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Diploma Thesis

Modern Information and Communication Technologies In Management of Multinational Companies: Analysis of Videoconference

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DIPLOMA THESIS ASSIGNMENT

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Thesis title

Modern Information and Communication Technologies In Management of Multinational Companies: Analysis of Videoconference.

Objectives of thesis

The main objective of this thesis is to analyse and select an optimal software solution of videoconferencing system for a multinational company.

The partial goals of the thesis are such as:
- to create a comprehensive overview of current videoconferencing solutions in the market,
- to analyse and select an optimal software solution of videoconferencing system for a multinational company,
- to develop a feasibility study and evaluate a decision-making process.

Methodology

Literature review is conducted using methods of synthesis, induction, deduction and extraction. Analytical section is done with the use of multiple criteria decision analysis (MCDA) methods by interpretation of gained results. Based on the theoretical part and practical estimations, discussion and conclusion are provided.

The proposed extent of the thesis

60 – 80 pages

Keywords

Management in Multinational Companies, Competitive advantage, Videoconferencing, Telecommunication, Multiple Criteria Decision Analysis,

Recommended information sources

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Declaration

I declare that I have worked on my diploma thesis titled " Modern Information and Communication Technologies In Management of Multinational Companies: Analysis of Videoconference" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the diploma thesis, I declare that the thesis does not break copyrights of any their person.

In Prague on _____

Modern Information and Communication Technologies In Management of Multinational Companies: Analysis of Videoconference

Abstract

This work illustrates and discusses an impact of information and communication technologies (ICTs) in the modern world and how they are currently used in the strategic management of multinational companies. The literature review gives an overview of ICTs and specifics of running an international enterprise, as well as an in-depth description of videoconferencing (VC) solutions, applications and vendors. The practical part is primarily focused on VC as a tool for facilitating meeting and discussion processes. Firstly, associated costs and benefits of VC implementation are presented in comparison to international traveling. Secondly, several interviews are conducted, and a content analysis is used to get a profound understanding of how advanced meeting planning is used by senior managers for achieving corporate goals and arranging effective team discussions. In the end, a suggestion of one of the available VC solutions is provided for the considered company.

Moderní Informační a Komunikační Technologie v Řízení Nadnárodních Společností: Analýza Videokonference

Abstrakt

Tato práce demonstruje a pojednává o vlivech, které informační a komunikační technologii (ICT) mají v současném světe a o uplatnění a implementaci daných technologie strategickým managementem mezinárodních korporacíí. Použité zdroje literatury obecnější zkoumá pojem ICT a dále práce se zaměřuje na specifiky fungování mezinárodního podniku a podrobnější členění videokonferencí (VC), jejich aplikací a dodavatelů. Praktická část je soustředěna na zkoumáni VC jako způsobu usnadnění procesu setkání a vyjednáváni. Nejdřív, je provedena komparace přínosu a souvisejících nakladu implementace VC oproti mezinárodnímu cestování. Následně jsou prezentovány výsledky pohovorů a obsahová analýza k objasnění, jak topoví manažeři používají pokročilé plánováni rozvrhu osobních schůzek k dosazeni cílů podniku a uspořádaní efektivních týmových diskusi. Na závěr pro zkoumanou společnost byl navržen systém VC.

Klíčová slova: Videokonference, ICT, Nadnárodní Společnost, Plánování Schůzek, Vícekriteriální Analýza, Konkurenční Výhoda, Analýza Nákladů A Přínosů, Polycom, Cisco, Typy Schůzek

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List of abbreviations

A/V – Audio / Video

AC – Audio Conference

B2B – Business-to-Business

B2C – Business-to-Customer

BU – Business Unit

BYOD – Bring Your Own Device

CAGR – Compound Annual Growth Rate

CRM – Customer Relation Management

F2F – Face-to-Face

GDP – Gross Domestic Product

HQ – Headquarter

IDI – ICT Development Index

IoT – Internet of Things

IP – Internet Protocol

ISDN – Integrated Services Digital Network

MCDA – Multiple Criteria Decision Analysis

MCU – Multipoint Control Unit

MNC – Multinational Corporation

OECD – Organisation for Economic Co-operation and Development

R&D – Research & Development

S4B – Skype for Business

SME – Small and Medium-Sized Enterprises

UN – United Nations

VaaS – Video Infrastructure as Service

VC – Videoconferencing

VoIP – Voice over Internet Protocol

VT – Virtual Team

1 Introduction

Nowadays, it is almost impossible to imagine the life without any advanced technology. As people use it for both professional and personal needs and tasks. Evidently, this global shift has brought people together from different parts of the world. Just with a click on a few buttons, it is possible to see and talk to a person miles away.

The business area has also seen drastic changes as current market and economy situations let companies explore new borders and stretch out their activities. More and more companies are born global. Managers' responsibilities have become as complex as never before. They have to not only manage people around but also subordinates across the globe.

On the rising of these changes, information and communication technologies (ICTs) has gained a huge power allowing people reach their more and more sophisticated objectives. A lack of essential information at one moment may result in catastrophic consequences. Hence, it is important to understand that ICTs have become an integral part of modern society and this trend is expected to grow.

When thinking about executives in big companies, it is hard to imagine them sitting in the office all day long. Most often, managers are running from back-to-back meetings and are extremely mobile. However, new videoconferencing service and products (VC) are widely available. The technology-based way of communication can be extremely beneficial as it brings together remote people residing in distinct locations at any point of time. This may become a new norm for running a business.

2   Objectives and Methodology

Next, the objectives of this study are presented as well as methods used to answer the research questions.

2.1   Objectives

The primary research question of this thesis is to define the application of VC in the management of international companies. Hence, it shows costs and benefits associated with an implementation of VC system and what is the reasoning and business criteria behind choosing virtual meetings over in-person sessions and vice versa. On the example of a company, the practical part aims to explore whether VC would be an advantageous investment and suggest a VC solution for adaptation. Moreover, the insights from multiple sources are provided to give a profound overview of existing VC products, market leaders and how VCs are arranged.

The secondary goal is to describe how cutting-edge ICTs are shaping modern world and what are specifics of running a multinational corporation. A literature review describes in details the role of technologies in different domains and how they contribute to overall societal progress. It also gives a description of MNCs structures and what challenges their upper management face.

2.2   Methodology

To fulfill the objectives of this work, a feasibility study is designed. It serves to uncover and give an access to the theoretical concepts worked out by diverse academics and research organizations as well as confirm or contradict these claims by conducting quantitative and qualitative analyses.

Primary data will be gained from in-depth interviews, that are specially designated to get an understanding of what managers think about virtual collaboration and communication technologies. On the basis of these observations, an evidence of decision criteria for using VCs for certain meeting types will be formulated. This analysis will be created by using Weighted Scoring Model, which is one of the Multiple Criteria Decision Analysis (MCDA) techniques (Dodgson et al., 2009). This approach has been chosen due

to its ability to specify and compare the preferences of certain meeting elements for different business cases.

Another MCDA technique – Cost-Benefit Analysis – will be used for the quantitative research. This method allows assessing costs and benefits of two options (Dodgson et al., 2009). Hereby, travel and non-productivity costs needed for a F2F meeting will be compared to VC expenses. The interpretation and findings of this analysis will be used for finding monetary and non-monetary rationales for decision making when considering a purchase of VC solutions.

To choose an appropriate VC system for a multinational company, the comparative method will be used. This analysis is generally used to see similarities and contrasts among alternatives (Collier, 1993). The study will include business advantages and disadvantages associated with two VC market leaders and portray what are future prospects for these companies.

The literature review and significant part of the practical part will incorporate theories, empirical findings and assumptions presented in various academic studies, white papers and other publications on the research relevant topics. All selected resources will be analyzed and presented using methods of synthesis, induction, deduction and extraction.

All the calculations, tables and data analyses will be created in Microsoft Excel program.

3 Literature Review

The theoretical part of the thesis was done by diligent examining different resources, which include: articles published in scientific journals, white papers, research papers and books written by accredited academic researchers. All sources were chosen for their accuracy and relevance to the thesis topic so that to provide an in-depth description of used terms and concepts. Presented literature study is used as a background for the practical part and explains the theme within the context of previous research.

3.1 Introduction to Information and Communication Technologies

Information and Communication Technologies (ICT) is an umbrella term for all types of communication networks and technologies that enable them. The ICT field integrates all software and hardware as well as associated services to process, transmit and display any information (Beckinsale and Ram, 2006; OECD, *n.d.*).

ICT terminology is consistently advancing; thus, it is not an easy task to give an exhaustive definition of ICTs components and their full range of properties as they have multiple rapidly-changing functions (ACARA, 2010). The *digital economy*, which is characterized by perpetual development and innovations such as smartphones, data science, robotics, artificial intelligence and others, have a direct impact on the way we communicate and exchange knowledge. Meanwhile, for decades, we are using mobile phones, computers, radio, landline telephones and television to share information. Hence, ICTs implicate not only internet-enabled high-tech networks but also technologies that we already take for granted.

Information Technology (IT) is a term that is heard very often in industry and business areas while ICT is commonly used in academics. IT refers to a computer, network and data management while Communication Technology (CT) is referring to any devices or programs, which primary purpose is to deliver or exchange a message. Nowadays these two concepts are interchangeable as multifunction of technologies and market needs become more and more sophisticated. Therefore, ICT is a broad notion that encompasses both ITs and CPs despite some fundamental differences between them (Chron.com, *n.d.*).

ICT conjoins numerous techniques to process, store and transmit information: telecommunication, data handling, network-based solutions, management of information technologies, intelligent systems and many other (Techproject, 2016). Figure 1 shows a

non-exhaustive list of different components of ICT, that are developed daily. All these ICT elements serve to facilitate the information management and perform different actions with it.
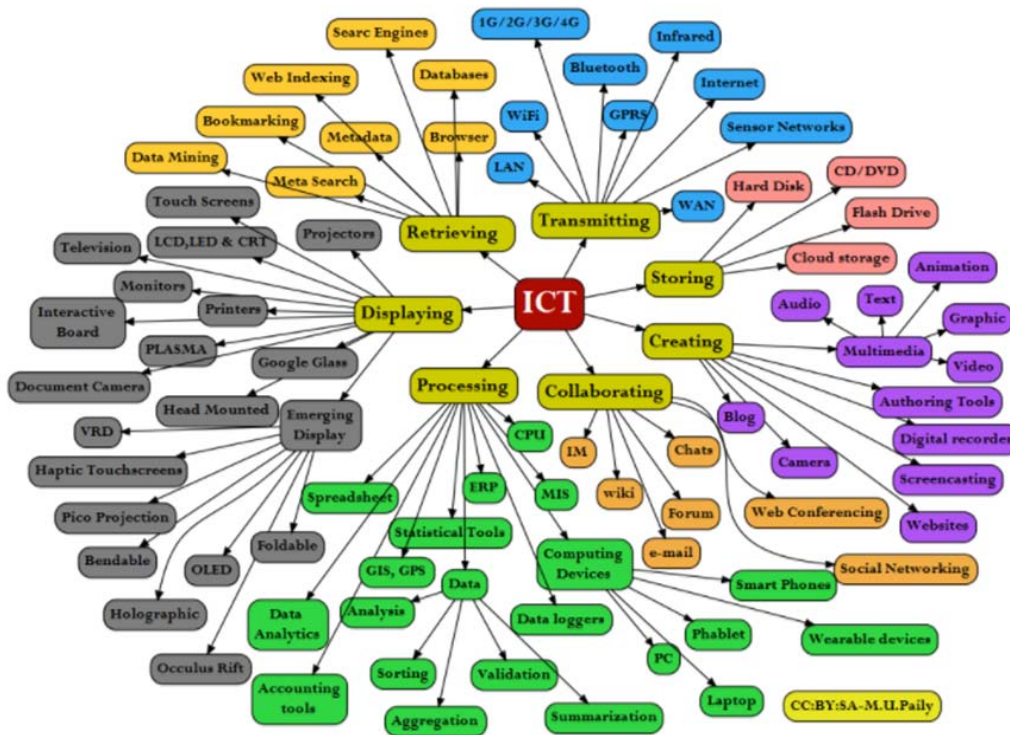
Figure 1 ICT Components

Source: Sure, 2016 [online]

Broadband is a data transmission of numerous signals and traffic types with a certain speed. It is essential for ICT usage. The definition of broadband has been changing over the time, but all definitions are recognizing that broadband can be described "always on" access to the Internet at a particular bandwidth (Bausha, 2001).

Broadband is relative and there is no one unique threshold to define data transmission rates. Yet, it is a fundamental element in ICT adoption and handling. It helps ICT to leverage its benefits and contribute to economic growth, technological innovations, and network communication (OECD, 2004). The speed and rate of broadband will define the quality and ability to use certain telecommunication. For instance, a too low bandwidth may affect the quality and package loss of video conference; or the availability of high-speed broadband may determine whether a company will use e-commerce as a potential tool as it can considerably increase customer and business experience, nevertheless, in a

case of slower speeds companies are discouraged to use Internet or any other technologies due to poor quality and necessity of additional funds (OECD, 2004).

