



GÖTEBORGS UNIVERSITET

Communication at a distance

Virtual IT teams creating their own conditions for communication

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Abstract

Aim: The overarching aim is to investigate how an IT department that consists of virtual teams communicates to complete their daily tasks, giving support to users, and finishing projects. The main research goal is to see how virtual teams communicate, their experiences and uses of communication channels, modes and resources, and how they reason about using different communication technologies.

Theory: The socio-cultural perspective has been used as a theoretical perspective in that people learn and develop using tools. In this study these tools have been seen as communication channels and modes. Other theories that are brought up to be used to understand how these teams work and communicate are literacy and personal learning environment. Literacy is another word for knowledge that a person needs to learn and can share with his or her community or team. When persons collect knowledge about communication and tools for communication they are building their own personal learning environment.

Method: Content analysis has been used so as to be able to categorize and find patterns in the data. The data has been collected using a survey sent out to 37 people of which 21 answered, together with five support issues that were observed. In addition to the observation was an interview with one participant involved in the issue.

Result: The result from this study suggests that teams work differently depending on their situation and environment. Virtual teams are flexible and find the best workable communication environment using the communication channels and modes available to them. They work around problems like language and cultural differences and when communication channels break down they are flexible in selecting a back-up channel. It is important to understand that teams work differently and prefer different ways of communicating. It depends on both their work and their way of socializing.

Keywords: virtual teams, information and communication technologies (ICT), communication channels, communication modes, socializing, teamness, personal learning environment, content analysis

Preface

This thesis is about communication in an IT department with virtual teams, where some members can communicate in-real-life (IRL) and others only through virtual communication channels, to complete their work together.

I have been working at this company's IT department for about five years. The department consists of eight different teams that are distributed between five different offices in Europe and Asia. During my time I have found that the communication between teams and members differs depending on the task at hand and social needs for individual staff and for teams. I have also noticed that different technologies help people in different ways. Some seem to really dislike the video-conference systems and feel quiet during meetings, while others used them as a supplement for in-real-life (IRL) communication. Slowly it started to become clear to me which technologies were preferred in my specific team, and I started to wonder how the other teams worked. What did they prefer? Was my team different from the others? Were we socializing too much? Were we alone in our dislike for video-conference systems? Was I the only one, as the only team member in Stockholm, who felt alone? Or did other people, without their team members being in the same physical location, feel lonely too?

When choosing my thesis subject these were the questions that guided me. These, along with a short pilot survey at the same company carried out in a previous course, highlighted that communication skills were something most people considered the highest regarded skills.

I want to take this opportunity to send a thank you to my team ISYT and my manager, who has been very supportive during my studies and always sent a supportive word in Skype whenever I had to take time off to study. I also want to thank the entire IT department for agreeing to participate in my survey and answer all my questions, and the IT management for giving me support and time to study, as well as letting me approach the staff at their department for the study. At last, I want to thank my supervisor Sylvi Vigmo for her support and inspiration during my data collection and writing, and my friend for being supportive and helping with my English.

Thank you!

Linn Rydahl
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1. Introduction

Communication is one important aspect in teamwork when trying to reach a goal. A goal can be: completing a minor task only connected to the team itself; a bigger task or project connected to the department; or a major project that will be delivered to a customer.

Whatever the goal is, the communication in the team working on the task is one of the linchpins for completing it. Communication basically means sharing and/or transferring information from one place or person to another. Even if communication per se is simple, it is how to communicate that might be hard. There are many different ways to communicate, all depending on where you are, if any particular tools for communication are available, and where the person you want to communicate with is – in the same physical space or at distance.

Communication can build knowledge and trust between people. In a team, trust and knowledge will help to keep the team together and its members motivated. The more knowledge a team has about its members, their work, knowledge and competence, as well as the departments' overall agenda on where they are heading, the better the trust within the team can become. Knowledge needs to reach the team members, and depending on what type of team it is, the communication to manage tasks will differ. A co-located team has its members in the same office and they have the possibility to talk face-to-face in real life. In comparison, a virtual team has its members dispersed in different offices with limited possibility to communicate face-to-face in real life. Co-located and virtual teams are the two biggest opposites of each other regarding communication (Bell, 2002). Teams can merge these two types to various variables of a virtual team, e.g. if two members are in Warsaw and three are in Stockholm, they are in a sense co-located with their team members in the same office, but at the same time a virtual team because the team itself is in two locations. These teams, however they are formed, are able to communicate via different technologies like email, video-conference systems, instant messaging, telephone and more.

This overarching interest for this study is to investigate how virtual teams communicate with each other in order to reach their goals, i.e. carry out the tasks at hand, and how they manage this with the communication technologies that are available. This implies taking an interest in if different teams' work in different ways depending on their tasks, and the

potential connection to shifts in their use of communication technologies or knowledge sharing.

It is worth mentioning that this thesis can contribute with information to companies which have virtual teams across the world, but also to companies which use various communication tools for carrying out work in order to better understand how their teams work, how teams prefer to work, and where improvements can be made in the communication channels to make the current work easier and perhaps more effective. In part, this study has been made with the hope of being able to help teams become more informed themselves and to express their communication needs in more explicit terms.

1.1. Background

The ability to understand how teams (co-located and virtual) work is of great importance to a workplace and companies across the globe. The reason for companies to choose virtual teams can be many: different knowledge resources and expertise, economy, customer location, company globalization on the market and more.

Independently of the choice for a company to create a virtual team, the possibility for the virtual teams' members to actually meet each other might be completely nonexistent. However, by putting together virtual teams, a company can access different people that fit the company's needs and profile regardless of physical location.

It is important to understand how a team best operates and functions, and which aspects that might have an impact on how work is carried out, when looking at co-located teams and virtual teams. Without a functioning team, the work performance will suffer. It has been suggested that trust, engagement and involvement are important aspects of a functioning team (Stawnicza, 2014); it has also been suggested that the distance between team members can lessen the work performance (Stawnicza, 2014). Others suggest that language and cultural differences can become a challenge when a team cannot meet face-to-face (Klitmøller, 2013).

When it comes to virtual teams and the communication they use for their work, there have been many different approaches in the research field, such as questions concerning what makes virtual teams perform less than co-located teams and which risks these teams face that co-located teams do not have to address. Beside these risks, there are also concerns about the technologies virtual teams have to communicate through. Are some of

them less good from the perspective of work performance than others? It has been suggested that face-to-face in real life is the richest communication and email is the poorest (Nemiro, 2001). Some studies suggest that a similarity between the team members virtual appearance in communication channels can be enough to raise the trust in teams (van der Land, 2015).

There are many possibilities to consider for virtual teams and more research questions to explore and discuss in this regard. In this age when companies want to become global to reach more customers, their teams will possibly become more virtual, at the same time as technologies will continue to evolve and present new communication channels (software to communicate through) but also new communication modes (communication cues involved in communicating, e.g. long or short text, images, video, and audio). Virtual teams need to evolve along with the new technologies, finding new ones and specifically the ones that best fit their work. Therefore, it is important to perform research, not only to understand the technologies or the risk virtual teams face, but also to understand how virtual teams work and why they work in this specific way. What drives virtual teams to use the communication modes and channels available in ways that may differ from other teams?

1.2. Aim of research

The overarching aim is to investigate how an IT department that consists of virtual teams communicate to complete their daily tasks, giving support to users, and finishing projects. The main research goal is to see how virtual teams communicate, their experiences and uses of communication channels, modes and resources, and how they reason about using different communication technologies. This will bring more empirical research to the studies of virtual team, but it would also be beneficial for companies around the world working with virtual teams to understand how teams work and how they use different communication technologies.

1.3. Key questions

The key questions for this thesis are as follows:

1. How do virtual teams, co-located and distributed, communicate among themselves and with the rest of the IT department when they complete their daily tasks?
2. What are the preferences in different teams regarding different communication channels and modes, and how do these preferences connect to socializing and team building?
3. How do the uses of communication modes, channels and resources affect the teams and their work?
4. What implications for communication, co-located and distributed, can be discussed based on the result from the questions above?

1.4. Limitations of this study

Some limitations had to be made for this study. Gender will not be focused on because the interest for this thesis is in reasoning about the uses of communication channels and resources and how IT teams communicate using different communication channels and modes, irrespective of gender.

Furthermore, this study will not focus on leadership or management of teams, either virtual or co-located. Other researchers (Bell, 2002; Malhorta, 2014) have conducted studies on this subject and concluded that more research is of interest. This thesis however will focus on a complete IT department and their work in daily duties, projects, system and user support. It is not how the teams are managed or the hardship of leadership that is of interest, but this thesis can contribute to management development of virtual teams.

1.5. Overview of the thesis

After this introduction and background to the thesis, the research questions and limitations of the study, the next section introduces the ethnical consideration and general information about the company. Thereafter the research overview is presented and the theoretical perspectives, which will be used to understand and analyze the findings from the data collected.

This is followed by the methodological approach and considerations, and how the data was collected for this thesis. Thereafter, the results are presented and followed by a discussion and analysis chapter. Finally, there is a concluding summary and suggestions for future research.

1.6. Ethical considerations

It has been decided that all information regarding the company, the IT department, the work, and its personnel will be anonymous.

The company has been given a fictional name (Xglobal) and the identities of the people answering the survey and the interview have been kept anonymous. The issues which are being looked at for this thesis have also been kept anonymous and cleared of any specific company, customer or task related information. Some of the team names have been changed for the sake of anonymity, since these names included words that were very specific for the company's market.

When sending out the survey it was clearly written both in the email and in the survey introduction what the aim of this thesis was and that the answers would be kept anonymous, and that any information regarding specific issues or events would be kept confidential. The survey was constructed with the intention of keeping the respondents anonymous. Since questions like "Which team do you belong to?" and "Which is your office?" were included, a decision was made to make it a bit harder to figure out who is who based on these questions. Instead of answering which team they belong to, the teams with closest connections were merged together in the answer (I.e. "PM, SM, SA" or "ISYT, TSYS, CSI"). This in turned made it harder to figure out who is who based on the answers. One of the reasons to keep the surveys anonymous was to let the respondents feel more secure and answer more truthfully.

"The confidentiality of information supplied by research subjects and the anonymity of respondents must be respected" (Silverman, 2013). For the issues that were observed, the company requested that the information collected in these issues (about the company, the work, the customer and the people involved) were kept out of this study, and instead the focus would only be on the communication and which channels that were used when solving these issues.

1.7. The company Xglobal

In this section a short description of the company which has participated in this study will be presented and explained, starting with the different teams and how they are built, thereafter a short description of the workplace and tasks, and finally a description of the communication technologies the teams have available.

The company Xglobal (a fictional name chosen for this thesis) is a company with around 500 employees and with over 50 years of experience in their specific field. The main office is in Stockholm, Sweden. The remaining work offices are placed in Gothenburg, Warsaw, Barcelona, Shanghai, Leuven and Detroit.

The IT department, which this thesis focuses on, is currently spread out over five offices: Stockholm, Gothenburg, Warsaw, Barcelona and Shanghai. To meet the customers' requests the IT department has split up their personnel into eight teams. The team members rarely meet face-to-face with their entire team. Some teams have several team members in the same office, while others have only one.

| Teams | Team abbreviation | Description |
|--------------|--------------------------|--------------------|
|--------------|--------------------------|--------------------|

| Teams | Team abbreviation | Description |
|----------------------------|--------------------------|---|
| IT Management | IT Mgmt. | Management of the IT department, with people in Stockholm and Gothenburg. |
| Project managers | PM | Leading IT projects, with people in Gothenburg and Warsaw. |
| System managers | SM | Manage the systems and upcoming changes, with people in Gothenburg and Warsaw. |
| Solution Architect | SA | Finding new solutions, with people in Gothenburg. |
| Research & Development | R&D | Develops new releases and updates for systems, with people in Stockholm, Gothenburg and Warsaw. |
| Information system support | ISYT | Support team for information systems, with people in Stockholm, Gothenburg, Warsaw and Barcelona. |
| Technical system support | TSYS | Support team for technical systems, with people in Gothenburg, Warsaw and Barcelona. |

| | | |
|----------------|-----|---|
| Client support | CSI | Support for client and infrastructure, with people in Stockholm, Gothenburg and Shanghai. |
|----------------|-----|---|

In Xglobals' IT department there are two different types of teams; project teams (short lived teams only for specific projects) and organization teams (teams based on individuals' knowledge and tasks). This is based on a so called Matrix organization. The organizational teams are placed in a linear organization with a manager, but the individuals can be picked for specific project tasks and will therefore become part of a project team for a specific time period. For instance, while a support person from ISYT is in the virtual team of ISYT with a team leader, he or she can also be part of a project or system team with people handpicked for that specific task.

The team members who are part of a project team will not leave the organizational team, but will continue to attend weekly meetings with the organizational team and give status updates to the team about what he or she is doing and the project status. For this thesis, the organizational teams (PM, SM, SA etc.) will be called teams. When it is important to highlight that the result concerns a project team it will be specified.

The context

Xglobal works in a field that requires the IT department to deliver a variety of different services to the company and its customers. Xglobal is in need of a vast amount of systems to be able to deliver the products the customers have ordered. Some of these systems have been designed in-house by the R&D team, while other systems have been supplied by other companies and are supported both by the IT support teams and by the supplier.

To handle the systems in the best possible way, IT has assigned one System manager and one Project manager to each system. The system manager is the one to receive the request for updates in his or her system. Based on the system's budget, the system manager can collect the necessary update requests and start a project with the system's project manager. From here a project process will begin, including different members like a developer and a support member. (This is when a project team is created).

Besides updating the systems, IT also handles support. This can be computer hardware support or system support. The requests will be sent via the JIRA bug tracking system

(see below) by either the staff of Xglobal or by the customers themselves. The support person responsible for that specific area will be assigned to the issue, with the possibility to assign it to someone else if needed.

These teams work in a daily stream of new issues coming in and systems sending error messages, at the same time as they are completing bigger projects to keep evolving for the company's benefit.

