out is what time is lost because of travel during work hours, which are not used effectively. Another factor that is difficult to measure is the intrinsic value of a business lunch. A face-to-face lunch meeting has a great advantage over VCON, because it can create an informal setting in which certain issues are discussed that do not come to the forefront in a VCON meeting.

[6] Excluding the value of a business lunch

The reality of employee travel is that distances are relatively short for daily, weekly, monthly or adhoc meetings. The majority of these meetings take place in the Netherlands (on a nationwide level). These short trips can amount to a large loss of effective work time on an annual base. What should be taken into account for these trips is the 'hidden' traveller. In other words, how many employees travel to a meeting? Otherwise the loss of effective time during these short distances is multiplied by two or more. Organisations can take more advantage of VCON if it can reduce these trips by twenty to fifty percent. For the simple reason that more employees travel throughout the Netherlands then that they would travel internationally.

With this calculation method the return on investment can be analysed and used to determine the breakeven point of VCON investment. Calculating the benefits of VCON should take place when organisations are faced with reoccurring (inter)national meetings, which can easily be held via VCON. Taking into account that 'standard' meetings are held via VCON and important meetings reminiscing contractual agreements, closing deals etcetera, take place face-to-face. Thus the benefits of VCON are best exploited, when the importance (value) of a meeting is weighted on the basis of a total effective work time (cost savings) calculation. In simpler terms, is a meeting worth the cost of travel when compared to the potential worth and importance of this meeting? If the potential worth is high, a face-to-face meeting is more adequate. When the potential worth is low, VCON will have more value for the organisation.

Conclusion

Having calculated the loss of effective time, it can be confirmed that VCON can amount to financial benefits. However the scale of these benefits is different for each organisation. This is dependent on the magnitude of VCON implementation and functioning, how many conference rooms, the budget for implementation, which purpose VCON will fulfil, the amount of (inter)national business meeting and how active VCON is applied?

Furthermore it is important to understand the value of face-to-face meetings. On occasion important information can be discussed during lunch or dinner. Creating an informal setting with VCON is difficult to achieve and should be taken into account when having to decide between face-to-face or VCON. Informal meetings are important to underline the importance of mutual relations, but also for information transfer. However it is difficult to put a price tag on such discussions, but can be worth the extra travel costs.

2.6 VIDEOCONFERENCING MARKET

Organisations operate within markets and these markets are within industries. The strategic windows of opportunity open out on a market within an industry. Understanding the nature of the industry and how it changes is crucial to understand the process of how strategic windows can be opened by external forces. Industries and markets are different entities, whereas markets can be looked upon as groups of customers with similar buying needs. Industries are collections of organisations with common products and technologies (Proctor, 2008).

The VCON market is formed by vendors that offer:
Conferencing products with the purpose of supporting real-time collaboration interactions, over a network, between participants in multiple meeting formats, aimed at the business-to-business segment.

The vendors active on the VCON market can be divided in three segments, namely:

- *Leading, specialised VCON organisations like Tandberg and Polycom, who are responsible for VCON protocols and developing 'new' technology, making use of the on-premises model;*
- *Software dedicated providers like Netviewer specialising in web-conferencing software, operating via the SaaS model;*
- *Major software companies like IBM and Microsoft, that incorporate VCON on a core platform that integrates collaboration services, using the blended model. These vendors are incumbent e-mail infrastructure providers in most enterprises.*

Relatively new to the VCON market are IBM and Microsoft. However they have used their dominant software presence to give them a strong strategic position on the VCON market, with software programs such as Microsoft Outlook and IBM Lotus.
Microsoft has developed a new software program, called Unified Collaboration (UC), which integrates existing software applications with newer applications, such as VCON on one communication platform. Organisations are evaluating the potential benefits that unified communication has to offer. It is expected that a large amount of organisations will integrate and use UC or similar software programs in the near future. Due to the fact that these software programs are incorporated in existing operating systems.

In the following table, the key differences are distinguished between mainstream vendors.

	SaaS model	On-premises model	Blended model
Strategy	Conferencing software, connection over IP	Conferencing software and installed hardware	Hybrid form, installed hardware and software connection over IP
Identified market segment	Small and midsized organisations	Multinationals, organisations with superior budgets	Seed lower end of the market
Defined cost and profit structure	Low User is able to lease conference software in the form of a license	High Purchasing hardware and software as a total package	Low Integrated in software package (example Microsoft Windows Live)
Setting	Desktop or conference room	Fully equipped conference room	Desktop or conference room
Strengths	Easy accessible	High quality	Easy accessible
Weaknesses	Have to purchase needed hardware Low quality. Relying on IP bandwidth.	Expensive	Have to purchase needed hardware. Quality is reliant on IP bandwidth.

Table 3.: Differences in Videoconferencing Business Models

The VCON market shows a separation between:

- *High-cost, high quality systems aimed at bigger organisations, such as multinationals;*
- *Low-cost, low quality systems aimed at small and midsized organisations.*

The vendor market can be divided by a top layer of high quality VCON systems aimed at the business-to-business market. A lower level distributing ‘free’ VCON software aimed at the private market. The business-to-business market will continue to purchase high-end VCON solutions. This is based on the need to protect organisational data, knowledge and information, whereas the private market will focus on software applications like Skype. These meetings are characterised by family, friends and colleagues and do not demand as much security protection.

2.6.1. FINDINGS OF VIDEOCONFERENCING VENDORS

In the following segment an analysis will be given of existing vendors, active on the VCON market. The specifications can be found in appendix 3. The vendors that are included in this list were selected based on the following criterion, as described by Gartner (2008):

- *The product provides at least the minimal functionality described in paragraph 2.4.2;*
- *A VCON system supports at least five participants. Products that support one-to-one interaction or small groups are generally aimed at the consumer or other specialised markets not covered by this analysis;*
- *The conferencing product must be marketed on a stand-alone basis, or as a component of a larger collaboration suite that may include presence and IM;*
- *A vendor must develop and market the primary conferencing product, not resell a "white label" product produced by another company in an Original Equipment Manufacturer relationship. The product can also be the result of an acquisition.*

The market has matured quickly in the past two years. The market's maturity is leading to less differentiation, as newer or lesser known players are just a version away from adding extra functionality. It is the area of VoIP, video, flexible pricing options and integration with learning management systems and other business applications, which vendors are looking to differentiate. A relative niche market is e-learning, where vendors are aiming to provide the SME market with e-learning tools, using VCON to combine educational software and tools (such as Microsoft or Linux), providing a tool for education. It overcomes distance, timing, attendance and travel difficulties.

The overall VCON market has been quite fragmented, with major vendors continually seeking to integrate communication methods on a core platform. Organisations should develop their strategy, for VCON, as a component of their overall communication strategy from an infrastructure perspective. This can be done in order to maximise integration possibilities with other platforms. Two examples of such business applications are, learning management systems and Customer Relations Management (Gartner, 2008).
An additional (important) finding is that the more expensive vendors offer the ability to interface with different systems, via an open codec. The other systems do not offer this application. In other words, the market has certain protocols by which video and audio transmission is transmitted, but lacks an overall protocol for hard-and software, which makes communication via different systems very difficult.

2.7 VIDEOCONFERENCING BOTTLENECKS

To meet the requirement of a VCON system over IP, many issues have to be addressed, such as security, scalability and system heterogeneity. Conferencing contents sometimes are private or related to commercial secrets. So security mechanisms must be in place, both for the session setup procedure itself and for the media contents in the session. However this is quite challenging, because of the inherently non-secure attribute of the Internet. Second the system has to be scalable to support a large number of participants online simultaneously, who are divided into size-limited conference groups. Third the Internet is a heterogeneous environment, where some people are in corporate LAN, which are connected to the Internet via 1000M fibre cable. And other people are on ADSL or even modem bandwidth. Dealing with this heterogeneity aspect and providing different services is complicated, because the network bandwidth is dynamic and measurement of network conditions is not easy (Du, Yin, Lin and Hu, 2008).

The key requirements of VCON are according to Du et al (2008):

- *Source transmission patterns*
  Conferencing applications have a source that transmits data at a fixed rate;
- *Performance requirements*
  Conferencing applications require low latencies and need to sustain high bandwidth between the source and receivers;
- *Adaptability*
  Conferencing applications deal with media streams that can tolerate loss through degradation in application quality;
- *Group characteristics*
  Conferences usually involve small groups, consisting of tens to hundreds of participants, where membership can be dynamic;
- *Session lengths*
  Conferences are generally long lived.