3.1.1 Role and Importance of ICT in Modern World

Nowadays global economic growth, labor and goods markets are driven by the technological progress that gives people enormous possibilities each day (Worldbank, 2016). ICTs represent a new way how worldwide economies, diverse governments, and business practices are changing in the modern innovation-driven era.

Klaus Schwab, Founder and Chairman of the World Economic Forum, has coined an idea that the Fourth Industrial Revolution – Industry 4.0 – is currently on-going[1]. This wave is aimed to address key global issues and emerging needs by embedding technology more and more into the society. Industry 4.0 is spread across different technological progress and developments in artificial intelligence, robotics, biotechnology, IoT, cybersecurity, big data and other. The previous industrial revolutions aimed to help humankind to achieve a full capacity of their powers while the current shift consolidates physical, digital and biological worlds and influences all industries, economies and societal systems (World Economic Forum, *n.d.*).

Pilat (2004) has described three ways of how ICT contributes to the economic growth. First, due to a raising usage and sophistication of these technologies, an extra labor force and further capital are needed in this sector; this way, a capital and employment transformation is stimulated. Secondly, ICT developments require higher productivity and output growth to use their full potential. Thirdly, an efficient utilization of technology helps to raise overall performance of most companies[2]. Kvochko (2013) claims that ICT is directly contributing to the global GDP growth (for instance, the Internet alone represent up to 8% of GDP in some countries (Boston Consulting Group, 2012); emergence of new jobs and increasing demand for skilled labour force[3]; creation of new services such as app industry, e-government services and developments in e-commerce.

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[1] See Appendix A

[2] Further confirmation of these assumption can be seen in the following works: Van Ark, et al., 2003; Colecchia, Schreyer, 2002; Brotchie, John, et al, 2017.

[3] Brynjolfsson and McAfee (2011) claimed that growing unemployment rates could be described by an increasing usage of technologies and Charles et al (2013) observed that manufacturing industries had seen the decline in labour due to the same reason. While other empirical researches confirm that a demand for manual tasks goes down because of increasing computerization, the employment in ICT sector is growing by 3%

In many countries, an understanding of ICTs and technical education have become a part of the basic competencies that should have been learned (UNESCO, 2002). With ICT tools, teachers can easier explain difficult notions to their students and make classes more interactive, while students can learn how to be more efficient and successful in the modern knowledge-based economy (The World Bank, 2017). A popularity of MOOCs is steadily increasing with over 700 universities providing various courses to all willing to grasp new expertise.

Furthermore, ICT has a sound influence on the environment (Berkhout & Hertin, 2001; Vickery, 2012). On the positive side, the usage of advanced technologies helps to facilitate an information exchange in order to optimize production cycles and supply chains, virtualize tangible goods, increase the demobilization via increasing online communication instead of lengthy travels. On the negative side, there is pollution and GHG emissions associated with ICT production and infrastructure, e-waste, usage of consumer electronics in households and data centers in industries (Askarzai, 2011). According to United Nations University (2015), the amount of generated e-waste was around 42 Mt and only 16% of it was recycled in 2014. Nevertheless, the green ICTs have been developing and many governments are taking actions and creating policies to encourage individuals and enterprises to recycle and use more sustainable equipment (Vickery, 2012).

An increasing use of ICTs transforms tasks that people perform on a daily basis but also standardizes a global culture – the phenomenon which is regularly named as *media culture* driven by social media (Suoronta, 2003). Media and Internet-based networks influence people's interactions and mental states. Figure 2 shows the percentage rates of the Internet access across OECD countries, that has drastically increased during past ten years. Furthermore, Internet-based networks and telecommunications introduced *me-centered society,* that brings people together according to their individual interests and values rather than collective or cultural aspirations (Castells, 2014). In his research, Drago (2015) found out that more than 62% of observed individuals use devices in the presence of other people and concluded that technologies have a direct impact on the quality and quantity of face-to-face interaction. Meanwhile, online communication using available

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growth per annum since 2016 (Eurostat, 2016). Therefore there is no a just validation that machines took over the need for human labour in the last 150 years (Allen, 2015).

ICTs helps people retain a connection with relatives, friends and like-minded people, who are geographically dispersed (Rajani & Chandio, 2004).
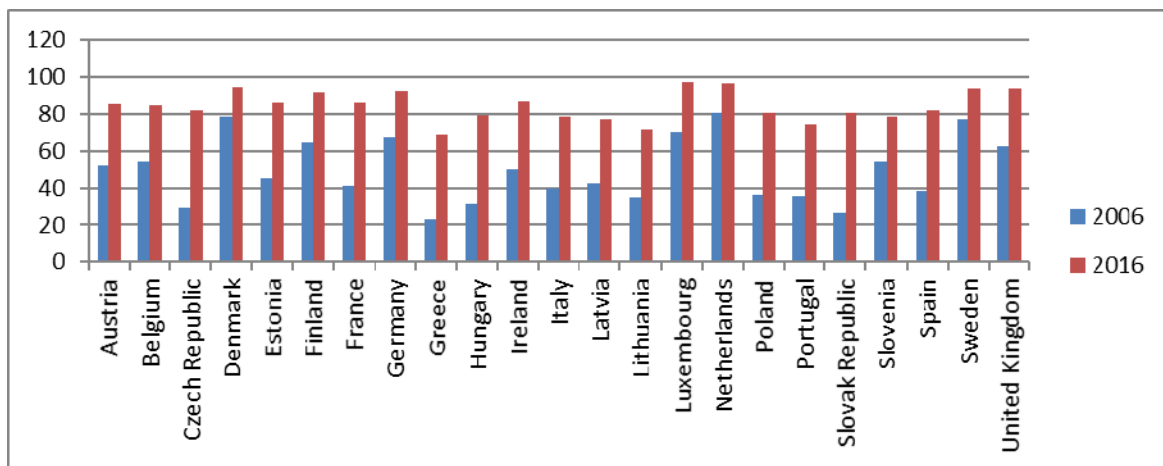
Figure 2 Internet Access in Total % of All Households

Source: OECD Factbook

Nowadays, ICT has become an integral part of almost every sphere of the modern society including medicine, tourism, business, education and government services. Many countries are creating ICT-specific policies to use its full potential and functionality to improve well-being and prosperity of the country, encourage innovation and continuous development, increase employment rates and productivity, enhance a delivery of private and public services, and address societal affairs (OECD, 2012).

3.1.1.1 Application of ICT in Business

Information and technology-based solutions are adapted in all business fields in the companies of different sizes. Their increasing usage helps businesses to achieve better financial performance, more effective internal processes and greater customer success management. ICTs trigger changes in the business environment to keep up with the rapidly changing tendencies in industries and facilitate organizational learning and growth (Lee et al., 2011).

Further, there are presented examples of how ICTs are applied to daily business activities, however, this is not an exhaustive list as each company has unique corporate guidelines and processes that may differ purposes for technology usage.

Information systems and communication technologies affect each party and corporate role in business. They change the way of how companies process, manipulate

and visualize data as well as internal corporate organizations. The use of ICT must be undertaken in each management circle and be clearly defined to all employees. When creating a proper business architecture[4], many think about business and ICT domains as separate ones while there is a great need to create a strong interrelation between them (Versteeg & Bouwman, 2006). If an organization manages to come across a business model with fully integrated ICT system, it will give a needed input for the great business architecture. ICT applications can improve information management and speed up a messages exchange and transactions flows for both Business-to-Business (B2B) and Business-to-Customer (B2C) fields (OECD, 2004). Moreover, with advanced technologies, a quality of provided services and products can be improved as well.

While researching about ICT in business, often the notion of *reengineering* can be seen in multiple sources. Reengineering is about redesigning and transforming business systems and activities in order to gain value-added benefits to a company and its customers (Delporte-Vermeiren, 2003). This approach helps find best practices that can alleviate workflow and improve an overall performance. One of such organizational redesigns maybe the method of *ICT-enabled business networks*, which implies more tightened networks among different stakeholders (e.g. suppliers, customers, manufacturers, third-party providers). These relations are supported by the heavy usage of communication technologies to respond fast to any occurring queries or ad-hoc situations. Even though this is not an easy transformation to be achieved, it is widely used nowadays. Delporte-Vermeiren (2003) in his research paper claimed that the companies like Sun Microsystems, Dell, IKEA, Olivetti apply different features and benefits of these best practices into their day-to-day business processes. This way, companies are able to respond quickly to customers' needs and smooth their internal activities in order to operate more effectively and efficiently and maintain a close look at all their and associated parties' operations.

Many businesses undertaking radical technological innovations gain a significant competitive advantage and even may become market leaders (Barsh et al, 2008; Hurley & Hult, 1998; Basl & Gála, 2009). Innovations can be brought to various stages and organizational processes (e.g. product development, technological implementation, marketing tactics, interaction with customers and many other). Nevertheless, ICT often

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[4] Business architecture – is a concept defining various economic (manufacturing, logistics, assembly etc) and business (marketing, sales, human resource etc.) responsibilities on different levels of an organization (Versteeg & Bouwman, 2006).

plays a key role in the process of innovation creation – it may either facilitate the process or be an integral part of the innovative solution[5]. From the results of their case study, Basl & Gála (2009) found out that a majority of the questioned Czech companies agrees that ICT is directly and significantly related to a business strategy, and these firms take into account ICT specifics while revising opportunities for further business growth. They also disclosed that many companies are in accordance that the most important role of ICT is to support innovations along with other business activities. The most usage of ICTs prevail in the initiating stage of an innovation cycle and the least usage is seen at the last stage (declination).

The technological and Internet-enabled solutions can help to reduce costs and information asymmetry while the real-time communication advance interpersonal relationships, increase transaction speed and strengthen organizational structure (OECD, 2004). Various valuable ICT applications such as Enterprise Resource Planning, Customer Relations Management, Knowledge Management Systems, Computerized Inventory Control System and others were introduced and applied to organizational structures in thousands of companies. Sophisticated programs, ability to react quickly and even e-commerce have given a potential for businesses to differentiate themselves from their direct and indirect competitors.

3.1.1.2 Challenges and Concerns

Although there are numerous benefits associated with ICT usage, new threats and challenges start to appear. The technological potential is valuable and serves as a driver for financial, innovative and social improvements, it also may be hard to embrace, maintain and exercise. When businesses are eager to implement a corporate architecture reliable on ICT, they must think about the following barriers-to-use:

- **Complexity.** Many companies get overwhelmed by the complexity of ICT structures and the needs of continuous maintenance and updates to keep these systems work properly and effectively (BlueSaffron, *n.d.*). Such a new way of working requires management and employees to switch from the status quo and shift to a new organizational strategy and processes, that may be too complex for low-skilled labor (Devex, 2013). Moreover, some of the businesses may need to

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[5] See Appendix B

find an equilibrium of how to manage multiple desktops, new ways of collaboration, servers, networks, applications, ICT devices and even remote workers;

- **Security.** In the survey conducted by Eurostat (2015), companies from all over the European Union were asked to rank the security concerns. The result introduced the following rank (from the most threatening to the less perceived risky) : (i) data destruction due to cyber attacks or other unforeseen incidents; (ii) disclosure of confidential data; (iii) unavailability of ICT services due to an attack from outside. Trust factor and privacy assurance are essential when using ICT-based solutions for customer service as well as for internal information storage. To avoid attacks and loss of data, the strong security policies are needed as a threat may come from different sources (e.g. hackers, spams, files containing viruses, employees desiring break internal security policy);

- **Cost.** Planning and funding of ICT systems can be challenging due to a need for a significant financial engagement. Earlier it was said that ICTs reduce the financial burden on some transactions and processes, however, their systems are requiring funds for maintenance, qualified staff, hardware, software, training and so on. Hence, the cost may serve as a barrier.

- **Lack of knowledge.** The more technology is incorporated, the more skilled workers are needed to be able to operate these systems. When new ICT is implemented, there is a strong demand to teach a personnel how to use it. This process may be time and cost consuming especially in large-sized enterprises. In case, there is a network outage, security breach, data backup issue, hardware breakdown or any other technical problem, an immediate reaction is needed. A lack of experts may follow into a considerable loss of revenues, overall productivity and company image (BlueSaffron, *n.d.*).

These are major concerns that companies may face while adopting and using ICTs but are not the only. The technological advancements and thorough planning tend to fill in the presented gaps and ensure a proper ICT execution.

3.1.2   ICT and Socioeconomic Development

Both academic and business worlds question how ICTs drive and act on socio-economic development. The international bodies agree that no world development is possible without ICTs and focus their attention and policies on an implementation of ICTs to different spheres, such as education, economy, agriculture, R&D and others.

Nowadays, a nation's welfare and competitive advantage directly depend on its ability to produce and share information, knowledge, and technology (Dzidonu, 2010). Also, countries that are eager to be early adopters of brand new innovative solutions by encouraging innovators, easing regulations and generally creating friendly atmosphere and infrastructure for ICT development, are more economically sound and prosperous. Appendix C shows the fields of ICT advancements by regions. Finland, Switzerland, Sweden, Norway, Singapore, the Netherlands and the United States are leading the scoreboard of the Networked Readiness Index, which shows how countries all around the world leverage ICT usage in order to increase national well-being (World Economic Forum, 2016).

