Get more out of video conferencing

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1 Management summary

FrieslandCampina broadens its focus towards both Western Europe and South-east Asia and with its focus on innovation have more communication between operating companies in the future. In Route 2020 FrieslandCampina also expresses the ambition to grow climate neutral. With these factors in mind FrieslandCampina asked to look at the potential impact of using video conferencing.

This thesis will show that using video conferencing has added value as a communication medium compared to other communication media and has lower costs than travelling to face-to-face meetings without increasing CO_2 emissions. Though the benefits are clear, adoption of video conference should have the attention. In order to get potential users to actual use video conferencing there are some aspects that have to be fulfilled before promoting video conferencing within the organisation. Investments need to be done in network, hardware and support. These investments are needed to give first time users a good experience. When they perceive video conferencing as useful future usage is more likely. Focusing on Amersfoort and Singapore first will be a good start. Lessons learned from implementations in these locations can then be used to further deploy of video conferencing within the entire company.

To come to these recommendations it is important to not choose one viewpoint, but look at it from multiple angles at the same time. Though a positive business case is made, this is not the most important motivation to use video conferencing. Focussing on ease of use and usefulness will stimulated the usage.

Video conferencing is one of the enablers for reaching climate-neutral growth. Video conferencing also facilitates better and more frequent communication, which is needed in a innovative organisation, without higher travel costs.

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2 Preface

This thesis is the conclusion of my master study Industrial Engineering and Management/IT and Management at the University of Twente in Enschede. In this assignment we explore the potential impact of video conferencing at FrieslandCampina. This research took place from April 2011 until December 2011.

This study has benefited from the help and support of some people. I would like to thank some of them in particular. I would like to thank Mariëlle van den Boogaard of FrieslandCampina for helping and coaching me during my research, she inspired me to make this report to what it is now. In general I would like to thank FrieslandCampina for giving me the opportunity to have an insight in the organisation, with all its facets.

I would like to thank Bart Nieuwenhuis and Klaas Sikkel for their guidance and useful comments that have shaped this thesis. They all provided me with great support and feedback, which resulted in this study I am proud of to present to the reader.

Finally, I specially like to thank my girlfriend, Miriam, for the patience and support during all these years. Finishing this report and the accompanied study has put an load on her as well.

Enschede, 12 December 2011
Foppe Benedictus

3 Problem description

3.1 Situation

FrieslandCampina is one of the world's largest organisations in the dairy industry. FrieslandCampina has grown from a local oriented organisation to the multinational it is today. With its central office based in the Netherlands and its largest potential growth in South-east Asia there is a great need to communicate between both ends of the world. Therefore high quality communication is needed to be able to trust each other. In a conversation non-verbal communication is a large part of the communication. Due to the possibility to see eyes and body language video conferencing is a rich media to communicate. Especially communication between different cultures can benefit from these characteristics of video conferencing.

In their window to the future, Route 2020 (FrieslandCampina, 2011), FrieslandCampina expresses the ambition to grow climate neutral. For every large organisation and especially in the food industry a responsible image is important. Video conferencing can be used to reduce the travelling for meetings and therefore reduce the emissions.

Video conferencing is already in use by FrieslandCampina as it was by its predecessor Royal Friesland Foods, but usage is very low. The infrastructure for video conferencing at FrieslandCampina is in most locations ISDN based, which has a hard time meeting up with today's HD standards.

3.2 Complication

FrieslandCampina would like to know what the impact of good use of video conferencing (VC) is. The first motivation to do so is the demand of its top management to improve video conferencing. This is one of the main drivers behind this project. Video conferencing would also be an extra means of communication for collaboration within FrieslandCampina.

The need for good use of video conferencing has two aspects; it reduces travel costs and decreases the carbon footprint of the company. Video conferencing can partly replace face-to-face meetings with preservation of communication. As video conferencing adds video to normal audio conferencing, it delivers a higher media richness. Video conferencing can reduce next to travel costs itself also the non-productive time needed for travelling. To meet future needs investments are likely to be made. FC likes to know what the impact of their investment is. Especially because video conferencing is not common practice at the moment, so it need to be promoted in order to be used.

In order to cope with video conferencing the use of bandwidth should be anticipated on. ISDN is currently the standard for the video conferencing connections. Today's standard is HD quality video, which uses, even compressed, large amounts of broadband. ISDN has limits to support high bandwidth. The use of the alternative, IP, brings in different problems like quality of service; the use of video conferencing should not slow down the rest of the network. On the other hand, applications used by other users must not interfere with the video conferencing. These issues are most urgent in locations where it is difficult to get access to broadband connections. As South-east Asia is known to have these difficulties special attention is given to this area.

Travelling is a costly activity, it not only takes lots of time and money; it also enlarges the carbon footprint caused by FrieslandCampina. Video conferencing can reduce travelling and therefore reduce

the output of greenhouse gas emission, which contributes to the goals set in the Route 2020 plan. One of the challenges will be to calculate the impact of video conferencing on the CO2 footprint of FrieslandCampina.

During the period that video conferencing was not much of an option, other options of communication, like WebEx and audio conferences, have filled the gap that video conferencing left open. One of the challenges will be to get managers actually use video conferencing again. Managers like the freedom that they are not watched while conferencing. They need to be aware that video conferencing provides added value compared to an audio conferencing call. Technology acceptance theory (Davis, 1989) will be helpful to analyse this problem.

3.3 Research Question

What is the potential impact of implementing video conferencing at FrieslandCampina?

It is not possible to measure the impact of the implementation due to the relative short period time available for this research. Therefore we have investigated the potential impact by asking the relevant stakeholders.

Though video conferencing is already in use within parts of the organisation, an organisation wide implementation has not yet been fully done. That is why the research question uses the term *implementation* instead of *improvement*. Though there is no blank sheet to start with. In the question is missing what configuration is used for video conferencing. The reason is that we do not know yet and it is in fact one of the results of this research itself.

3.4 Sub questions

The research question raises different sub questions;

- What is the current state of art regarding video conferencing according to literature?
- What is possible with current and future video conferencing technologies?
- Which processes within FrieslandCampina are impacted by use of video conferencing?
- How does use of video conferencing impact FrieslandCampina's processes?
- What are FrieslandCampina's current and future requirements for video conferencing?

These sub questions will result in a literature research to answer the first sub question. The second sub question will be answered with a market research. For the third and fourth sub question the processes of FrieslandCampina will need to be investigated. For the last sub questions a requirement analysis will be done.

4 Royal FrieslandCampina N.V.

4.1 History

FrieslandCampina exists since 2008 when Royal Friesland Foods and Campina merged. Both co-operatives were already mergers themselves, its predecessors emerged around 1870 when farmers in the Netherlands bundled their power and build dairy processing factories. These factories were needed to preserve milk longer by for instance making cheese out of it or to concentrate it. Bundling power also helps to guarantee sales. These local activities became regional organisations, which became national brands. Friesland Foods had its origins in the northern and eastern part of the Netherlands, while Campina served the western and southern part. In Figure 1 we visualised the mergers that led to FrieslandCampina. The merger of Frico and DOMO dates from 1983, 25 years and three mergers from both sides later a shift is made from mostly local focused to a global organisation.

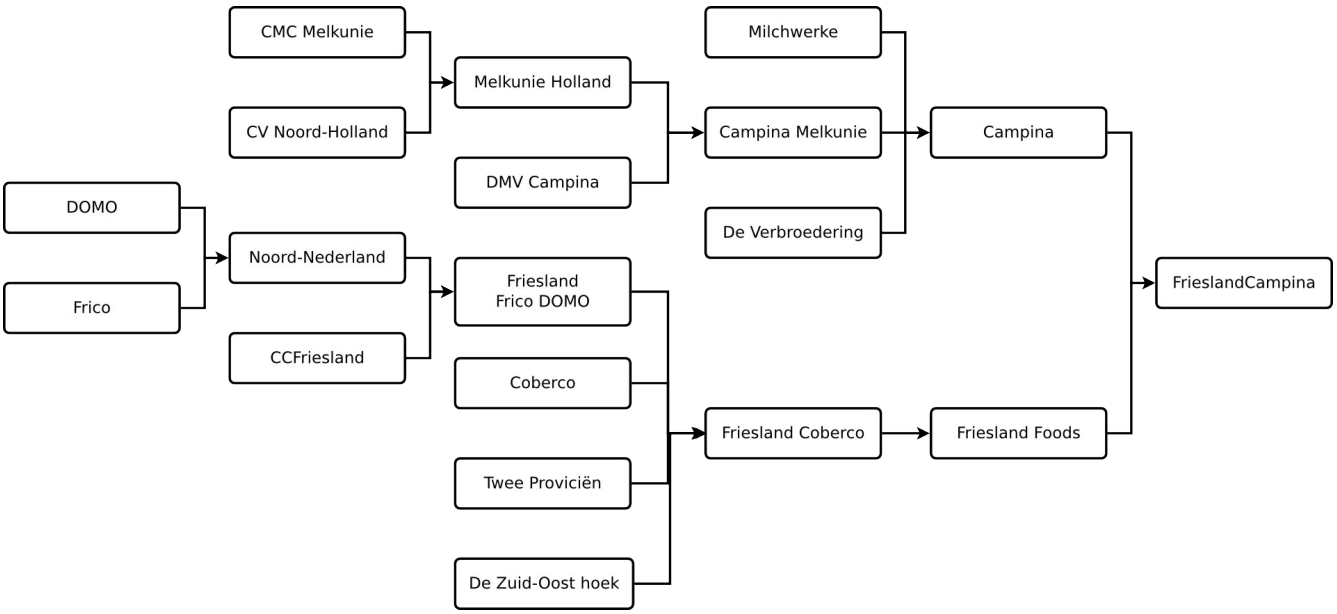

Figure 1: Mergers of FrieslandCampina

4.2 Products and brands

FrieslandCampina produces several different products, ranging from classic diary products like pasteurised milk and cheese to food supplements refined from milk to trendy milk and yoghurt drinks. FrieslandCampina has strong positions when quality is the most important aspect of the product, so where it can add most value. Good illustrations are products specific for children and especially infants. Mothers need to rely on the quality of the product to feed it their children.