The most important technical issue of VCON is the access to the Internet. Explicitly the upload and download capacity of LAN or WAN corporate networks. When high bandwidth is not maintained, audio and video lags occur. Temporal cues, such as the duration of response latencies, are crucial to preserve smooth VCON conversations. The participants of VCON often complain about the temporal gap of back-channel responses, delayed by the network transmission among conferencing systems, even if the temporal delay is about half a second. As a result, it becomes difficult to maintain natural turn-taking, because the utterance and motion of each participant is presented to the other with a time lag, which induces a temporal gap in estimating the appropriate timing of turn-taking. Consequently, participants often feel that the handover of the floor has failed and make another speech that leads to a collision of turns or utterances. (Kawashima, Nishikawa, Matsuyama, 2008)

Although VCON has matured, it still faces one main problem. Namely VCON mediates between the so-called unities of time, place, and action (referring to the rules of Aristotle). These unities have different limitations:

- *The unity of time limits the supposed action to the duration, roughly, of a single day;*
- *Unity of place limits it to one general locality;*
- *The unity of action limits it to a single set of incidents which are related as cause and effect, "having a beginning, a middle and an end." (Bellinger, 1927).*

The unity of time can be a problem for organisations who want to use VCON as an international communication tool. For example, two people want to have a meeting via VCON. Mister Jansen, located in Amsterdam (the Netherlands), wants to have a VCON meeting with mister Appleby, based in Sydney. What is the best time to have this virtual meeting? The time difference between these two participants is ten hours[7]. By the time that Jansen has started his workday at nine a.m., Appleby will already have finished his workday. Assuming that both persons work from nine a.m. till five p.m. (local time) it is not possible for them to have a VCON in the same single workday. The only way that it could be realised is, when Jansen would start earlier (for example eight a.m.) and Appleby would work longer (for example till seven p.m.).

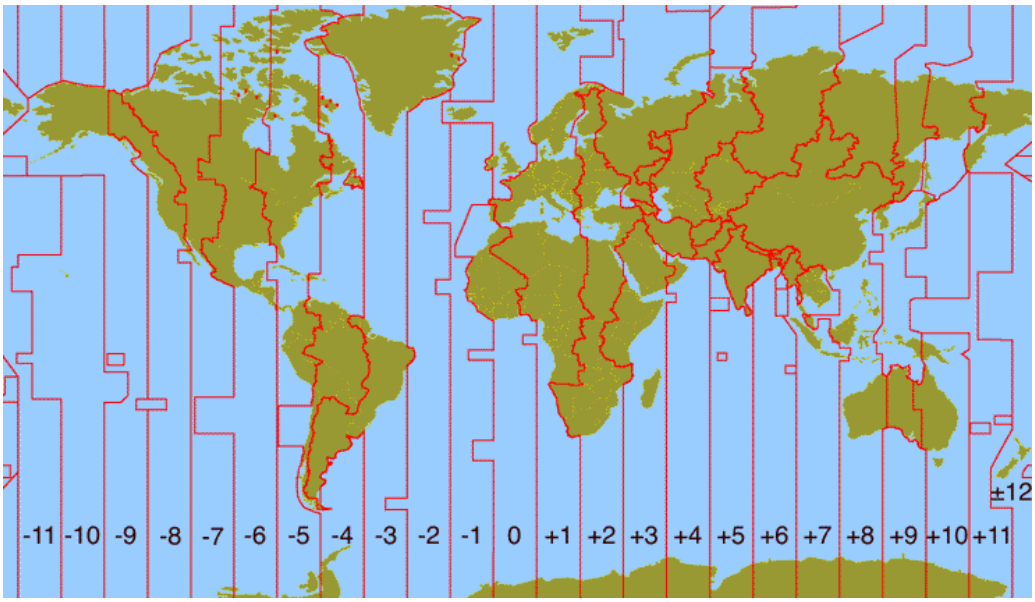

Fig 9.: Global Time Zones[8]

VCON is more effective for users, who can plan a meeting within the hours of their single work day. When the time difference is greater than seven hours, participants of a VCON meeting will have to be willing and able to join in. Thus flexibility is required of participants,

[7] Total difference in hours can differ due to daylight savings time

[8] The numbers located at the bottom indicate how many hours each zone is earlier (negative sign) or later (positive sign) than GMT.

when VCON meetings have to take place outside office hours. Here participants have to balance work and private hours, in order to use VCON to its full potential.

2.8 RELEVANT DEVELOPMENTS

VCON has not succeeded in becoming a standard communication norm, as some telecommunication companies were hoping for. At first this was mainly due to the quality of audio and video live stream, which was not satisfactory. Nowadays quality is very good but this comes at a price. Organisations are put off when they hear about the high investment costs of equipment and the adverse technological requirements. A key development is that major software companies are integrating VCON within existing software programs. As a result the barriers to use VCON will be lower because:

- *Users can choose which communication method will be applied to transmit the information;*
- *The cost of systems will be cheaper;*
- *Resulting in an easier access to VCON.*

2.9 CONCLUSION

As VCON technologies continue to evolve, the use of VCON will grow accordingly. In the near future, major software companies will launch communication platforms that will integrate phone, mobile, IM, IP, e-mail and VCON. The digital possibilities of Internet and computer mediated technologies, will combine old with new ways of communication, influencing our daily communication processes for a great deal.

Although there are many benefits that VCON has to offer, there are still bottlenecks that stand in its way of becoming an accepted communication standard. Reflecting on the points, mentioned in previous chapters, the major obstacles for an organisation to employ VCON are:

- *International time barriers;*
- *Cultural and language barriers between (inter)national organisations;*
- *Different organisational processes and methods;*
- *Ensuring that there is a suitable LAN or WAN connection, which provides sufficient bandwidth and capability to handle isochronous data streams;*
- *Providing an affordable system for each participant;*
- *Systems cannot interact with each other without an open codec;*
- *System training, using the system to its full potential.*

CHAPTER 3 RESEARCH METHODOLOGY

3.1. OBJECTIVE

The aim of this chapter is to construct an analytical model that examines the preconditions and characteristics of VCON. This is needed in order to establish a go/no go method for VCON implementation. The model considers the variables (desk research) that are taken from literature review and are evaluated by reviewing the collected data from the case study.

3.2. RESEARCH QUESTIONS

In the preceding literature review several aspects of VCON bottlenecks have been highlighted. This research will focus specifically on the following problem, which is defined as follows:

Which are the preconditions and characteristics of organisations in which VCON can effectively be formed and what possibilities arise when VCON is implemented successfully within an organisation?

3.2.1 SUB-QUESTIONS

To answer the main problem, sub-questions are formulated, in order to research the subset of questions that are a part of the problem statement. These sub questions are:

1. *What are the objectives of VCON and the preconditions that are required?*
2. *Which type of organisation benefits from a VCON system and what does it have to offer the organisation?*
3. *In what way are organisations utilising VCON in their organisation?*
4. *What are the bottlenecks that organisations face when using VCON?*
5. *When integrating VCON in an organisation what are the financial cost benefits and what impact does this have for an organisation?*
6. *What possibilities and obstructions are to be signalled, that will influence VCON in the near future?*

3.3 RESEARCH METHOD

This research focuses on analysing organisations that use VCON as a communication tool. Research took place from August 2008 till April 2009. During the process of research the primary importance was to look at the technical and user requirements of VCON. The secondary goal was to look at the design of VCON within an organisation and the functions that it fulfils. This research makes use of three types of data collection.

3.3.1 LITERATURE REVIEW

Preliminary research is held making use of a questionnaire sent to random organisational personnel to explore who uses VCON, what type of organisations uses VCON, how often and for what purpose. Additional interviews were held with VCON experts to obtain more insight in the user market. The assumptions from preliminary research, in addition with the findings of literature study and expert conversations, form the basis for the population of the qualitative analysis. The observed population consist of organisations which are known to have a VCON system. Furthermore, information and theories on the subject of VCON are taken from literature.

3.3.2 DESIGN-DEMONSTRATION

At the same time a design-demonstration study is shaped. This design-demonstration is setup as a VCON demo between participants in the following locations:

- Bethesda, Washington D.C. (USA);
- Duluth, Georgia (USA);
- Eibergen, Gelderland (NLD);
- Enschede, Overijssel (NLD);
- San Diego, California (USA).

The design-demonstration study provides an analytical model for the technical requirements of VCON systems. The parameters of which, form criterion for VCON systems of the observed organisations that are analysed.

3.3.3 STRUCTURED INTERVIEWS

Data is collected by means of in-depth interviews with organisation employees, who actively use VCON systems and who carry out a higher or middle management function. The interview items are constructed from literature review. In some cases it was not possible to have an in-depth interview face-to-face, instead interviews are taken via phone. An overview of these participants can be found in appendix two.

A general interview guide approach is selected. The interviews are held with vendors and organisational employees. This approach is chosen to consider different viewpoints on the subject of VCON. This is needed to elicit information about specific topics, resembling technical and user issues surrounding VCON. The results from interviews are gathered and compared with one another.

3.3.4 ANALYSIS AND RESULTS

Further explanation is needed of methodological problems that where encountered and their solutions or effects. The problem of reviewing interview results is that certain aspects of participant behaviour cannot be measured. For example participants can state that they actively use VCON, but is this really the case? For purposes of interpretation it is needed to highlight that the aspects of behaviour, such as experiences, expectations, opinions and feelings are worth mentioning. However these 'statements' will not be included in the examination process.