The effect of technologies on the growth can be seen in historical records of industrial development in western cultures, while there are a few studies and arguments of how ICT contribute to the least developed parts of the world (e.g. African rural territories) (Rhodes, 2005). There is an opinion that the increased usage of technologies and telecommunications has coined a *'digital divide'*[6] between developed countries and those that are pursuing fewer chances for the social and economic development due to a scarcity of ICTs and limited Internet access. Hence, technological factor has become one of these that determine a gap between developed and developing countries (Avgerou, 2003; The Global Information Technology Report, 2016).

The Global Information Technology Report (2016) gives an overview of the findings from several international organizations about ICT and its impacts. The key highlights in this report are:

Technologies have changed the core of innovation. The digital revolution has given a new vision on innovative thinking and allowed companies to embrace new business models. Telecommunications and other technologies drastically reduced costs and

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[6] Further reading: Norris, 2001; Warschauer, 2004; Van Dijk, 2017.

leveraged some R&D processes to make innovations affordable to everyone, effective and fast-adopted;

Innovative thinking became an integral part of each business. Many industries and companies are under the pressure to keep up with fast-paced developments of their competitors. It is essential to adopt new innovative solutions to keep the niche in the markets, however, it may be challenging for certain firms and countries.

Some firms and governments cannot meet the digital demand from consumers. The report emphasizes that "*the digital revolution has been principally driven by consumer demand*". On the digital market, there is a limited number of companies able to meet populations' technological needs and desires. This is to say some states have to devote more attention to ICT sector to be on one page with their citizens.

The increased popularity of ICT and recent innovations have shaped a new economy. The digital revolution requires governments to adapt their laws and governance to meet emerging technological developments and "*react quickly to changing circumstances*".

Summing up, to grasp the developments available thanks to ICT, countries and businesses need to invest and develop a technology-friendly environment and then the social and economic development will increase drastically. For example, bringing the mobile broadband to developing markets can bring US$300-420 billion to the world's GDP and create more than 10 million jobs (Beardsley et al in The Global Information Technology Report, 2010). However, this is the only one ICT possibility while there are many others. Benefits and socio-economic effects by ICT structures are already in the power in many countries, nevertheless, this is just a beginning of true ICT potential as many unprecedented changes appear on a regular basis and the acceptance of digital revolution is not under the question anymore.

3.1.2.1 ICT Development Index

The ICT Development Index (IDI) serves as a measurement and indicator of developments in ICT sector between countries and over time (ITU, *unknown*). IDI aims to show the progress and evaluation of ICT usage and expansion in developed and developing

countries. IDI is calculated on the basis of 11 indicators[7] and recognizes the importance of ICT in overall development.

In 2016, nearly all countries increased their IDI and improved ICT use (Measuring the Information Society Report, 2016). According to IDI statistics of 2017, Iceland was on the first place of the most developed ICT infrastructure followed by the Republic of Korea, Switzerland, Denmark and the United Kingdom, meanwhile, the African countries – Eritrea, Central African Republic, Chad, Guinea-Bissau and Burundi – were at the end of the list scoring less than 1.5 points (while 10 is the highest possible).

The concept of IDI confirms that ICT contribute to the economic and social development. It gives a reference point to create an information-based society. Figure 3 shows three stages that form IDI model, which on its side measure the indicators on each of the stages. In case a country is capable to achieve an open and fast *access* to ICTs and encourage their *usage* to exercise relevant *skills,* it can reflect on the results that ICT bring to its economy and well-being (Measuring the Information Society Report, 2016).
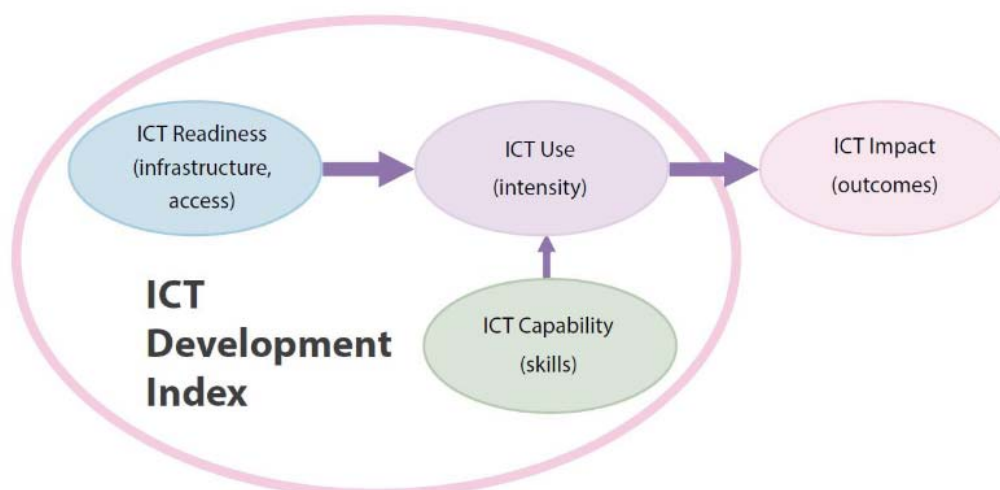
Figure 3 Three Stages in IDI towards Socio-Economic Development

Source: Measuring the Information Society Report, 2016

This index may give an understanding of digital divide and whether it narrows down. In addition, states with high IDI ratings along with other economic factors can be attractive for companies to develop their businesses as usually it means that there is available high-speed broadband, easy access to a technology for both companies and

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[7] See Appendix D

potential customers, and more affordable circumstances for development. In other words, the higher a country is in this rating, the more technological opportunities there are.

3.1.2.2 Differences among Users

As it was noted earlier, one of the most important indicators of ICT presence and influence in any nation is the degree of access and usage of different technologies by users and companies.

Figure 4 shows the gender gap between Internet users and Internet penetration by gender in different regions. The proportion of male Internet users is higher in the two third of the world. The proportion of female Internet users is 12% lower worldwide while in the Americas women are utilizing the Internet more frequently. However, it is seen that the gap between users has narrowed down within past years. According to ITU research, there is a connection between the Internet use and enrolment in postsecondary studies by gender parity, which confirms the low gender gap in Americas countries.
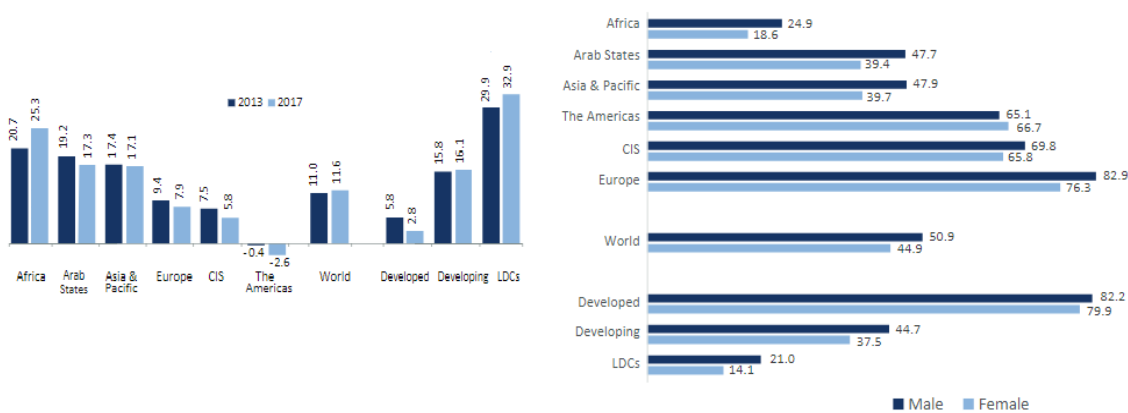
Figure 4 Gender Gap between Internet Users & Internet Penetration Rate by Gender, 2017 estimates

Notes: (i) in the first graph, the proportion of female Internet users is compared to the Internet penetration proportion for men; (ii) the estimates in the second graph represent the proportion of Internet users corresponding to the proportion of female/male population correspondingly; (iii) CIS – Commonwealth of Independent States.

Source: ITU

Over 830 million of youngsters are broadly using the Internet while the proportion of the total population is much lower (71% vs 48% correspondingly) (ITU, 2017). The millennials and generation Z (people born between 1995-2005) are generally considered to

be more technology literate and advanced due to their early acquittance with diverse types of technological advancements than their predecessors who had to learn how to use technologies at the later stage of their lives. There is also seen a gap between users in urban and rural areas. This can be explained by limited functions and application of ICT to the rural lifestyle, small to no access to the Internet and the availability of technologies.

Moreover, various ICTs require different sets of skills. For instance, anyone can learn how to use email box to exchange emails or surf the Internet, however, the more advanced technologies and business objectives require specific skills (e.g. professional video editing, creating spreadsheets, using complex databases etc). Proficiency needed for complex ICTs depends on the following factors: (i) the specifics of the knowledge required; (ii) used software and hardware; (iii) materials and data to be worked with; (iiii) essence of the products/services provided (Hunter for International Labour Organization, 2006). Nevertheless, ICT sector has created numerous jobs and qualifications, that boosted national interest and development in this sphere.

3.2   Introduction to Management

Management is the process of coordinating different activities and subordinates as efficiently and effectively as possible to achieve a personal or organizational objective. Simply speaking, management is *"doing the right things and doing them right"* (Robbins & Coulter, 2005). Nowadays, management functions are exercised in all groups of people with shared goals whether they are social, commercial or political. Growing complexity of different lifestyles, business settings, technological revolution and many other emerging factors require more sophisticated managerial skills.

There are distinct levels and types of management in organizations, however, the primary purpose of any manager is to accomplish an assigned mission well and supervise dependent workers. Robbins & Coulter (2005) specify the four functions that each manager is supposed to be proficient in:

- Planning – setting objectives and determining crucial processes for achieving these aims;
- Organizing – arranging and clarifying responsibilities and tasks to be performed;

- Leading – encouraging and supporting subordinates as well as solving rising conflicts;

- Controlling – monitoring workflow to guarantee a compliance with the plan.

In its nature, management can be regarded as both a science and an art (Robbins, 2005). It is presumably a goal-orientated role, albeit it requires sufficient competencies in creative thinking, problem-solving, detail-orientation, leadership and versatility.

3.2.1 Management in Multinational Companies

A multinational company or corporation (MNC) is a business organization that has operating offices in more than two countries different from the home country. It also assumes a direct investment abroad, international staffing and transfer of organizational practices across borders. The size of MNCs may vary according to a number of their activities, locations and personnel (Lazarus in Smelser & Baltes, 2001). Apple, Alphabet, Microsoft, Berkshire Hathaway and Exxon Mobil are named the top five MNCs in 2017 (Gray for World Economic Forum, 2017). Not to mention, technology companies are usually born global and get intentional relatively quickly. Nevertheless, any company has a potential to become MNCs in case it manages to leverage on an international expansion of its direct business and receive particular benefits from it.

The increasing number of MNCs has a direct link to the globalization, which is driving the economic integration among countries and setting convenient conditions for international business development. Gooderham (check the year) claims that there are two factors of MNCs phenomenon: (i) diversity of factor endowments around the globe; (ii) market failures. He also says that companies prefer to run their business abroad in own facilities rather than give away their know-how to locals. This way, companies maintain the full control over their international operations.

MNCs has large competitive advantages in comparison to local companies. Big companies substantially achieve economies of scale, create brand recognition and loyalty, have the specific market knowledge, own considerable funds and other business perks. In emerging markets, the entrance of a foreign competitor represents a serious threat to domestic companies and requires them to search for new strategies to be able to compete with giants (Dawar & Frost, 1999). Nevertheless, in some case the enormous size of a company can be a disadvantage especially if it is poorly managed Gooderham (check the

year). For instance, there can be issues with bureaucracy, logistics, regulations, market knowledge, distrust and other. Hence, the management of a MNC may be highly challenging and requires proper structure.

For success, MNCs must understand social, political, cultural, economic, strategic, organizational and legal peculiarities of all the countries where they function as these specifics have a direct impact on business. All these numerous factors and processes are unique to each country and must be taken into consideration by each level of an organization. Management of a MNC considerably differs from the one of a domestic firm (Gullén, 2013) due to its complexity and operational scope. The giants are not only bounded to be challenged by regional regulations and cultural norms, that may alternate already fixed organizational structure and processes adopted by these firms, but it also may be challenging for foreign governments that are willing to keep autonomy and prosperity of local businesses but the same time looking for technological innovations and investments from foreigners (Lazarus in Smelser & Baltes, 2001).

Managers of MNCs must find a balance between global integration of their company, local responsiveness to such market changes and customers' needs. This challenge requires a sophisticated cross-regional strategy and structure that is the most difficult part. Moreover, these managers must create a friendly atmosphere between the firm and the locals (incl. labor unions, state, suppliers, third-parties, competitors and society) (Gullén, 2013).

Although managing multinationals is not an easy task, it requires a profound strategy as the international scope makes business running more laborious and entangled. However, the achieved success of expansion campaign brings great benefits and many further opportunities to MNCs.

3.2.1.1 Organizational Structure

International markets are characterized by volatile environments, so multinationals must adapt their organizational structures to work efficiently and meet market demands and changes. They also need to consider the specific functions that must be performed in different regions. A challenging part is to find a correct way of how to organize distinct business units (BU) to be successful and the same time keep all operations under one

company's umbrella, in other words find a correct exploitation of domestic tasks worldwide (Kumar & Puranam, 2011).