Communication channels

Xglobal uses a large amount of various communication technologies, which will be called communication channels in this thesis. There is no direct information regarding how to use these communication channels, however when a new person arrives at the company, the team he or she is placed in shares their knowledge of when and how to use the channels.

| | |
|---------|--|
| Outlook | Outlook is Microsoft's email client and is primary used at Xglobal for sending emails and booking meetings. |
| Lync | <p>Lync is also a Microsoft product and is a chat client connected to Outlook. The connection is based on the address book from Outlook, which gives the user access to all the contacts in the company without having to add them manually. Lync is also connected to Outlook's calendar and will change status depending on the bookings in the users' calendars.</p> <p>Lync can be used as one-to-one communication, like instant messaging, but also as a voice call or video call, with the possibility to share the screen, with one or more participants. Lync saves the written conversations in Outlook for easier traceability. However, group conversation history that takes place after leaving a group will not be saved or received once connecting again.</p> |
| Skype | <p>Skype is an instant messaging tool and can be used for video and voice calls. It is also possible to share the screen, with one or more participants.</p> <p>Skype can be used as a one-to-one communication tool, or for group conversations. In a group conversation the information will be saved</p> |

| | |
|------------------------------|---|
| | while a participant is offline and he or she will receive it as unread once logging back in. |
| JIRA | <p>JIRA is Xglobal's system for bug tracking, issue handling and project management. Xglobal uses a customized JIRA, a product developed by Atlassian. Using this system, everyone at the company can add a support issue, an error report or a change request (the three most typical issues) to the different support teams or to a specific project (these issues will be handled by IT projects steered by a project manager or a system manager).</p> <p>Via the JIRA system one can assign an issue to a relevant party, write messages in the issue itself (which will generate an email notification to people involved or watching the issue), and change status in an issue (for instance going into specification, development, or resolve the issue).</p> |
| Video conference system (VC) | Each office at Xglobal has one or more video conference rooms, which can be booked by participants via Outlook. Once at a meeting the participants can call each other and see one another via video camera on a television screen. There is also the possibility to share a computer screen. |
| Telephone/Mobile | Not everyone has a mobile phone, but most people have a land line for calling colleagues and customers. |
| In-Real-Life (IRL) | It is worth mentioning that no one is 100% virtual at Xglobal. Even if one might be the only one from a specific team in their office, he or she nonetheless has someone from IT at the same location. |

The only official rule there is that it is preferable to use Lync over Skype, since Lync is secure and in-house. However, Skype was used before Lync was introduced and was already a part of IT as a communication channel for most teams. Skype is also used to stay in contact with customers and suppliers.

2. Research overview

The research on communication and specifically the one surrounding virtual teams has increased during the last 10-15 years. For this study a limitation has been taken to stay within the timeframe of 10-15 years. The reason for this limitation, besides being up to date on the research, is also a conscious choice knowing that the information communication technologies have changes drastically during the past years.

Nemiro (2001) worked on a survey instrument called Virtual Team Creative Climate (VTCC). During the development and testing phase 77 management students from the USA, of whom the majority were working professionally, were asked to test the survey. The work on the survey instrument was based on Nemiro's previous empirical research Nemiro from 1998, where she investigated the environment that made virtual teams creative. Nine virtual teams (consisting of on-line service, product design engineering, and educational consortium teams) with a total of 36 virtual teams participated in the study. The survey focuses on eleven environmental features, which Nemiro did a previous empirical research in 1998 to find. The previous research concluded that the eleven environmental features that were important in an environment of creativity were dedication, goal clarity, having challenges, regular information sharing and collaboration, personal connection among team members, freedom to decide how to work and trust were important for the team to feel creative, and to have management's encouragement (Nemiro, 2001). The results from the VTCC testing was based on previous work from scholars and on the students' survey answers with the instruction to answer the questions while thinking of a virtual team they had worked on before.

Virtual teams "are connected and communicate through various electronic means such as telephones, fax machines, e-mail, audio-conferencing, videoconferencing, or groupware" (Nemiro, 2001, p. 65). Even though most of this applies today some technologies are out of date (like the fax machine) while others like instant messaging have taken a more important role in communication. It is important to contribute with new questions in the research on virtual teams to be able to follow the changes in communication technologies and the changes these new technologies bring to virtual teams and their work.

It was noticed during the research collection for this study that instant messaging was mentioned only in a small amount. The research done on virtual teams differs between

literature studies on previous research and field studies where the researcher used observation, interviews and/or surveys to collect their data.

2.1. Virtual teams

Virtual teams are teams with members distributed in different offices and with different time zones. Bell (2002) points out that not “all virtual teams distributed across space are also distributed across time” (Bell, 2002, p. 29). Bell and Kozlowski (co-writer) presented a framework for work related to virtual teams and effective leadership in these teams. The typology is based on other researchers’ previous work on virtual teams and leadership, but taken further to propose characteristics of virtual team and what this means for leadership. They propose that it is the task itself that determines the lifespan of a virtual team. The smaller the task the shorter the lifespan (Bell, 2002). It is important to recognize that not all virtual teams are temporary. Some do have a continuous lifespan (Bell, 2002).

There are some risks with virtual teams. They have to work with different cultures and traditions, with people with different native languages and with different values. This can, according to Bell (2002), make communication more difficult and less effective. Klitmøller (2013) came to the same conclusion in his ethnographic field-study at a Danish company with people both in Denmark and in India, which explored the effects of culture, shared language and the choice of communication technology when sharing knowledge. While observing the 14 virtual teams and interviewing a selection of the 61 members he collected qualitative data, analyzed in a similar way to content analysis, which suggested that while the Indians had trouble understanding the Danish, the Danish in turn had trouble understanding the Indians.

Communication is an important aspect for teams and virtual teams, especially since they connect using different communication technologies. While language and culture differences may be risks, they can also build misunderstandings (Klitmøller, 2013), which in turn might turn to mistrust. Stawnicza researched communication trends in the use of different technologies in a company in India and how they could and could not create teamness in a virtual team. She conducted interviews with eight male project managers using a theoretical framework on communication. She also found that communication for building trust is based on how timely the response is. If it takes longer for management to reply to a question the less trust the team member feels. Trust

is one of three factors, according to Stawnicza (2014), which influence team performance. The other two are communication and teamness. “The level of trust and teamness depend on the quality or amount of communication. The better team members communicate, the stronger the bonds between them are and the higher the trust level in the project team is.” (Stawnicza, 2014, p.1062)

According to Nemiro (2001), even if the team is virtual and uses different technologies to communicate and keep up awareness, they are still a team. Specific for virtual teams is that they are interdependent and, like any team, they work towards common goals. Similarly, Bell argues that the “ability of virtual teams to cross boundaries enables them to be more adaptive, flexible, and responsive” (Bell, 2002, p. 31). Horvath and co-writer Tobin (2001) collected empirical research into one article with the goal to identify the research-based similarities and differences between teams. Based on this they wanted to present a framework specifying competencies based on performance research from virtual teams. One competence the empirical research supported according to Horvath was that “communication is not just the act of sharing information between each other. Exchanges must be characterized by mutual respect, appropriate and timely sharing of information, and genuine accept others feedback and opinions.” (Horvath, 2001, p.251) This gets closer to the knowledge a virtual team must comprehend when communicating with team members, which the next section will focus more on.

2.2. Knowledge and knowing

Knowledge and knowing can mean different things to different teams. Virtual teams communicate using different technologies and have different cues available depending on the technology they use. Horvath argues that the skill to communicate without non-verbal cues demands that the participants learn to be clear when they communicate, and to ask for clarification if needed (Horvath, 2001). “It is possible that specific sub-competencies (i.e. knowledge, skills, and attitudes) will need to be identified in order to maximize a virtual team.” (Horvath, 2001, p.253)

Bhappu and co-writers Zellmer-Bruhn and Anand (2001) collected others’ research to address the diversity and work environment on knowledge processing in virtual teams, with the proposition to serve as guidelines for workers and managers. A virtual team performs three basic knowledge-processing activities: “(a) *knowledge acquisition*; (b) *knowledge integration*; and (c) *knowledge creation*” (Bhappu, 2001, p.153). They do,

however, imply that teams usually have difficulty in sharing their knowledge with each other. *Knowledge acquisition* is a situation that takes place when a team recognizes the importance of a new knowledge which they are currently working with, and are able to acquire it and use it in performing their tasks. (Bhappu, 2001) To be able to realize and from this acquire the relevant knowledge is of great importance to team work. If one cannot, based on a new situation, assess that new knowledge is required, then one cannot evolve with the work. *Knowledge integration* is the process when team members collectively combined their knowledge to one outsource (Bhappu, 2001). For instance when a project team meets up to gather the knowledge for the scope of the project, each individual brings their knowledge to the table and combines them to a scope for the project. The last basic knowledge is *knowledge creation*, which can be created during many stages. Basically it is when a team has shared its knowledge of, for instance, how a specific type of servers works and based on that shared knowledge each team member generates new ideas on how to work with the servers, which they share between each other and build new knowledge from (Bhappu, 2001). After a while, the knowledge from the first shared meeting has grown to a collective knowledge of facts, ideas and trials.

2.3. Communication technologies

An important tool for virtual teams are information communication technologies (ICT). These ICT are usually placed in two different categories: rich media and lean media. Face-to-face is the richest media because it provides the biggest amount of cues during the conversation (Nemiro, 2001). Nemiro (2001) found that participants in the virtual teams frequently described misunderstandings and miscommunications when using lean media, and that email was considered the leanest media of all (Nemiro, 2001). Klitmøller (2013) proposes that when unclear knowledge is being communicated it is best to use face-to-face communication instead of virtual. Stawnicza (2014) claimed that the “so-called ‘millennial [sic] generation’, i.e. the generation of 1980-2000, in particular tends to use cell phones to communicate. Adopting mobile or social channels enables them to communicate faster. Writing an e-mail and waiting for a response is seen as time consuming.” (Stawnicza, 2014, p.1062) Malhorta (2014) suggested that instant messaging can be used for presence awareness in teams.

Malhorta and co-writer Majchrzak followed their previous research from 2012 about technology functionalities to create awareness, together with theoretical framework on presence and situation awareness, to conduct a new study in 2014. In the 2014 research

they studied 54 virtual teams from 33 companies in 15 different industries. They conducted interviews with team leaders (54 in total) and the team members (23 in total) answered a survey. To gather the participants they were sponsored by the Society for Information Management, a solicitation sent out by Groove Inc. to its customers, and a solicitation sent by Netage to its members. Instant messaging, according to Malhorta, will “foster a spontaneous asking of questions and checking of assumptions without the need for planning meetings. This early check of assumptions held by each other may then lead to timely mutual adjustment of others’ and one’s own assumptions, leading to higher team performance.” (Malhorta, 2014, p.396) Being accessible also makes communication and quick sharing of knowledge easier (Malhotra, 2014).

Stawnicza (2014) argues that during the stage of solving an issue, “the lack of immediate response can delay the decision making process” (Stawnicza, 2014) which in turn could slow down a project or in worst case even a delivery. Similarly, Malhorta (2014) suggested that if members feel that they cannot ask quick questions about the lack of communication, it is possible that the team will continue to work following the wrong assumptions, which will lead to conflict in the future. They suggest that virtual teams “that cross more knowledge boundaries will perform better when they target their use of ICT at maintaining presence awareness.” (Malhorta, 2014, p. 397)

That technology can both enhance and reduce work performance has been focused on in empirical research. As one example of this, van der Land (2015) suggests that team members that recognize themselves in their avatars (images seen during chat) will feel a bigger involvement. Van der Land (2015) conducted an empirical research at the University of the Netherlands with 255 students in business administration classes (the median age was 19). The study was based on a theoretical framework on team visual and member-avatar similarity, and hypothesis from this. The study was conducted with teams of three students in each. These had a murder mystery to solve via chat, testing if their avatars enhanced or reduced their work performance. Team visual similarly was tested on half, where the teams either had dissimilar or similar avatars to their team members. The other half had avatars that were cartoons or avatars that were similar to the participant themselves. It was concluded that the team performance was highest in the team with avatars that were similar to themselves (self-identification) and the entire team’s avatars were similar (team similarity) (van der Land, 2015). Because of this they could see that these teams “were more socially attracted to each other, interacted more strategically, expressed greater motivation to contribute to the group task, and performed

best on the task” (van der Land, 2015, p.144). In comparison, “teams without any self-identification or team similarity could create a positive group dynamic but this group would have a ‘no strings attached’ nature.” (van der Land, 2015, p.144) The conclusion based on this study is that both forms of similarity (self-similarity and team similarity) are important and provides support for a virtual team. What is also worth mentioning is that only sharing one similar cue (i.e. a cartoon figure) did not lead to “greater group identification, nor did it hinder it.” (van der Land, 2015, p.145)

In most virtual teams, members are taken in and provided with some form of communication channel and it’s up to them to work using them (Horvath, 2001). It is, however, most likely that a company and a virtual team has a specific routine for how to handle a support issue. This routine would also include what type of communication channel should be used and why in resolving the issue (Malhotra, 2014). Malhorta (2014) also confirmed that information communication technologies in virtual teams is not directly related to team performance. Instead “it is not simply a matter of matching the technology to the task, but rather matching the technology to the coordination needs of the team.” (Malhorta, 2014, p.397) In short, teams use different information communication technologies depending on their needs, and companies should be aware of that and be flexible in providing teams with communication channels.

3. Theoretical perspectives

In the socio-cultural perspective the theory is that human beings learn and develop using tools, especially cultural ones (languages, symbolism etc.), which are products of the development of society over time. The nature and use of these different tools may differ between societies and even groups in a society (Säljö, 2010b). Different companies use different communication channels, which can be seen as cultural tools. Many of them are used for sharing knowledge between team members. These virtual tools have changed during the years and different resources have focused on different communication channels. It started with emails and moved on to video-conference systems and chat programs, and in some parts of society even to social media (Facebook, Instagram, and Twitter). In this thesis the socio-cultural perspective is used to view the communication channels and modes as tools for communication. The societies and groups is seen as the different team constellations with the possibility that they might create groups that works using different tools.

Critique against the socio-cultural perspective for learning is that it does not look at the individual. However, Säljö (2010) argues that this is important even for this perspective since if the individual does not learn then society will not learn either (Säljö, 2010a). Individuals learn in different ways and are better in different areas than others. According to Säljö (2010b) the human being has the ability to be flexible and adapt to different situations, but to be able to do this the individual needs cultural experiences. The only way to learn a cultural experience is through communication (Säljö, 2010a). “Communication should be processed as material, as something we possess to be able to conduct certain actions and put the world in motion” (Säljö, 2010a, p.81).