FrieslandCampina has a rich portfolio of brands due to its many mergers and acquisitions. Different brands support different users. Some brands have disappeared due to the mergers and a lot of brands are region specific. In South-east Asia Dutch Lady is a well known brand, while Peak has that position in Nigeria. FrieslandCampina does not only have consumer products, but also produces products for other businesses. Especially Ingredients produces ingredients for other food companies, including other dairy processing companies.

4.3 Structure

FrieslandCampina is a co-operative organisation, which means its shareholders are the farmers that deliver to FrieslandCampina. To be more precise, FrieslandCampina is fully owned by the co-operative "Zuivelcoöperatie FrieslandCampina UA" that embodies 20.000 members, most of them dairy farmers. These farmers deliver their milk to FrieslandCampina and FrieslandCampina has the duty to buy this milk. This implies that FrieslandCampina will need to process this milk with a much added value as possible. The dairy farmers are paid a guaranteed price for every 100 kilos of milk with certain fat and protein properties. On top of that price is a share in the profit. 25 per cent of the profit of FC is paid out to the members.

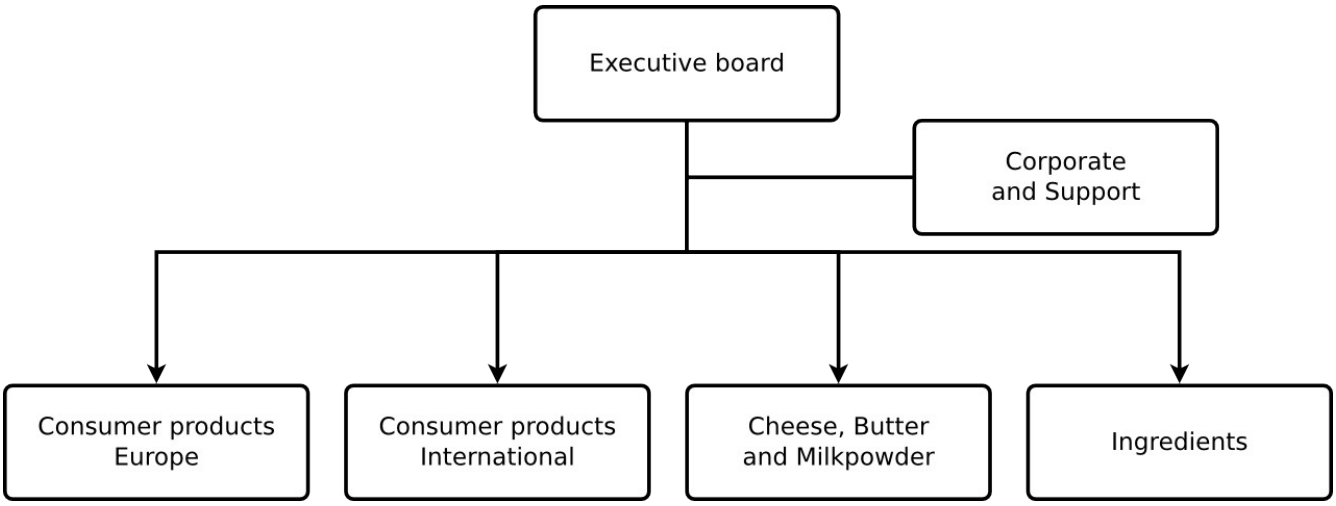

Figure 2: Structure of FrieslandCampina

As can be seen in Figure 2 FrieslandCampina has four business groups; Consumer Goods Europe, Consumer Products International, Cheese, Butter and Milkpowder, and Ingredients. The name Cheese, Butter and Milkpowder is a good description of the products its business group is responsible for. Ingredients sells food supplements it subtracts from milk. Both consumer goods business groups do not only produce for consumers as the name suggests, but also with its professional brands to professional users, like restaurants, bakers, etc. Corporate and Support is the central office of FC and its shared services. These shared services are facilities that are used by multiple business groups. ICT is one of the corporate wide organised departments.

In order to process all milk the milk needs to be divided between all business groups. In that sense are the business groups Ingredients and Cheese, Butter and Milkpowder communicating vessels, not only for processing capacity also the margins of one go up when the others decrease. One of FC future challenges is milk quota will be abolished in Europe. Every farmer will then be able to produce as much milk as they like.

4.4 International

Though FrieslandCampina has strong Dutch roots its activities are worldwide, its predecessors already exported concentrated milk in the 1910s. The predecessors of FrieslandCampina merged with Belgium and German dairy processors, therefore the co-operative has also members in these countries as a result of these mergers. Outside of Western Europe it is historically less common to consume dairy products. In Eastern Europe FrieslandCampina has a strong position in Hungary, Romania and Greece. The consumer products in these countries are popular and their market share is still growing. Due to the strong connections of the Netherlands with Indonesia, FrieslandCampina has a strong position in South-East Asia. FrieslandCampina still exports products like cheese and concentrated milk from the Netherlands, but FrieslandCampina also has production facilities in China, Hong Kong, Indonesia, Malaysia, Singapore, Thailand and Vietnam. FrieslandCampina has a small role in Northern and Southern America, as those markets are more difficult to enter. The business group Ingredients has however production sites in the USA.

4.5 Key figures

Net revenue of FC is almost 9 billion Euro with a profit of 285 million Euro (FrieslandCampina, 2011). Though still a quarter of its revenue is made in the Netherlands a third of its revenue comes from outside Europe. Consumption of dairy products is declining in Western Europe, but are increasing in Asia and Africa.

Almost 20 000 FTEs are employed by FC, of which one third works in the Netherlands and one third outside Europe. Half of the FTEs work in production facilities, though Europe has most production sites, most FTEs are located outside of Europe due to highly automated production facilities in Europe.

5 Research method

In order to get an answer to the research question the following steps have been made. This research comprises.

1. First, we conducted a literature research about the state-of-art of video conferencing. Not only the current technologies have been studied, also the impact of actually implementing video conferencing.
2. As a next step, we have developed a business model. As an input for the business model a workshop is organised with business analysts from the ICT department of FrieslandCampina. As a result stakeholders are identified.
3. Next, we have described the different business processes within FrieslandCampina that are significantly impacted by the use of video conferencing. To keep the processes manageable the processes of Kievit, an operating company within FrieslandCampina, have been used. In a later stadium the conclusions are generalised for FrieslandCampina as a whole.
4. We have derived and build a business case from the chosen business model. This gives a solid foundation for further decision making in FrieslandCampina.
5. A part of the business case calculation, we have studied and analyes the reduction of greenhouse gasses. This has been given special attention.
6. In order to get qualitative data from stakeholder semi-structured interviews are a good means. These interviews are conducted at Kievit in Meppel. Kievit is a representative operating company for FrieslandCampina. The interviews are conducted to get data about requirements and tasks that are executed in meetings.
7. Finally, we present our main conclusions and recommendations for the future.

Parallel to the research a pilot runs with video conferencing as a service. The feedback from this pilot is an input to draw up the requirements and look, from a day-to-day practice base, how it impacts the different processes.

In a literature search issues around implementations of video conferencing or similar communication technologies are input for the business case. This draws up the business case for the use of video conferencing at FrieslandCampina.

6 Literature study

We have conducted a literature study on the effects of video conferencing. The research about video conferencing falls apart in a technical part and a socio-technical part. The technical part is most video compression optimisation. The socio-technical part is most part of the broader computer-mediated communication field and is hardly video specific. Next to these also general issues about implementation of information systems are included.

6.1 Video conferencing

Definition

Video conferencing is defined as the use of a multimedia application that combines audio, video, text, and graphics to support real time transmission and sharing of information among a distributed group of people cooperating in a common activity, such as design, learning, entertainment, telemedicine etc. (Kouadio & Pooch, 2002). Real time is here defined as a connection with a maximum delay of 150-300 ms (Calyam & Lee, 2005). The combination of audio and video is the key component; video can transmit also text and graphics. Common activity can be anything as long as it requires a distributed group of people to cooperate.

The term video conferencing is used very broad and covers in day-to-day use everything that uses a video stream to connect between two or more persons. There is a large distinction between webcam quality connections and a video connection via a dedicated video device. First of all is the codec for a webcam and the associated software, like Skype, instructed to use a small amount of bandwidth to get a decent video quality. This quality can be perceived as hindering in the conversation and therefore do more harm than good to the experience. Second, with the use of webcam software most of the time the infrastructural issues are not met, though broadband internet is more and more a common good, bandwidth is not guaranteed most of the times. Especially for multipoint video conferencing this will be problematic, as much larger bandwidth is needed.

Telepresence is defined as the perception of presence within a physically remote or simulated site (Draper, Kaber, & Usher, 1998). In the continuum of Daft, Lengel and Trevino (1987) telepresence is close to face-to-face meeting. Today most vendors use the name telepresence as substitute for video conferencing, though the hardware will not give the perception of presence. The feeling of presence, as suggested in the name, is an important added value of telepresence and is not always the case with video conferencing.

Application

Video conferencing is used in several businesses. Telemedicine and telepsychiatry are much-discussed topics in the cross-field between computer mediated communication and medical fields. Though clinical effectiveness is disputed for all diseases. Bower et al. (2001) describe the application and possible impact of video conferencing in the construction industry. Its application is not limited to any industry, though some industries can benefit more than others.