There are several types of possible organizations adopted by MNCs. The choice of a certain structure primarily depends on the degree to which companies headquarter (HQ) want to control their subsidiaries and production processes (Jao, 2003; Südekum et al, 2012). Betts et al. (2015) affirm that a control over BUs should reflect the level of technology and location contiguity of all departments. For instance, Betts et al. claim that in a situation where BU functions are interdependent with HQ's, the overall control of business should be centralized so the management has an unobstructed vision of all operations. In case of BU independency from HQ, the control system should be decentralized, which means that any decision is made on the local level to meet local shifts and needs. Hence, managers' communication and responsibilities may vary according to the selected organizational structure.

At first, many companies started to create only narrowly specialized subunits across borders, mainly customer service centers or sales booths to enhance interaction between companies and local clients. Further on, multinationals learn to leverage on location-specific resources (e.g. low-cost manufacturing in developing countries or R&D establishments in western countries) or product lines (e.g. creating products for local niche markets or due to the unique availability of a supply of scarce resources). In case of the complexity and enormous size of a company, matrix structure can be an alternative, which combines best practices of HQ and flexibility of local subsidiaries. In such organization, team members report to a team leader, who reports to the HQ manager. Usually, HQ retain certain control over regional teams that are working according to their domestic requirements. This way, MNCs can use the knowledge of on-site workers (Kumar & Puranam, 2011).

Along with the creating subsidies across the border, MNCs can choose other international expansion strategies such as joint venture, licensing, franchising, distribution, mergers and acquisitions. The choice of an entry mode is up to corporations' vision on control, technology, location specifics, local regulations and service-product to be provided. Each of these strategies has advantages and disadvantages while HQ's management has to take key decisions over them.

Kumar & Puranam (2011) in their work cite the study from Accenture saying that 95% of senior managers agree that their companies' business models and organizational

structures may not use the full potential of emerging opportunities driven by an international presence. Trade changes, increasing the bargaining power of competitors and emerging markets like China and India challenge big enterprises; an organizational redesign sometimes may feel like a second breath for companies losing market shares. Nevertheless, restructuring can be confusing and very few firms go for it. Re-thinking an organization can bring a company to a higher stage on a market arena.

Moreover, Lazarus (2001) emphasizes that organizational structures evolved significantly over the past decades and this phenomenon is still ongoing. MNCs find new ways to transfer the best practices around the globe and redistribute responsibilities to have a competitive advantage. The digital revolution and increasing usage of ICT only accelerate this evolution.

3.2.1.2 Challenges Faced by MNCs Management

MNCs as being represented across different states face not only issues emerging in a home country but also many challenges that are unique to certain locations. A corporation of any size and industry is facing issues, that are needed to be addressed to improve or retain company's position. Nevertheless, as it was noted in the previous section, managing an international company is more challenging than a purely domestic firm located at one place.

Although nowadays multinationals have very skilled managers, there are many challenges that must be overcome at various levels of the corporation. Moreover, different departments (i.e. Human Resource, Marketing, Supply Chain, Manufacturing and other) may face distinct problems. Therefore, MNCs must deal with raising issues on both macro and micro levels (Ziriukina, 2014). For instance, there is a need for diverse marketing campaigns across regions as products must correspond to overall corporate identity as well as geographically-dispersed customers' preferences (Gogel & Larreche, 1991).

One of the most prevailing issues that managers of MNCs must consider is a cultural difference. It is crucial not only for the internal organization but also for being successful in the host country. A lack of understanding of culture can cause miscommunication between a manager and international subordinates, clients and third parties (Hult, 2017). In addition, time zones, language and ethical norms also create barriers to effective communication among different stakeholders (Ziriukina, 2014).

MNCs invest heavily in their foreign subsidiaries and operations. Hence, they may face more financial instability and risks comparing to SME. Before entering any country, managers must evaluate and research economic situation and policies of this country. The losses because of volatile foreign currencies or underestimation of a financial stability can be catastrophic for a firm's performance. Mistakes in currency exchanges and incompliance with local accounting standards can lead a MNC to false reporting of its activities, misleading upper management and even have legal consequences (Gashu, 2016; Hult, 2017). Also, managers must think carefully about pricing strategies across borders as price sensitivity vary considerably across the globe.

Along with economic policies, MNC managers are expected to know details of hosts' laws and regulations to be able to run a business there. For instance, companies have to take into consideration local labor regulations when hiring employees to BUs. Hence, recruiting can be a challenging due to legal requirements and available on-site talents. Additionally, it is mandatory to comply with tax implications and trade regulations of each country where business transactions are happening thus creating a lot of legal and economic pitfalls for MNCs. It is also vital to remember that a shift in political powers and accusations of bribery can bring any company down (Hult, 2017).

Management of dispersed BUs is not easy. It takes time, resources and efforts to understand foreign business environments, create trustworthy partnerships and find a correct strategy for a growth. A company's success is greatly determined by its ability to manage all emerging challenges and issues associated with the business expansion across borders.

3.2.2 ICT in Management of MNCs

These days, information became a core of any business (Berisha-Namani, 2010). The one who has the complete set of data about products or services production and market knowledge has all prerequisites for becoming successful in its business environment. However, for information processing, exchange, visualization and interpretation special systems and technologies are needed. Thus, information systems and technologies have created new opportunities for companies and their management.

Many authors and researchers agree that ICT has a crucial role in companies of any size (Lucey, 2005; Zaidman et al, 2008; Alfaro & Chen, 2015). Initially, technologies were

used primarily for processing transactions and support certain business operations, however, the scope of ICT usage has skyrocketed due to the digital revolution. Modern technologies enhance business analytics and development as well as facilitate decision-making for managers by giving recommendations and reducing uncertainties (Berisha-Namani, 2010). Nowadays, ICTs are applied to each function of a business (e.g. marketing, supply chain, sales, manufacturing) and decision-making at each level.

As it was discussed earlier in this work, MNCs require more sophisticated and advanced management tactics comparing to SMEs. Hence, the complexity of such organizations requires more information and technology-based infrastructure. Technology is one of the key leverages that MNCs have over local companies. According to Gullén (2013), ICT accelerates: (i) information exchange around all foreign divisions and HQ; (ii) the cycle of new product development; and (iii) market expansion across borders. As an example, he claims that fifty years ago it would take five-ten years for a MNC to develop a new product and adapt it to the international arena. Meanwhile, nowadays, the development cycle usually last less than three years and due to increased globalization and technologies many companies are capable to launch a new product on several markets at once.

The usage of certain technologies corresponds to a company's scope of business functions and geographies. Table 1 shows the issues and situations that MNCs must undertake when operating in either contiguous or disparate market locations having contiguous or disparate technologies.

	CONTIGUOUS GEOGRAPHICAL MARKETS	DISPARATE GEOGRAPHICAL MARKETS
CONTIGUOUS TECHNOLOGIES	Global Firm (Interdependent SBUs)	"Technoscape" (Shared upstream-know-how)
SEPARATE TECHNOLOGIES	"Supermarket" (Shared downstream know-how)	Conglomerate (Cash-Flow Based Controls)

Table 1 Geographic and Technical Issues

Source: Betts, Laud, Mir & Vicari (2015)

Betts et al (2015) describe these four MNCs structures as following:

a.   **Global Firm** – represents a company that has a tight control over its BUs and use the same organizational and technological structure in all its subsidiaries. In other words, it is one operating mechanism across the globe;

b.   **Supermarket** – is described by firms selling a wide range of goods in a narrowly dispersed area. Although diverse divisions may not be located far from each other, they are usually free to use unique technologies in order to boost productivity and efficiency of only their branch. To fight this challenge, MNCs have to run mutual analyses and market studies as one company but not separated departments;

c.   **Technoscape** – presents companies providing similar products in different parts of the world. These are usually very geographically dispersed subsidiaries that require centralized control power but individual functional operations like marketing, supply chain and business development most often use the same digital tools across all departments;

d.   **Conglomerates** – consist of independent local offices that are free to use any available technological means to be successful in their marketplace.

In their research, Derksen & Luftman (2013) found out that many companies increase their spending and investment into a technological revolution of their businesses. The budgets for information systems are increasing over time across all regions. They also claimed that the main reasons why many managers are willing to increase the use of IT solutions are to reduce costs and improve overall business productivity. Due to a geographical scope of MNC operations, the technology-enabled megatrends have emerged. Derksen & Luftman highlight the following trends seen in multinational enterprises.

Centralized structures will pass away. Due to the increased number and application of numerous ICTs, people tend to be more independent in their work. Information and know-how become driving forces in business while organizational hierarchies start to have less power[8]. Organizational transparency and advancements in technology bring a lot of knowledge to all public levels and recent studies show that employees trust their CEOs much less than before;

Quality of network and its size continue to matter due to its perceived importance. Social media, smartphones and *cloud* facilitate and enhance the exchange of knowledge and information. Nowadays, it is said that the number of meaningful connections is the core to the personal and organizational success.

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[8] Even though this trend was noticed in companies of different sizes, it is more applicable to SMEs. MNCs have still certain organization power and culture that is challenging to amend while SMEs are benefiting from technological developments and relatively easily adapt new innovative solutions.

Big Data and ***Business Analytics*** **are vital for businesses.** Companies possess a lot of data thanks to advanced technology and the key is to learn how to leverage on the access to all this information. Henceforth, it is needed to learn how to analyze and work with all these data in an efficient manner. Competency in business intelligence become one of the top skills and requirements.

The power of the cloud is constantly going up. Online presence is taken for granted now. In many companies, a majority of computational activities is going through the cloud technology and this tendency keeps increasing. As an example, cloud solutions give SMEs a loose access to other technology making them capable to compete with MNCs.

It becomes harder to foresee business future. Many companies get strangled by unexpected market shifts and entries of innovative competitors. An impact of emerging ICTs is very difficult to evaluate and anticipate. What starts to be more important is the impact of business on its industry. For instance, Spotify.com changed the music industry drastically in record time with its innovative technology-based approach. Hence, companies have to embrace new digital systems and find a way to get the full potential from them.

The effective usage of ICT inside any business requires organizational change and leaning towards technology-based solutions. Although employees may be asked to use any information system and technology for their activities (for instance, a particular video conferencing tool for communication, which services have been purchased by the company; or a specific CRM system for customer studies), such a technological transformation requires a supportive organization culture, so personnel was not overwhelmed or troubled by introducing new ICT applications into their responsibilities. When MNC decides to adapt innovative technology, it must also think about cultural diversity, languages, skills and local technological development across its international BUs (Zaidman et al, 2008).

3.2.2.1 Big Data

Nowadays, companies receive a massive amount of quantitative and qualitative data from different resources such as internal recordings, social media, transaction operations, public information, researches and others. There is no an exhaustive definition

of big data (Ward & Barker in Measuring the Information Society Report, 2014) but it signifies an increasing size of *datafication* driven by the digital revolution.

Tsuneo Kawatsuma, Fujitsu CTO and CIO, said: *"Big data will have an impact on all industries, on every process — in planning, research, sales, production and elsewhere."* However, it requires very specific knowledge and technologies to deal with. This phenomenon – big data – is not new but its scope raises continuously as more and more information starts to be available and more advanced technologies are created to capture it. Big data is described and characterized by 5 Vs[9] (ITU, 2014):

- **Velocity** – indicates a speed of data generation and movements;
- **Variety** – implies that data can be discovered in diverse sources and forms;
- **Value** – presents potential socio-economic benefits;
- **Veracity** – ensures data quality and privacy;
- **Volume** – is a great size of data sets generated in seconds.

Technologies helping to translate data into meaningful insights give companies a strong touchstone for their businesses. For instance, the gained information may be a market insight into customers' behavior, possible partnerships and overall overview of an industry. Big data imply a variety of data that simple tools and basic technologies are not able to fully grasp, that is why this approach requires more sophisticated ICTs for storage, analysis and management, hence, ICTs and big data are strongly tied together. In addition, technologies serve as a predominant source of various evidence (Al Taie, 2016).

Enterprises that want to leverage on big data have to choose means of how they want to treat these datasets. Al Taie (2016) describes cloud computing as one of the approaches for big data analyses as it allows different users access, store and work on data anytime simultaneously. Next, he mentions Internet of Things (IoT) ability to connect everything and everyone through Internet makes it easier for companies to access multiple sources. The third offered technology-based solution is Artificial Intelligence (AI), which can help firms to draw more specific conclusions about possessed information, work at faster speed, gain diverse insights from big data and empower companies to be more efficient in business analytics. As other means for companies to embrace business

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[9] Initially, Doug Laney (2001) came up with 3 Vs of Big Data: volume, variety and velocity. However, his framework was further expanded into 5 Vs, 7 Vs and 10 Vs.

complexity, Al Taie mentions networked systems and mobile service that provide a data-driven background for creating competitive advantage.

Forrester Consulting for Xerox (2015) revealed that many companies already benefit from or try to embrace a potential from big data analytics. Some of the gained results from their study show: (i) 72% of the respondents to their research think that big data give a leverage and advantage to their companies; (ii) 39% believe that enterprises with advanced data processing and analytics will have the leading places on markets; in addition (iii) 56% already receive business benefits by treating big data. Figure 5 shows that many enterprises focus their ICT solutions to handle big data as a priority number one while other senior managers are planning to use ICT in other domains primarily due to the specifics of business environments in which they operate.