If people communicate, they will learn, and if they learn they will collect different types of knowledge. Knowledge can have different names. One is literacy, which in general terms means the ability to read and write. This type of knowledge is not natural. It is not a knowledge individuals are born with, instead they learn this in the society they grow up in. A similar knowledge is digital literacy, which refers to computer knowledge but it can also include knowledge as communication via different technology channels. Knowledge of how to use different technology channels must therefore be shared for people to learn and to collect different knowledge. People can be said to have a personal learning environment which is a platform for a lifelong learning (Mafawez T. Alharbi, 2013). A personal learning environment usually consists of different technologies or tools. These tools are picked up and used throughout an individual’s life. A virtual team would then consist of members that share parts of their personal learning environment with each other. Their personal learning environment would consist of a specific email software, a video conference software, and a support-handling software since these are the tools that they use daily. Using these tools they would be able to both learn with the tools themselves but also “rely on their peers to direct their learning, resulting in a two-way communication. The advantage of this proposal is the support available for sharing between learners” (Mafawez T. Alharbi, 2013, p.280).

4. Methodological approach

In this section the method will be described, first with an overview of the analyze method used for this thesis, thereafter how the data was collected and analyzed, and finally the ethnographic considerations that have been taken.

Since this thesis is a social study using a survey as the basis for the data collection, it was of importance to find a analyzing method that would manage both to lift up the quantitative data from the close questions, but also to find patterns in the open questions that let each individual share their unique experience. To manage this, content analysis was chosen, since it was flexible enough to reach the goal in analyzing the data collected.

4.1. Content analysis

Content analysis has been used to be able to categorize and find patterns in text and documents. It is a very flexible method that can be applied to different forms of media. Content analysis “involves establishing categories and systematic linkages between them, and then counting the number of instances when those categories are used in a particular item of text” (Silverman, 2013, p.443). There are several areas where content analyses can be used for research questions, some of them are: *who*, *what*, *where*, and *why* (Bryman, 2012).

It can be difficult using content analysis since it is up to the researcher to find the categories to use when analyzing. According to Elo and Kyngäs (2007) the challenge with content analysis is that is very flexible, which means that there is no simple and correct way to use it. Admittedly this might be a good thing, since it a method fitting for many types of data content (Bryman, 2012).

The method content analysis has been used to find patterns in the survey answers and the issues that were observed. Being able to follow a specific person’s response and find patterns between people has helped in analyzing the results. Together with being able to find concrete examples of individual’s answers in the observation of the issues.

During the research overview it became clear that content analysis or a similar method was used even by other researchers (van der Land, 2015; Klitmøller, 2013; Stawnicza,

2014). Similar methods were described as analyzing text using categories to find patterns, except the name content analysis was not used to describe the method. As for the method used to gather the information, it differed. Some looked to older research to find patterns (Bell, 2002; Hovarth, 2001; Bhappu, 2001), while others gathered data using interviews, surveys and/or observations (van der Land, 2015; Klitmøller, 2013; Stawnicza, 2014; Malhorta, 2014).

The data collection for this thesis used two methods: a survey and observation of support issues with supplementary interviews. More information about the data collection and analysis of it can be found below.

4.2. Data collection and analysis

Two methods have been chosen to collect data for this study. Firstly, a survey was sent to the entire IT department, and secondly a couple of support issues from the system JIRA were observed and supplementary interviews were made with one of the persons involved in one of the support issues.

These methods were chosen based on the researcher's knowledge about the company and its staff. The IT department usually works under time pressure. Therefore a survey, with three weeks deadline, was selected to give as many people as possible the opportunity to give their answers. The survey was conducted using Google Form, a survey tool in Google Drive, which is a collection of open source tools that you can use if you create a Google email account. The survey contained both open and closed questions. The open questions were added to reach the more personal views of communication from each participant, and as a supplement for the closed questions if the participant wanted to add a comment for clarification or to give an example. The closed questions were added to make the survey quicker to take if the participant did not want to answer the open questions, but also to be able to collect statistic data regarding usage of communication modes and channels. The survey was sent to 37 participants at the IT department (this includes the entire IT department). The link to the survey together with a description of the purpose of the survey and the deadline (three weeks later) was sent via Outlook, an email service. Two reminders were sent, the first one week after the first email and the other on the last day the survey was open for giving answers. In total, after these reminders, 21 replies were collected.

Once the survey answers were collected and downloaded from Google Drive as an Excel file, they were compiled in a document for each participant to make it possible to focus on the individual if necessary. Each participant was given a number, which would be their reference number in presentation of the results, and to make sure that all participation was presented anonymously. The number was chosen based on the order when the participant answered the survey, i.e. the participant that answered first was assigned number one. Thereafter the survey answers were analyzed using a content analytical method to find patterns in the following categories: sharing versus not sharing a physical office, socializing, communication modes, communication channels, problems and resolutions. The categories were selected based on the aim of this research and the key questions, which in turned were decided during the research overview when specific areas became more interesting than others.

During the first category (sharing versus not sharing a physical office) the participants' answers were compiled depending on answering yes or no to the question if they share an office with a team member. These different compilations were then searched through to find common threads for people not sharing a physical office with a team member and people that shared a physical office with team members.

Thereafter, the participants' answers were compiled according to the predetermined team constellations designed to enhance the anonymity. These constellations are the following: *IT Mgmt.* which is the management for the entire IT department; *PM, SM, SA* which included the project managers (controlling the projects), system managers (controlling the administration of the systems), and solution architects (coming up with new solutions when new systems or products are created); *R&D* which includes all the developers (some are connected with specific systems and others updates in different systems); *ISYT, TSYS, CSI* which includes the support personnel for both user support, system support, and hardware support. Using these group constellations the data could be analyzed to find patterns in how these types of teams work using communication modes and channels.

Five JIRA issues were observed and four interviews were conducted for supplementary information regarding these support and development issues. The interviews were not recorded due to a short time frame for both parties. Instead, extensive notes were taken during the interviews to gather as much information as possible, and a double check of the notes was done directly after the interview to add information where there was a need

for clarification. To select the issues, the request was first sent to IT Management who in turn agreed that issues could be observed with the reservation that information would not be revealed about the specific work and customers connected to the issue. Thereafter, IT Management suggested three different people from different teams which the researcher could contact. These people, one project manager, one support person from ISYT and one developer from R&D, were contacted via Skype with the request to observe one or more of their JIRA issues that were being handled at the moment. The participants were instructed to select issues related to a normal work-day but ones would include communication (i.e. not issues that were simple to the participant and did not involve any clarification and could be solved within 30 minutes), and it was suggested that issues that might shift between different communication channels when being solved were of interest. The reason for letting the participants themselves select issues was that the researcher had no knowledge of where to find the issues or which ones were of interest to best describe each team's everyday communicative work tasks. Once the issues were selected, the participants sent the information to the researcher and a short interview was conducted either via voice call on Skype or face-to-face. In two cases there were questions that surfaced after the interview, and in order to answer these questions the researcher contacted the participant to clarify the questions regarding the support issues. Two of the issues were included in a customer project where the project manager was interviewed during the specification phase (when it is decided which updates should be included in the project) using Skype as a tool to call the participant, and then five weeks later after the project had been closed. On the last occasion, the project manager was interviewed face-to-face.

When presenting the issues, the information will be limited to ensure anonymity towards the company, the specific work and the customer. Included information will be to which team the issues were sent and from which office, and a short overall description regarding which kind of issue it was.

4.3. Ethnography

Since this study was conducted in an overt study at the company Xglobal, there was a clear description included when the survey was sent and during the request to observe issues. However, it was an in-house observation since the researcher has been working at this company for five years. Therefore, the objectivity is not completely passive since the researcher is well aware of the ways the company and the teams might work. It is worth

mentioning that the researcher is a member of one of the eight teams, but does not work closely with some of the others and is only aware of the more general working relationships. Based on this, the use of content analysis was also intended to heighten the objectivity, because the content analysis creates an objectivity from the data since there is a transparency in the procedures for assigning the raw materials to categories. In other words, “the analyst’s personal biases intrude as little as possible in the process” (Bryman, Social research methods, 2012). This is also one of the reasons why it was of high importance to stay anonymous during the data collection. The teams were grouped together to make it harder not only for outsiders to identify respondents, but also for the researcher’s to be able to read the data more objectively.

It can be seen as an access to already be included in the area of study, since some underlying communication reasons might be more visible to an insider. It is worth considering that the people working at the IT department were more willing to open up and answer more honestly to a person they have known for years, than a complete stranger that might as well be spying on them.

5. Results

In this chapter the data will be presented. It has been separated into four different categories: team members distribution which looks at how the teams are distributed between offices and comments regarding this; socializing which goes through how the participants viewed the communication between them and how they socialized with each other for team building; communication modes and channels which explain the result on the participants’ views on different modes and channels, and the significance of each in their work and overall comments on them; and finally problems in communication which bring up where participants found problems and how they dealt with them.

The IT department at Xglobal consists of eight different teams. In this study they have been compiled into four constellations to make them more anonymous. The constellations are based on their work tasks to make the results more consistent. These constellations are the following: *IT Mgmt.* which is the management for the entire IT department; *PM, SM, SA* which included the project managers (controlling the projects), system managers (controlling the administration of the systems), and solution architects (coming up with new solutions when new systems or products are created); *R&D* which includes all the developers (some are connected with specific systems and others are for

updates in different systems); *ISYT*, *TSYS*, *CSI* which includes the support personnel for both user support, system support and hardware support.

To present the result this chapter has been separated into categories: team division, socializing, communication modes and channels, and problems and solutions in communication. The data is presented using both staple diagrams and text. The staple diagrams have been chosen to better be able to present the similarities and differences between team constellations when it comes to distribution (sharing and not sharing a physical office) and communication modes and channels. These diagrams will be explained in text together with comments given on the open questions in the survey, the majority use of channels, and the observations from the issues.

The diagrams are also presented using persons (not in percent) to show the numbers, since the number of respondents is quite small and using percentages would not show anything more than the amount of people would.

The survey was sent out to 37 people at the IT department. 21 of these people answered with an equable amount of people from each team constellation (see table 1).

Table 1 – Who answered?

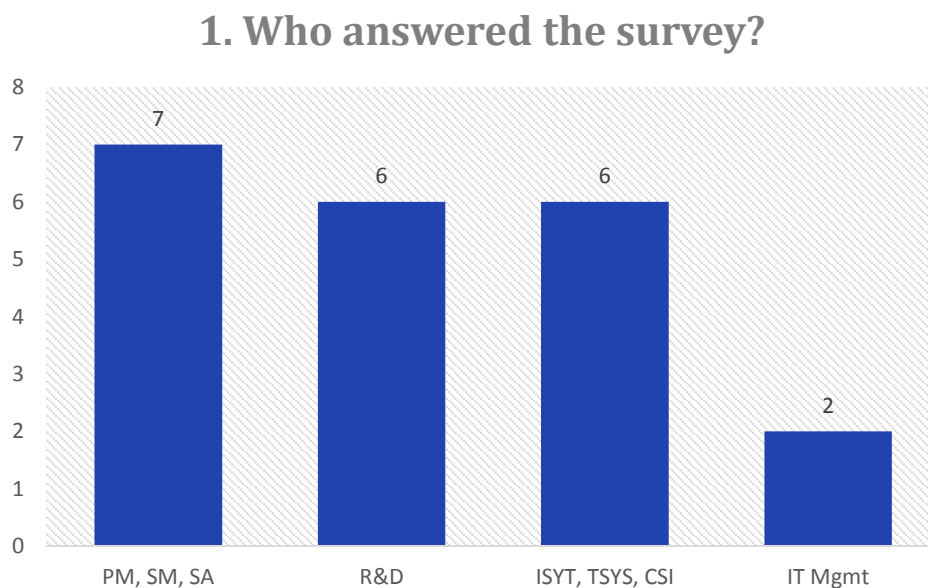


Table 1 shows that most people who answered the survey are either a Project manager (PM), System manager (SM) or Solution Architect (SA). Nonetheless, there were both a

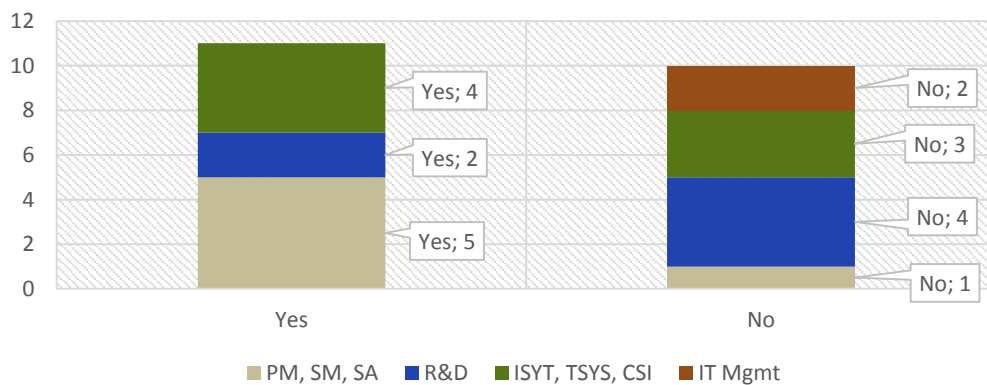
large amount of developers (R&D) and support members (ISYT, TSYS, CSI) who answered the survey. The IT Mgmt. staple might look small, but more than half of the IT Management answered the survey (they consist of three people in total). This means that the shortfalls were evenly distributed between the teams, which in turn makes the data level more stable.

5.1. Team members distribution

The IT teams are distributed between five different offices (Stockholm, Gothenburg, Warsaw, Barcelona, and Shanghai). The previous knowledge of these teams is that they are virtual, but that some teams are more co-located than others. To find out how the teams are distributed a closed question was included in the survey: “Do you share an office with any team member?” It was explained that that the question did not refer to IT members, but to team members. An open question was included asking “Is this good or bad in your opinion?”