3.3.5 CONCLUSIONS

The findings of this research are based on a small case study, therefore generalisations cannot be made without thorough reasoning.

CHAPTER 4 RESEARCH ANALYSIS

This chapter will discuss the different factors influencing the use of VCON within organisations. The findings in this chapter are based on the observations acquired from interviews. These observations will be analysed and examined with the help of literature. The following subjects will be included, which are needed to answer the outlined research questions:

- *How is VCON being implemented;*
- *Type of organisations that use VCON;*
- *Use of VCON;*
- *What type of activities can be done with VCON;*
- *What are the motives to use VCON;*
- *Bottlenecks and success factors of VCON;*
- *Organisational policies regarding VCON;*
- *Financial cost benefits;*
- *Future organisation communication.*

4.1 How is videoconferencing being implemented

In order to define VCON implementation, first an overview is given of the implementation process. The table depicted below must be read as a step by step process.

1. Problem indication
   Signalling an abundance in (internal) communication between head office and sub-offices and high cost of employee travel expenses.

2. Cost analysis
   The decision to implement VCON, within an organisation, is based on a cost analysis, whereby the cost of personnel is being weighed opposed to the cost of VCON.

3. Assessing technical requirements and company needs (vendor)
   The vendor assesses the information technology infrastructure of a company. Analysing technical requirements and communication needs. Points of interest for the vendor are:
   - *The organisation has to possess a minimal bandwidth, preferably a bandwidth 768Kbps to sustain HD.*
   - *Arrangement of VCON rooms. Decor setup, lighting, sound and audio, because communication occurs between two offices (or more). Both sites need to be pre-pared.*
   - *Securing internet network.*
   - *Integration with existing software applications, such as Lotus and Outlook.*

4. Installation and integration
   Installation of VCON system is done by the vendor. Whereby the IT department is involved in the setup process (training).

5. Business process reengineering
   Depending on the system, training will be given accordingly. As mentioned be-fore, the IT department will have to be involved in a training process. In many cases a staff member of the IT department is present during the start-up phase. In order to let staff members use VCON, they will have to follow a basic training.
   - *Training (coach the trainer)*
   - *Instruction (teaching how to use the system)*
   - *Creating users (stimulating use of VCON)*
   - *Calculating ROI*

Table 4.:Implementation Process of Videoconferencing

The process of VCON integration and business process reengineering can be very time consuming. Reason being that a VCON system has to be tailored to 'fit' the organisational infrastructure (corporate network) and to the specific wants and needs of an organisation. When all of the technical requirements are mapped out and fulfilled, then the path of reengineering can begin. This stage is responsible for adequate training of users and combined with the technical requirements is accountable for successful VCON. This step by step process is one that is not followed deliberately by vendors or implementing organisations. VCON systems are ready to use and merely need to be turned on. However operating a system still requires some skill. Potential users are helped by IT mangers or follow a short instruction guide, usually placed next to the VCON apparatus. What organisations forget to inform possible participants is, when to use VCON and what type of meetings are suited for VCON application. As a result VCON is purchased with no real intent for proper use, other than it will save money. Also it is not clear for organisations what type of meetings can be conducted with VCON. This is why VCON can be a disappointment for some organisations, thinking that VCON can substitute face-to-face meetings.

Conclusion

When a VCON system is purchased, this should be done on the basis of due consideration. This is particularly the case when the cost of such a system can amount to thousands of Euros. The intent to use a system should be evaluated and discussed with the potential users. Here the above mentioned implementation process functions as a guideline. During this process an organisation has to assess what type of meetings will be held via VCON and specifying who will use the system. Further deliberation with these potential users also helps organisations analyse what the specific communication needs are of its employees, whereby participants are asked the questions: is VCON a functional improvement for your daily communication needs? This should not be the other way around, whereby a VCON system is purchased then evaluating its possible use by employee personnel. This is usually the case for organisations. Who are influenced by positive publicity that surrounds the subject of VCON. It seems that larger organisations decide to invest in VCON with the intention to keep up to date with competing organisations. Thinking that they might lose their competitive edge if they do not invest VCON.

4.2 VIDEOCONFERENCING ORGANISATIONS

In this segment the interviewed organisations[9], which operate with a VCON system, will be evaluated. The aim of this segment is to determine what kind of features VCON organisations present.

VCON meetings take place on a national and/or international level. This is generally done between interdepartmental managers and project team members. Organisations that work on project base usually do so with dedicated project teams. These team members use VCON as a communication portal, whereby direct communication is made with the necessary participants (associated offices) on a regular basis, for the duration of a certain project. Participants choose VCON to give presentations, while at the same time being able to discuss relevant information. The decision for a C-level - or departmental manager to use VCON is based on time efficiency, whereby the main motive for managers is: "being tired of having to travel all the time." Nevertheless business trips also function as a form of status for certain personnel and sometimes function as pleasure trips. It is expected that when people are confronted with new rules and regulations, confining people more to their desk, that their level of VCON acceptance will be lower.

Users of VCON employ face-to-face meetings as much as they can. This is more the case for C-level and departmental managers, where important discussions cannot be avoided due to old habits and cultural issues. More importantly business meetings with new clients or suppliers will be completed via face-to-face. This is because people find it important to meet face-to-face, to do business, in order to build trust. To illustrate an interviewee response: "why should I meet via VCON? When there are nine other suppliers who want to meet me face-to-face." These old habits, combined with trust and the media choice that people face, are reasons to avoid VCON. The people who want to transmit information will only use VCON when all other media options fail. In this case people choose VCON in order to transmit information that needs extra explanation, which cannot be transferred via other media options.

The organisations, mentioned in appendix 1, who operate with VCON have the following features:

- *One headquarter with multiple (inter)national geographical distributed offices;*
- *Regular (quarterly, monthly, weekly, daily) and ad hoc meetings;*
- *Other meetings take place between project based (inter)national teams;*
- *The participants of these regular meetings are department managers and c-level managers;*
- *There is a need for efficient time planning brought about by higher management (reducing travel time as much as possible);*
- *Employee travel expenses are substantial.*

[9] Table concerning interviewed organisations to be found in appendix 1

Conclusion

The e-commerce possibilities of VCON in relevance to other functions then internal communications are not yet exploited. Organisations are hesitant in applying VCON as a sales channel, or information portal for possible customers. However the possibility of direct interaction with customers is one that can be of great value. Particularly when integrated within a corporate website, adding a personal touch to online retail and marketing.

The value of VCON to be added to the existing e-commerce channel is one that needs further investigation. This is mainly because existing customer application was not found. An exception to the rule is Rabobank Enschede-Haaksbergen, who revealed that there are additional customer contact plans for VCON, creating a concept called Rabobank Unplugged. The aim of this concept is a new way of delivering customer service. Unmanned computer points will function as a direct video link between customer and Rabobank personnel, giving this 'call centre' a more personal character.

4.3 VIDEOCONFERENCING USE

The VCON systems mainly operate in a dedicated conference room. However Arcadis also uses VCON laptops, as well as conference rooms. Arcadis argues: "we work with laptops and conference rooms due to the amount of international projects and the need for communication between interdepartmental employees." Further analysis showed that all of the systems were purchased with a service contract. The service is maintained by the vendor for a period of two to three years (depending on the service contract).

Prior to any business meeting proper preparation is essential. With VCON this entails that preparation is done by using different media to send relevant documents, discussions, time table. The logistics of where a meeting will be held is for VCON predetermined, because the location is located in a dedicated conference room. Besides the fixed location there are no other differences in meeting preparation, when compared to a face-to-face meeting.

Because VCON is mainly used as an internal communication tool, it can function in a fixed conference room, whereby the headquarters and other offices have the control over a conference room. When an organisation like Arcadis is working on an international project, whereby clients partake a great deal in decision making process, VCON has to become more flexible. Here personnel have the possibility to apply VCON via laptop. Interesting to see is that VCON is not widely applied on desktops. Due to the cost of hardware desktop implementation this is not scalable for an organisation. Desktop ready systems can take away possible employee hesitation, which are reluctant towards VCON use. This is based on the fact that some people find it time consuming to book, prepare and walk to the conference room. A possible solution for these sceptics is providing VCON apparatus in the comfort of one's office. Stimulating use amongst personnel so that colleagues will stimulate each other in VCON use.

4.3.1 INFRASTRUCTURE

The internet connection that enables VCON use differs per organisation. This bandwidth difference is a result of, in what way organisations modify VCON to fulfil organisational communication needs, within their existing corporate network. At this point in time organisations choose to incorporate VCON via:

- *Integrating VCON in existing corporate network.*
  The preference of organisations, such as Heineken, Servier and Tauw, is to use an ISDN connection.
- *Integrating VCON on an external network.*
  An (A,S)DSL 4 m/bit upload (768 kbps needed) connection is used.