"What are your main Information and communications technology (ICT) priorities for 2015?"

Big data solutions	38%
Real-time predictive business and customer analytics	33%
Mobile app analytics	24%
Understanding of existing customer base	23%
Web analytics	23%
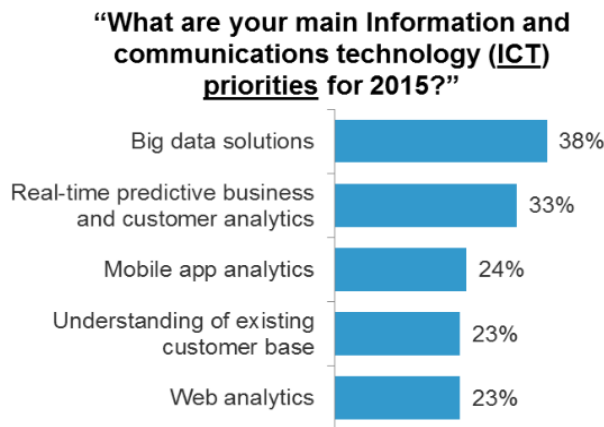
Figure 5 Companies Objectives for ICT Developments, 2015

Source: Forrester Consulting for Xerox (2015)

There are many ways of how ICTs help companies access big data. For instance, telecommunications and technology giants like Google, Facebook, Twitter provide loads of information for business purposes and public usage. The Internet has become one of the biggest sources of data that is used by different entities, i.e. business, government, scholars and others. As an example, UN uses social media posts to gain an understanding of emerging development topics in different regions and big data for humanitarian practices (ITU, 2014). Consequently, new policies regarding big data and ICTs started to emerge worldwide to ensure the fairness of data treatment and users' consent when being observed. The evidence gained from ICT sector help states better understand citizens' behaviors and more effectively serve their needs. Furthermore, governments can see weak

areas in their countries where immediate intervention is needed, therefore, many of them dedicate a special department responsible for analyzing big data.

There are many challenges that firms of any size have to address when creating the technology-based infrastructure to crack big data. Data science requires a wide range of applied skills and expertise, so this discipline requires highly skilled employees, enduring training and proven understanding the complexity of this field. Moreover, many executives are concerned about data security and its quality (Forrester Consulting for Xerox, 2015). Data-driven solutions must take into consideration the means to ensure that gained pieces of information are reliable and accurate. Besides, UN Global Pulse largely advertise the notions of *data philanthropy* to secure data sharing. Companies tend to protect confidential sensitive data about customers and business operations as the disclosure of client-sensitive information can be illegal, give an advantage to competitors or shake customers' trust. Henceforth, a privacy of the data become one of the hot topics addressing ICT and big data (ITU, 2014).

3.2.2.2 Virtual Teams

A number and popularity of global virtual teams (VT) is steadily going up due to the increased number of companies expanding their operation across borders and generic access to ICTs. Plus, it starts to be more common for MNCs to outsource certain business operations[10] that also implies distant communication among companies and their business partners. VT can be created for any business function and characterized by: (i) scattered locations of team members; (ii) presence and reliance on ICT; and (iii) a common specific objective (Nataatmadja & Dyson, 2005; Ferrazzi, 2014; Dávideková & Hvorecky, 2017).

Wrike Team in 2012 published results of their research showing that most companies regard time-saving (41%) as a major benefit of VT collaboration. Increased productivity rate and better concentration on workflow were named the next advantages (29% and 10% respectively). Meanwhile, SHRM study (2012) found out that most companies are using VT to leverage on geographically dispersed talents and unique expertise, boost teamwork among international employees, raise productivity, reduce

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[10] Some of the reasons why companies tend to outsource certain functions are: (i) cost reduction; (ii) access to distinct expertise; (iii) decreasing a number of miscellaneous tasks for internal staff; (iiii) risk cross-sharing with partners and other (Pine, 2017).

spending on traveling and other. Despite different metrics and survey tactics, most scholars and experts agree that remote collaboration enhances personnel to spend less time on miscellaneous tasks and be more focused on delivering results while ICTs help them maintain constant and multilateral contact. As an evidence to this allegation, BCG (2009) points out that well-managed VTs can outperform teams residing at one location.

According to SHRM (2012), almost a half of questioned companies tend to set up VTs in their organizations. Meanwhile, the majority of these enterprises are MNCs, that are seeking to manage their increasingly global operations. Appendix E shows the comparison of VTs and traditional on-site teams confirming that VTs tend to be more efficient in brainstorming, collaboration, planning and coordination of their responsibilities and workflows. Nevertheless, most companies concur that face-to-face communication promotes more trust and morale comparing to remote teams. It is also said that a conflict resolution and activity monitoring is easier to achieve in one location organization. However, Nataatmadja & Dyson (2005) suggest that a use of ICTs in VTs reduces conflicts related to the cultural diversity of teammates in certain cases [11]. For instance, they say that a minor representation of non-verbal signs reduces cultural differences among multicultural members. Electronic messaging, online translating programs and data storage gives a chance and necessary time to make meaningful information exchange, hence, decrease language barriers and misunderstandings.

Success and well-being of any VT depend on a chosen ICT (Ferrazzi, 2014; Wrike, 2012). As VT members are often scattered around different continents and time zones, a technology-to-be-used determine the way how these people will interact, work and share information. Appendix F shows the application of some ICTs in remote teamwork. According to Nataatmadja & Dyson (2005) and Dávideková & Hvorecky (2017), the choice of technologies should reflect: (i) cultural and diversity; (ii) technology availability, compatibility and 'user-friendliness'; (iii) members' locations; and (iiii) members' technology proficiency.

Collaboration platforms and tools must meet VT's needs and create a trustworthy environment for a fruitful work. Managers have to find a great compromise between

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[11] The way how ICT will influence the team's relation is highly dependent on the management, people, technology and personal attributions of each member. Dube and Pare say that remote work can increase communication barrier due to a possible loss of information and a lack of context. In addition, predominant members of the team can push other teammates to adapt their usual working style and restrain foreign members.

technical requirements and team members' abilities. Nevertheless, their demands and business situations can change over the time. For example, when teammates start to lose confidence in their colleagues, a video conference set-up can be useful to create more personal bounding in this team, however, a low-speed bandwidth can prevent some of the group members of using ICT requiring more advanced connections and talents. That is why it is so crucial to find a balance among different capabilities (Nataatmadja & Dyson, 2005).

When creating a VT, MNCs have to set up an appropriate corporate culture so employees could feel that they belong to one organization despite being geographically scattered. Key ingredients of a successful remote work are right people, effective leadership, shared touchpoints and appropriate technology.

3.3   Introduction to Videoconferencing

In last several decades, a usage of videoconferencing solutions as a communication and collaboration tool has considerably grown up. VC works as a *simultaneous transmitter* of video, audio and data to enable a *real-time* connection among people located across borders.

Digital revolution has shaken existing workflow settings in many aspects and drastically cut a perceived distance around the globe. Many companies seek for a strategic tool to boost its productivity and meet certain business outcomes, and so they invest heavily in different IT solutions (Smith & Lundy, 2015).VC technology has transformed significantly and become a mass product for many businesses, especially MNCs that require an effective communication solution. Smith & Lundy (2015) foresees that by 2020 a half of conference rooms will be supported by VC. All business stakeholders like customers, executives, HR officers, marketers and others look for means to get the most from various business possibilities such as distant teambuilding, webinars, meetings, online learning etc. Appendix G shows some of the examples how different business departments can apply VC to their primary business functions.

There are many VC options available now so companies are free to choose solutions that will meet their needs, budget constraints, participants' flexibility and security requirements.

3.3.1 Overview of VC Set-up

VC is often associated with innovative thinking as it enhances overall business operations. In 2013, Polycom surveyed over 1,200 VC users and found out that 76% of executives used VC solutions at their workplaces. Meanwhile in other research Polycom representatives (2013) questioned 4,700 respondents, among whom one out of four uses VC on a daily basis. They also has learnt that 96% of interviewees, who have managing and executive positions, admit that VC help their companies be more productive and diminish perceived differences on cultural backgrounds.

There are two types of VC in terms of a set-up:

a.   **Point-to-point configuration** – means only two locations are connected;

b.   **Multipoint configuration** – means more than two sites are connected at once.

A point-to-point connection is easier to start as only one person or a group located in one place can communicate only with another location, and it does not require complex technical support as Multipoint VCs. This configuration requires a *virtual meeting room* that serves as a bridge or multipoint control unit (MCU) among all connected sites. It aims to control and enable VC connection. MCU works as a translator of different audio/video (A/V) signals and data sent by locations (Polycom White Paper, 2013). It is important to note that MCU work is highly dependent on participants' bandwidth as the bridge is a mediator among all locations' capabilities and it acts in a way to make all participants be on equal terms and enable all of them to participate in VC. MCU is also responsible for VC screens set-ups. However, participants can choose to transfer only audio or data signals without any video. As per video settings, there are several ways how participants can see each other during a meeting (VSGi, 2005):

a.   **Active speaker or voice activated**: the site with a speaker is showing to all other locations as the main screen;

b.   **Continuous presence**: all sites are presented in a chosen frame or one by default.

For any VC, a special equipment is required. Firstly, without a special VC hardware and software no video call is possible except web-based videoconferencing applications, that will be described later in this work. Secondly, there is a need for a *codec*, through which VC connection is going through. A codec aims to transmit and decode

different streams sent by participating locations. Thirdly, participants must choose appropriate displays to be used (these can be plasmas, monitors, tabletops, laptop screen or even a mobile phone). The choice of a display is usually dependent on the size of a room and group of people there. Next, microphones are essential for audio sending while speakers are needed for transmitting incoming audio. Some of the codecs may not have an embedded camera, which is necessary for a video (VSGi, 2005; Polycom White Paper, 2013). Although most modern codecs are integrated with almost all needful VC components, some of the video meetings may need additional options such as projection systems, recoding system, extra speakers, scheduling tools, internal IT support service for troubleshooting and others.

Fernandez et al (2017) project a 3% compound annual growth rate (CAGR) from 2016 to 2021 of overall spending on CTs. This is to say that companies do recognize benefits that can be achieved by using VC solutions. Nowadays, there are many existing vendors that provide different communication services and tools. Cisco, Polycom, Zoom, Microsoft, Vidyo, BlueJeans Network, Arkadin are some of the providers of complex services for business internal and external collaborations[12] (Gartner, 2017). A primary decision on implementing VC system depends on business objectives, functions and available funds. Whether video calls are needed for external meetings with clients or for internal online group training, there are many features to be taken into account and each of the providers offers a unique package of services and technologies. As for example, Cisco sells a full video room setting as well as an application WebEx which is extremely popular among end users for distant learning.

VSGi (2005) gathered information from its customers and created the following list of best practices of how companies can leverage and utilize VC system:

- Define different application across an organization to be addressed and what connection different corporate departments have to these applications. This way it is possible to see how to use VC tools effectively and efficiently in internal settings;

- If a company has already used a certain collaboration tool, verify whether it is possible to suit this tool with VC setting as it is crucial that the chosen technology fits people and not vice versa;

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[12] See Appendix H

- Know connection capabilities and business requirement (e.g. available broadband, network, corporate long-term trends, international expansion etc);

- Certain evaluations and ROI are needed to be implemented to see how video calls are used in a company to see how VC contributes to a company and what changes may be needed;

- Create a reporting metrics to budget needs and facilitate employees' acquittance with recent technologies;

- Enact a special scheduling/booking solution to ease planning and create a support service group to help personnel to troubleshoot and respond to any ad-hoc requests.

Some of VC technologies have additional features to create rich media. This capability can be very useful for some business functions as it allows end users to edit, archive and repeat available media. Such extra benefits can be (i) live streaming that can be enhanced by available software; (ii) video-on-demand that is a saved video, which is possible to play anytime; (iii) content management that allow participants to use different interactive tools during video calls (e.g. categorizing, whiteboards, presentations etc); (iiii) create online polls; (iiiii) "raise hand mode" and other (Polycom White Paper, 2013).

3.3.1.1 Network Transport Choices

When considering what VC system to implement in an organization, it is essential to decide how the video call will be transferred. This decision has a direct impact on A/V quality and all VC associated costs. Internet Protocol (IP) or Voice over IP (VoIP) and Integrated Services Digital Network (ISDN) are two network choices that require the different speed of connections and use distinct standards[13] (VSGi, 2005).

A connection via IP packet-based network implies that participants or MCU dial a specific IP address, which is associated with a particular location and video call should be connected straight away (Reid, 1999). This type of connection uses the Internet to transmit and receive signals using a codec. IP-based VC support both point-to-point and multipoint meetings and quality of such VCs primary depend on available bandwidth and equipment.

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[13] H.3xx represent recommendations by International Telecommunications Union for videoconferencing settings and protocols. For further reading, refer to TANDBERG. Video Conferencing Standards. *Application Notes*, D10740 rev 2.2

Meanwhile, ISDN connection resembles a landline phone call. To start a meeting, the participant must dial a specifically assigned number and then a network interface system will link ISDN network to VC system (VSGi, 2005).