Scope

Out of the scope of this paper is webcam usage. Though webcams are more and more an important aspect of video usage in the business environment, it does not give the possibility to view ones non-verbal cues. Webcams can however be part of video conferencing, as the hardware can facilitate one-

on-one video conference meetings. Video conferencing is by definition capable of facilitating also many-to-many conversations.

Benefits

With video non-verbal communication is added to audio, compared to audio conferencing. The feeling of presence of the other is larger than when only hearing the other. Presence is defined as “the feeling of being together with another” (Biocca, 2001; Zhao, 2003; Biocca, Harms, & Burgoon, 2003). Though presence is hard to measure, because its definition already includes the word feeling. Physical presence is only possible in face-to-face meetings, this type is called social presence.

Risks

As suggested by Lin (2003) the adoption of communication technology is the interaction of six factors: Adoption, System, Technology, Social, Use and Audience factors (Figure 3). In order to have a complete reimplementation plan these factors need to be considered.

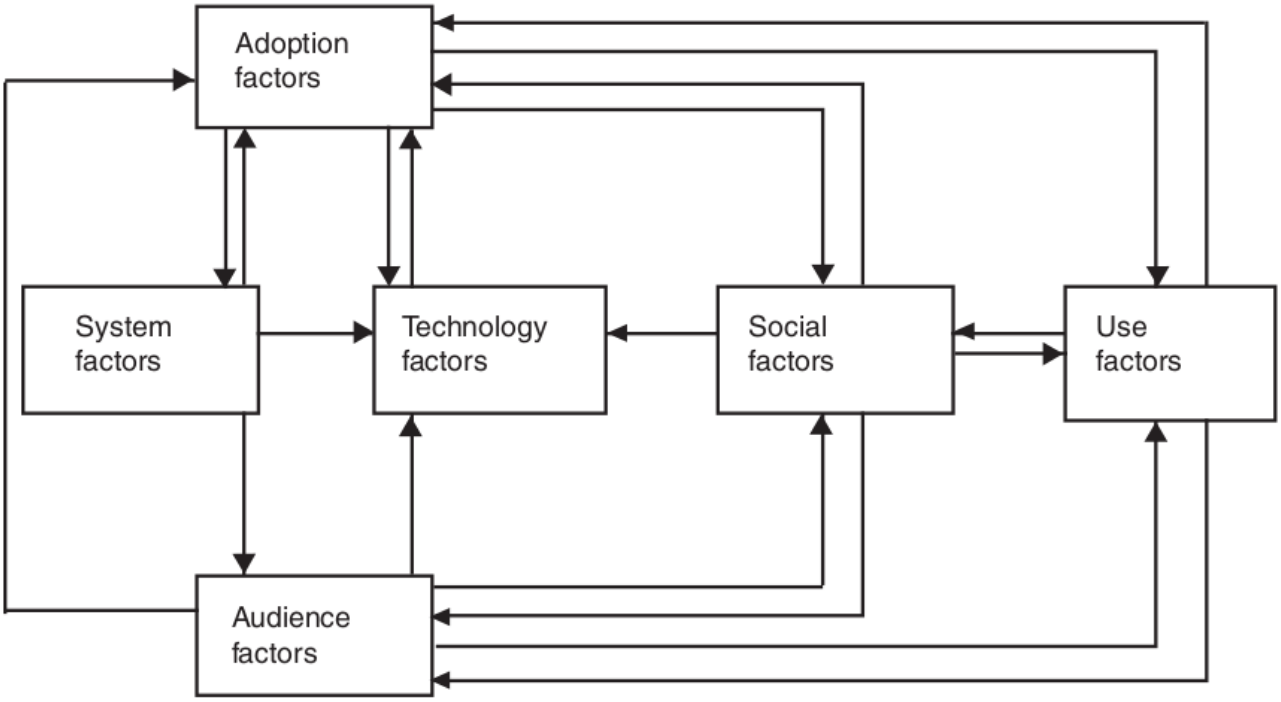

Figure 3: Interactive Communication Technology Adoption Model (Lin, 2003)

Liu et al. (2008) note that for video conferencing scenarios the following factors need to be considered: number of sites involved, number of participants at each participating site, network connection capability, meeting venue, purpose (specific requirements), how often the video conferencing devices will be used, and budget. She also points to some related issues; delay, latency, security, quality of service, user interface, system set-up, and maintenance cost.

In a 2002 research about usage and effectiveness of knowledge management IS video conferencing is ranked lowest in usage and is also in the lowest ranks when practitioners are asked about effectiveness (Egbu & Botterill, 2002). Egbu and Botterill explain this by pointing at the newness of the technology. Strangely telephone is ranked higher as face-to-face meetings in effectiveness. Video conferencing can't be described as new any more, though virtual presence and therefore the needed bandwidth

infrastructure is not in all countries available as common goods.

Several studies (Anderson et al., 1996; O'Malley, Langton, Anderson, Doherty-Sneddon, & Bruce, 1996; Doherty-Sneddon et al., 1997; Sanford, Anderson, & Mullin, 2004) conclude video conferencing has no added value over audio conferencing. These studies however test the effectiveness with tasks that according to McGrath (1993) do not suit video conferencing. It does show that video conferencing is no holy grail and should be applied in such a way that it is beneficial.

Diamant et al. (2008) warn for overlooking the cultural aspect of computer-mediated communication (CMC) on team performance. As CMC have made it easier to collaborate with people from other cultures, also the difficulties of working together with different cultures within one project team become clear.

Baltes et al. (2002) look at how tasks as described by McGrath's suits CMC. They state that choosing and negotiate tasks will be less effectively done by CMC as by face-to-face. Video conferencing is the most like face-to-face CMC available. In their meta research they state that the most used CMC media, e-mail and video conferencing, are the least researched within the CMC field.

Technology

On a technical level a lot of research is done on the compression of video. Compression is important to reduce the used bandwidth (Côté, Erol, Gallant, & Kossentini, 1998; Gray & Neuhoff, 1998).*"Video compression is made possible by exploiting redundant information in an original source image among neighboring pixels (spatial redundancy) and among color components (spectral redundancy), as well as the inability of the human visual system to perceive any major difference in the quality of compressed and altered images that lack the full richness of the original, up to some distortion point."* (Kouadio & Pooch, 2002) To make video conferencing possible between codecs of different manufacturers, open standards are followed. The H.323 standard of the International Telecommunication Union (ITU) is the common used standard for video conferencing of the internet.

Quality of the video is impacted by the resolution of the video stream, current standards are HD quality, starting with 720p, and meaning 1280x720 with progressive scan. Also the frame rate impacts the feeling of having real contact with the person on the other side. 30 or 60 frames per second are most common, with 60 fps having the preference. Whittaker (1995) show in their research that low quality video has a negative effect on the meeting and is therefore not a better substitute than audio conferencing.

Video conferencing is part of CMC research. Though a large part of this research area concentrates on the educational and medical application of VC. The application in these fields are in practice mostly one-to-one or one-to-many communication and differ in that sense from business usage, as these meetings are most of the time many-to-many and have different dynamics due to the difference in relation (doctor – client vs colleagues).

6.2 Media richness

Daft, Lengel and Trevino (1987) define four levels in the hierarchy of media richness; Face-to-face, telephone, addressed written documents and unaddressed written documents (Figure 4). The richness is based upon four criteria; feedback, multiple cues, language variety, and personal focus. Video conferencing can be placed in the continuum between face-to-face and telephone, as it gives more feedback, cues and personal focus as telephone (Daly-Jones, Monk, & Watts, 1998), but less when meeting each other face-to-face. Daft, Lengel and Trevino (1987) show that managers prefer rich media for ambiguous communication.

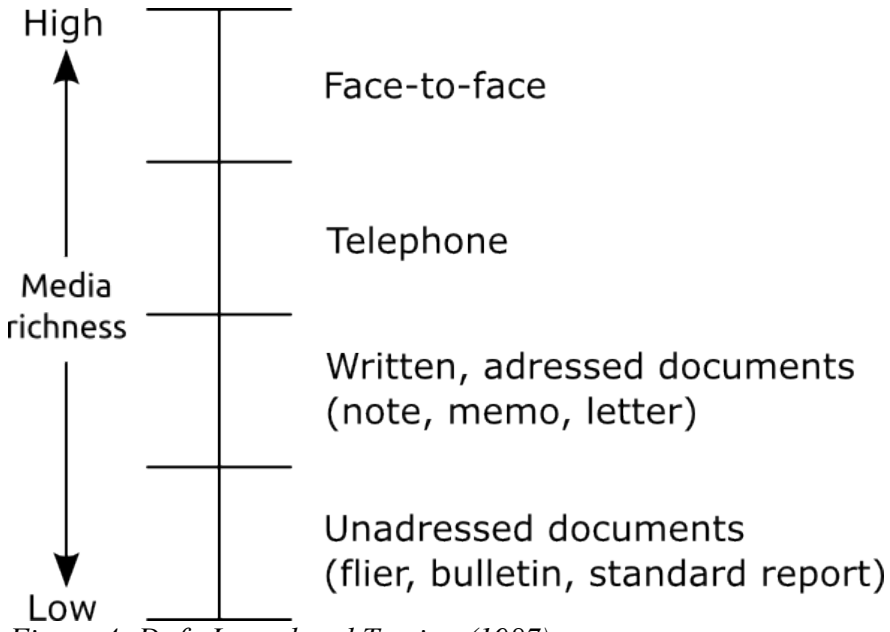

Figure 4: Daft, Lengel and Trevino (1987)

Baltes et al. (2002) split the media richness of Daft, Lengel and Trevino in two axes. They distinguish between the degree of synchronisation and the presence of non-verbal and para-verbal cues. Written communication is low in both dimensions and face-to-face communication is high in both. They conclude that the higher on both dimensions the greater the success of the communications and the decision making process will be. In their paper they rate video conferencing lower in synchronisation than teleconference due to technical issues, with current bandwidth availability the degree of synchronisation should be more the same.