Table 2 – Sharing vs not sharing office

2. Do you share your office with any team members?



The team constellation that had the most team members sharing an office are PM, SM, SA. When answering the open question on whether this was good or bad most of these participants were positive about it. Two participants commented that they liked having someone close by and that it made communication easier. The team constellation ISYT, TSYS, CSI had four members whom shared an office with a team member. Unlike PM, SM, SA, the team constellation ISYT, TSYS, CSI was divided on whether this was a

good or a bad thing. Two participants commented that it was good, while another commented that it depends on the situation. It was good for social reasons, but not good when having Skype calls or trying to focus. R&D had two participants that shared an office, and one commented that it did not provide additional benefits to the relevant communication.

The team constellation that had most members that did not share an office with a team member was R&D. They were positive towards not sharing the same office. It might be slightly bad for communication but it was very good for concentration. The team constellation ISYT, TSYS, and CSI, on the other hand, commented that they thought it was bad not sharing an office with a team member. A member from IT Mgmt. shared that while it was good to be spread out over different locations, it could be bad sometimes since one cannot take part in more informal corridor talk or discussions during lunch breaks.

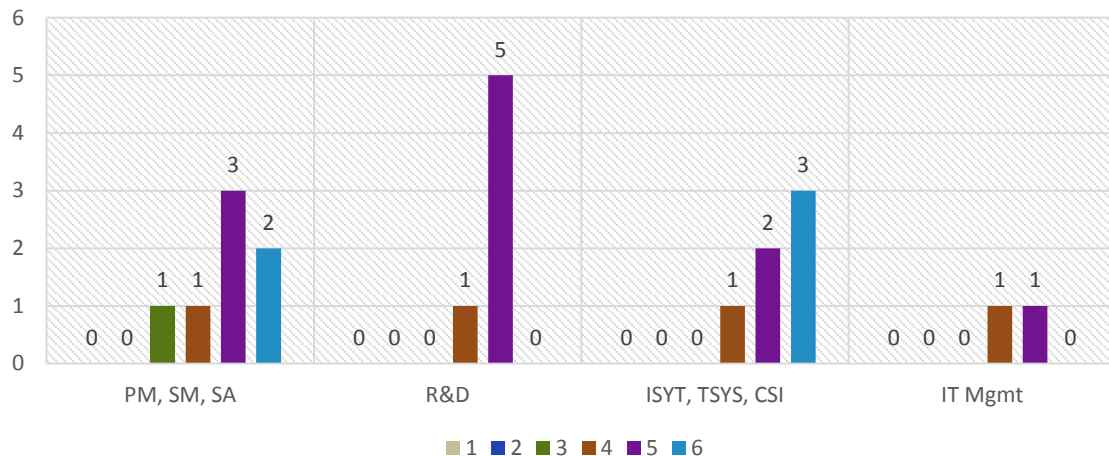
In conclusion, the constellation of PM, SM, SA had the most members sharing an office and thought this was good. The participants from R&D who shared an office did not find it to be important, while R&D who did not share an office found this to be good. The constellation of ISYT, TSYS, CSI was divided. Some thought it was good to share an office and some did not.

5.2. Socializing

Not depending on sharing an office with a team member, it is of interest to see how different teams relate to socializing (i.e. being social) while communicating. A closed question was asked: “What do you think about socializing as part of communication when dealing with an issue?” To answer, the participant had to choose a number on a scale from one to six, where one stood for dislike and six stood for like. The possibility to comment on their answer was given in the next question, which was an open question.

Table 3 - Socializing

3. What do you think about socializing as part of communication when dealing with an issues?



The preferred value from all teams was number five, meaning all teams find socializing to be a good thing. Participants shared a similar view that it is important to have a good relationship with their colleagues and that it benefits work and problem solving. One participant from IT Mgmt. argued that misunderstandings are reduced if people know each other. It was a general belief from all teams that being social makes it easier to discuss problems, and makes you feel more confident when speaking. One participant from the team constellation ISYT, TSYS, CSI commented that if you get stressed during work and you have a friendly relationship with your colleagues you can unload on them without fear of offending anyone (13, 2015), while another from the same constellation wrote: “Feeling like you are part of a team is hugely important in trying to create a sense of comradery” (15, 2015).

However, one participant in R&D argued that even if it is good to know your colleagues, it can be a risk when two requests come in at once. If you know one of the requestors better, it is possible that you give them priority, with less regard to the importance of the request. Likewise, a participant from the support constellation (ISYT, TSYS, and CSI) commented that the most important thing is the work and that socializing should not get in the way of progress.

5.3. Communication modes and channels

These teams are distributed in different offices, which some consider good and others consider bad, but they all agree that communication is important and that it helps them to connect and understand each other.

In order to be able to be connected as virtual teams, communication channels are important. It is also important which kind of communication modes that are included in the communication channels. Since communication is not only about speaking it also includes different cues like body language, voice level and so on. To find out how these IT teams used the communication channels and modes they have at their disposal three different questions were asked.

To get a better understanding on the teams' views on communication modes, a closed question was asked: "How important are the following communication modes to you?" There was a four level scale to answer with the following choices: "Not important", "Less important", "Important" and "Very important". The modes that were included in the question were: text (like email), sharing documents, chat (Skype, Lync), Still image (avatar), Still image (of that person), audio, video, shared screen, and IRL (In Real Life).

To get a better understanding on the teams' views on communication channels, a closed question was asked: "Which communication channels do you mostly use for your daily work?" There was a four level scale to answer with the following choices: "Not at all", "Very little", "Sometimes" and "Very often". The communication channels that were included were: Outlook, Lync, Skype, Video Conference, JIRA, Telephone/Mobile, and IRL (In Real Life).

The answers from both these questions are presented in tables. Because nine different modes and seven different communication channels were included, the tables have been divided presenting two or three different modes or two or three different channels at the same time. The modes are presented in one table and the communication channels in another. Each team constellation is presented next to each other to give a clearer view over each team constellation preference.

These questions were followed by a question with multiple answers: "When do you use [a specific communication channel] as a communication channel?" The answers that could be selected included ten different situations: "formal requests/messages", "quick

requests”, “planning (booking meetings etc.)”, “sharing documents”, “sharing links”, “socializing”, “meetings”, “discussions”, “brainstorming”, and “other” which was given as an option where the participant could add a situation not mentioned in the pre-written answers. This data will be presented in text and not in diagrams, because many diagrams would be needed and the data showed a vast deviation among answers on these questions. It could be that the majority of the participants in the team constellation used it for three or four specific situations, but then one participant might use it for seven different situations. Since the study aims to show how teams work, the majority of answers (in this case, when four or more people chose the situation) will be presented. . Since IT Mgmt. only consists of two respondents the options that have been chosen by them both will be presented.

To be able to present the comments from the open questions in close relationship to both the communication modes that might be related and the communication channel, it was decided to present these in close proximity. This means that first a group of communication modes will be presented and explained. Thereafter a group of communication channels with close proximity to the recently presented modes (i.e. the modes are or can be used in the communication channels) will be presented and explained. Comments from when the channels are used, open questions and issues that were observed will be included in the text.

Longer text communication

Moving on to the first table about communication modes: table 4, which includes text (like email) and sharing documents. To share a document there are different options available for the teams. It can be included as an attachment in an email, it can be sent via Skype or Lync, and it can also be added as an attachment in JIRA. There is also the possibility to send the file’s location on a specific server to someone.

Table 4 – Communication modes: Text and sharing documents

4. How important are the communication modes: *Text (like email)* and *Sharing documents*?

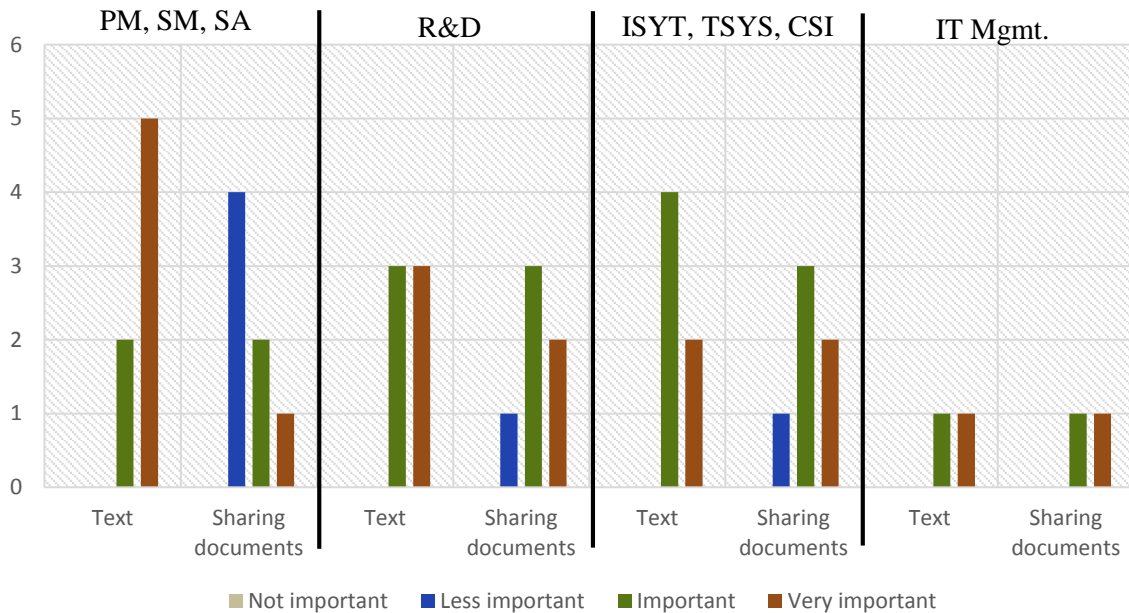


Table 4 shows that text is seen as important or very important to all team constellations. In the constellation PM, SM, SA the majority finds text to be very important for their work. Five participants out of six have selected this option. In comparison, in the team constellation ISYT, TSYS, CSI the majority considers text as just important, since four out of six chose this answer, while R&D and IT Mgmt. is divided on whether text is important or very important. None of the teams, however, found it to be unimportant.

When it comes to sharing documents the majority of participants from the constellation PM, SM, SA appears to find it less important. Both the majority in R&D and the team constellation ISYT, TSYS, CSI found sharing document to be important in their work. IT Mgmt. are divided about sharing documents.

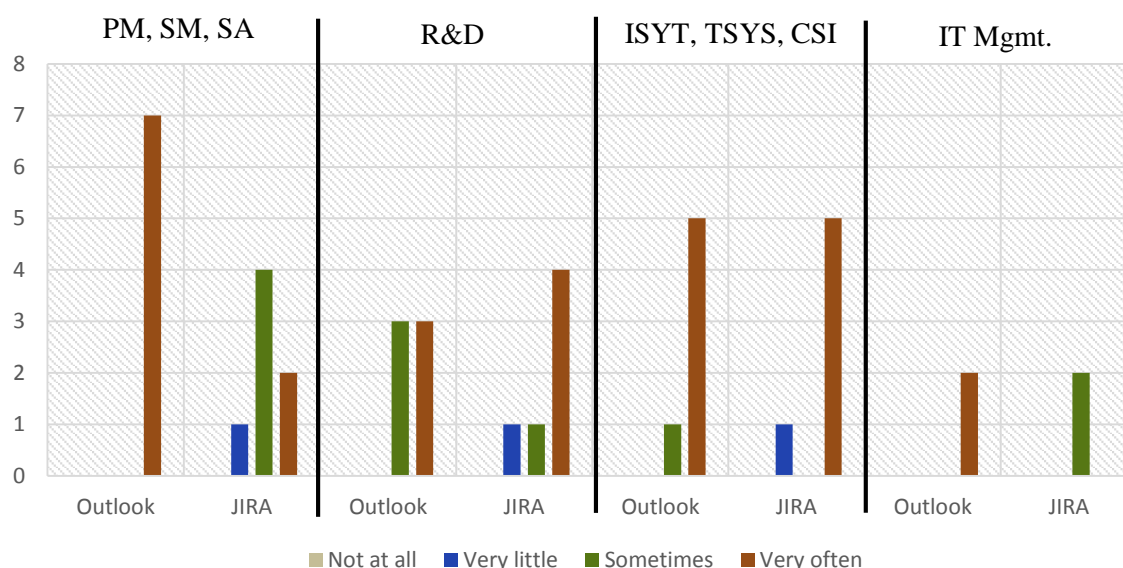
Text and sharing document can mostly be used in the email client Outlook or the issue handling software JIRA. Both of these channels deliver emails. Outlook sends emails inside the office and to customers, and also has the possibility to book meetings. JIRA also sends emails of notifications when a new issue has been assigned to an individual or

an issue has been changed or updated. Both these channels can also share documents.

Table 5 shows the use of the communication channels Outlook and JIRA.

Table 5 – Communication channels: Outlook and JIRA

5. How often do you use the communication channels: *Outlook* and *JIRA*?



In table 5, it is clear that every participant in the team constellation PM, SM, SA uses Outlook very often in their work and that the same goes for IT Mgmt. The majority of participants in the team constellation PM, SM, SA use Outlook for formal requests/messages, and planning (booking meetings) which seven of seven participants answered. Six participants answered meetings and four participants answered to share documents. The team constellation PM, SM, SA commented that Outlook archives the communication history and is on the company’s domain which makes it secure. Sending files via Outlook makes them searchable, something both R&D and the team constellation PM, SM, SA agreed on.

R&D members are divided between using Outlook very often and sometimes, which fits with their answer on text where they also were divided in their usage of the mode text. Outlook is used by all team members for formal requests/messages, while planning (booking meetings etc.) and sharing documents were used by four out of six people in this team.

IT Mgmt. uses Outlook for formal requests/messages, planning (book meetings etc.), meetings and sharing documents.

The majority of the team constellation ISYT, TSYS, CSI uses Outlook very often. All of the participants use it for formal requests/messages and planning (booking meetings etc.). One of the participants commented that Outlook was underused at IT with the probability that it was because emails can be ignored (13, 2015), and another participant wrote that when instant messages are commonly used emails take a subordinate role except for formal requests (08, 2015). Another participant from this team found Outlook to be a good channel since unlike Skype it's not direct and lets you handle the incoming emails once you have time for them (15, 2015).