Although most companies are choosing a connection type according to what is available and suitable for them, the IP-based connection is used more frequently due to increasing broadband worldwide, lower network costs and ongoing technical advancements (Baerg, 2013; Reid, 1999). However, many VC providers are offering to their clients both network solutions in one service. This is primarily attractive for companies having many external video calls with various customers, partners and third-parties.

3.3.1.2 Cloud-based Solutions

VC technologies keep evolving from year to year. Companies that are not willing or do not have a possibility to invest into complex VC infrastructures, may use web-based VC applications as they do not require any specific expertise, technology-heavy equipment or special network settings. According to Technavio (2015), cloud-based VC market is going to grow at around 40% CAGR by 2019, meanwhile, CDW (2013) claims that cloud solutions reduce firms' IT costs by 25% and they also state that VC and remote collaboration will be the major cloud application.

Skype has boosted a customer utilization and popularity of internet-enabled video communication and created a VC opportunity for low-budget firms (Kichenmann AG, *n.d.*). Now, a lot of video infrastructure as a service (VaaS) providers are emerging on the online VC market. These vendors are hosting video call connections and provide VC as a service to participants. Moreover, many providers of traditional VC systems start also offer web-based solutions.

Cloud-based VCs are characterized by relatively low cost, which is still declining due to an increasing number of available options. Pricing and strategies are different across vendors, however, there are several prevailing pricing plans: (i) payment per minute of VC; (ii) monthly or yearly subscriptions; (iii) purchasing of licenses and (iiii) special services (e.g. webinars, event organization etc.) provided by vendors (ReadyTalk White Paper, *n.d.*).

Another attractive attribution is a lack of any expertise needed for VC settings. Also, VaaS providers have their own customer support and in case of any technical issues,

companies using cloud-based meetings can directly contact vendors instead of hiring a VC-dedicated internal support team. Furthermore, due to the trend of new working schemes like home office and virtual teams, it starts to be more complicated for some companies to invest solely on implementation of VC equipment in certain locations as nowadays many employees are flexible and dispersed across time zones (Kichenmann AG, *n.d.*).

On-Premise Video Conferencing	Cloud Video Conferencing
High-cost	Cost-effective and affordable
Claim the framework and hardware	No lavish framework
Get a custom on-premise fit out arrangement	Utilize existing equipment
IT team required	No IT team required
Team up with other site or area with comparable endpoints	Quick to scale up/down
	Simple to convey
Control the arrangement on your own system	Overseen by supplier
Secured	Secured

Table 2 Comparison of Cloud-based and Traditional Videoconferencing

Source: Lee, 2017

Table 2 shows the unexhaustive features list of two main VC types. To sum up, there is no one single argument which of the VC settings is the best. There is no one solution that fits all companies. What should be considered when deciding is what system is the most suitable for a company and compatible with locations to be connected as the idea in a heart of a VC is to enable participants to collaborate remotely whether it is a cost-efficient and easily maintained cloud-based system or in-house VC system.

3.3.2 Comparison of VC and Face-to-Face Meetings

Rogelberg, Scott and Kello (2007) stated that a number of meetings has drastically increased during past 50 years. Executives spend up to 23 hours per week attending various meetings and this trend appears more in MNCs than in smaller companies. Meanwhile, according to Pidgeon (2014), on average any corporate employee participates in 62 meetings per year and they spend around 4 hours per week to prepare for meetings. However, the statistics also say that 34% of meetings are a waste of time, thus it is crucial to make every session to be productive and useful for all participants.

Meetings in-person are considered to be beneficial and crucial for running a business (Denstadli et al., 2013). Nevertheless, with technological advancements novelty

and international expansion of firms and their operations, a way of how to have an effective meeting has changed. When there is a need for a gathering of people residing at multiple locations, time spent on one session is considerably increased due to extended travel and transit. VCs can both substitute and complement face-to-face meeting. Even though using ICTs drastically reduces time and money spending on travels, according to Polycom research (2013) only 87% of respondents named it a reason to use VC while 94% believe that firstly video meetings enhance productivity, followed by increased impact of discussions (88%) and fast decision-making (87%).

An ability to see remote colleagues or clients make people feel close and personal. Video enables participants to see each other simultaneously and read non-verbal clues, which can be critical for understanding a person on the other side. At the same time, lack of a personal proximity due to distance and personal contact reduce a perception of cultural diversity and increase a total performance of remote communication (Gera et al., 2013). It is said that VCs as face-to-face conversations allow participants to build trust and empathy to each other (Bos at al., 2001). However, in-person meetings create a stronger feeling of belonging to a team and discussion satisfaction than VCs (Warkentin et.al, 1997; Gera et al., 2013). As a clear advantage of a virtual meeting is its flexibility. It is fast to schedule and set up. VC can be a default option for ad-hoc discussions allowing to include last-minute participants (VSGi, 2005).

There are distinct benefits for both types of meetings. Companies can choose any setting according to the agenda and current circumstances. In most cases, face-to-face meetings and VCs are regarded as complementary as it is not very beneficial to substitute all in-person discussions. Networking and building a personal bonding with clients during formal and informal gatherings contributes to achieving commercial business objectives (Denstadli et al., 2013).

4 Practical Part

The following chapter describes how the study and analyses were run to give a further overview of VC usage. The techniques of Multi-Criteria Decision Analysis were used to analyse and select an optimal software solution of videoconferencing system for a multinational company.

4.1 Executive Summary

As it was noted earlier more and more companies recognize the utility of VC as a tool for active collaboration and productivity. Meanwhile, one of the main factors that organizations consider when taking any structural decision is the minimization of their controlling costs while increasing or retaining competitive advantage and effectivity. Comprehension of value-added associated with using ICT may help managers in MNCs to realize a true potential of different communication technologies and regard them as a necessity rather than a refinement (Earon, 2013). The analysis in this work is aimed to compare VC implementation costs with other costs occurring when organizing an in-person meeting for participants located in different countries. The cost-benefit analysis is calculated to see what tangible and intangible benefits can be gained when using VC if any.

Michael Massari has said: *"Regardless of how tech-savvy you may be, face-to-face meetings are still the most effective way to capture the attention of participants, engage them in the conversation, and drive productive collaboration"*. Nevertheless, there are many formats of existing meetings. Keith (2017) has described the 16 meeting types that any organization can encounter[14]. Thus, the raising question is for which of these types managers may prefer to organize a discussion via a VC system or have a F2F gathering. The hypothesis for this research is that a managerial choice of how to plan a meeting directly depends on multiple *impact factors* (which will be determined from a designed study).

There is an ample supply of different VC solutions on the current marketplace. Many providers strive to create a unique offer with diverse features in order to increase their market share. Thereby, when deciding to purchase a VC system, a thorough research

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[14] See Appendix I

should be performed to find the best fitting option for a company. In the last part of this study, a comparison of two VC vendors is created to give a general overview of what factors decision-makers must have a look when considering different alternatives.

4.1.1 Cost-Benefit Analysis

For the cost-benefit analysis, it was decided to use a non-existing company to simulate a real-case situation. This method allows to generalize the findings and give a sketchy overview of the conducted analysis disregarding the field where a company is operating.

The company in the middle of this research is defined as MNC and will be referred to as Company X. This company is mature and runs its business in the B2B environment for at least few years with a stable financial performance. Company X has its headquarter located in France – Paris and has offices in other countries across Europe and North America.

The analysis is focused only on one international team inside Company X, which is working on one common project. The team consists of six people in total, whereas the Team Leader is residing in France (Paris), two team members are in Canada (Montreal), other two are in England (London) and one person locates in the Netherlands (Amsterdam). Work on the project requires the team to meet at least 8 times per year in Paris. For the simplification, no rotation in meeting locations is considered in the following study. Each meeting is supposed to last two hours on average. Currently, Company X is considering, whether they should implement VC system in these offices or run F2F meetings for this team.

Table 3 shows how much it would cost to Company X to run the team's meetings per year. An average salary was taken from Eurostat statistics of the average wage in Eurozone (2016). It is assumed that 2.800 euros would be the cost of meetings in regard to employees' salaries.

Number of meetings	8
Length (hours)	2
Number of traveling participants	5
Average salary per hour (€)	35
Total cost (€)	**2800**

Table 3 Total Meeting Cost Per Year

4.1.1.1 Costs Analysis

When planning a meeting among international participants at one location, the first thing to consider is a cost of needed transits of people from various places to a set meeting place.

Average roundtrip flight cost per person (€)	800
Hotel cost per person (€)	125
Other T&E per person (€)	200
Total travel cost for 5 travellers (€)	**5625**

Table 4 Total Travel Cost

Note: T&E stands for Travel and Entertainment Expense

Participants from three different countries are required to travel. The assumptions are made for a case where the participants have to stay two days and one night in France. The roundtrip cost was calculated and rounded up by finding an average price for tickets from Montreal / London / Amsterdam to Paris and back. Price ranges were taken as official flight charges for an economy class as of January 15th, 2018. Hotel cost per person was determined by an average price of hotel accommodation. According to Booking.com (2016), a mean price range for a hotel room in Paris is 125 euros per night. Moreover, it was decided to mention additional costs that were averaged to 200 euros. These spending can include fares for taxes, car rents, meals, tolls, parking and other occurring costs. It is important to note that these expenses may vary significantly depending on a situation. Table 4 shows a summary of all travel associated expenditures.

When traveling, not only costs of flights, hotels and other expenses should be taken into account but also a loss of time while being in transit between two locations. It is needed to consider how much time will be spent on a roundtrip from home/office to an airport and waiting time there. This time is considered as a productivity cost and can be monetized in terms of an hourly wage spending. Table 5 shows how much Company X would lose when requiring its employees go for business trips:

Average travel time (hours)	16
Non-productive time	60%
Number of trips	40
Non-productive cost (€)	**13440**

Table 5 Total Productivity Cost

Nevertheless, it is a customary practice among people who are traveling frequently to work while being in transit. For instance, they may check emails or read offline documents related to their responsibilities while waiting for boarding or being in an airplane. That is why in this analysis, it is assumed that 40% of travel time employees may perform certain work tasks. The travel hours are given as a total time for a door-to-door commute.

Travel expenditure and costs occurred from a productivity loss are the main drawbacks of running a F2F meeting. Next, approximate VC system implementation costs were calculated (see Table 6).

Up-front cost of VC (€)	10000
Number of systems	4
Initial total cost (€)	40000
Cost minus amortization (4 years) (€)	10000
Annual maintenance cost (€)	6000
Total VC cost per year (€)	**16000**

Table 6 Total VC Cost

The cost for one VC system was taken as an average of multiple reference prices presented in different white papers and articles. As the members of the project team are located in four countries, there is a need for at least four systems to be installed in each of this location. However, one system can be used only in one meeting room as often VC hardware is not very mobile. Additionally, it is possible to run only one meeting at a time. Hence, Company X has to decide whether to purchase additional systems in future. As it was stated that in this analysis only interests of one team are considered so no extra VC needs were taken into account.

It was decided that maintenance cost represent 15% of the initial VC cost that will be amortized over four years. This analysis does not consider any other possible costs such as system upgrades, network costs, repairs or training for the staff.

Table 7 summarizes total costs for both meeting cases.

Total cost if meeting in-person (€)	21865
Total cost if using VC (€)	18800

Table 7 Costs Comparison

4.1.1.2 Payback Period

After the comparison of in-person and VC associated meeting costs, it was decided to determine in how much time Company X can receive a return on its investment for VC solutions. For this purpose, a payback period was calculated.

	Scenario #1	Scenario #2	Scenario #3
Number of traveling people	5	5	5
Number of trips per year	8	8	8
Average roundtrip travel cost per person (€)	800	800	800
Percentage of trips replaced by VC	20%	50%	70%
Savings if using VC (€)	6400	16000	22400
Cost for 4 systems per year (€)	16000	16000	16000
Payback Period (months)	**30**	**12**	**9**

Table 8 Payback Period (Scenarios 1-3)

Firstly, in the example of the team used for the cost-benefit analysis, a payback period was calculated for different possibilities (see Table 8). Scenarios #1 to #3 show example cases, where a certain number of meetings on premises is substituted by using a VC system.

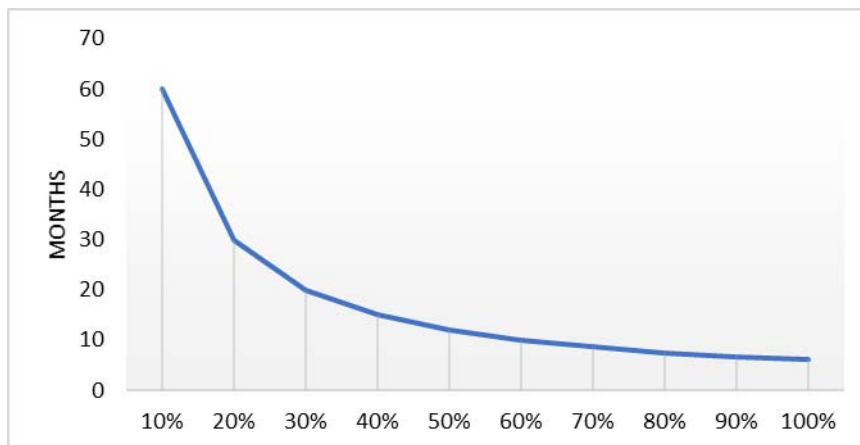Figure 6 shows all expected payback periods for the team.