6.3 Knowledge management

One of the most common uses of meetings is transfer of knowledge. For knowledge transfer several options are available, depending on the nature of the knowledge it transfer vehicle will differ. Knowledge can be split in explicit and tacit knowledge (Nonaka, 1994). Tacit knowledge requires direct contact to transfer, written communication is by definition ruled out as an option. Tacit knowledge is most often situation based. Frequent communication helps to organise that situation. Therefore tacit knowledge is best transferred when working together. Video conferencing can be a good means for frequent communication, without extra travelling.

6.4 Task – Technology Fit

According to Venkatraman (1989) there are six perspectives on technology fit, comprising moderation, mediation, matching, gestalt, profile-deviation, and covariation. Zigurs and Buckland (1998) point out that the first three perspectives are criterion free and therefore not suitable for the fit in purpose of effectiveness. They use the sixth perspective, covariation, as the other two consider only a limited number of variables. Though the paper of Zigurs and Buckland is about group support systems and this research has a narrower scope, the definition used can be used with a small adjustment. Task technology fit is therefore defined as ideal profiles composed of an internally consistent set of task contingencies and communication technology elements that affect group performance. Improving group performance should be the aim of using video conferencing.

Tasks have a history of research, from organisational research as well as from a group process perspective (Zigurs & Buckland, 1998). Zigure and Buckland sum up research starting from 1950 about categorising tasks. McGrath has a significant impact on this research area. In 1984 McGrath wrote an article about the different task types. He identified three broad group types (natural, concocted and quasi-groups) which covered in total 12 subtypes. These groups could perform four basic process types; generate, choose, negotiate and execute tasks. These four quadrants, as McGrath pictured them, are all divided into two parts. “Generate” is divided into planning and creativity tasks, “choose” is split into intellective and decision-making tasks, negotiate falls apart in cognitive conflict and mixed motive tasks, and the execute quadrant hold performance/psycho-motor and contest/competitive tasks.

These tasks can be seen as two dimensional, with on the one axis the degree to which a task entails cognitive versus behavioural performance requirements. The other axis represents the degree and form of interdependence among group members (cooperation versus competition). Argote and McGrath (1993) define this axis with three levels; collaboration, coordination and conflict resolution (Figure 5).

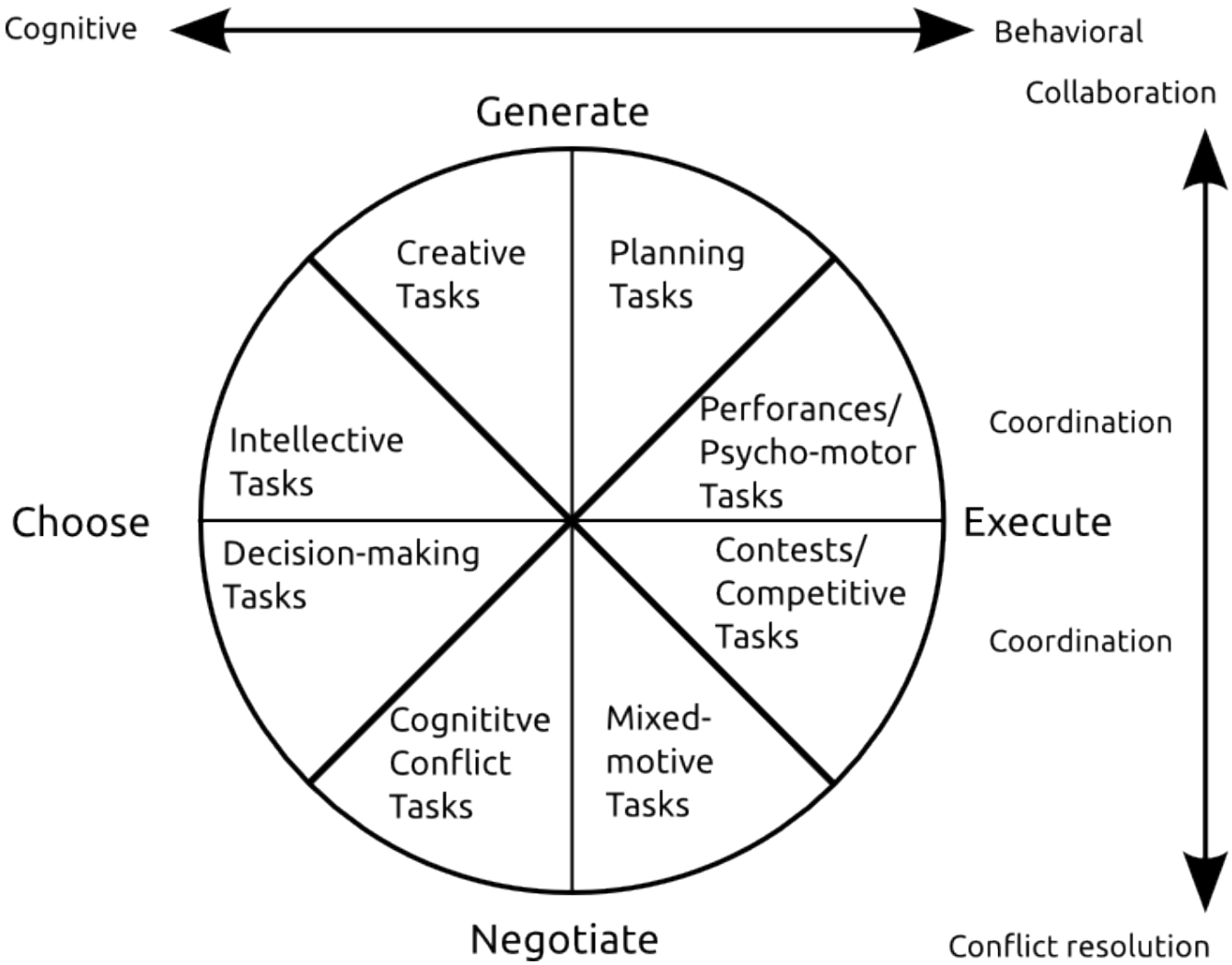

Figure 5: The group task circumplex (adopted from Argote and McGrath, 1993)

McGrath and Hollingshead (1993) combined the media richness and task types. (Figure 6). Depending on the task type the medium has to meet other information richness requirements. The task and technology (communication medium) should have a good fit for effective completing the task. For instance negotiating new prices should not be done over telephone, but face-to-face. Audio and video systems however are more overlapping in terms of fit than the extremes as can be seen by the four good fit blocks in the middle of Figure 6. For video conferencing only generating ideas and plans would be definitely ruled out as fitted tasks, though also negotiating conflicts of interests have only a marginal fit as the medium is too constrained.

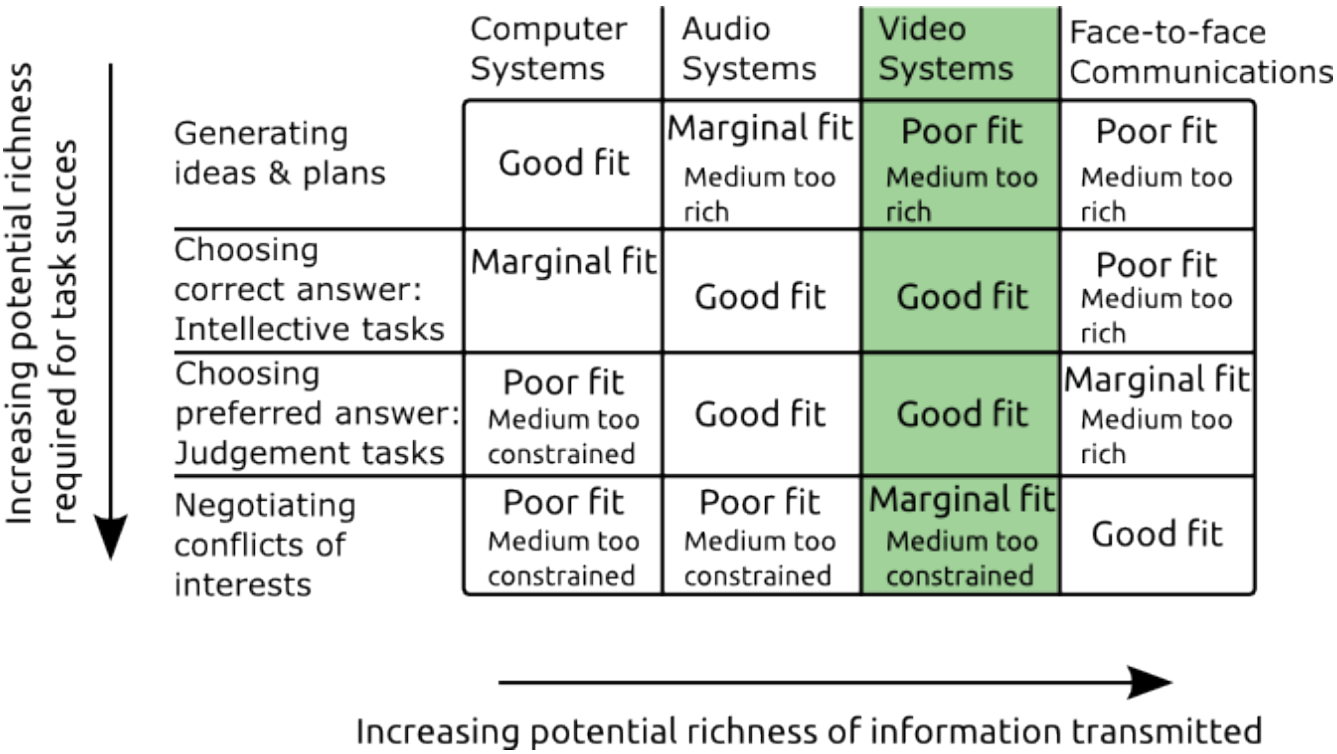

Figure 6: Task-media fit (adopted from McGrath and Hollingshead, 1993)