The choice to apply ISDN or (A,S)DSL is dependent on the heterogeneity of corporate infrastructure. This refers to the bandwidth connection that different offices have to their disposal. The decision to use ISDN or (A,S)DSL is based on the cost of bandwidth connection. For international operating organisations it is a case of using existing bandwidth. In this case ISDN is the predominant bandwidth connection that is already installed. An additional factor is that not all the countries in the world possess the speed of (A,S)DSL for the price that organisations can get it in the Netherlands. Newer systems that are used for VCON in the Netherlands contain (A,S)DSL bandwidth connection, the quality of which is a lot higher in contrast to ISDN. Though organisations using ISDN do indicate that the connection does fall away occasionally, this can lead to aggravation of meeting participants. With (A,S,)DSL this problem is minimised. Another factor of faltering connection with international VCON meetings is the heterogeneity of internet bandwidth in other countries.

The motive of organisations to use ISDN is based on the fact that a corporate infrastructure typically uses different types of network media. This includes media used by personnel to communicate, store information and external access to information. From an organisational perspective existing infrastructure will not be altered for the VCON application. Important to understand is that technology of VCON systems are changing rapidly. The change of organisational infrastructure however is slow. When altering infrastructure this will influence processes of the entire organisation, every department, unit and employee. Organisations cannot afford to invest in software and hardware on a regular basis, which are needed to fulfil organisational practice, just to be able to apply VCON. The point made here, is that although the cost of VCON apparatus has gone down this does not weigh against the possible cost of infrastructural reorganisation. That is why existing ISDN lines are used. When this is not possible a (A,S)DSL bandwidth is preferred to function ‘outside’ a corporate network.

In addition, organisations prefer the use of an open codec that can be added to VCON. An open codec gives the VCON system the ability to communicate with other technological different (external) systems. It is best described as an encryption key that codes and decodes information and it requires a licensing fee for implementation. This gives users the possibility to communicate with other VCON systems, for example a Polycom system with a Tandberg system. The choice for an open codec is based on the expectance that the use of VCON will continue to grow, lengthening the life span of a VCON system.

Conclusion

While the VCON branch has been keen on creating standards and protocols for the entire industry, apparatus ubiquity is still an issue that has not been resolved. An open codec is a handy workaround tool, which allows interface between different systems. However this does not guarantee that VCON will work without blemish. The difference in bandwidth connection and hardware heterogeneity (on either side) will influence streaming quality. A frequent faltering signal will influence the choice to make use of VCON for future application. When people are faced with a negative VCON experience, this will cause them to favour other media, such as phone, email and avoid further VCON use.

4.4 WHAT ORGANISATIONAL ACTIVITIES ARE BEING DONE WITH VIDEOCONFERENCING

VCON is used as a communication tool to send information between different geographically separated departments. Hereby interaction takes place between employees. As a result the activities of VCON focus on:

- *Quarterly review;*
- *Formal business meetings;*
- *Presentations;*
- *Training;*
- *One-on-one meetings;*
- *Intake meetings;*
- *Informal ad hoc meetings.*

Vendors state that the possibilities of VCON are endless. A few examples are educational meetings, conferences, better brainstorming and attracting new clients. Though practice shows that, higher management primarily uses VCON for information exchange. This can be in the form of a presentation or quarterly review, but the essence of the meeting remains the same (information exchange). Having mentioned the core functions of a VCON system in chapter 2.3, it is suggested that de different functions of VCON only support information exchange. If organisations want to explore other possibilities, different software applications are needed. More notably, applications that support live interaction with the customer. Here a combination can be made between sales and communicating relevant information via a ‘live’ tour of the organisation. In other words VCON is lacking the capacity to be applied for other organisational features. This requires a certain degree of tailored software applications, which can be achieved, but is very costly. Conversely using live video streaming for other purposes then VCON is a rather new concept, which is still in the starting phase of the product life cycle. Up until now the quality of streaming services is often insufficient. It is difficult to reach a constant suitable level of quality for video transmissions.

4.5 WHAT ARE THE MOTIVES TO USE VIDEOCONFERENCING

Analysing the results of organisational interviews, it can be stated that there are two major reasons why these organisation are motivated to use VCON:

- *Time efficiency by not having to travel;*
- *Company Socially Responsible Enterprise policies.*

However there is one expression used as the primary motive. The term applied by the participants was 'ease'[10], though the phrase 'ease' encompasses several facets. It is best described as the ease of not having to travel to a meeting. Whereby the negative aspects of travelling are used as motives to use VCON, namely:

- *Effective time gained by time not spent travelling;*
- *Travel expenses.*

A motive for organisations to apply VCON is a result of company policy. This specifies the way that organisations try to invest in organisational and employee wellbeing, also referred to as the term Socially Responsible Enterprise[11] (SRE). This term refers to an organisation's effort to invest in environmental and co-worker friendly solutions. When business is booming organisations are ad emend to invest in SRE. However when economy is in a decline, SRE investments are the first that will be postponed. Investing in VCON supports the idea of company SRE policy by, decreasing cost of travel expense and getting employees of the road as much as possible (less car mileage).

Questionable is if SRE comes from necessity or that organisations are influenced by a SRE hype. Nonetheless organisations are investing in sustainable technology and VCON is benefitting from this trend. Conversely, when is technology deemed to be sustainable? Is VCON sustainable? If so, how should an organisation measure this sustainability? Can this be measured by a reduction in Co2 emissions? At this moment in time there are little guidelines for SRE and finding information about sustainable products or technology is even more complicated. What remains is that the demand for SRE products is growing and organisations are grabbing every opportunity to declare that they are sustainable. Thus as a result VCON has grabbed the interest of organisations.

[10] Phrase used by participants in Dutch: "gemak"

[11] Dutch term: *"Maatschappelijk Verantwoord Ondernemen"*.

4.6 BOTTLENECKS AND SUCCESS FACTORS OF VIDEOCONFERENCING

The difficulty encountered with VCON is divided in two segments. The problems users are faced with and the bottlenecks of technical implementation. In the following these points are discussed.

Communicating via VCON is different compared to a face-to-face meeting. Face-to-face conversations can be more interactive, meaning that participants are able to interrupt each other without loss of information. With VCON participants have to take turns in speaking. This is due to the speed of audio and video streaming, which does not function well when people at both ends are talking at the same time. Consequently training has to be given in how to communicate via VCON. Participants have to get used to different psychological aspects and the art of reading body language. VCON users have to get used to these aspects. Participants have to learn that when somebody is speaking other participants have to be silent.

4.6.1 USER BOTTLENECKS

In order to use VCON some form of training must be offered to the potential users. Especially during the start-up phase, participants are hesitant in making use of VCON. This hesitation is due to the fact that people do not want to be trained in VCON use.
Implementing VCON and having people that actively use it takes time. This can take up to several months, whereby users have to get to know the system and get used to VCON "etiquette". It is advised that participants have to follow a protocol that explains how to prepare oneself for the meeting, how to start-up the system and when to speak.
Because existing technology like phone, email and fax can work just fine, employees are not directly convinced that video conferencing is of relevance for their communication needs. These existing communication methods are important reasons why employees are hesitant in using VCON, because:

- *The phone works OK for many information exchanges;*
- *Connecting by phone is easy and ubiquitous;*
- *Employees can put important information on the internet using e-mail;*
- *Cost of phone/mail is low, compared to VCON, for both equipment and connection.*

VCON application limits itself to a certain amount of users. The participants on either side must not be more than four or five. This is also the case for multisite-meetings between multiple offices or group members. The main problem is that participants get confused about who is talking, which participant the commentary is coming from. For practical reasons it is recommended that VCON meetings are held between no more than three locations. More than three locations will give difficulties in maintaining quality of bandwidth connection, video projection and fitting all of the participants onto one screen. In other words, having more than four to five participants (per location) is just not practical.

Furthermore group creativity sessions via VCON, similar to brainstorm sessions, are not as effective when compared to a face-to-face meeting. These techniques demand a free flow in discussions, which is in conflict with the character of VCON, where participants have to wait in turns. In addition, VCON does not lend itself for resolving conflicts or resistance in meetings. Personal issues or conflicts need to be settled face-to-face.

Moreover VCON is affected by sophism, meaning that people have a plausible, but invalid reasoning about VCON application. People are not convinced that VCON over IP is secured against hackers, thinking that VCON conversations can be hacked and seized from the internet. Additionally people have a dated image of VCON, based on the fact that these systems were slow, of poor quality and expensive in the nineties. People with a dated image of VCON have a biased opinion about using it. They are not convinced that advancements in sound and image in HD have led to superior systems. A possible reason why people are not convinced is, because they are ill informed about technological enhancements.

Several other bottlenecks which organisational users face are:

- *Training, practice and experience with system;*
- *Limited amount of participants;*
- *Location of conferencing room.*

The success and acceptance of VCON is increased when the company culture and procedures are the same. The organisations, mentioned in appendix 1, are different in their product offering, but share a common feature namely: while offices are geographically separated, organisational culture and procedures are the same. This is needed in order to let integration succeed via identical work procedures and software applications. Complementing this fact is the homogeneity of VCON hardware/apparatus. Meaning that hardware/apparatus has to be identical at both locations, in order to benefit from high quality VCON. As a result organisations choose to invest in one system, which will be placed in all of the predetermined sites.