The other communication channel JIRA is used very often by the majority of both R&D and the team constellation ISYT, TSYS, CSI. In the latter team constellation all participants use JIRA for formal requests/messages, the same as Outlook. JIRA is considered not a very great communication tool in general (08, 2015) but it is good for communication about specific tasks according to the team constellation ISYT, TSYS, CSI. It is good for formal clarification and to keep track on issues. One participant commented that it was risky to use JIRA since the feature where you mention someone and they get an email notification does not always work since the person might not read the notification (13, 2015).

The majority in the team constellation PM, SM, SA and IT Mgmt. use JIRA sometimes in their work. In the team constellation PM, SM, SA six participants use it for formal requests/messages, and they found JIRA to be a good tool for progress tracking as it allows you to find work logs, add comments and attachments. However, one participant commented that some discussions that are held in JIRA should be conducted elsewhere (21, 2015). IT Mgmt. agreed on that it was a good tool for progress tracking and also used it for formal requests/messages.

In R&D, JIRA is used by four participants out of six as formal requests/messages and quick questions. R&D agreed on the previous teams that JIRA is a good tool to track work and issues.

When requesting issues to observe from a developer, the developer wanted to show a specific one to explain when the team for this system solved something very efficiently. The R&D issue was initially added in JIRA and assigned automatically to the support

member in TSYS who is responsible for the specific system the issue was attached to. A member of TSYS looked it over and decided that it was not a support issue, but rather a request for a change in a system. The ISYT member changed it, added a short comment, and assigned it to a developer responsible for the system. The developer looked it over, made the change in the system, and with a comment that it was ready for test assigned it back to the TSYS member. The TSYS member noted the comment, and assigned it to a tester in another department. The tester did the necessary tests, added a comment that it worked and assigned it back to TSYS, whom in turned closed it. All of this communication took place in JIRA with no additional comments in another communication channel for clarification. During the interview the developer explained that it is preferable to keep the discussion in JIRA because it is easy to refer back to things that have been said before. Changing communication channel to Skype would mean that the discussion in Skype needs to be added in JIRA later on, because otherwise it would be forgotten. To book and take part of a meeting would take longer and be more complicated than only asking for clearer instructions, giving answers and solving the issue. The developer also explained that during the weekly system meetings with the system manager, project manager and TSYS, they keep the meetings short and precise because none of them like longer meetings.

In conclusion, all teams use Outlook. R&D is the only team where half of the participants use it sometimes and the other half very often. The team constellation ISYT, TSYS, CSI uses both communication channels very often, R&D uses JIRA very often, while the team constellation PM, SM, SA and IT Mgmt. uses Outlook very often but JIRA only sometimes. All teams use Outlook for formal requests/messages, planning (booking meetings), and sharing documents. The majority in the team constellation PM, SM, SA does not find the communication mode share document to be important. R&D is the only team that uses JIRA for quick questions as well as formal requests/messages. All the other teams only use it for formal requests/messages and according to the comments to track issues.

Instant communication

Moving on to two opposite communication modes: chat and in-real-life. To be able to chat or sent instant messages is possible in Lync and Skype. To be able to communicate in-real-life is only possible if the persons are in the same physical location.

Table 6 – Communication modes: Chat and In-Real-Life

6. How important are the communication modes: *Chat* and *In-Real-Life*?

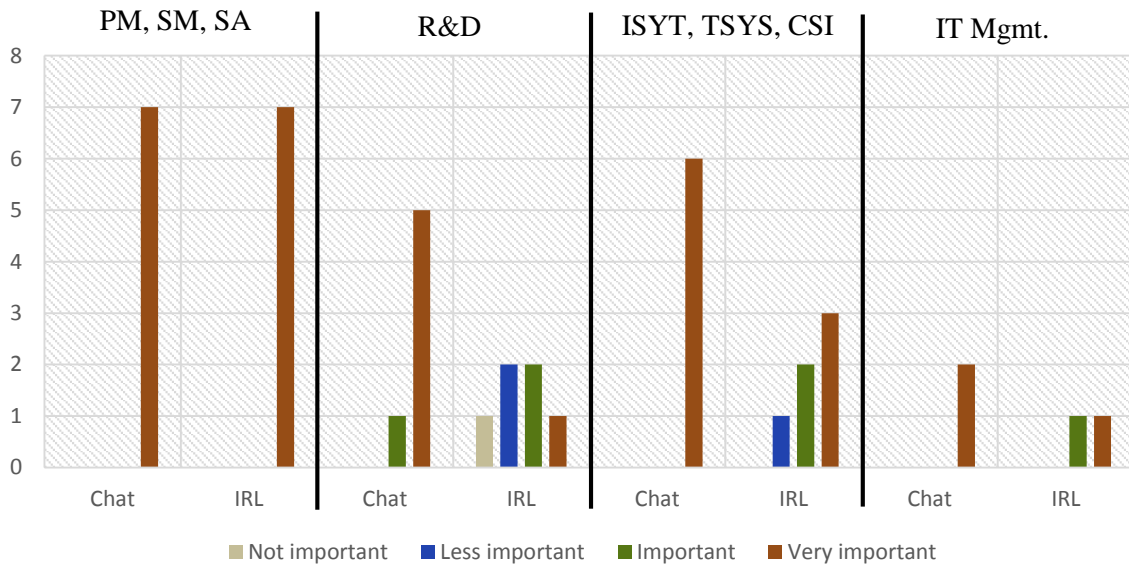
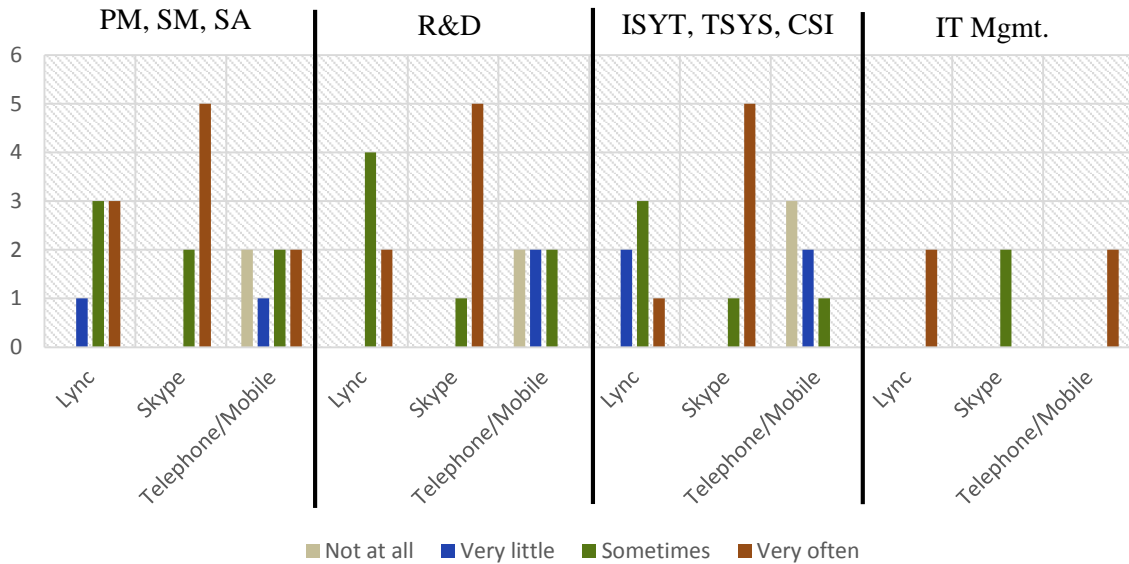


Table 6 shows that all teams find the communication mode chat to be very important. In-real-life, however, is in majority very important only for the team constellation PM, SM, SA and the team constellation ISYT, TSYS, CSI, whom are divided. IT Mgmt. is also divided when it comes to in-real-life. R&D is the most divided team when it comes to this communication mode, but leans more towards less important than the team constellation ISYT, TSYS, CSI.

Chat is used in many communication channels. The most obvious ones at this IT department are Lync and Skype. Table 7 shows these communication channels and the channel telephone/mobile. It has been included here because it shares similarities with instant messages.

Table 7 – Communication channels: Lync, Skype and Telephone/Mobile

7. How often do you use the communication channels: *Lync, Skype and Telephone/Mobile*?



Based on the previous table (table 6) it was clear that all teams found chat to be very important. Table 7 shows which communication channels where chat is included are popular.

The majority of all teams, with the exception of IT Mgmt., agrees that Skype is used very often. Lync, however, is used very often by IT Mgmt. and the team constellation PM, SM, SA is divided between very often and sometimes. R&D and the team constellation ISYT, TSYS, CSI, however, only use Lync sometimes.

Telephone/mobile has fewer users, which is not strange because not everyone at IT has this communication channel available to them. According to table 7 the teams that mostly use telephone/mobile are IT Mgmt. and the team constellation PM, SM, SA.

All members of the team constellation PM, SM, SA all use Lync for quick questions, while five participants out of seven use it for meetings. Skype, however, is used for many more situations (between six to four participants out of seven on each option): quick questions, sharing documents and links, socializing, meetings, discussions and brainstorming. Four participants used telephone/mobile for quick questions. Note that socializing was never mentioned for Lync.

The team constellation ISYT, TSYS, CSI also uses Lync for quick questions and meetings (five out of six participants chose this option), and like the previous team uses Skype for many more situations (between six to five participants out of seven on each option): quick questions, sharing documents and links, socializing, meetings, discussions, planning (booking meetings).

In R&D four participants out of six use Lync for quick questions, sharing documents and formal requests/messages. Like the other teams, R&D uses Skype for many more situations (between six to four out of six participants on each option): quick questions, meetings, discussions, and sharing links. However, these situations are fewer than the previous teams. Four participants from R&D use telephone/mobile for quick questions.

IT Mgmt. uses Lync for quick questions, sharing links, meetings, brainstorming and socializing (which none of the other teams did). IT Mgmt. uses Skype for quick questions and discussions and telephone/mobile for discussions.

In the open questions about these communication channels R&D and the team constellation PM, SM, SA agreed that the good thing about Lync is that the conversation history is searchable and that Lync is secure on the company's domain (like Outlook). Two participants from the team constellation PM, SM, SA use Lync to check the availability of people since the status is connected to the Outlook calendar and change when the person is in a meeting. The team constellation ISYT, TSYS, CSI commented that it was only used when the screen needed to be shared with more than one person (13, 2015), otherwise Skype is a better tool, aside from the fact that Skype does not have a search function. The other teams agreed on the comment that Skype is a better tool which can be used with group chats, either for teams, project teams or other constellations with other stakeholders (21, 2015).

In an ISYT issue a support request was placed from a person in Warsaw who received a transformation error regarding exporting a pdf file. The issue was entered in JIRA and automatically assigned to a member of the ISYT team. The ISYT member looked through the description of the problem but found that it was unclear because the error regarded a language the ISYT member did not understand. To clear up the situation, the ISYT member turned from JIRA and contacted the person who reported the error via Lync. When asking why the ISYT member turned to Lync instead of asking questions in JIRA, the reply was that it was easier to chat directly with the person in Polish, instead of

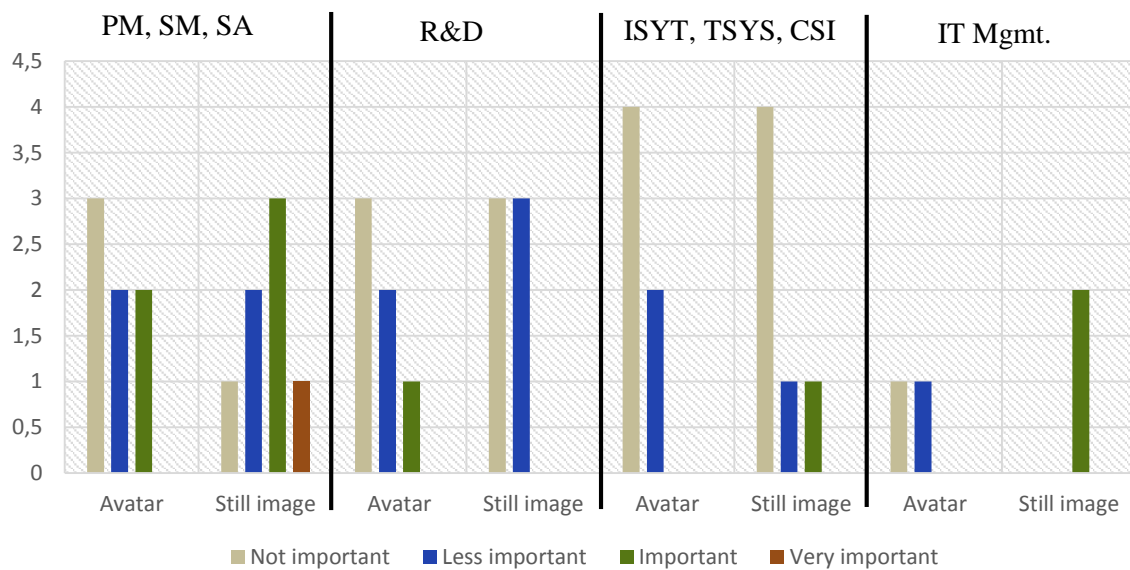
have to write in English in JIRA and wait for a reply. The reply via Lync ended with an explanation of the problem and a suggestion from the person to send the error on to a different office with more knowledge of the language. Instead of doing this, the ISYT member remembered that they had a person with that language competence at the Warsaw office. A discussion in-real-life was held to try to figure out the problem, which could then be fixed without sending it on to another office. During this issue there were three different communication channels that were used: JIRA, Lync and IRL. The option to use IRL was only possible because an opportunity for help existed in the same office. When asking what the solution might have been if IRL would not have been possible, the ISYT member answered that it would have been discussed through Lync or Skype, but it would have taken longer if people did not answer. It was also a matter of urgency, since if it was not an urgent job it might have been solved using only JIRA, but if it were urgent Skype or Lync is better since the communication is faster.

In a chat software there is the possibility to add a still image that will be connected to the individual's name and shown when communicating in the chat. Usually the image will be shown each time the individual writes something in order to show more clearly who said what. To find out what the teams thought about avatars (a cartoon image) and still image (of oneself) these were added as two communication modes, see table 8.

At Xglobal people have the possibility to use a picture of themselves. This picture will be changed to black and white and added in Outlook and Lync, to be visible when sending an email or having a chat conversation or audio-call in Lync. There is the possibility to add it manually into Skype and JIRA.