6.5 Technology Acceptance Theory

In the field of Information Systems (IS) a lot of research is done on user acceptance. Because a technical superior IS can fail in an organisation when it is not accepted. Davis (1989) introduced the technology acceptance model (TAM), based upon behavioural science studies. The theory of reasoned action (Fishbein & Azjen, 1975), which was the base for TAM, is an attempt to predict human behaviour in general. TAM focusses on voluntary acceptance of IS only. In his research Davis finds that the intention to use is influenced by perceived usefulness, which is influenced by perceived ease of use. There are studies that question whether TAM holds in all cultures (Straub, Keil, & Brenner, 1997; McCoy, Galletta, & King, 2007). The model has been subject of many following research to extend its scope or to improve the predictability (F. D. Davis, 1989; Venkatesh, 2000; Venkatesh, Morris, Davis, & Davis, 2003). The UTAUT model (Venkatesh et al., 2003) is more complex and makes a more reliable prediction about technology acceptance. The added complexity of the UTAUT model does not add that much predictability to use it in our context. For FrieslandCampina it is important that every business unit can decide for themselves whether or not to adapt video conferencing. TAM can for that matter be used in our research.

In order to get video conferencing used by all potential users it is important to focus on the perceived ease of use. VC has the name to be difficult to use. Users might already have the experience they could not connect with others due to for instance connecting between IP and ISDN networks. Those kinds of experiences will make users hesitant to use VC. These kind of problems can be solved by either easy to use hardware or a service that sets up the connection before the meeting.

Also the perceived usefulness should be addressed. Most people know what is possible in video today. HD quality is the standard and so are large screens. Hardware must be useful and it is worth educating how VC can be most effective used for meetings.

6.6 Business model

Business models have gained much more attention in recent years (Osterwalder, Pigneur, & Tucci, 2005). The Canvas approach from Osterwalder (2010) is an appropriate model to adjust to the FrieslandCampina case. The Canvas of Osterwalder consists of nine building blocks; customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure. The model can be used in the split demand and supply IT structure (Mark & Rau, 2006). The canvas will be used as a guiding model for keeping track of the process.

The goal of using a business model is twofold. First of all it gives us an overview of the dynamics around video conferencing and its implications for the business environment. Second the business model will give us a framework for building a business case.

Though the concept of the business model has been around for long, it has currently more attention than ever. Especially the dynamics of business models, due to the ever changing environment around it. The business model we will use, Osterwalder's Canvas, gives the flexibility to use in that dynamic environment and still be easy to use.

Building upon his Ph.D. thesis Osterwalder started this project with an online collaboration environment. In a crowd sourced project Osterwalder has further developed a business modelling tool with the help of more than 400 practitioners. His approach is a good example of a new business models. Traditionally, the publisher takes the risk of publishing a book and they therefore take a large part of the margin. Osterwalder spread the risk by letting interested practitioners buy in to participate. Thereby bypassing the publisher.

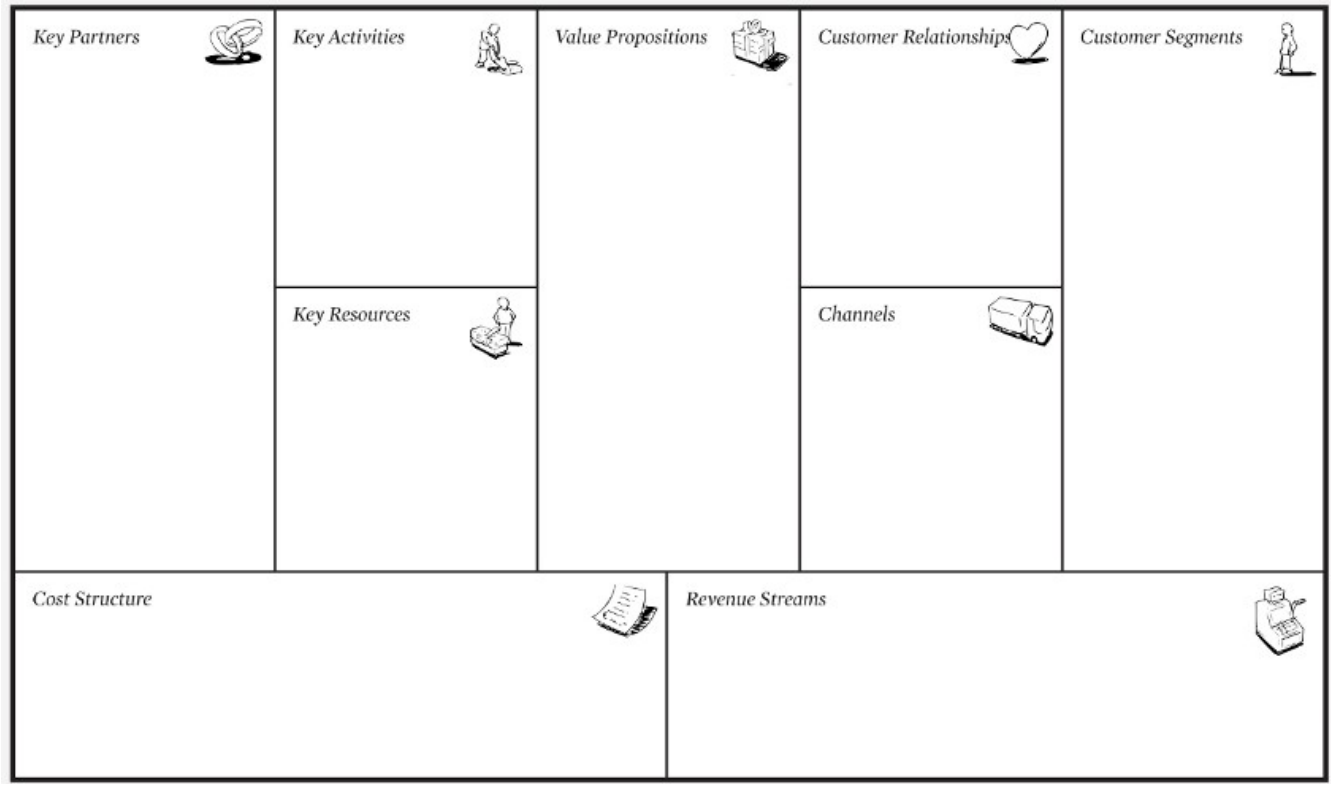

Figure 7: Business model canvas

The canvas consists of nine interlinked building blocks (Figure 7). The centric value proposition is supported by key activities, key resources. Not all activities and resources are done by the organisation self, so key partners provide support on those. On the other side the value proposition has to find its way via channels towards customer segments. For feedback customer relationships are used. This value proposition has on the left side costs (cost structure) and will generate revenue streams on the right side (Osterwalder & Pigneur, 2010).

7 Results

7.1 Business model

As a first step towards a business case FrieslandCampina Corporate and Support (C&S) for VC, we have developed a business model for VC. The business model was developed during a two hour workshop with five business analysts of FrieslandCampina C&S. In this session the task was to design a business model for VC within FrieslandCampina (Figure 8).

Discussion during the workshop first focussed on the questions: who is the customer? That could be the VC users or the business units of FrieslandCampina? The choice between them has a big impacted on the business model. Not only the revenue model completely changes as the measurement unit changes, also the value proposition will change.