4.6.2 SYSTEM BOTTLENECKS

A main drawback of VCON is the purchase price. Starting at 10.000 euro and depending on the system requirements, this can accumulate to a sum of 100.000 euro and higher. Moreover VCON needs at least two locations to function. Thus the calculation is times two or more depending on the amount of locations. Within an organisation this leads to the question who is responsible for the cost of VCON?
A reoccurring problem is the bandwidth used to maintain audio and video quality, which requires a great deal of up-and download speed. The cost of a (A,S)DSL bandwidth connection in the Netherlands can vary between 80 to 150 Euro per month. This same bandwidth connection in countries like Belgium can cost 1000 euro, in extreme cases this can lead to an amount of 5.000 Euro. In South Africa these prices vary from 10.000 to 30.000 Euro. Therefore the cost of an international VCON meeting is more expensive, then a Dutch VCON meeting.

The following problems occur when setting up an (inter)national VCON meeting.

- *Cost of VCON;*
- *Who is responsible for the investment costs;*
- *Implementing and integrating technique and software into corporate network;*
- *Bandwidth connection.*

Organisations calculate the cost of VCON per user-group. The responsibility of investment costs is thus distributed amongst the departments using VCON. The cost is usually settled with yearly department budgets. These calculations cover the cost of licensing and are worked out in the form of a lease payment to the organisation.

4.6.3 SUCCESS FACTORS

In the following chapter further elaboration will be given on the benefits of VCON implementation. Some points have been discussed in paragraph 4.1 and will also be applied in this chapter. This is needed to highlight the causal relationship between VCON success and the process of implementation.

The success of VCON is dependent on the introduction phase, where installation and training is provided by the vendor. Further adaption of the system has to be supported by the organisation. During the introduction phase, certain tools are used to create awareness and user groups. These tools include:

- *Aiming direct communication towards possible/expected users. Campaign via Intranet, posters, flyers and newsletter;*
- *Use through example (department managers using system);*
- *Allowing wide spread use for every employee.*

The main factor that has to be conquered for successful VCON implementation is user acceptance. The widespread use of VCON, throughout the entire organisation, is higher when organisational personnel are stimulated to use such a system. That is why promotional activities are needed to create awareness, but more importantly get people comfortable with VCON application. In so doing the likelihood of employees to try VCON is higher when:

- *It is easy to use;*
- *Other employees use VCON as well;*
- *Users get the feeling that they are in control of the program.*

The hesitation of people that do not want to use VCON, is supported by the fact that people are not aware of the added value VCON has to offer them. This is difficult to explain other than that it can achieve time efficiency. On the other hand the subject of time efficiency is not enough to convince people to use VCON. That is why certain procedures are implemented during the introduction phases, which help form a foundation for VCON etiquette. These can be divided in the following segments:

- *Introduction and training*
  Educate personnel on how to use the system and how to communicate with each other;
- *Creating awareness, user groups and stimulating use*
  Users need to get familiar with how to operate VCON and the start-up protocols;
- *Booking, planning and selecting meetings*
  Explaining which meetings are suitable for VCON, booking the conference room, selecting and inviting participants.

The success of VCON application is dependent on the following features:

- *The way that certain projects are structured, projects whereby participants have the need to meet on a regular basis;*
- *International projects whereby participants find it easier to meet via VCON then to fly;*
- *The willingness of people to use VCON;*
- *Stimulating use via incentives, for example awarding time spent on VCON with free time.*

Introducing and getting people to use a system like VCON is not difficult. Getting people to actively use VCON after the introduction stage is. This is due to the fact that projects where VCON is used come to an end. Also people prefer to communicate via other media channels and are influenced by negative experiences, which they might have had with VCON. Thus organisations need to promote the use of VCON periodically via different promotional activities.

When the interviewed organisations where confronted with the question: “what are the major benefits of VCON for your organisation*?”* the following answers were given:

- *Communication transparency;*
- *Timeliness of decision making;*
- *Speed of information transfer;*
- *Gaining time not travelled;*
- *Reducing costs of employee travel;*
- *More ad hoc meetings between internal departments;*
- *Specific communication between expected user groups.*

Other benefits which were mentioned can be seen as a consequence of VCON use, these are:

- *Frequent communication between internal departments;*
- *Meetings are shorter, better prepared and more efficient (avoiding chit chat);*

- *Co2 reduction*.

When looking at the list mentioned above, the question arises what kind of meeting is more efficient, face-to-face or VCON? Though the interviewed participants declare that they see an increase in meeting structure and state that decision time is quicker, these aspects are difficult to measure. For example is the decision time of a VCON meeting quicker in comparison with face-to-face? In paragraph 2.4.2. an argument is made about the selection of media richness. When it is assumed that face-to-face meetings are held for more significant discussions, these meetings will be longer lived than VCON meetings. This is because VCON meetings are held to discuss more trivial subjects. Thus decision time via VCON will be quicker.

Conclusion

The success of VCON is highly influenced by the acceptance and the reoccurring application of its users. This is stimulated by appropriate system training, creating user groups and motivating future VCON use. Only then will organisations benefit of VCON use in the form of reducing travel costs. Therefore it can be stated that VCON is successful when:

- *The return on investment of a project is higher than the cost of the system;*
- *The goal of the meeting is achieved.*

The stimulation of VCON use is an ongoing process, which employees have to be made aware of. It can be suggested that efficiency really starts when participants are used to VCON etiquette. When participants are 'veterans' in VCON use their total time in meeting preparation will go down, in comparison with a 'newcomer'.
For an even higher efficiency scale VCON needs to be integrated with other communication channels.

In many cases people are not aware of what kind of meeting should be held via VCON. As a consequence the set out goal is not accomplished, which could have been achieved via face-to-face.

4.7 WHAT ARE THE ORGANISATIONAL POLICIES REGARDING VIDEOCONFERENCING

It is from a SRE perspective that these organisations are trying to get employees of the road, intended to enhance employee, organisational, and environmental wellbeing. Though with VCON there are no distinctive policies that organisations uphold. Organisations enforce the use of VCON via internal communication, using intranet and other communication portals, such as newsletters or company mail to inform employees. There are certain procedures that employees have to follow when wanting to travel. Employees have to submit a request form for international travel arrangements. Here employees have to justify their decision for international travel. This procedure encourages the thought process of employees making them aware of VCON application versus international travel. The employee is reminded of the fact that there is an alternative solution. Based on the written explanation of the employee, an organisation has the right to deny or grant a travel request.

The use of a travel request forms is beneficial for VCON when the applicant has to justify why he should travel to a meeting. In order to give these request forms more weighting, the value of the business meeting should be included. Here the applicant stipulates the potential value for himself and the organisation. Important here is to indicate what the meeting is meant for. Is the meeting needed to carry out an employee's job? With whom is the meeting going to be held? When these questions are gathered, an organisation can examine what type of meeting have to be fulfilled via face-to-face and which via VCON. Another advantage would be that organisations see who travels the most where. For example if it can be concluded that a lot of travel occurs with one client, then a decision can be made to install a VCON system on location.

4.8 FINANCIAL COST BENEFITS

The decision to purchase VCON is based on a weighted cost-benefit analysis. This analysis looks at:

- *Possible costs of (inter)national projects*
  Certain (inter)national project demands a lot of employee travel and communication, whereby the cost of travel would be the biggest calculated expense;
- *Employee interdepartmental travel*
  Re-occurring travel of employees amongst (inter)national branches.

The impact of cost benefits, in correlation with VCON is different for every organisation. Organisations apply different tariffs for overhead costs. This can differ between 38 and 50 cents per kilometre for compensation. This is very marginal, because there is a factor of effective loss of labour time. In order to calculate the loss of labour time, employee wages need to be considered as discussed in 2.5. From this paragraph it can be concluded that the biggest benefit is avoiding (inter)national travel, calculating the cost of travel, loss of labour hours and subsistence costs.
Thus the amount of cost benefits for an organisation using VCON depends its core business. For example the cost benefit will be higher for an organisation that focuses its core product on international project management, when compared with a national operating organisation. This is based on the assumption that an organisation operating on an international level will have more employees that travel. This can also be true for an organisation that has a lot of employees travelling within the Netherlands. Whereby, the likelihood will be that there are more employees that travel shorter distances more often. At the end of a year these shorter trips can accumulate to a vast amount in employee travel costs.

One of the benefits which cannot be measured in cash flow, is the manner in which organisational efficiency is gained. Efficiency in the form of making ‘quick’ decisions in an increasingly competitive market, focussing on the interaction between (inter)national project group members. Some organisations refer to this as ‘chit chat’ that is being left out during meetings. On the other hand, this ‘chit chat’ with face-to-face meetings can be responsible for exchanging important information that otherwise would not have been discussed.