Table 8 – Communication modes: Avatar and still image

8. How important are the communication modes: *Avatar* and *Still image*?



In table 8, it is visible that avatars (a cartoon image) is not important for the majority of participants in any team, except IT Mgmt. who are divided between not important and less important.

Still image (of that person) is seen as not important in the team constellation ISYT, TSYS, CSI. In R&D it is considered to be both not and less important. However, in the team constellation PM, SM, SA and in IT Mgmt. the majority thinks that a still image is important.

In summary, all teams found the communication mode chat to be very important while only the team constellation PM, SM, SA found in-real-life to be very important. The other teams were more divided when it came to in-real-life, where R&D found it less to not important and the team constellation ISYT, TSYS, CSI and IT Mgmt. found it to be important to less important. When it comes to the different communication channels for instant messaging, the majority of all teams, except IT Mgmt., use Skype very often and in many situations. Lync, however, was used in more situations by IT Mgmt. while the other teams mostly used it for formal requests/message and quick questions. Even in the open question the participants seem to agree that Skype is a better tool than Lync, other than the fact that the conversations in Lync are searchable. When it comes to telephone/mobile, it is a smaller amount of participants that actually have a telephone and

even fewer who use it often. On a team level it was the team constellation PM, SM, SA and IT Mgmt. who used it the most.

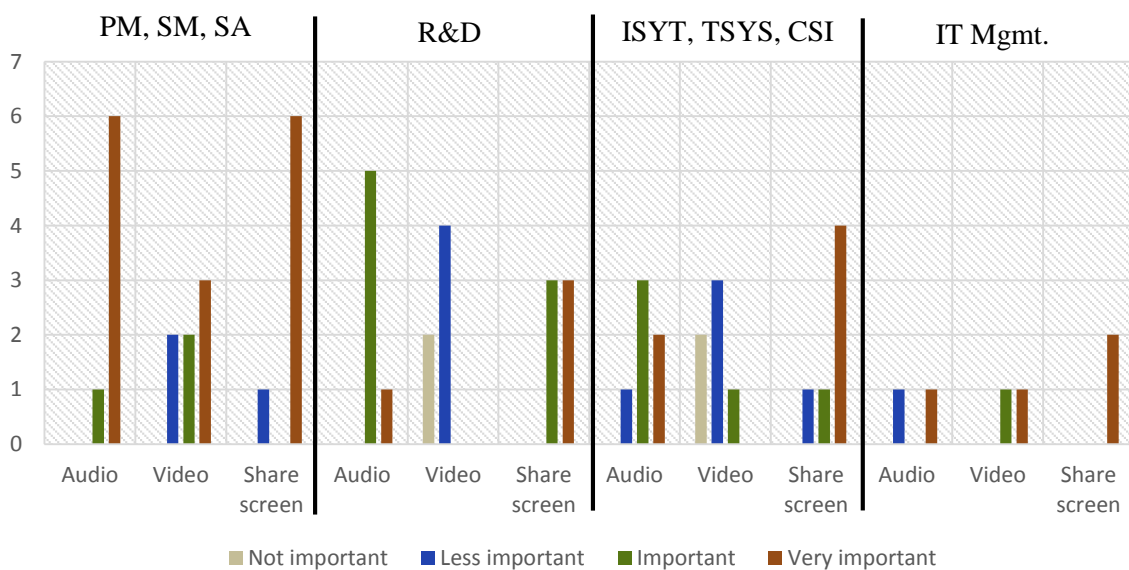
Asking the teams about avatars and still image of the person they communicate with, the majority of all teams found avatars to be unimportant. Only IT Mgmt. is divided in this questions. Still image of the person is not important to R&D and the team constellation ISYT, TSYS, CSI. To the other two teams, however, it is important.

Video conference and In-Real-Life

The three final communication modes are audio, video and share screen (see table 9). These three modes can be included in the communication channels Lync, Skype and video-conference systems.

Table 9 – Communication modes: Audio, video and share screen

9. How important are the communication modes: *Audio, Video and Share screen?*



The majority of participants in all teams, with the expectation of IT Mgmt., found audio to be an important or very important mode. IT Mgmt. is divided between very important and less important when it comes to audio.

Video, on the other hand, is only seen as important or very important by the majority of participants in IT Mgmt. (who are divided here too) and the team constellation PM, SM,

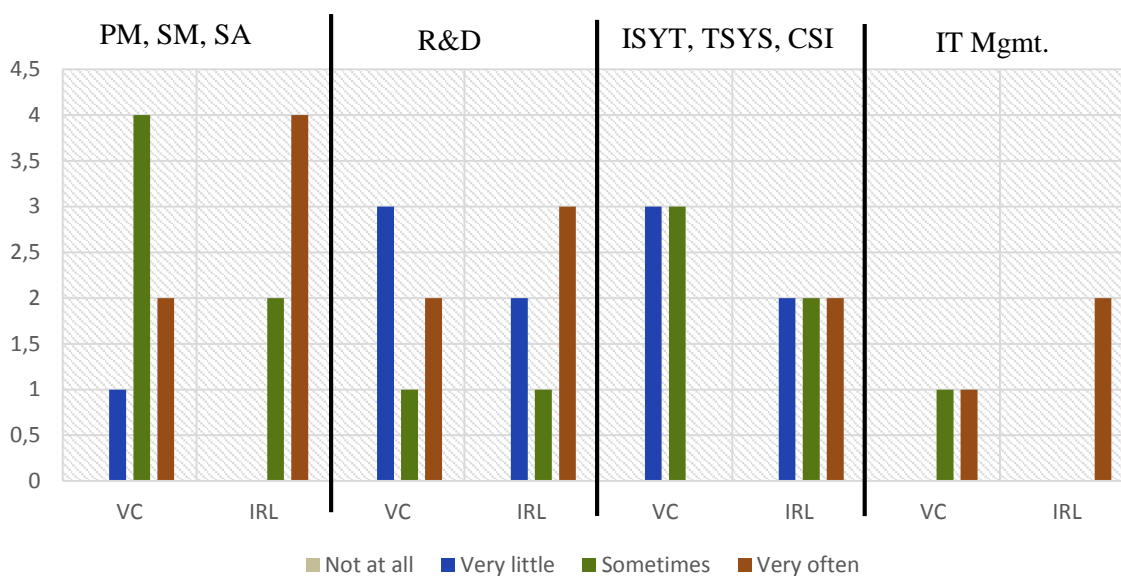
SA. The majority in R&D and the team constellation ISYT, TSYS, CSI find it to be less important.

Share screen is the one mode out of these three that is seen by the majority of participants as very important by all teams, with the exception of R&D who is divided between important and very important.

The two final communication channels are video conference and in-real-life. The channel in-real-life was not specified to the IT team in this question.

Table 10 – Communication channel: Video Conference (VC) and In-Real-Life

10. How often do you use the communication channels: VC and IRL?



The majority in the team constellation PM, SM, SA uses video conferences sometimes and IT Mgmt. is divided between sometimes and very often. However, the majority of participants in R&D and the team constellation ISYT, TSYS, CSI use video-conference very little or, in the case of the team constellation ISYT, TSYS, CSI, sometimes.

The team constellation ISYT, TSYS, CSI commented that the video conference system is of very poor quality, sharing screen either works or it does not (15, 2015) and that finding time to book the rooms can be difficult (07, 2015). The team constellation ISYT, TSYS, CSI uses video-conference system for meetings.

One participant in the team constellation PM, SM, SA commented that video conference is a great way to get close to virtual teams, however, the ones at this company are out-of-date (21, 2015). This team constellation uses video-conference system for meetings, discussion, and brainstorming.

R&D added that a video conference lets people have a real kind of meeting and gets people away from their computer screen. This, however, is only useful if there are more than two individuals at each location, if not a call is sufficient (17, 2015). R&D uses video-conference system for meetings, discussions and brainstorming. IT Mgmt. uses the video-conference system for meetings and discussions.

In-real-life is used by the majority of participants in all teams as very often. Only the team constellation ISYT, TSYS, CSI is divided between very often, sometimes to very little. The team constellation ISYT, TSYS, CSI agreed that in-real-life is good to get an instant answer or to reach consensus in a discussion. One participant commented that it was ridiculous that some people used Skype to talk when they were three meters from each other (13, 2015). The team constellation ISYT, TSYS, CSI uses in-real-life for quick questions, socializing and discussions.

R&D agreed that the best possible way to communicate is with in-real-life, and the majority of participants use it for quick questions, socializing, meetings, discussions and brainstorming.

IT Mgmt. commented that if the person who the participant wanted to talk to is located in the same office, the participant usually talked in-real-life (01, 2015). IT Mgmt. uses in-real-life for quick questions, planning (booking meetings etc.), socializing, meetings, discussions and brainstorming.

The team constellation PM, SM, SA did not share a comment on the communication channel in-real-life. They do use it for quick questions.

When interviewing a project manager, an issue was presented which was part of a bigger project. The PM explained that in the beginning of a project, the system manager for that specific system collects the JIRA issues that should be included in the next release for a system and the issues are looked at together with the customer. When the project is first created they start off with a meeting to go through the project plan, time reporting and which day to book the weekly meeting. This specific project had issues which were to be

developed by a supplier and some issues that would be developed in-house at Xglobal. This specific issue was one of the in-house ones, and the PM explained that the communication mostly took place in JIRA or Skype. In the case when the issue was discussed in Skype, the decision was later added in the JIRA. In the start-up phase when the issue was explained and planned, the PM mentioned that asking for estimations (the time it would take to solve the issue) from the developer it was usually done via Skype with a link attached to the issue itself where the developer could comment with the time it would take. Beside the weekly meetings, most communication during the development phase was done using Skype in case of quick questions or in-real-life, because in this case the project manager, system manager and developer were seated in the same office. When asked why they used Skype or IRL, the PM answered that is simpler to communicate in real life, and when using Skype they could talk in Swedish instead of English which is a must in JIRA.

In conclusion, video was only seen as important to the team constellation PM, SM, SA. The other teams found it to be less important. IT Mgmt. is divided with both finding it to be important and less important.

Audio was seen as very important by the majority of all teams, except IT Mgmt. who is divided between very important and important. The communication mode that is very important for all teams is share screen, even if R&D is divided in how important it is to them.

Video-conference systems are used by IT Mgmt. and the team constellation PM, SM, SA while the other two teams use it very seldom. All teams seem to use the video-conference system for meetings, discussions and brainstorming, except the team constellation ISYT, TSYS, CSI who uses it for meetings only. They were also the team that complained most about poor quality and difficulties with finding a time for booking the system.

In-real-life is often used by all teams. Only the team constellation ISYT, TSYS, CSI is divided equally here in how often they use it. All teams, except the team constellation PM, SM, SA, use in-real-life to socialize.

Favorite communication channel

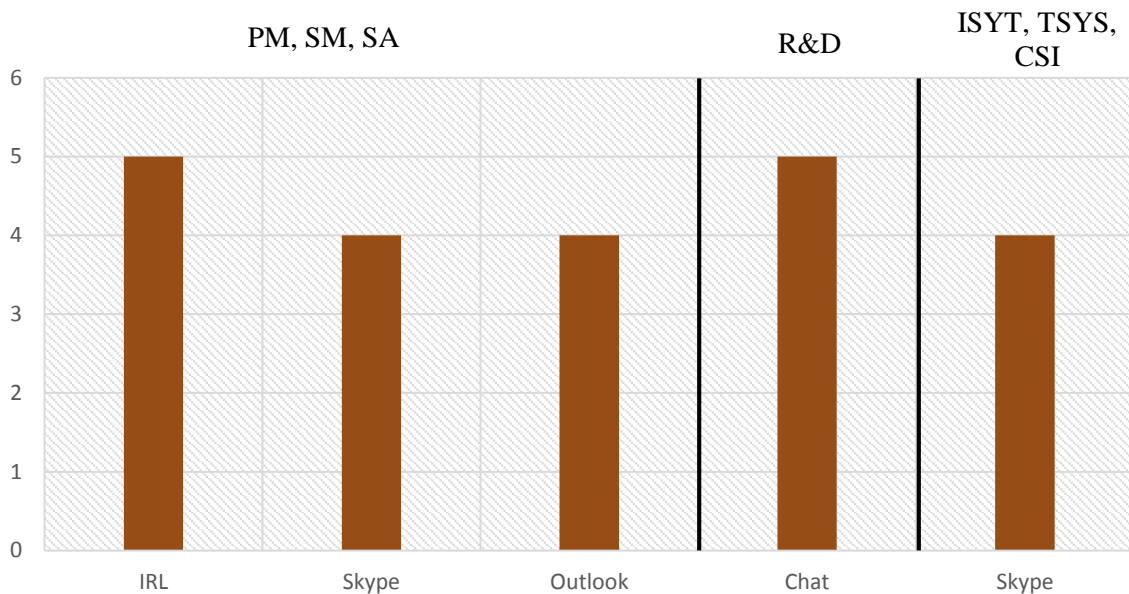
To understand which communication channel the participants had as favorites an open question was included: "Which one is your favorite communication channel?" The

answer option was free text for the participants to add any channel that they might think of, even one that were not included in the questions above.

The table (see table 11) includes the channels that were mentioned by four or more participants.

Table 11 – Favorite communication channel

11. Which one is your favorite communication channel?



IT Mgmt. did not agree on one specific channel and is therefore not included in the table. One participant mentioned IRL, Lync and VC for different situations (01, 2015), and another participant commented that it depended on the situation (16, 2015). One participant in the team constellation ISYT, TSYS, CSI mentioned that Skype is good because it is easy to use and quick. It gives the possibility to use many features like voice call, video call, sharing screen, chat and share links (20, 2015).

All teams presented in the table agreed that the favorite communication channel is Skype (or a general chat). Five participants in R&D wrote chat in general, while four of them said Skype in particular. The majority of participants in the team constellation PM, SM, SA also had in-real-life and Outlook as favorite communication channels.

5.4. Problems and solutions in communication

The final area that will be presented is problems and solutions in communication.

Communication can sometimes be hard and problems can occur. Two open questions were asked in the survey: “What makes communication hard for you today?” and “When the communication channels don’t work, how do you manage to get your message across?”

One of the issues raised by IT Mgmt. is colleagues who are less skilled in English. Both R&D and the team constellation PM, SM, SA also mentioned that there can be language barriers and/or cultural differences.