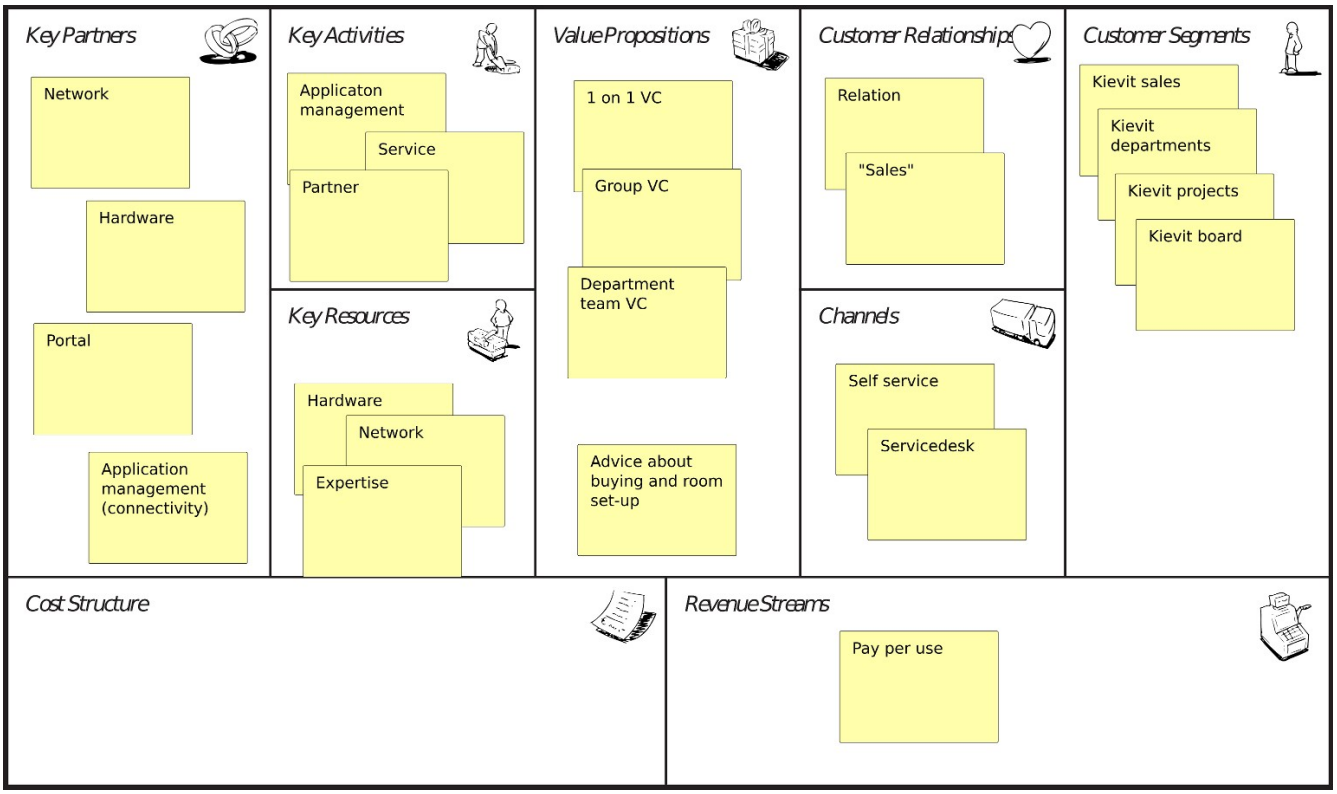

Figure 8: Canvas as result of the workshop

The value proposition consists of three different ways of VC; one-on-one, group, and department VC, and a guideline for buying VC equipment. The three different VC options differ in the way they are used, although technically they can be the exactly the same. On the right side of the canvas the service proposition is made for the different customer segments, consisting of sales and other departments, project teams, and the board of Kievit. The VC options are delivered through the servicedesk or via self service. On the other hand feedback can be either via the business analyst ("sales" in the canvas) or via the relation. The proposition is backed up by partners for the network, hardware, the portal for self-service, and the application management. The ICT department adds partner management and expertise self. After a thorough discussion the best way to charge the user for using the VC service is by let them pay per use.

Due to time constrains it was not possible to fill all blocks during the workshop. Therefore the cost structure blocks have been added later. As the aspects of the cost structure are defined by the activities and resources this can be deduced from the top part. Expertise and partner management are general costs, they are not included into the costs in the model. The ICT department of C&S does not buy hardware at this moment and it will also not be compulsory in the near future. Leaving it on the canvas takes care of the optimal solution of letting the ICT department buy in larger quantities and therefore being able to negotiate about price.

In order to complete the canvas, it needs to be adjusted to FrieslandCampina in large instead of Kievit alone. Because the relationship between Kievit and other operating companies is no different, we simply removed the Kievit label. In the workshop the sales department was named as example case, but in general it is a single department.

The value proposition consists has been refined after the workshop. We have defined three different types of video conferencing, but this is not really a value proposition as defined by Osterwalder. The essence is to deliver communication without having to travel to meet face-to-face, video conferencing is the solution as it comes most close to face-to-face meetings. More concrete would telepresence be the solution, but the business case would not be positive.

As possible customer relationships Osterwalder gives (dedicated) personal assistance, self-service, automated services, communities and co-creation. For FrieslandCampina it will be a combination of self-service and personal assistance. The channel phases awareness and evaluation are done by the service-desk. Purchase, delivery and after sales will be handled by "sales".

As possible revenue streams Osterwalder gives asset sale, usage fee, subscription fees, lending, renting, leasing, licensing, brokerage fees, and advertising. Usage and subscription fees are the options for FrieslandCampina. Pay per use as suggested in the workshop is based on a usage fee for the usage of the VC equipment, so it is included in the canvas.

These modifications result in the complete canvas (Figure 9). This business model is the base for the business case and also gives a good insight in which stakeholders are involved.

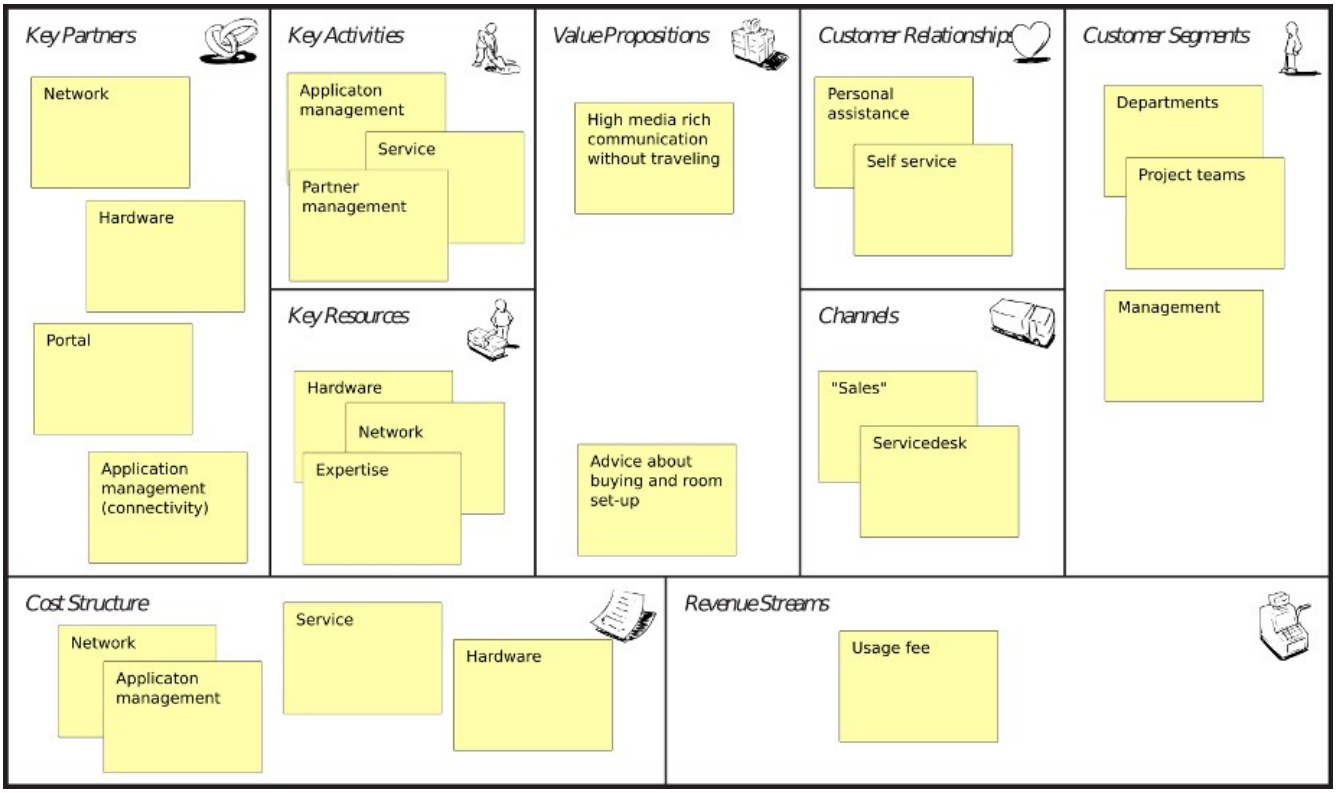

Figure 9: Modified canvas

7.2 CO_2 reduction

One of the pillars of the Route 2020 (FrieslandCampina, 2011) is climate neutral growth. On order to achieve these goals, FrieslandCampina has to reduce its current greenhouse gasses emissions. One of the projects to reduce the footprint of FrieslandCampina is green IT; using IT to reduce emissions, VC is part of that.

The largest challenge for FrieslandCampina is to reduce the emissions at the farms. The farms produce almost 85% of the greenhouse gas emissions in the dairy chain. This does not mean that it is of no use to reduce the emissions in the rest of the chain. Video conferencing can be used to reduce the amount of travel needed to meet.

In our calculations, we only consider CO_2 emissions. This is the most measurable greenhouse gas emission due to the combustion engine. Not every way of transport has the same emissions rate. We have considered the most used way of transport, the car. However, also cars differ with respect to their CO2 emissions. New cars tend to have lower emissions as older ones. Also averages will move with time as cars tend to get cleaner with innovating technologies.

For flights CO_2 emissions does not only depend on the type of engine, but also due to the fact that departure and landing a plane takes much more of the engines and has therefore a much higher CO_2 emissions. The length of the trip is taken into account. The WRI has calculated different rates for three types of flights (WRI, 2008); long, medium and short distance. Because FrieslandCampina has two large markets, the European and South-East Asian, only two rates are used in the calculations; long flights, and medium flights. Short distances are most of the time travelled by car. Public transport is low on emissions per persons, but hardly used within FrieslandCampina, except for commuting travelling.

In order to get an average of the kilometres flown, a set of representative flights is calculated (Appendix A). An average long flight takes 17 500 kilometres and 22 hours in total for a return flight, and an average medium flight takes 2200 kilometres and 7 hours.

With every long distance flight on average 2 ton CO_2 is saved, medium distance flight are responsible for 0,24 ton CO_2 per flight. For a car travel of 100 kilometres 0,017 ton of CO_2 emissions is calculated. Depending on the saved travels it can be calculated what is the saved emissions per installed VC device. Most important is the awareness within FrieslandCampina that there is an alternative for travelling.

7.3 Business case

We have compared the financial impact of VC and face-to-face meeting, both situations have been considered. Differences in the current situation and the will-be scenario are based upon costs. Revenues are not important, as it is no goal of ICT to make a profit, they only charge for the costs.

The expenses for a room are not part of the calculation, because they will be the same in both situations and room space costs differ largely from place to place. In the case of video conferencing there are two or more rooms needed, but these rooms can be smaller in comparison to face-to-face meeting. The expenses in case of video conferencing fall apart in current assets and fixed and variable costs. Costs for equipment and network connection are investments that will be depreciated over the economical life span. The economical life span of video conferencing equipment is five years.