Figure 6 Total Payback Period - Incremental % Meeting Substitution

The analysis above is showing results only for 8 meetings per year, however, it was decided to verify when the payback will be achieved if the team meets more frequently (Scenario #4).

MNCs generally employ hundreds of people and as VC systems can be used by the whole personnel from different departments, Scenarios #5 and #6 show an expected return

in a case when 20 people consider replacing their business trips by using VCs while assuming same costs and meeting set-ups as the previously analyzed team (see Table 9).

	Scenario #4	Scenario #5	Scenario #6
Number of traveling people	5	20	20
Number of trips per year	15	8	8
Average roundtrip travel cost per person (€)	800	800	800
Percentage of trips replaced by VC	20%	20%	70%
Savings if using VC (€)	12000	25600	89600
Cost for 4 systems per year (€)	16000	16000	16000
Payback Period (months)	**16**	**8**	**2**

Table 9 Payback Period (Scenarios 4-6)

4.1.1.3 Non-monetary Benefits

The usage of VC brings not only tangible benefits but also intangible (Weinstein, 2013; Earon, 2013; Curtis, 2012). Some of the most predominant non-monetary advantages resulted from in-person meetings replacement by VC are:

- **Work-life balance**. Skipping long business trips allows employees have more time on personal needs and family time;

- **Personal contact**. Using a VC system simulates an experience of being in the same room while having a meeting in distinct locations. It also allows to see non-verbal cues;

- **No CO_2 emissions**. The use of any transport results in pollution, while VC is considered more sustainable. An amount of CO_2 emission created by the trips that the team would undertake is the following: 175.2 kg/km per passenger for roundtrip London-Paris; 117.2 kg/km per passenger for roundtrip for Amsterdam-Paris; 613.5 kg/km per passenger for roundtrip Montreal-Paris (International Civil Aviation Organization, *n.d.*).

For further benefits created by VC in comparison to F2F meetings, refer to section 3.1.1.

4.1.2 In-depth interviews

To gain a deep understanding of what managers in MNCs expect from diverse types of meetings, the in-depth interviews were conducted. These discussions were vital to see patterns of how to have effective meetings and what arrangements are needed for this.

In total, seven interviews were carried out in person or via Skype. All discussions were in English while the duration of each interview varied – 30 minutes on average. The interviews were going on in a friendly atmosphere and out of laboratory conditions so that interviewees felt relaxed and informal.

Table 10 shows the full list of interviewees. The participants were unaware of other respondents and chosen according to the following criteria:

- Work in a MNC that has minimum three international locations;
- Have an international management position (supervise at least two people abroad);
- Use various ICTs *daily*;
- Be experienced with VC systems;
- Be able to communicate in good English.

Interviewee	Position	Company type	Company size	Average of VC usage	Average of International Trips
AR	Carbonates Marketing & Strategy Director	Industrial (mining, chemicals, minerals)	50 countries (16.000 employees)	1-2 times per week	2-3 times per month
GA	Carbonates Global HR Director	Industrial (mining, chemicals, minerals)	50 countries (16.000 employees)	3-5 times per week	1-2 times per month
LP	Head of Financial Risks and Asset Management	Energy	70 countries (158.000 employees)	4-5 times per week	2-3 times per month
DL	AMP EU Team Leader	Management Consulting	120 offices worldwide (25.000	8-10 times per week	1-2 times per year

			employees)		
KC	AMP NA Team Leader	Management Consulting	120 offices worldwide (25.000 employees)	6-10 times per week	1-2 times per year
MT	International Office Director	Education	7 countries	1-3 times per week	1-2 times per 2 months
JSF	Streamline Client Service Manager	Human Capital Management	58.400 employees worldwide	5-7 times per week	3-5 times per year

Table 10 List of Interviewees

During the interviews four main topics were discussed: (i) usage of different technologies at the workplace and how they drive success within a company; (ii) meetings; (iii) meetings with remote participants; and (iiii) VC. Appendix J shows a non-exhaustive list of exemplary questions, which the interviewer asked the respondents. Many follow-up questions were created in different contexts to gain a better understanding of discussed topics. Only the interviewer has access to collected data and transcripts as the interviews were anonymous.

4.1.2.1 Data Analysis

As the previous analysis found out that VC would be a considerable cost advantageous investment for Company X, it was decided to check what business-related benefits it can bring to the firm. The results give an understanding why managers are choosing VCs over other means.

The gained insights from the interviews allow generalizing findings as respondents were generally in accord regarding all the discussed topics.

All interviewees agreed that modern ICTs are playing a crucial role in fulfilling their duties. The used technologies vary according to managerial positions; moreover, it was repeatedly confirmed that technological evolution is driving business progress. Early adopters of ICTs possess a competitive advantage and increase overall productivity across all divisions. Nevertheless, there is a strong need for a technology-friendly culture that would make a transition to new processes more effective and less painful for employees.

For instance, one of the respondents shared observations that when a company decided to completely move all email system and collaboration to a new web-based software, implement distinct cloud-based HR management tool and get rid of land phone lines to use online phone system instead and all these changes were made at once; the majority of employees were overwhelmed by these organizational changes so company's activities got stuck and productivity drastically decreased because of a poor re-organizational management, lack of training and employees' unfamiliarity with new tools. This situation has shaken people's trust in the firm.

Senior managers are interested in conducting meaningful meetings with the least time waste despite any cost as they are mostly interested in the most efficient decision-making and keeping their teams active and productive. They all agreed that settings and expectations of a meeting outcome depend on a purpose of the gathering (in accordance with Rebori (2007), McNamara (1999), Rowan (2003)). Figure 7 summarizes insights that each of the interviewees referred to during the conversation. This tree diagram shows selected objectives and attributes of meetings on the basis of Literature Review and interview observations. Interviewees were asked to comment on these points and elaborate on how they discern different meeting types according to these distinct characteristics.
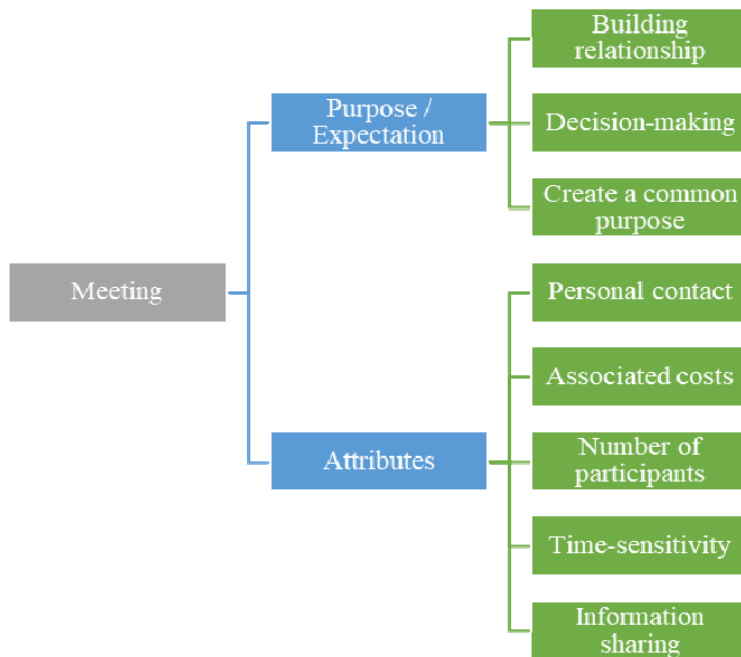

Figure 7 Coded Data from Interviews

Hence, the findings show that to run an effective meeting, it is first needed to decide what is a purpose. For example, it may be conducted to build a relationship with team members, clients, suppliers or any other stockholders or align subordinates with a shared vision on a certain point. Depending on an objective, meetings can vary in time, a number of participants, costs and way of information communication (e.g. discussion, presentation, introduction).

4.1.2.2 Performance Matrices

For further analysis, it was decided to run a MCDA technique, namely Weighted Scoring Model to compare several formats of meetings using eight elements described above. The interviews served as source of primary data for comparison. The interviewees were asked to describe what they expect from various meetings and assess VC, F2F and Audio conference (AC) setting for these events. Responses about advantages and disadvantages of using one of these conference setups were used to assign a grade on a five-score scale for each of the meeting component. Table 10 reveals a gained performance matrix based on interview observations, whereas one on a scale is the lowest performance and five is the highest (exception is *associated costs*: one is the most expensive and five is the cheapest setting).

	VC	F2F	AC
Building relationship	4	5	2
Decision-making	4	4	4
Creating a common purpose	4	4	3
Personal contact	3	4	1
Associated costs	4	1	5
Number of participants	5	3	5
Time-sensitivity	4	2	5
Information sharing	4	5	2

Table 11 Scoring Meeting Options

The scores were assigned on the following reasoning shared by the interviewees, that go in alignment with the findings in previous researches:

Building relationship: F2F meeting is named to be the most effective way to create a strong network as people are physically in the same room and after a meeting can have an informal discussion to make common work more personal (Duncan, 2014). Meanwhile

VC is also considered to be a powerful tool for building a relationship as it enables people to connect any time as frequently as needed and see non-verbal cues to verify whether participants have a mutual understanding (Johnston, 2014). AC was named as the least intimate way of arranging a discussion and some of the participants can *tune out* during the conversation that may cause future misunderstanding and disaffection (Frey & Overfield, 2002).

Decision-making: During F2F meeting, people tend to take a faster decision, while during VC this process take longer but a final solution is frequently more accurate (Pridmore & Phillips-Wren, 2012). AC is also considered to be helpful in fast decision-making due to the ease of instant connection (Jeffrey, 1998). The interviewees agreed that in case of an urgent need for fast decision-making, the meeting set up is not crucial;

Creating a common purpose: F2F and VC meetings allow people interact with using visual tools that enable a creation of a shared vision in a team (Wick, 2015). Meanwhile, AC can still be used for creating a common purpose and set a direction for a mutual success, but this way of communication is regarded as less forceful;

Personal contact: F2F meetings offer more personal contact and create a team spirit faster than VC, which in its turn also enhance socialization inside teams in a bit longer timespan (Panteli & Chiasson, 2008). AV is perceived to be less personal due to inability to see conversation participants and a need for a facilitator to coordinate discussion as there is a high possibility of asynchronized communication that may detach participants (Frey & Overfield, 2002; Jeffrey, 1998);

Associated costs: Traditionally, the reason why many companies and managers prefer VC over F2F sessions is to avoid travel costs, which can be very high (Weinstein, 2013). AC is stated to be the cheapest option as a hardware is inexpensive, many phone providers offer plausible flat-rate schemes and there are even free services available (Jeffrey, 1998; Earon, 2015);

Number of participants: VC and AC are beneficial as they allow a considerable number of participants to join (i.e. several people at one location can connect to other groups in various places);

Time-sensitivity: VC and AC are fast to set up and need a minimum of planning (Jeffrey, 1998). However, VC needs a small amount of time to create a connection and book a room with the on-premise system while practically there are land-line phones in

each room. F2F meetings need advanced planning and sufficient time to gather all foreign participants at one spot;

Information-sharing: During a F2F sitting, participants can share any kind of information both in printed versions and electronically, whereas VC also enables people to share screens, use virtual blackboards and show different content (Earon, 2013). AC restrict an amount of information that can be exchanged as it is presented only in a verbal form (Jeffrey, 1998).

From the sixteen types of meetings presented in Appendix K, four types were chosen for the more detailed study (Keith, 2017):

a. **Project Status Update** – a structured regular meeting format where team members follow-up on the progress of their work. The aim of this gathering is to verify whether all people assigned to the project are on the same wave and know their direct duties, if not, this meeting serves to give a direction and action plan. The meeting setting highly varies among teams as they may have different ground rules;

b. **Introduction** (meeting with a potential foreign client) – an intense formal meeting to learn about a probable customer, build a strong partnership and introduce own offering;

c. **Training –** an event where one person (trainer) leads the whole session to transfer some knowledge. These meetings are made for employees, so the participation is a key, but no collaboration is expected;

d. **Workshop** (teambuilding) – a congenial session to form a bonding across the team. Teambuilding aims to build a close relationship with teammates to make their mutual work easier and non-conflicting.

Interviewees were asked to give their thoughts about these types of meetings and describe how they would set up them for teams they supervise. Moreover, they were invited to state their opinion or share previous experience on how VC, F2F and AC would work for these sessions. Conclusions based on how much managers value meeting components can be seen in a form of assigned weights to them presented in Table 12.

	Project Status Update	Introduction	Training	Workshop
Building relationship	5%	25%	0%	25%
Decision-making	30%	5%	10%	5%
Creating a common purpose	5%	25%	25%	20%

Personal contact	5%	15%	3%	15%
Associated costs	15%	5%	7%	5%
Number of participants	15%	5%	20%	15%
Time-sensitivity	15%	5%	10%	5%
Information sharing	10%	15%	25%	10%
Total	**1**	**1**	**1**	**1**

Table 12 Weights of Meeting Elements by Meeting Types

Hence, it is possible to understand what preparations are needed to run any of these meeting formats. A planning is one of the most essential elements to run effective meetings and reach a set objective (Woodward, 2017). For instance, in Table 12 it is visible that the main driver of conducting a workshop is to build a relationship and create a shared vision regarding mutual work among teammates whilst many managers are ready to spend any money to bring the whole team together to strengthen a *team spirit* that determines the future success of the collaboration.