Another area of problems that was mentioned is distances between members. The team constellation commented that geographic separation makes communication hard, as well as time zones. Time zones can be very hard because it is hard to find a reasonable time slot for meetings between US, UK and India (19, 2015). IT Mgmt. agreed that this could be a problem and that there were budget restrictions on travels, which would mean that not everyone can go to see their team members face-to-face.

One participant from R&D raised the issue that there are long response times, and that emails usually have a slower response time than Skype or Lync (18, 2015).

The biggest problem area, however, is technical issues. All teams commented on the video-conference system which was either poor quality, unavailable or simply not working properly. One participant commented that it could take up to ten minutes before the meeting could start due to technical issues (21, 2015). Another participant raised the issue that there are multiple ways to communicate which can add confusion and distraction (08, 2015), and when things do not work the risk is that people spend more time trying to fix the problem to be able to communicate than actually communicating.

IT Mgmt. addressed the fact that problems with technical platforms is solved by trying another channel. “If there are problems with the video-conference system you can try Lync. If Lync does not work, I try Skype” (01, 2015). This approach is repeated in other teams’ responses to solutions. More than half of the participants that took the survey find that the solution to a communication channel that does not work is to change the channel. Some suggested talk face-to-face, use Outlook, or Skype.

6. Analysis and discussion

In this chapter the research overview, theoretical perspectives will be used to analyze and discuss the data from the previous chapter. This chapter has been separated into four different areas: team members distribution, socializing, communication modes and channels, and knowledge and knowing. The last area will connect back to research overview and theoretical perspective regarding knowledge in virtual teams.

6.1. Team members distribution

When asking teams whether or not they found sharing an office to be a good thing, only the team constellation PM, SM, SA thought it was all good. R&D thought it was best not to share an office and the team constellation ISYT, TSYS, CSI was divided if sharing an office was good or bad. However it is never discussed what teams might prefer in the research overview, only that team member separation might affect work performance and teamness negatively (Stawnicza, 2014; Klitmøller, 2013; Bell, 2002; Malhorta, 2014). Researchers have agreed that face-to-face is the richest media (Klitmøller, 2013; Nemiro, 2001) and that virtual teams that are distributed in different locations are vulnerable to different risks (Stawnicza, 2014; Malhorta, 2014), based on this knowledge it could be concluded that virtual teams would prefer sharing an office, because then they would not need to work with communication risks that made it harder to trust each other, or deal with language and cultural differences (Klitmøller, 2013). The result from this study, however, suggests that these virtual teams do not care about sharing or not sharing an office. The only thing they seem to note about sharing or not sharing an office is that it might be harder to socialize from different locations, like the comment from IT Mgmt. that not being at the same location means you miss out on informal discussions and lunch breaks. Both the IT Mgmt. and team constellation ISYT, TSYS, CSI said sharing an office is good for being social, however most participants (with the exception of PM, SM, SA) commented that it was better for focus not to share office. To find more evidence that virtual teams who are working together every day might not care as much about how they are distributed, more research should be focused on this question, and to widen it expand the research to more companies than just one. It might differ between companies, and it might also differ between tasks that the virtual teams work on.

The empirical research also mentions that a project team that is created has a short lifespan (Bell, 2002). The team would only be together for as long as the project was

ongoing, and the lifespan is determined by the task (Bell, 2002). Looking back at the issue from R&D, they were also working in project teams with one person from SM, one from TSYS and one developer from R&D. However, it is possible that some of these teams are reoccurring based on the PMs' comment that there is a specific System manager for a specific system. An example of reoccurring teams can be seen in the R&D issue shown in the results were issues are automatically assigned to someone responsible for that specific issue subject. In conclusion, there are individuals at this IT department who are part of multiple teams. The question "Do you share an office with any team members?" yielded some strange and noticeable responses that might twist the data. When participants from R&D answered this question, some placed themselves as "not sharing an office" even though they were stationed in Stockholm where several R&D members are stationed. Therefore, the conclusion can be drawn that some members of these department teams (R&D, PM, SM, ISYT, TSYS etc.) might not see themselves as members of R&D. Instead they see themselves as members of a project or system team, which contains members from different department teams as seen in the R&D issue where members from TSYS, R&D and another department at the company all worked together.

Stawnicza (2014) argued that trust and teamness are based on communication. Is it possible that they feel a closer teamness with these individuals because they work more closely together? According to Nemiro (2001) a virtual team is interdependent and work towards a common goal. It is possible that the members of R&D do not work towards a common goal, but rather on different goals in their specific systems. Additionally, unlike PM and SM who work using the same work tools (i.e. Project managers work with tools for projects) and by that feel a connection to each other and the PM team, R&D works with their specific tool or system (which can be seen as tool) and does not share common tools. They might share common knowledge on programming and software design, but not on the tools that they work with every day. Therefore they might feel more connected to the members from other teams that work together with them on the specific systems. There is no basis for this in the data and therefore it cannot be proved in this study. It would be interesting to study this further, possibly with interviews, to find these other teams that might exist in the IT department and if their members feel more connected to them than to their department team.

6.2. Socializing

Being social seems to be an important aspect for all members in these teams. With the majority answering number five on a scale between one and six, it is clear they find it to be important. Stawnicza (2014) argued that trust and teamness are based on communication and that it gets deeper the better members communicate with each other. Communication also builds respect according to Horvath (2001). The teams' comments on socializing aligned with previous studies, and it is clear that the team members find it important to build a sense of comradery. One comment from the team constellation ISYT, TSYS, CSI was that if you are friends with your colleagues you can unload without the fear of offending them. That is trust in team members. There were risks brought forward by the teams that by knowing someone too well you may prioritize based on this, or that socializing can lessen the work performance. Once you know each other it is easier to work on tasks and clear up misunderstandings. This has been argued in previous research (Stawnicza, 2014; Horvath, 2001). However, there is less discussion about how socializing or being too social can affect work performance. Hypothetically it is possible that people who know each other better might prioritize a request because of this friendship. It is also possible that during a conversation with people it loses track of the work task and instead starts to discuss other areas. This would be a complicated situation since it might not be possible to build a friendship or teamness if the members were not allowed to talk about other life issues in addition to work related issues. If this is the case for these teams, it is not visible in the data. What is visible is that some teams prefer to be more social than others. For instance, the majority in the team constellation ISYT, TSYS, CSI considered socializing not a five, but a six on the scale.

When presenting the data, one possibility occurred when it comes to the team constellation ISYT, TSYS, CSI. It has been created based on the supportive nature of the work performed by its members. However, the ISYT team works on information system support, TSYS works on technical system support, and CSI works with hardware support. They all work with different kinds of support, but is it possible that the deviation that can be seen in some of the diagrams in this team constellation is due to these three teams differing very much from each other? Looking through the diagrams there are some areas they are less divided in: the use of Outlook and JIRA, chat and the use of Skype, avatars and still images, and sharing a screen. In conclusion, all these teams work a lot using Outlook, JIRA and Skype and when communicating they prefer chat and sharing screens, and they do not care about avatars or still images of the person they

communicate with. It would have been of interest to look closer into these three teams and find more proof of this hypothesis than the current data can provide. For further research, a suggestion could be not to place teams in constellations since teams might differ more than the names suggest. This was not possible for this study since the constellations were created to protect the anonymity of the participants.

Returning to the subject socializing, it was clear that all teams found this to be important, and that it is important that team members know each other. One interesting occurrence was seen in the communication channels Lync and Skype. More about these channels further down, but when asking in which situation these channels were used all teams, except IT Mgmt. and R&D, said they used Skype for socializing. On the contrary IT Mgmt. used Lync for socializing. R&D only seemed to use in-real-life for socializing, which was an additional channel for socializing for the other teams.

6.3. Communication modes and channels

One of the areas for this thesis was to find out if different teams work differently from each other and how they use the communication channels and modes at their disposal. These communication channels and modes can all be seen as tools, using the socio-cultural perspective. At the same time the teams different way of working can also be seen as cultural societies that has been created depending on the knowledge these teams possess and what kind of work they do.

The research on the subject focuses on communication channels that are preferred and best suited for different situations. Face-to-face is seen as the richest media and email is considered the leanest (Nemiro, 2001). Face-to-face should be able to be reached when adding as many communication modes as possible to a communication. If there is the possibility to add video, audio, screen sharing and text this would be a rich media like face-to-face or in-real-life. Depending on the view these two can be the same or differ. In-real-life you see the entire body of someone and can touch the person. Face-to-face can mean the same thing, or it can be that you see each other's face which can be accomplished by two connected computers showing video. In-real-life is when you can touch the other person which would be the richest medium, face-to-face is closer to a video-conference system and from there communication modes can be removed until only text is left, which is the leanest media since most communication cues are removed. Chat should be seen as something a bit richer than email since it is a faster

communication and there is the possibility to add smileys to the conversation to hint how the speakers face might look like. This is not specified in the research or proven in the data from this thesis. It is a hypothesis built from the data and research.

Instant messages, which would involve chat, is according to Malhorta (2014) a good way to keep up team awareness which will erase more knowledge boundaries (Malhotra, 2014). Quick questions and assumptions can be double-checked using instant messaging (Malhotra, 2014) and it would speed up the work progress (Stawnicza, 2014). The researcher van der Land (2015) proved in her research that the possibility to find similarity in the avatar viewed in a chat of oneself or similarity with team members' avatars can enhance the work performance (van der Land, 2015). However, it was mentioned that only finding one similarity, like a cartoon image, that did not lessen the performance, but there was no proof that it heightened it either (van der Land, 2015). Malhorta (2014) confirmed that the communication channel cannot be the only reason for a team's performance, instead it is necessary to understand that the communication channel needs to match the team's needs (Malhotra, 2014).

When it comes to the teams that this study has researched, they might work differently from each other when it comes to their use of communication channels.

Video-conference systems and In-Real-Life

Looking at these teams and their view on the richest communication channels and modes, an interesting discovery was made. The idea that maybe virtual teams would prefer richer media might not be true for these teams, or at least some of them. Only IT Mgmt. and the team constellation PM, SM, SA found video to be a very important communication mode, while the other teams did not. Instead audio was more important to them. Audio as a communication mode was very important to all teams.

Do R&D and the team constellation ISYT, TSYS, CSI find it to be more important to be able to talk to each other and hear each other voice than see each other? It is possible that they work in such a way that when they need to explain something they use audio and share screens, which was another communication mode these two teams found very important. Perhaps because these teams are working more with technical issues (development and support of systems) they find it more important to see and understand the systems than the people they work with? While IT Mgmt. and the team constellation

PM, SM, SA work more with people than systems, and therefore find video to be a needed mode to be able to understand people.

Looking on how these teams work with the communication channels that are the richest, video-conference system and in-real-life, there is a connection visible from the communication modes and the use of these communication channels. IT Mgmt. and the team constellation PM, SM, SA use video conference sometimes or often.

The majority in the other teams uses video-conference very seldom or in the case of the team constellation ISYT, TSYS, CSI, sometimes. IT Mgmt. and the team constellation PM, SM, SA seem to prefer richer media to communicate. R&D does not use video-conference often, but when they do they seem to use it for the same situation as IT Mgmt. and the team constellation PM, SM, SA. They use it for meetings, discussions and brainstorming. What differs here is that some participants in the team constellation ISYT, TSYS, CSI used the video-conference system more than R&D. However, the majority of members in the ISYT, TSYS, CSI only use the video-conference system for meetings. This might indicate that the team constellation ISYT, TSYS, CSI prefers to use other communication channels for discussions and brainstorming. There is no data why this could be, only that many participants from this team constellation commented on the bad quality performance of the video-conference systems, which might be the reason for why they only use them for meetings.

Looking at the richest communication channel there is (in-real-life), it is used very often by the majority of all teams, except the team constellation ISYT, TSYS, CSI who is divided in their use. One third of the team participants uses it very often. The situations when the teams use in-real-life differs. What was of interest was that the team constellation PM, SM, SA does not use in-real-life to socialize. This is interesting because they are the teams that throughout the data seem to be more positive to seeing people they work with in real life and sharing the same office with their colleagues than the other teams.

There is a possibility that some participants who answered this question on when they use the communication channels were thinking only of communicating for work within the IT department and therefore did not find socializing to be part of it.

Email and JIRA

Moving on to the flattest communication channel: email and JIRA. The visible pattern in the data showed that IT Mgmt. and the team constellation PM, SM, SA use Outlook very often and both consider it an important communication mode. They do not use JIRA as much or sharing document. These tools are more used by R&D and the team constellation ISYT, TSYS, CSI.

A possible reason for this is that these teams differ in their work tasks. R&D and the team constellation ISYT, TSYS, CSI work with issues (development or support) that comes in via JIRA and need to use this communication channel or tool often. The other teams IT Mgmt. and the team constellation ISYT, TSYS, CSI, do not work directly with the issues that come in via JIRA. Instead they collect them for projects or system releases and give them to developers or support to solve. This means that they keep track of them but they do not work directly with them. These teams do however work more with Outlook, perhaps because they need to keep a formal contact with customers or colleagues outside of the IT department, where email is perhaps the best communication channel to use. There is no basis in the data to support that this is why the communication channels are used in such differing amounts for their work. This would be an interesting question for further research; to look even closer at an individual's daily work and how this person changes communication channels and tools depending on the work at hand. This thesis has only started to scratch the surface of the subject and more research is needed to get a better understanding on how teams work and why. Using interviews as a method would possibly give more information as to why, as would observations during a work day.

Skype and Lync

The communication channels Skype and Lync can consist of many communication modes. Focusing on the mode chat, it is a quick way to keep in touch and get a response. Skype was seen as the communication channel that was used the most and the comments and table 11 (which is your favorite communication channel?) suggested that Skype was the favorable communication channel. It was used for many different situations. What was surprising was that all teams, except IT Mgmt., used Skype for almost all situations included in the question (quick questions, sharing documents and links, socializing, meetings, discussions etc.). IT Mgmt. on the other hand did not use Skype for more than

quick questions and discussions, but instead they used Lync for most of the situations mentioned above. The other teams used Lync for quick questions and meetings.