In the calculation of the financial impact of video conferencing at FrieslandCampina the following aspects are taken into account; hardware, infrastructure, and service costs, CO_2 compensation, efficiency, and travel savings.

Maintenance, network, service and application are yearly fixed costs, which are spread over all usage in that year. Higher utilisation of the equipment will make the costs per call lower. Maximum utilisation, meaning 8 hours per workday, will lower the costs. The other costs depend on usage. The level of the costs for CO_2 compensation and both indirect and direct costs depends on how often face-to-face meetings take place.

Not all travel costs and time are reduced to zero compared to the target situation. First of all commuting travel will still be needed in the target situation. Next to that not all face-to-face meetings will be replaced by video conferencing. Also not every task can be performed optimally with video conferencing. Even if all meetings can be done by video conferencing it still is suggested to have face-to-face meetings. Also not all savings will be realised within one year. The first year only half of the savings are included.

To calculate the financial impact for video conferencing at FrieslandCampina several assumptions must be made. Hardware and infrastructure costs are based upon offers, although these are not negotiated yet. For one FTE an average wage of € 50.000 per year is assumed. Costs for travel times and travel costs are based upon a set of representative flights in the case of FrieslandCampina with a focus on Western Europe and South-East Asia. We further assume that the Internet (IP) connections are used and hence no costs for the duration of the call are included. The economical lifespan of a video conferencing device is five years. The calculations are done over 250 replaced travels, equalling one per workday for 50 weeks.

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Hardware											
Maintenance											
Network connection											
Network											
Service											
Application											
CO2		€ 595	€ 595	€ 595	€ 595	€ 595	€ 595	€ 595	€ 595	€ 595	€ 595
Travel time											
	Car										
	Long air										
	Short air	€ 81.250	€ 81.250	€ 81.250	€ 81.250	€ 81.250	€ 81.250	€ 81.250	€ 81.250	€ 81.250	€ 81.250
Travel costs											
	Car										
	Long air										
	Short air	€ 43.750	€ 43.750	€ 43.750	€ 43.750	€ 43.750	€ 43.750	€ 43.750	€ 43.750	€ 43.750	€ 43.750
Meeting room											
		€ 125.595	**€ 125.595**	**€ 125.595**	**€ 125.595**	**€ 125.595**	**€ 125.595**	**€ 125.595**	**€ 125.595**	**€ 125.595**	**€ 125.595**

Figure 10: Business case is-situation

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Hardware		€ 21.000					€ 21.000				
Maintenance		€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500
Network connection		€ 1.000									
Network		€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000
Service		€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000
Application		€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000
CO2		€ 595	€ 397	€ 298	€ 298	€ 298	€ 298	€ 298	€ 298	€ 298	€ 298
Travel time											
	Car										
	Long air										
	Short air	€ 81.250	€ 54.167	€ 40.625	€ 40.625	€ 40.625	€ 40.625	€ 40.625	€ 40.625	€ 40.625	€ 40.625
Travel costs											
	Car										
	Long air										
	Short air	€ 43.750	€ 29.167	€ 21.875	€ 21.875	€ 21.875	€ 21.875	€ 21.875	€ 21.875	€ 21.875	€ 21.875
Meeting room											
		€ 170.095	**€ 106.230**	**€ 85.298**	**€ 85.298**	**€ 85.298**	**€ 106.298**	**€ 85.298**	**€ 85.298**	**€ 85.298**	**€ 85.298**

Figure 11: Business case target situation

Figures 10 and 11 give an example of the medium distance air travels compared to VC. Appendix B gives all three overviews of the costs. The net present value of the travel situation is almost € 850.000 and for the VC situation it is almost € 700.000. For car travels the travel situation costs a little more than € 210.000 and the VC situation € 280.000. For long distance travels the business case improves much more. The NPV of the travel situation is almost € 3.450.000 and the VC option is a little under € 2.250.000. All these NPVs are based on 250 uses per year, which is an optimistic calculation for the long distance air travels. In reality the business case is a mix of the three travel options. Usage will not be limited to replacing travels. When the meeting frequency is higher due to usage of video conferencing, it will lower the costs per video conferencing.

The calculation shows a large difference between replacing long distance air travel on one hand and car travel on the other. In most cases,, the replaced travels are a mix of air and car travels. Comparing the options separately does not give a realistic view on a day-to-day situation, but gives a good insight what the savings can be for every type of travel. Because there is no situation alike this will give the best insight per case to decide if video conferencing is an added value.

7.4 Impact on processes

Video conferencing does not only replace travel and therefore save costs. It also impacts al kinds of business processes. The impact on other processes can be more beneficial as it impacts deeper into the organisation. Especially when an organisation is geographical scattered and therefore it is more difficult to plan meetings with people around the world. Video conferencing can be part of the solution then. Shortening time-to-market due to bouncing the ideas quicker back and forth, or shorter repair times when local technicians use video to show broken down machines to experts, are a few examples.

As a result of Route 2020 (FrieslandCampina, 2011) the communication between different locations will grow. Recently all processes, including overhead processes were organised within every operating company. Knowledge of the processes is hardly standardised. One of the current ICT projects is standardising ERP within FrieslandCampina. Ultimately, the processes within FrieslandCampina will become more similar. If possible, the processes will also be more centralised and more interlinked between the operating companies. Then, knowledge and information sharing will become more important. When the different operating companies are sharing more knowledge, especially tacit knowledge (Nonaka, 1994), there will be a need for high medium communication media, like video conferencing.

Video conferencing on itself will not impact the processes of FrieslandCampina, but it will facilitate the impact the change of processes planned in Route 2020.

7.5 Task technology fit

Between Friday 30 September and Wednesday 5 October six semi-structured interviews were conducted with employees of the operating company of Kievit in Meppel. All interviewees have managerial responsibilities and have or have been regular visitors of an other location in Lippstadt, Germany.

The questions (Appendix C) start with frequency and duration of visits and then try to get to the tasks that executed during the meetings. To conclude the interview two what-if-questions were asked in order to ask more explicit if video conferencing is a viable option to replace these face-to-face meetings.

The Lippstadt location cooperates with Kievit, Sato and DMV, which are all operating companies within FrieslandCampina. The Lippstadt location started production of Kievit products only after the merger, a few years ago. Therefore more contact was needed between Kievit Meppel and the Lippstadt location. Lippstadt is a three-hour drive and 300 kilometres from Meppel. It is possible to travel to and from Lippstadt in one day. Almost all interviewees (5 of the 6) did this. Only when a one-day meeting was foreseen, they travelled to Lippstadt the day before and book a hotel. The meetings are almost always with the same people from Lippstadt, either peers or subordinates. This core group is extended when the topic of discussion requested it. Two of the interviewees travel only twice per year to Lippstadt. The others visit the location monthly.

For our research, we want to know which tasks are being performed at Lippstadt. With the six interviewees eight different generalised tasks have been identified. Of those eight there are five “choosing correct or preferred answer” or better “intellectual” or “judgement” tasks as described by Hollingshead and McGrath (1993). Concrete these tasks are meetings with colleagues to assess the current state and how it can be adjusted to get better performance. These meetings are regular meetings to update and set or adjust the goals for the coming period.

The three other tasks can be described as “conflicting interests within the group”. These conflicting interests are due to the involvement of other organisations from outside of FrieslandCampina. These organisations are either customers or suppliers. Also DMV and Sato have different objectives when meeting with Kievit, with one of the interviewees this gave also conflicting interests and therefore adds negotiation to the meetings.

All interviewees are convinced they would have visited Lippstadt with the same frequency when it was a five-hour drive, though some admitted the barrier would have risen then. They see it as part of their jobs to keep good social contacts in Lippstadt. When asking if the meeting could be done via an other medium, with video conferencing as example, the respondents all pointed to the fact that social interaction is very important during these visits.

One of the remarks during the interviews was that video conferencing could be a viable option to meet more frequently instead of replacing meetings at the current frequency.

8 Conclusions

In this research we have studies various aspects. In this section we present our conclusions from various angles.

Video conferencing has become a mature technology over the past years. High bandwidth connections and better hardware make it possible to use video conferencing in high definition.

As part of Route 2020, FrieslandCampina wants to reduce greenhouse gas emissions. The Route 2020 states that ICT can support the achieving of the goals. It is not a holy grail as impact is minimal compared to total emissions, but video conferencing is much greener due to travel reduction. The Route 2020 explicitly states that growth must be climate-neutral. Video conferencing can make more and better communication without an increase of CO_2 emissions.

Th reduction of travelling is the core of the business case built in this thesis. Depending on the rate of travel replacements and the type of travel, the video conferencing business case turns out to be positive easily. Video conferencing is most beneficial for international air travel.

Route 2020 will impact communication within FrieslandCampina processes. Communication is expected to grow between operating companies. The choice of which communication medium to use will come up more often. Video conferencing is a good option when meetings do not involve dealing with conflicting interests. As most communication between locations within FrieslandCampina are sharing (tacit) information, video conferencing is the preferred option.

The interviews within Kievit shows that travelling is only done when either necessary because of conflicting interests or a social factor plays a role. The social factor is legitimate, though not for all travels. The frequency of the travels are already low. It will therefore be difficult to reduce them drastically. Suggested is to meet not once every month, but use three video conferences and travel once every two months.

Video conferencing will impact FrieslandCampina as enabler for more high-quality communication. Video conferencing is a prerequisite for the large impact. Use of video conferencing makes FrieslandCampina ready for 2020.

9 Recommendations

Based on the conclusions mentioned in the previous section, we now formulate our recommendations to achieve positive impact when using video conferencing at FrieslandCampina.