4.9 FUTURE ORGANISATIONAL COMMUNICATION

Instead of having to travel, VCON is seen as an easy communication alternative, whereby employee communication exists of webmail, intranet, instant messaging, outlook and (cell)phone, for daily interaction. These communication methods are divided into two groups. Real-time (synchronous) communications, like telephone calls and voice mail, while message-based (asynchronous) communications, like e-mail, depend on a separate incompatible network. From an organisation perspective these applications need permanent safeguarding from internet viruses and hackers. More notably maintaining these applications consumes time, money and effort of IT personnel. Therefore, IT managers suggest:
"*We would like to have a software application that combines these business communication methods on to one platform. This will make it easier to integrate communication processes throughout the entire organisation.*"

As a result the personal computer (desktop) will form the heart of employee communications. IT managers are convinced that this will only take a matter of time before this will be realised. This will form a 'new' standard for managing organisational communication. A recent example is Google who launched Google Wave: a service aimed at online cooperation and communication. Incorporating among others e-mail, chat, document management and photograph exchange. Users can edit each other's documents in a 'live' web-browser environment. These kind of online applications are an addition to existing organisational communication and can be seen as an alternative for VCON.

Organisations are signalling an increase in the demand of desktop VCON. This demand is predicted to grow, especially when the cost of VCON systems is going to drop further. It is expected that the demand for VCON on desktop will come from the group of teleworkers active in an organisation. Teleworkers in this context means people who work from outside the office. This occurs when employees reduce their commute by carrying out all, or part of, their work away from their normal place of business. However these teleworkers are faced with technological bottlenecks that stand in the way of VCON, due to extra security needs and company firewall protection.

4.10 CONCLUSION

The use of VCON can be seen as an extra addition to 'normal' communication media. People see VCON as an extra feature and not as a day-to-day communication tool. This is because the thought process of people, who want to send information, does not start with VCON. When information is transferred between two people, the (rational) choice would fall on the easiest or the simplest way of transmitting such information. With organisational information this choice is email or phone. Another factor is the limited use of VCON application. Such a system can only focus on transmitting information from point A to point B. The applications of VCON focus on discussing work processes, because of the inability to interact with each other in a free flowing setting. Thus people will tend to choose face-to-face meetings above VCON. Adding to this is that every now and then people want to shake hands and meet in person. The value of meeting people in person creates trust. This is especially important for doing business. It is also important to understand that important business meetings, such as discussing contractual agreements, are not done over the phone or via VCON for that matter. Usually important discussion are carried out in an (in)formal setting.
So why use VCON? It can be stated that VCON places organisations in a position to conduct meetings with more structure and higher frequency, while at the same time drastically reducing travel expenses. In some cases this is indeed true. However VCON will only function when participants have agreed upon mutual use. It can be acknowledged that the use of this system benefits organisations (people) who already know each other and share a form of trust. When there is a good level of trust between interdepartmental offices, VCON will be applied more frequently. As a result this will lead to cost benefits. This is only worthwhile when the effective loss of labour during travel is high.

Although VCON technique is advancing some 'old' problems remain. These problems are: the heterogeneity of systems and bandwidth possibilities, cost scalability of apparatus and maintaining a high level of security. The success of VCON application is linked to the degree of employee acceptance, organisational culture, processes and methods. It can be concluded that in order to make VCON a success, an organisation is responsible for the 'cultivation' of VCON use by its employees. Therefore an organisation is in charge of creating clear rules, regulations and stimuli concerning VCON application.

CHAPTER 5 VISION OF CONTRIBUTING PARTIES

In the previous chapters the preconditions and requirements of successful VCON implementation have been examined. This segment will discuss the vision of VCON vendors, as well as the viewpoints of the user (organisation) on the subject of VCON application.

5.1 VIEWPOINTS ON VIDEOCONFERENCING

These are the viewpoints of both parties that will benefit the implementation of VCON, as well as critical learning points. These viewpoints are taken from conversations with vendor managers, as well as organisational employees.

5.1.1 VENDOR POINT OF VIEW

The opinion of the vendors is: "*more than seventy-five percent of the organisations in the Netherlands do not see the importance of using VCON*". This is due to reality that organisations operate fine with existing communication technology. The consideration to use VCON is made, when an organisation will have more international meetings in the future, or when customers/partners/subcontractors are switching over to VCON, whereby the main reason to use VCON is future time saving.

People who have used VCON in the past (four to six years ago) are aware of the disadvantages. The technique then was inadequate in relation to the purpose of VCON. The VCON systems had troubles with proper audio and video projection. These people have a pessimistic opinion about today's VCON capabilities. Adding to this is that there are hardly any advertisement campaigns being exploited by vendors, to create VCON awareness. When vendors do have the opportunity to give a demo presentation, of current HD technology, people are stunned by the improvements in quality of VCON. Lately VCON is getting more publicity from media, due to the financial crisis. Organisations are actively looking to cut costs and thereby looking at alternative or new ways of doing things.

5.1.2 ORGANISATIONAL POINT OF VIEW

The organisations who work with a board of directors are content with the solution that VCON has to offer them, because it offers an extra feature to coordinate work processes. In this setting VCON is effective because if offers an update on operational status in-between face-to-face meetings. The shared information becomes more relevant when significant participants are included in the presentation. The ability to use different communication tools is vital for these types of organisations, due to the speed in which certain decisions have to be made. The goal of VCON in this situation helps to coordinate and inform relevant participants on the status of certain work processes.

People struggle with the notion of VCON. In particular the effort one has to put in training, meeting preparation and booking the conference room. It is because of these actions that people find VCON meetings time consuming and in many cases not necessary. Daily communications can be had via phone, which is easy and effective. It is difficult to persuade people what the added value of VCON can be for them. This issue is strengthened by people who have used VCON in the past but were not satisfied with the results. People unconsciously know that for important talks a face-to-face meeting is needed.
A lot of organisations are misled by the potential VCON benefits, which are pronounced and suggested by media and vendors. On the other hand it is difficult for organisations to calculate how valuable VCON really is. This is based on the fact that the value of trust, efficiency and avoidance of 'chit chat' cannot be measured in hard cash.

5.2 CRITICAL POINTS OF VIDEOCONFERENCING

The different viewpoints of vendors and organisations, emphasise the notion that organisations who use VCON face certain practical and technical application issues. Although these organisations are content with the use of VCON, its application would be better when the following issues are solved:

- *Sending audio- and video images over the world will result in time-lag, ensuing in a delay in sound and image. This is a problem that VCON continues to struggle with and has not yet been resolved;*
- *VCON does not have the power to change cultural differences in doing business. Creating trust, respect and appreciation in doing business;*
- *The majority of VCON systems are not equipped to interface with dissimilar systems;*
- *There is too much technological knowhow for people to comprehend;*
- *It is merely used for projecting information and communication;*
- *There is a lack of extra application capabilities or tools.*

With any new kind of technology comes a period of transition, training, use and acceptance of users. The use of VCON can be enhanced, when systems are made as simple as possible. One way touch screens or voice command and further integration on PC's, desktops or laptops takes place. Nevertheless VCON still faces the difficulty of becoming a standard communication tool. Thereby referring to the thought process of people, which media option will they choose when they want to share/transfer information? In order to stimulate people in their thought process about VCON, the following features are influential aspects of VCON awareness and use:

- *Acceptance and standardisation*
  One of the most important issues of VCON is its acceptance as a communication channel. It does not function as a mutually shared (standard) communication method similar to phone and email. In order to become a standardised communication tool, VCON has to manifest itself on a prominent place. In order to generate more users, VCON should not be tucked away in a conferencing room. If people are confronted on a daily basis with the use VCON, then they will be more likely to accept it as a communication method. Therefore it is suggested that VCON has to be integrated on the desktop. As a result VCON becomes a standard in office equipment;
- *Technique and training*
  Organisations depend on hardware and installation that is provided by others: from VCON apparatus, to internet bandwidth and systems training. The implementation of VCON covers such a broad arsenal of technical requirements that it becomes an obstacle in terms of costs and user friendliness. Thereby, VCON users want an easy, preferably one touch system, which need no extra training or manuals. Adequate training sessions need to be planned during the first few months when VCON is implemented. This is a cyclical process, whereby new potential users need to be trained. Stipulating which meetings are best held via VCON. Alternative solutions can be a manual guide, user friendly software or a helpdesk;
- *Mapping out potential users*
  In order to apply VCON in an international setting, an organisation must analyse the cultural differences of the other participant first. Clearly map out which customers, clients or partners are ideal for communicating via VCON. This will benefit the successful use of the system. The more often VCON is used the more comfortable people will get using it.
- *Stimulating personnel*
  Management has to limit the total amount of (inter)national travel by motivating people by underlining the advantages of using VCON. The way an organisation can stimulate personnel can vary per organisation. Also by formulating rules and regulations when travel is acceptable and when this is not suitable, then the use of VCON will increase.