Apparently, based on this data, IT Mgmt. works with these two communication channels completely opposite from the rest of IT. According to Malhorta (2014) instant messaging builds a communication situation where spontaneous asking is acceptable, where individuals can check assumptions which will keep everyone in mutual understanding in an early stage, without the need to book meetings to explain a situation (Malhotra, 2014). The research does not, however, mention that this method might be preferred by virtual teams. It is also discussed that instant messages are a quick way to get feedback and it is important for the work performance (Stawnicza, 2014).

In the open questions, comments that participants preferred Skype over Lync were included. It is possible that the reason why teams prefer Skype over Lync is because Skype was available first. When Lync came it was decided that Lync should be the main communication tool for instant messaging, however, it seems that the team still prefer Skype. Perhaps Skype is seen as faster than Lync? Maybe Lync is seen as more formal since the participant has the entire company's staff in their address list from the start, while on Skype you need to add each contact. Adding a contact manually might create a stronger bond to that person. If members of the IT department have added the colleagues they talk most to on Skype, this can be seen to create a personal "family-circle" inside a larger company. There is no basis that this is the reason why teams seem to prefer Skype over Lync in the data.

The communication channel telephone/mobile did not give any direct information other than that IT Mgmt. and the team constellation PM, SM, SA seem to be the teams that use it the most, while the others might not even have the possibility. It is possible that only some members of the IT department need to have the possibility to contact people via telephone/mobile. It is possible that these teams use telephones for the same reason they use e-mail and video-conference more often. They have the need for a stronger relationship than the other teams, who in the case of having to ask a quick question might turn to Skype or Lync as a communication channel instead.

Chat (or Skype) was also seen as the favorite communication channel. This is interesting because according to the research people prefer in-real-life since it is the richest media. It is only the team constellation PM, SM, SA that mentioned in-real-life as a favorite, while

the majority of the other teams favored Skype. One participant commented that Skype was easy to use. The research does not comment on a channel being favorable because it is easy to use, only that some communication channels include more cues and make communication easier. It is possible that Skype is favorable because it gives many people different communication possibilities. People can both write instant messages, call each other using both video and/or audio and share a screen.

Avatars and still image

When it comes to the communication modes avatars and still image, the teams answered surprisingly. Based on van der Land's (2015) work, these should be important to heighten team performance. The team performance was highest in the team with avatars that were similar to themselves (self-identification) and the entire teams' avatar were similar (team similarity) (van der Land, 2015). These teams were seen as more socially attached to each other and worked better with each other, while teams without similar avatars had a less close relationship to their group (van der Land, 2015).

The teams in this study, however, do not seem to view it this way. Instead only IT Mgmt. was divided about avatars. A possibility for this is that if people start to use avatars that differ from each other, and this will be visible to the rest of the company or to customers, the department or the company might give a less professional look.

Still image of the person one is communicating with might be seen as even more important, since it gives a clue as to how the person looks, and if all team members have an image which is similar it should, according to van der Land (2015), build a stronger teamness. But these teams found it to be unimportant for them. Van der Land's research is based on students who have never talked to each other before or met in real life. It might be possible that in that situation, when a student sits down in front of a computer to communicate with two strangers, seeing similarities in the avatars or image will give comfort and heighten the team spirit. Therefore, it is possible that in a company where people work together all day using different communication channels and where most people one time or another have seen the other person via a video-conference system, during a meeting or a quick Skype call, they do not need these images to feel connected. They build the connection during a longer time period and during conversations in different channels.

Perhaps R&D and ISYT, TSYS, CSI usually talk to people who they have seen on video conference or in real-life, so the need to remember what the person looked like is not important during instant messages or audio calls. PM, SM, SA and IT Mgmt. might contact a more diverse group of people whom they have never met or talked to. Perhaps seeing an image of such a person facilitates the first meeting.

It is then possible that teams build teamness differently. The students in van der Land's research had only one task at hand and a deadline for solving it. The people in these teams at IT have multiple tasks to solve with multiple people. They sometimes have a deadline, but they also have time to socialize with each other during the work days in order to build team spirit. That can be a reason to why this data contradicts van der Land's data. There is no proof in this thesis' result that the team performance is changed if these team members were to have images or avatars. This data only shows their view on that specific communication mode, not if they have it or what the result of having it might mean for the team performance.

Problems and solutions in communication

When it comes to problems that virtual teams face, many of the problems that previous researchers have mentioned affect virtual teams were mentioned by the teams themselves. Language and cultural differences are mentioned as a potential problem by the teams which can be referred back to previous research. Klitmøller (2013) mentioned that a risk for virtual teams is that they work with different cultures and people with different native languages. Additionally, this can according to Bell (2002) and Klitmøller (2013) make communication difficult. Another risk that was mentioned is time zones. Researchers mention this as a typical situation for virtual teams (Bell, 2002; Klitmøller, 2013; Malhotra, 2014) and something that might lessen the performance together with team distribution in general between team members where meetings in-real-life are impossible.

When it came to more technical difficulties that the teams face, the one relating to the fact that instant messages were faster and quicker to get response from than email where discussed by Stawnicza (2014). She claimed that this might be a generation shift, that people born from 1980 and on would prefer instant messages over email (Stawnicza, 2014). This cannot be proved in this study since a question about the participants age was

not included in the survey. Based on Stawnicza's claim, one might draw the conclusion that the participants in this survey were born after 1980.

One problem that has not been discussed in the research for this study is technical difficulties when technologies do not work. Based on the result, this seems to be the biggest problem the participants face on a daily basis, such as one communication channel not working at a given time, requiring them to either spend precious time trying to solve it or change the communication channel. In two examples from the data there were problems with a video-conference system where the participants solved it by choosing another channel like Lync or Skype, which also have the option to make video calls. One participant did comment that there are many different communication channels and that this can lead to misunderstandings on which to use and when. This might be an issue connected to communication outside of the typical teams, who seem to have found their specific communication environments, but there might be confusion in communication when talking to someone else. Based on the result, it might be possible that a project manager, who prefers to talk using video and book meetings, books a meeting with a developer to have the kind of communication that the project manager finds to be the best when exchanging information. However, based on the data, a developer prefers to have a faster communication using JIRA or chat, where video is not necessary. Having this meeting might give the developer a sense of stress because this is not the "natural" way of communicating for this participant. There is no basis for this in the data shown in this thesis or the research overview, however it is based on the socio-cultural perspective that humans are flexible and can adapt, but to be able to adapt they need to experience the situation and learn from it, which can only be done through communication. If the developer has been working only through the way that R&D seems to prefer, then the sudden change when working with a project manager might be hard at first before the developer or the project manager learns and adapts to each other's work method.

In conclusion, it seems that IT Mgmt. and the team constellation PM, SM, SA work very much alike, having larger communication situations where a richer communication channel is preferred. Meanwhile, R&D and the team constellation ISYT, TSYS, CSI work more in the same way, having the need for a quicker and faster communication where only the most necessary communication modes are needed, usually audio and sharing a screen.

6.4. Knowledge and knowing

Since these teams seem to prefer leaner media over face-to-face, it is possible that these teams have found a specific way to communicate that does not take up too much time, i.e. so it does not intrude on work, but at the same time is social enough to make them trust each other to be honest and open. This is a possible knowledge that these teams have collected while working together. The team members have tried each other out and found what works best for each team.

For instance, R&D seems to find it best to be distributed between different offices since this is best for focus, and uses JIRA to send work back and forth between each other with only a few comments. The less time placed on discussions the better. The information shared when working seems to be mainly via JIRA and less using e-mail. Socializing is done in-real-life, which could indicate that it is not necessary for R&D to communicate with all the team members on the basis that they feel more teamness with the system or project teams than with the department team R&D.

The team constellation PM, SM, SA seems to be more for sharing an office and be able to talk in-real-life. They use Outlook more and sharing document less. However, they seem to think that chat and in-real-life is equally important which might suggest that they need both for their work. Since they share an office with more team members, they might work with more members in different offices which means they need chat to communicate while performing their work tasks which in turn would explain why they use video-conference systems and chat more frequently.

The team constellation ISYT, TSY, CSI seems to be divided between how R&D thinks and how the team constellation PM, SM, SA thinks. However, they are more for chat than they are for in-real-life, perhaps because they like R&D think that focus is better for work, on the other hand they think socializing is more important and it seems to be needed for them to build their teamness. A hypothesis for why this is might be because they use rich media less and chat more to because they want to be fast and flexible in their communication, therefore they need to communicate and socialize more frequently using these channels to keep the trust in their team.

Malhorta confirmed that the communication channels are not directly related to team performance. “[I]t is not simply a matter of matching the technology to the task, but rather matching the technology to the coordination needs of the team” (Malhorta, 2014,

p.397). Is it possible this is what these teams have done? They have built a way to communicate effectively with each other from a selection of communication channels. Each team is similar but they differ too. These teams have built their own environments that fit their work using the communication channels and modes to their disposal. They need to change and be flexible depending on who they communicate with in the company, but within their specific team they have a specific way to communicate. Because virtual teams need to become flexible to understand each other's cultural and language differences, it is also possible that they are also flexible when it comes to the communication channels. During the teams' lifespans (may it be a couple of months up to several years) the team tries out different communication channels that the company offers until finding the one fitting their needs the best. Bhappu (2001) lifted different knowledge processes that can occur in an environment. Knowledge acquisition is when a situation takes place where a team recognizes the importance of a new knowledge and is able to acquire it (Bhappu, 2001). This can be said for these team members. They have understood that they need to be flexible to be able to work with each other, and to be able to do this they have created their own working environments. Because these teams work with the same communication channels and modes they can still work well with team members from other teams, i.e. project teams and system teams. However, the environment they have built with their team members is the one where they feel most comfortable. This might suggest that it could be hard for a team member to change teams or for a new team member to come in to a team, but since most teams found socializing to be important it is very possible that when a new team member arrives the older team members will show the new one how they prefer to use the communication channels and modes. Which in turn means sharing their knowledge to new members.

Therefore teams use communication channels in different ways, depending on the team's working environment and the main reason for the team to exist. A team built for a two month project might create a communication environment fitting for longer discussion, brainstorming and traceable solutions (i.e. possibility to return to previous meetings to see where a decision was made), while a team built to connect people with the same work responsibilities for several years might instead build a communication environment fit for quick questions and support (both technical and social) to each team member when they get stuck in a task or need to vent. These communication environments could be seen as a big team learning platform (based on personal learning platform theory). It is possible that each member at this IT department has created their personal learning

platform with their personal favorable communication channels and modes, and because they work with a team with similar knowledge and skills they have started to connect the individual platforms to one common team platform. Knowledge integration is the process when team members collectively combine their knowledge to one output (Bhappu, 2001). In these teams they have created a communication environment that best fits their work. Where they are able to share their knowledge with the team members in order to move forward in their work tasks and their personal learning. Creating a communication environment that builds both the individuals knowledge and the team knowledge.

7. Conclusion and summary

Teams work differently depending on their situation and environment. Virtual teams are flexible and find the best workable environment using the communication channels and modes available to them. They work around problems like language and cultural differences and when communication channels break down they are flexible in selecting a back-up channel. It is important to understand that teams work differently and prefer different ways of communicating. It depends on both their work and their way of socializing. These virtual teams, co-located and distributed, communicate among themselves and the rest of the IT department in different ways. There is a clear similarity between the teams since they work with the same tasks and use the same communication channels. However, different teams seem to prefer different channels when communicating. All teams prefer chat, the only difference is that IT Mgmt. uses another chat channel than the rest of the teams, which might be because they favor the easiness and familiarity of that communication channel over the one IT Mgmt. prefer.

Why these teams prefer different communication channels is not easy to answer. Based on how they work, it seems that R&D and the team constellation ISYT, TSYS, CSI prefer quicker replies than the other teams. The issue followed from R&D was handed to the researcher with the intention of showing when the team worked most effectively, hinting that this is the way R&D prefers to work. The team constellation PM, SM, SA seems to prefer richer media and face-to-face, preferably in-real-life possibly because they work closer to people than to systems like R&D does. The team constellation ISYT, TSYS, CSI was closer to R&D's way of working, except that the majority of participants in that team found socializing to be very important (unlike R&D), suggesting this is an important factor for this team constellation. The comment from one participant that it is good to know the people to be able to unload without hurting their feelings, suggests that

these teams need a more talkative environment. The team constellation ISYT, TSYS, CSI seemed to use different channels for socializing, unlike R&D who seemed to socialize mostly using in-real-life.

When it comes to the risks that are affecting the work these teams do, they seem most affected by the video-conference system and the lack in functioning properly. However, they work around it by using other communication channels. The risk mentioned from other researcher about being disrupted in time and space does not seem to affect these teams negatively according to themselves.

Based on the result from this thesis, the implication for communication for virtual teams is to give teams the flexibility to find the communication channels and modes that work best for them and their work. These teams seem to have created their own environment to communicate in and to share their knowledge and skills with each other. It is important for teams and their members to be open to and accepting of other ways of working in order to be able to work with different members from different teams. To have an open communication on how they as individuals work best.

It is important for management to understand that not all teams work in the same way, that some teams find quick and clear communication to be the best while others need to talk and be social during their work to feel more at home in the work environment and to be able to perform better.

As a final conclusion for this thesis, were it possible to do the research again, different methods might have been chosen. The data might have given more answers if it had been collected using interviews and more observations.

For future research, a suggestion is to use methods like the ones mentioned above to gather a more qualitative material which might give a deeper insight to individuals and the question why they choose different communication channels for different situations. Areas that can be of interest for future research are to look into how teams are built, and whether individuals might find themselves connected to more than one team. Another area is to look closer at individuals' work and how they shift in communication channels and when and for what purpose they shift. For such research, observation would be a positive method. The last area of research is to look into avatars and still images. This study could not answer why these participants did not find avatar or still images to be important or if this affected their work performance.

8. Bibliography

8.1. Tables

Table 1 – Who answered?

Table 2 - Sharing vs not sharing office

Table 3 - Socializing

Table 4 – Text and sharing documents

Table 5 – Outlook and JIRA

Table 6 – Chat and In-Real-Life

Table 7 – Lync, Skype and telephone/Mobile

Table 8 – Avatar and still image

Table 9 – Audio, video and share screen

Table 10 – Video Conference (VC) and In-Real-Life (IRL)

Table 11 – Favorite communication channel

8.2. Literature

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