Though video conferencing can be beneficial, it depends on several other factors if it will be adopted. The availability of the system is an issues at least in Amersfoort and also in Meppel before buying a second system. Though availability will be a trade-off between utilisation and costs, the impossibility to use video conferencing will certainly not stimulate adoption. The availability of rooms with VC possibility and an appropriate network connection should be increased

Next to facilitating the possibility to video conferencing it should also be used. In order to let employees use the equipment it should be perceived as useful and easy to use (F. D. Davis, 1989). Ease of use can be taken care of when buying the hardware and also adding a service. Though the pilot did not give real conclusive results, the service provides added value and will support the users.

In a cost-aware organisation as FrieslandCampina charging for video conferencing per use will limit it usage. Especially when video conferencing is introduced, it should be made clear that is also cheaper as travelling by car. When the utilisation of the VC room is not optimal this will not be the case, if usage is then charged for, it will withhold potential users from using video conferencing.

One of the difficulties is that the local facility departments buys the hardware, which is considered to be suboptimal. Facilitating good communication is not a concern of one location only, but should be organised by the central organisation. The ICT department of corporate and support is the most logical department to allocate these responsibilities to. They also are responsible for audio and intranet communication. Negotiating a contract with one of the hardware vendors will also lower prices.

The general recommendation is to roll out video conferencing facilities and to stimulate its usage. Video conferencing should be added as an option to communicate for every location within FrieslandCampina. The first focus would be on Amersfoort and Singapore as top management is located in those cities. Lessons learned from those implementations can then be used to further deploy of video conferencing within the entire company.

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Appendices

Appendix A

Flight distance and time calculation as used in the business case and CO_2 reduction calculation:

			KM	Hours
1	Amsterdam	Singapore	11337	14,55
2	Amsterdam	Jakarta	12280	16,3
3	Amsterdam	Kuala Lumpur	10384	13,15
4	Amsterdam	New York	5847	6,3
5	Amsterdam	Nairobi	6672	8,1
6	Amsterdam	Bangkok	10124	12
7	Amsterdam	Moskou	2151	4,05
8	Amsterdam	Hongkong	11363	11,45

			KM	Hours
1	Amsterdam	Athene	2172	3,1
2	Amsterdam	Boedapest	1168	2
3	Amsterdam	Manchester	489	1,1
4	Amsterdam	Milaan	794	1,35
5	Singapore	Kuala Lumpur	307	2
6	Singapore	Jakarta	902	2
7	Singapore	Bangkok	1422	2
8	Singapore	Hongkong	1600	3

Appendix B

Complete details of the business case

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Hardware		€ 21.000					€ 21.000				
Maintenance		€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500
Network connection		€ 1.000									
Network		€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000
Service		€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000
Application		€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000
CO2		€ 42	€ 21	€ 14	€ 14	€ 14	€ 14	€ 14	€ 14	€ 14	€ 14
Travel time											
	Car	€ 12.500	€ 6.250	€ 4.167	€ 4.167	€ 4.167	€ 4.167	€ 4.167	€ 4.167	€ 4.167	€ 4.167
	Long air										
	Short air										
Travel costs											
	Car	€ 18.750	€ 9.375	€ 6.250	€ 6.250	€ 6.250	€ 6.250	€ 6.250	€ 6.250	€ 6.250	€ 6.250
	Long air										
	Short air										
Meeting room											
		€ 75.791,83	**€ 38.145,91**	**€ 32.930,61**	**€ 32.930,61**	**€ 32.930,61**	**€ 53.930,61**	**€ 32.930,61**	**€ 32.930,61**	**€ 32.930,61**	**€ 32.930,61**

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Hardware		€ 21.000					€ 21.000				
Maintenance		€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500
Network connection		€ 1.000									
Network		€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000
Service		€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000
Application		€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000
CO2		€ 3.875	€ 2.584	€ 1.938	€ 1.938	€ 1.938	€ 1.938	€ 1.938	€ 1.938	€ 1.938	€ 1.938
Travel time											
	Car										
	Long air	€ 375.000	€ 250.000	€ 187.500	€ 187.500	€ 187.500	€ 187.500	€ 187.500	€ 187.500	€ 187.500	€ 187.500
	Short air										
Travel costs											
	Car										
	Long air	€ 131.250	€ 87.500	€ 65.625	€ 65.625	€ 65.625	€ 65.625	€ 65.625	€ 65.625	€ 65.625	€ 65.625
	Short air										
Meeting room											
		€ 554.625,33	**€ 362.583,55**	**€ 277.562,66**	**€ 277.562,66**	**€ 277.562,66**	**€ 298.562,66**	**€ 277.562,66**	**€ 277.562,66**	**€ 277.562,66**	**€ 277.562,66**

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Hardware		€ 21.000					€ 21.000				
Maintenance		€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500	€ 1.500
Network connection		€ 1.000									
Network		€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000	€ 6.000
Service		€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000	€ 5.000
Application		€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000	€ 10.000
CO2		€ 595	€ 397	€ 298	€ 298	€ 298	€ 298	€ 298	€ 298	€ 298	€ 298
Travel time											
	Car										
	Long air										
	Short air	€ 81.250	€ 54.167	€ 40.625	€ 40.625	€ 40.625	€ 40.625	€ 40.625	€ 40.625	€ 40.625	€ 40.625
Travel costs											
	Car										
	Long air										
	Short air	€ 43.750	€ 29.167	€ 21.875	€ 21.875	€ 21.875	€ 21.875	€ 21.875	€ 21.875	€ 21.875	€ 21.875
Meeting room											
		€ 170.095	**€ 106.230**	**€ 85.298**	**€ 85.298**	**€ 85.298**	**€ 106.298**	**€ 85.298**	**€ 85.298**	**€ 85.298**	**€ 85.298**

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Hardware											
Maintenance											
Network connection											
Network											
Service											
Application											
CO2		€ 42	€ 42	€ 42	€ 42	€ 42	€ 42	€ 42	€ 42	€ 42	€ 42
Travel time											
	Car	€ 12.500	€ 12.500	€ 12.500	€ 12.500	€ 12.500	€ 12.500	€ 12.500	€ 12.500	€ 12.500	€ 12.500
	Long air										
	Short air										
Travel costs											
	Car	€ 18.750	€ 18.750	€ 18.750	€ 18.750	€ 18.750	€ 18.750	€ 18.750	€ 18.750	€ 18.750	€ 18.750
	Long air										
	Short air										
Meeting room											
		€ 31.291,83	**€ 31.291,83**	**€ 31.291,83**	**€ 31.291,83**	**€ 31.291,83**	**€ 31.291,83**	**€ 31.291,83**	**€ 31.291,83**	**€ 31.291,83**	**€ 31.291,83**

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Hardware											
Maintenance											
Network connection											
Network											
Service											
Application											
CO2		€ 3.875	€ 3.875	€ 3.875	€ 3.875	€ 3.875	€ 3.875	€ 3.875	€ 3.875	€ 3.875	€ 3.875
Travel time											
	Car										
	Long air	€ 375.000	€ 375.000	€ 375.000	€ 375.000	€ 375.000	€ 375.000	€ 375.000	€ 375.000	€ 375.000	€ 375.000
	Short air										
Travel costs											
	Car										
	Long air	€ 131.250	€ 131.250	€ 131.250	€ 131.250	€ 131.250	€ 131.250	€ 131.250	€ 131.250	€ 131.250	€ 131.250
	Short air										
Meeting room											
		€ 510.125,33	**€ 510.125,33**	**€ 510.125,33**	**€ 510.125,33**	**€ 510.125,33**	**€ 510.125,33**	**€ 510.125,33**	**€ 510.125,33**	**€ 510.125,33**	**€ 510.125,33**

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Hardware											
Maintenance											
Network connection											
Network											
Service											
Application											
CO2		€ 595	€ 595	€ 595	€ 595	€ 595	€ 595	€ 595	€ 595	€ 595	€ 595
Travel time											
	Car										
	Long air										
	Short air	€ 81.250	€ 81.250	€ 81.250	€ 81.250	€ 81.250	€ 81.250	€ 81.250	€ 81.250	€ 81.250	€ 81.250
Travel costs											
	Car										
	Long air										
	Short air	€ 43.750	€ 43.750	€ 43.750	€ 43.750	€ 43.750	€ 43.750	€ 43.750	€ 43.750	€ 43.750	€ 43.750
Meeting room											
		€ 125.595	**€ 125.595**	**€ 125.595**	**€ 125.595**	**€ 125.595**	**€ 125.595**	**€ 125.595**	**€ 125.595**	**€ 125.595**	**€ 125.595**

Appendix C

List of questions task-technology fit interview in Meppel (Kievit):

What was the last task you performed at Lippstadt?
Does it contain negotiations or other conversations with conflicting interests?
Is this the most common task you perform at Lippstadt?
What is the most common task you perform at Lippstadt?
Does it contain negotiations or other conversations with conflicting interests?
Do you combine tasks when travelling to Lippstadt?
Do you travel on ad-hoc basis or do you plan them weeks before?
How often do you travel to Lippstadt?
Do you go for one day, or do you stay there a night?
How do you travel, by car? (Takes how long?)
If Lippstadt were further away, say a 5 hour ride, would you still go to Lippstadt with this frequency?
Would you be able to perform these tasks via another medium (e-mail/telephone/video conference)?
If so, why do you travel to Lippstadt?
Would video conferencing be a possible solution to perform the task?

Appendix D

Abbreviations used in this thesis:

C&S	Corporate and support department of FrieslandCampina
CMC	Computer-mediated communication
F2F	Face-to-face
ICT	Information communication technology
IT	Information technology
TAM	Technology acceptance model
TTF	Task-technology fit
VC	Video conferencing