CHAPTER 6 CONCLUSION AND RECOMMENDATIONS

The daily communication needs and activities of employees are more and more influenced by the possibilities of virtual communication. Modern workplaces already make extensive use of existing communication media. Although new technologies are slowly being added to this. More importantly, employees who are member of a project team need to be flexible in their communication. As a result organisations are investing in new technologies, updating operations and business processes, with as main goal to achieve efficiency and cost advantages.

In the search for new technology organisations are finding VCON. Organisations that benefit most from using VCON work with geographically distributed project teams. Though organisations are ill informed of the real benefits of VCON. Often organisations procure VCON on the basis of cost allocation, whereby the cost of travel expenses in relation to the cost of VCON is analysed. What organisations should examine, is the loss of effective work time when travelling in relation to VCON. Conversely the effectiveness of VCON depends on the desired or expected outcome, whereby meetings are held to achieve a certain goal. One of the goals for a project manager using VCON is to discuss progress, deadlines and coordinate operations. VCON is not effective when meetings are characterised by different:

- *Cultures;*
- *Languages;*
- *Business processes;*
- *Technological requirements and corporate infrastructures.*

In addition it is better not to use VCON when conflicts have to be resolved between group members or when creativity techniques are applied. In these situations face-to-face meetings are preferred.
As a result of cultural influences VCON application is very restricted in its application. Only for those who have the specific need to broadcast oneself does VCON really succeed in doing so. It can be deduced that the application of VCON is more effective, when national meetings are held between interdepartmental managers/project groups, sharing a responsibility for outcomes and task fulfilment. The purpose of these meetings is to share information and to discuss project progress.

It can be assumed that the extent in which VCON will be used, is associated with the acceptance level of its potential users. In the case of organisations this will relate to its employees. Here it is important to understand that employees transfer communication via different media (phone, email), whereby media selection is based on the media richness theory. This entails that a richer medium will be selected when information is very important. In more simpler terms, the thought process of people has to be changed in order to stimulate VCON use. In this course of action, human habits and routine practices stand in the way of VCON.

The choice to apply VCON is influenced by the opinion of many employees, which is: *"I do not see the benefit of VCON, phone and email are sufficient"*. Therefore it is important to stimulate VCON by creating user groups. Confronting people with VCON application and having co-workers who use VCON, will stimulate acceptance to becoming a standard in media selection.

Therefore an organisation who wants to integrate VCON has to assess if the organisation is equipped to sustain the use of VCON . The assessment consists of identifying possible bottlenecks of existing corporate infrastructure and covering aspects of application and use. At this juncture VCON is tailored to 'best fit' the organisation, to complement existing media channels fulfilling organisational objectives.

6.1 CONCLUSION

VCON meetings are greatly affected by human habits and cultural beliefs. VCON will fail to function as an effective communication tool, when applied in international meetings Because the difference in business cultures has an effect on the process of decision making and the way that information is communicated. VCON is more successful when used as:

- *An internal communication tool;*
- *Between interdepartmental project groups, or managers;*
- *Sharing the same cultures, beliefs, and procedures.*

There is no doubt that VCON has improved, however some VCON problems of the past remain. Referring to the common availability of either ISDN or network systems capability of dealing with isochronous data streaming, which are:

- *Transmission delays;*
- *Bandwidth connection;*
- *Security firewalls;*
- *Cost of technique.*

These features continue to influence the success and acceptance of VCON communication. If these drawbacks cannot be resolved, VCON will never become a totally accepted communication tool.

6.2 RECOMMENDATIONS

Having had conversations with VCON users, vendors, IT personnel and examining their point of views on this subject, it can be stated that VCON still has some drawbacks. Therefore this segment will consider a go/no go for organisations, who want to work with VCON. There are a few recommendations for implementing VCON, that cover system application, user friendliness and overall improvements.

Note that there will be a higher positive effect of VCON for organisations that work by means of project base and use VCON to perform as an interdepartmental communication tool. It is assumed that organisations that will be interested in VCON are more likely to be already searching for alternative ways of resolving the cost of employee travel.

6.2.1 GO/ NO GO VIDEOCONFERENCING

An organisation faced with the consideration of investing in VCON, should do so based on an assessment of the present employee travel situation. The aim is to specify what the organisation spends on employee business travel by a cost-benefit estimation. This estimation is based on how often interdepartmental meetings take place and how many employees have to travel to such meetings. For this approach, an organisation needs to know beforehand what the total cost of VCON apparatus and maintenance will be. This is needed to calculate the return on investment, where the possible cost of the VCON and the cost of employee travel are compared. An organisation must consider the following questions in order to map out if VCON is a viable option:

- *What is the total cost of (inter)national employee travel per year?*
- *How many international trips per year are needed to fulfil projects or customer relations?*
- *How many employees that travel for interdepartmental meeting does the organisation have?*
- *How many employees travel on average per trip?*
- *Which are the most important clients that need to be visited on a regular basis?*

If the cost of annual employee travel is high and interdepartmental meetings are frequent, then the organisation should integrate VCON. An organisation can begin with one conference room per location, depending on the scale of the organisations and the need for VCON.

A no go decision for VCON is better when interdepartmental meetings are very marginal. Or when there is no real need to coordinate geographical dispersed activities. Keeping in mind that such a need is a result of:

- *The scale of the organisation;*
- *Type of business activities;*
- *(Inter)National range of doing business.*

From this can be deduced that small scale organisations with no intention to do business on an (inter)national level, will benefit more from face-to-face meetings because of its intrinsic value with customers, clients or suppliers etcetera. This is especially the case when the level of trust has not yet been established between significant business partners.

6.2.2 GO FOR VIDEOCONFERENCING

For an organisation it is important to understand, that applying VCON requires structured procedures and training. From the user perspective, working with VCON needs to be kept as simple as possible.

- *KISS method and corporate network integration*

Keep It Simple, Stupid. Employees are hesitant in using a system that requires training. Therefore VCON should be one touch and headache free. Looking at the process surrounding VCON, like sending invitation emails, booking the room etcetera. This should be automated as much as possible. As a result conference rooms can be booked online, via Outlook, Web-mail or Intranet, while at the same time sending invitations to participants. The participants should receive a memo containing:

- *Date and time of meeting (if needed a time clock showing difference in time);*
- *Information about the applicant and other participants;*
- *Agenda with discussion points;*
- *Attached files.*

Vendors emphasise the importance of creating user groups. By taking VCON out of the conference room setting and placing it on desktops and/or laptops, would help in removing possible boundaries that employees have.

- *Desktop integration*

Conference rooms have to be booked, prepared and participants have to relocate themselves to the conference room, usually taking their laptop (with presentation material and such). In some cases the disadvantage of relocation can be cut by adding desktop or laptop application. Imperative for desktop and laptop conferencing, is to guarantee the same experience that one would have in a conference room. When implementing desktop and laptop, organisations should take notice of using identical VCON hardware, open codec and similar DSL (preferred) bandwidth connection. Other incentives should still be maintained such as:

- *Rewarding time spent not travelling;*
- *Providing laptop installations, for telework purposes.*

However VCON should focus on the appropriate user, forming a clear structure on which meetings are best held via VCON, phone or face-to-face. Organisations should analyse the potential of applying VCON in different settings. Having a meeting with customers, suppliers, displaying products and advertising.

6.3 ADDITIONAL RESEARCH

This research has shown that people do not know when and why they should use VCON application. Therefore it seems that the correct application for VCON has not yet been discovered. Further research should focus on the growing importance that virtual communication methods are fulfilling for organisations. Analysing to what extent organisations are using VCON in 'new' ways of doing business. What type of sales functions can VCON fulfil? More importantly what is the best way to incorporate VCON within a corporate website? Is this the next step in customer contact? As I have discussed in the previous chapters this is not yet possible, due to the high cost of VCON apparatus and the great diversity in technical requirements.

It is my opinion that when the negative association with VCON of future participants is cleared and the right application is found, then VCON application will form a substantial part of daily organisational communication.

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Appendices

Appendix 1

The following table shows the interviewed organisations and their VCON systems in use.

Organisation	Core business	VC system	Amount	Purpose
Arcadis	Consultancy	Combined solution, Polycom unit with Tandberg IP software IP connection and ISDN.	9 conference rooms 300 laptop connections	Interdepartmental communication and international project efficiency
Heineken	Beer	Combined solution, Polycom, Tandberg with ISDN connection.	125 global VCONsystems	Interdepartmental communication and international project efficiency
Rabobank Enschede-Haaksbergen	Banking	LifeSize HD DSL connection	2 conference rooms	Regional interdepartmental communication. Haaksbergen-Enschede
Servier	Bio medicine	Polycom ISDN	12 conference rooms	Internal communication with international offices
Tauw	Consultancy	Polycom ISDN	6 conference rooms	Interdepartmental communication project efficiency
Ten Cate	Fabrics	Combined solution Polycom, Tandberg Microsoft UC	6 conference rooms	C-level management, interdepartmental communication, R&D managers
TKH group	Fibre optics	Combined solution Polycom, Tandberg	4 conference rooms	C-level, R&D department managers, internal communication
Tui	Tourism	Lifesize HD open codec	4 conference rooms	Internal communication between department managers

Appendix 2

Vendors interviewed

Name	Company	Function
R. Brilman	Tandberg/Imotions	Managing director
T. Visser	Tandberg/Imotions	Sales executive
D. Redondo	Netviewer	Sales executive
K. Fairbank	Netviewer	Sales manager
T. Spurgeon	Spontania	Sales director
J. Bei	Spontania	ICT manager
W. de Beus	Go Telecom	Sales executive
B. Heisterkamp	Go Telecom	Marketing manager
H.J. van der Heide	Exovision	Sales director
D. Kapetein	Talk and Vision	Sales manager
S. Lagerwy	Talk and Vision	Sales manager
E. Derksen	Computer SOS	Managing director
M.Asbreuk	Iris2Iris	Managing director

Organisations interviewed

Name	Company	Function
T. Meijer	Tui	Director IT department
I. Huiskes	Ten Cate	Secretary board of directors
R. van Sijen	Rabobank	ICT manager
L. Andriesen	Servier	Assistant controller
E. van Osch	Tauw	ICT manager
E. Schouten	Arcadis	Director IT department
E. Kroes	Heineken	IT manager
R. Innemee	TKH groep	Technical director
A. van der Lof	TKH groep	CEO
E. Wintzen	Exovision	VC/investor
H. Ligtenberg	Oost N.V.	Managing director

Employees interviewed

Name	Company	Function
J. Kockman	Rabobank Metals&Minerals	Sr. Consultant
S. Dondorp	Alado-IT	Account manager
R. Andriesen	De Telegraaf	Senior purchase department
R. Nijhuis	Fortis MeesPierson	Account manager
N. Brandt	Getronics	IT manager

Appendix 3 Videoconferencing suppliers			
Vendors	**Product**	**Strengths**	**Weaknesses**
Adobe	Adobe acrobat connect pro	-Based on Adobe Flash, the company's Web-conferencing can be deployed easily. It has resizable screen displays for users, authoring capabilities and less intensive bandwidth requirements for video. -Native integration with Adobe Acrobat enables document-centric real-time collaboration with Web conferencing from within the document. -Adobe's products provides compliance features, with logging and tracking of use and communications.	-Adobe has to maintain its focus on enterprise sales execution. -Its current server support is for windows servers only.
Alcatel-Lucent	Alcatel-Lucent Omnitouch my teamnetwork	-Alcatel-Lucent offers integrated, on premises, carrier grade audio conferencing and Web conferencing as part of its UC capabilities. -It has been successful in the SMB market.	-Alcatel-Lucents's offering does not integrate with learning management systems. -Customers typically procure the company's offering as a bundled communications solution and not primarily for its Web-conferencing capability.
Cisco	Cisco unified meetingplace	-Cisco has strong converged Web-conferencing offering, that focuses on UC. -The company's acquisition of WebEx has given it the leading web-conferencing product in terms of market adoption.	-Cisco has to realise its communications and collaboration portfolio, which may lessen the emphasis on MeetingPlace in favour of the acquired functionality in the Webex product. -Cisco must gain credibility in the market as a collaboration software company.
Citrix Online	Citrix GoToMeeting &	-Citrix Online focuses on ease of use for its primary SMB market, rather than on advanced or rich fea-	-It does not support advanced enterprise user requirements, such as multiple language versions or video for

	GotoWebinar	tures. -Its flat-fee pricing is attractive to smaller companies that want to conduct unlimited meetings and webinars at one set rate.	all participants in a conference via USB Web cams or room based video system. -The company's primary focus is on the SMB market; a lack of advanced features will limit enterprise penetration.
Dialcom	Dialcom Spontania Unified collaboration	-Dialcom offers advanced functionality with converged VoIP, providing integration with multiple PBX vendors such as Cisco, Avaya and Nortel. -Its adaptive bandwidth management features support better performance and higher quality video.	-Dialcom is a smaller company and will continue to have challenges selling to enterprises. Its main market presence is in Europe, but it slowly increasing in North America.
Elluminate	Elluminate Live	-Elluminate supports most of the major server and client platforms (such as Windows, Macintosh, Linux and Unix). -Its core strength is in e-learning, including testing facilities and integration with several course management systems.	-The predominant use is for e-learning. -Elluminate does not integrate with PBXs or provide support for audio conferencing bridges.
Genesys	Genesys meeting centre	-Genesys Conferencing's products is proven to scale in large enterprise deployments. -Genesys has its own R&D and offers customisation for larger enterprises.	-Genesys still lacks an on-premises deployment option. -Market pressure has made Genesys the subject of a tender offer by West.
IBM	IBM Lotis sametime standard IBM lotus sametime unite	IBM offers an integrated real-time platform in IBM Lotus Sametime with on-premises IM and Web conferencing. -It provides native integration with Lotus Notes and integration with Microsoft Outlook. -Following its acquisition of Webdialogs, IBM now offers a hosted Saas Web-conferencing service (IBM Lotus Sametime Unyte).Which will aid in	-IBM is a new player in the SaaS market and has not focused much on SMBs. -There is currently no integration between IBM Lotus Sametime Unyte and the on-premises IM and presence functionality in IBM Lotus Sametime Standard.

		penetrating the SMB market and further into non-Lotus-Notes environments.	
iLinc	iLinc 10	-The company provides full integration with multiple learning management products. -iLinc has added its Green Meter tool, which tracks carbon dioxide emissions and costs saved by having meetings online rather than travelling to the meeting. -It made a strategic move by selling its audio conferencing assets to Premiere Global Services in may 2008.	-iLinc is a fairly small vendor and it is expected to experience some revenue decline, with its recent switch to focus on SaaS subscription-based Web-conferencing services. -It currently lacks integration with Lotus Notes, IM and UC clients, but is does support Outlook and Web service application and programming interfaces are available.
Intercall	Intercall web meeting	-Intercall bundles its own audio-conferencing bridge, with its Intercall Web Meeting product from its acquisition of Raindance in 2006. -It provides event conferencing services, with dedicated specialists helping to set up and manage events.	-Intercall resells Microsoft Office Live Meeting 2007, Cisco Webex Web Meeting applications and other Web-conferencing products, as well as selling Intercall Web Meeting and Mshow for event conferencing. -It does not offer support for multiple languages. -The company does not provide integration with learning management systems.
Microsoft	Microsoft Office Live Meeting 2007 and OCS 2007	-Microsoft now has two options for business Web conferencing. Though Microsoft Office Live Meeting 2007 deployed via a SaaS model and OCS 2007, which now offers on-premises Web conferencing in additions to IM and presence. -Both of Microsoft's business Web-conferencing products provide deep integration with Microsoft Office and with Microsoft Sharepoint as a repository for Web-conferencing content. -The company's products offer improved video and	-The on-premises OCS version supports only the Windows platform for Web-conferencing. -Drawbacks are the new pricier model for Microsoft Office Live Meeting and Microsoft's overlapping conferencing products.

		VoIP support.	
Netviewer	Netviewer one2meet	-Netviewer provides both on-premises and SaaS deployment options. -Based in Germany, Netviewer has good traction in Europe, which represents most of its customer base. -It provides added support for Macintosh users.	-The company currently lacks support for audio-conference bridges, although this is planned to be realised in 2009. -Netviewer mainly targets departments and will be challenged at targeting enterprises.
Premier Global Services	Premiere global services Netspoke professional	-Premier Global Services uses its strengths as an audio-conferencing service provider to build its Web-conferencing business (a result of its acquisition of Netspoke). -It provides each customer with a conferencing Hub (a centralised website location) to manage all phases of a conference, from pre-meeting to post-meeting	-Premier Global Services' lacks integration with learning management systems, but this is planned for 2009. -Macintosh support is not available, but is planned for 2009. -It resells Microsoft Office Live Meeting 2007 and Cisco Webex Web Meeting applications in addition to its own Netspoke offering. -It does not support multiple languages for its Netspoke Web-conferencing product.
Polycom	CMA 4000/5000	-Polycom provides both on-premises (high-end) and SaaS deployment options and develop their own software. -They are based all over the world, operating with international sales partners. -They tailor products to customers wants and needs. -They integrate with existing corporate databases, directory, security structures and UC-applications such as Microsoft OCS, for smooth transition of video into IT-environments, without duplication of processes or system elements.	- In order to communicate with other system it needs an open codec, which is very costly. - System language mainly in English and does not support multiple languages.
Tandberg	Telepresence T3/T1	-Tandberg is fully specialised in delivering total VCON packages.	-Systems and maintenance contracts are very costly. -In order to communicate with other systems an open

		-Developing their own software and hardware applications, working closely with Microsoft and Cisco. -The brand for VCON high-end solutions for total conference room set-up. -Broad partner network	codec is needed. Licensing fee can be very expensive.