The total weighted scores by meeting type were calculated to see which technology or in-person presence can be used for these sessions[15]. Hereby, Table 13 can serve as a reference how it may be more beneficial to run a planned meeting. It is seen that VC is the preferred mean for all these types of meeting except an introductory event with clients as it may be more advantageous to have an on-premise discussion with a possibility to show your offering, have a more tight personal first acquaintance and meet participants in a *shared space*, that cannot be achieved during VC or AC due to their two-dimensional communication style (Taylor, 2011). On another hand, during follow-up meetings it can be more lucrative to use technology as it can be used fast, anytime and as long as needed. Interestingly, a great teambuilding can be achieved using both VC and F2F meetings with relatively the same effect of the workshop. One of the interviewees had told that she is arranging a F2F gathering of the whole team once per year, so people were able to see with whom they closely work and have out-office time together but each second year they use VC for the same purpose but with less cost spent. Hence, she believed that this rotation helps the team to maintain a close connection to each other but the same time it is cost effective for the whole company and fits the budget. Moreover, VC is named the best tool for training and professional development as it allows all willing people to connect at any

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[15] This is a general theoretical finding, a final decision on how to arrange a meeting depends on a manager's choice.

time and location, record sessions and have an engaging experience. This assumption is going along with the interview observations and Literature Review. Several interviewees affirmed that VC is used for training even for people located at the same location.

	VC	F2F	AC
Project Status Update	4.1	3.3	4
Introduction	3.9	4.1	2.7
Training	4.2	3.6	3.5
Workshop	4	4	2.9

Table 13 Total Weighted Scores by Meeting Type

All in all, the interview participants agreed that VC as a collaboration tool is gaining more and more recognition and power. Nevertheless, for them, it was not a one-day transition process to stop meeting in-person and use ICT instead. To widely embrace the potential of VC, a corporate culture is needed. For example, one manager said that his company once introduced VC systems in offices without notice and training so for the first months these systems were untouched by employees as they preferred to communicate as they got used to.

4.1.3   VC Systems Comparison

As now, the reasons why VC should be used for the project team meetings in Company X were cleared up and recognized, the next question is what VC solution would be the best option for them. It was decided to compare two biggest VC providers offering on-premises hardware and specialized software. The result of this comparison will be presented as a suggestion for Company X to purchase needed systems.

For the subsequent analysis, it was determined to consider only room-based endpoints with IP connections but not cloud-based vendors. Cisco and Polycom are indisputable VC giants providing a wide range of products and services[16]. To compare these companies, the following analysis was created (Table 15). Although they have distinct VC systems and services, there are also a lot of commonalities between them, especially external factors are similar, that shape the overall VC market.

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[16] Refer to Appendix H and K

Cisco	**Polycom**
Advantages	
• One-stop shopping for various high-tech services and products; • A strong relationship with vertical industries by providing exclusive services; • Retaining strong relations with key accounts; • Attractive licensing offering; • A considerable number of acquisitions and partnerships; • Spark (enabling cloud audio, video, messaging, persistent meeting room, and the collaboration API markets); • Strong brand (incl. WebEx); • Robust financial performance.	• Wide channel distribution system – Polycom Partner Network; • Great focus on innovations (especially hardware); • Offering endpoint integration with Microsoft Office 365, dual-view camera, content sharing and other highly demanded features; • Strongest partnership with Microsoft – Skype for Business (S4B); • Good customer service on a personal basis; • RealPresence Trio – the first hub concept (audio, video and content); • Polycom SmartPairing technology; • Providing solutions using 50% less bandwidth than competitors; • Proven compatibility with other VC systems (e.g. Cisco, Zoom, Blue Jeans, Lifesize etc.).
Disadvantages	
• Multiple offerings with overlapping functionality, partial interoperability and different feature sets; • No clear roadmap; • Fallen behind in supporting meeting experiences with third-party wearables, AR and VR; • Sophisticated customer support; • Problematic supply chain resulting in orders delays; • Multiple litigations and fraud accusations.	• Need for Polycom hardware to use software; • Dependence on partnerships such as with Zoom and S4B; • Lack of some leading-edge features; • Difficult deployment and handling of systems; • Unstable financial performance; • Supplier concentration; • Need for Polycom certified person for installation.

Table 14 Comparison of Cisco and Polycom

Sources: Fascisni et al., 2016; Preset, 2017; MarketLine, 2016; MarketLine, 2017; Vyopta White Paper, unknown; Ventimiglia, 2013; Bhasin, 2018; Cavins, 2012

4.1.3.1 Strong Sides

Cisco and Polycom provide the most valuable variety of room-based VC solutions and highest-quality customer support across the globe. Commonly, their products are

sophisticated, innovative and compatible with other systems and devices (Dudley, 2016). In total, they both have a 75% share of the whole VC market worldwide in 2017 (Synergy Research Group, 2018)

The pricing is relatively similar, however, Polycom's RealPresence line is named to be a cost-effective product, which is assembled in a way to start VC fast using different devices. Polycom was also the first to create a three-part technology enabling video, content and audio all at once. Meanwhile, Cisco launched a unique product – Spark with a help of which remote collaborators are capable to exchange messages, run VCs and leverage on rich data conferencing.

Cisco has a much wider range of products beyond VC solutions while Polycom's focus is on VC only. Cisco name is widely known and recognized – its brand sits on the 55th place in the ranking of top 500 most valuable brands worldwide by Brand Finance (2017). Its web-based application WebEx is often used in many companies as it is easy to manipulate, secure and multi-functional, additionally, Cisco is continuously improving WebEx features (Cisco, 2009). Cisco's stable financial performance and global reach allow them to boast a considerable number of partnerships and acquisitions. During last ten years, Cisco has acquired 12 companies in the collaboration business area (Vyopta White Paper, n.d.). Acquisitions of small companies let them embrace new VC horizons much earlier than competitors (Bhasin, 2018).

Polycom is a smaller company in comparison to Cisco but has the same widespread reach and good reputation. One of the most valuable characteristics of this company is outstanding technical and customer support, which is personalized and extremely customer-orientated. Polycom also has created a special program, Partner Network, which connects various experts, influencers and executives to improve VC products and promote services (Gartner, 2017; Polycom, n.d.). Polycom has a strong focus on continuous innovation, development and delivering high-quality, that keep the products up to the market and create a competitive advantage. Polycom has the strongest partnership with Microsoft Office, namely Skype for Business (S4B). This alliance enables both companies to leverage each other's capabilities and secure a future of integrated VC products (Vyopta White Paper, n.d.). Moreover, Polycom has found a way to reduce network bandwidth required for using its VCs (up to 50% less comparing to other vendors) (Polycom, n.d.).

4.1.3.2 Companies' Pitfalls

Both companies provide office-based solutions that are of a high A/V quality but are sophisticated in a technical sense so in case of any troubleshooting a special IT expert is needed. Such hardware is usually hard to move and requires specially-designed meeting rooms dedicated to VC sessions. Moreover, on-premise VC solutions are considered to be expensive requiring occurring funds, labor and network investments.

Although Cisco has a lot of VC products to offer, the features of them are often overlapping and may have partial interoperability with other devices and systems, what confuse many potential customers when choosing a VC (Gartner, 2017). Cisco's customer support is perceived not as quick as Polycom's. However, the largest weakness is an inefficient supply chain. Cisco outsources some of their manufacturing processes and purchases certain components from third parties resulting in frequent delays in order deliveries and decreasing margins (MarketLine, 2017).

Polycom is considerably dependent on partnerships, especially for VaaS offerings. Some products are also missing certain advanced meeting properties such as session analytics, custom VC layouts and always-on meeting feature (Gartner, 2017). Polycom also has several issues with its supplies as some of the components can be purchased from a limited number of sources, hence, Polycom loses a bargaining power (Market Line, 2016). Besides, the installation of their systems requires a Polycom-certified technician and many customers claim that maintaining of Polycom products is quite exigent.

4.1.3.3 Prospects for Future

As it was repeatedly said, many MNCs realize and discover benefits of VC usage so this market keeps growing steadily as well as a number of remote and virtual collaborations skyrockets nowadays. These two are the main drivers of the VC market that require vendors to innovate constantly. Still, a popularity of room-based solutions seems to decrease as cloud-based solutions get more and more advanced, thus the two VC giants are prospected to explore this sector. Furthermore, there are many companies appearing in this market niche offering unique solutions, that may serve as potentially beneficial partnerships.

As Cisco has acquired a considerable number of companies, they can leverage on their unique knowledge and technology (e.g. Arcano's flexible bridge). Cisco may also

develop other product lines and bundle them with VC products as well as use gained revenues to invest in R&D. Although Cisco has exited the Flip business in 2011, they can still use the technical knowledge in innovating their VC products.

Polycom has a limited proposal for data conferencing, which is highly appreciated by companies. They also can maximize their relationship with S4B to attract new customers who are using Microsoft office. BYOD (bring your own device) trend is raising and demands VC providers to search for appropriate solutions. Polycom could come up with other products like SmartPairing Technology, which let conference participants start VC with a swipe of a finger on a tablet as this technology directly connects Polycom VC system with a user device (Polycom, *n.d.*).

4.1.3.4 Risks and Challenges

Cloud-based VC is an opportunity but also can be a threat to both companies as many companies are trying to embrace this market and create a unique offering. Besides, many smaller VC providers are striving for market shares and may start a price war. Other factors that most end-users are concerned about are security and user-friendliness of VCs. In a case of security breach, a company may lose trust and reputation.

Cisco has been in a middle of several litigations and accusation of fraud, that can shake customers' loyalty. Many markets where Cisco operates are volatile, so some economic changes may appear and decrease Cisco's orders and revenues (MarketLine, 2017).

Polycom in 2016 has become a private company and there is a rising concern that this shift may affect Polycom's roadmap (Ganter, 2017). As it was said, Polycom is highly dependent on its partners and if any of the relationships deteriorate, it may bring a company to a hard situation. Also, Polycom is operating in a fast-changing environment and in order to keep with competitors, they innovate vastly. This development results in products obsolescence and excessive inventories (MarketLine, 2016). Frequently launching products also cannibalize already existing products on the market.

5 Results and Discussion

5.1 Findings

All in all, the conducted studies show that an implementation of a VC system can be highly beneficial for Company X for arranging meeting sessions within international teams and other foreign stakeholders.

The analyses showed that companies can achieve a considerable cost reduction and efficiency if using VC instead of going for exhausting business trips (Weinstein, 2013; Gerdeman, 2014). Virtual meetings tend to save not only companies' funds but also time and high productivity of employees. People, who have to undertake regular travels, waste time while being in transit. They also are extremely exhausted and stressed due to connection issues, missed flights, jetlag and being far from the loved ones (Alkon, 2016). Cohen (2015) claims that frequent travelers are more prone to obesity, radiation and fast aging. Even though traveling may seem glamorous nowadays particularly thanks to social media, business trips are often done at a higher cost than just hotel reservations and flight tickets.

Nevertheless, occasional face-to-face meetings are still needed as VC usage cannot substitute all business trips (Vyopta, 2016). Telepresence enables people to have a real-time communication at any point in time and place, so collaborators can have fast, two-dimensional and effective meetings. It allows them to keep each other updated at each stage of a project but for building a mutual trust between it may be more beneficial for them to meet in-person. Thus, VC does not aim to replace all face-to-face communications but enhance productivity and decrease perceived distance among remote workers (Vyopta, 2016; Gerdeman, 2014).

5.1.1 Cost Effectiveness and Environmental Footprint

The Cost-Benefit Analysis showed that the more people are using VC systems, the faster return on expenditures a company can expect. This result is vital as it shows that companies considering using virtual meetings should encourage executives to embrace new opportunities and flexibility of how to manage international subordinates and external communication. Nevertheless, an investment in VC solutions requires an objective and

thorough analysis, as this is a long-term commitment requiring occurring spendings, additional labor force and correct corporate mindset (Karagheusian, 2007).

Along with already mentioned benefits, socially responsible companies focusing on sustainability can boast a small contribution to carbon footprint when refusing use long-distance transport but use VC instead. This factor can be appealing to firms that want to sustain their commitment to improving the environment (Talk and Vision, 2012).

5.1.2 Meeting Planning

The interviews and their thorough analysis show that managers realize that team members are not required to be in the same room to perform well. The objective of a planned session determines how it will be held. There are situations when VC would be more beneficial comparing to in-person gatherings and vice versa. As a F2F meeting, VC requires participants to follow certain etiquette, set ground rules, learn technology and have prior rigorous planning (Thomas, *n.d.*).

The gained results from interviews as well as academic researchers agree that meetings requiring fast decision-making, knowledge transfer or information exchange are advised to be conducted by VC while sensitive meetings would be better done in-person. However, on the basis of interview observations, one important note was made that there are still many people who frequently use and rely on AC primarily due to its simplicity, familiarity and access even though they realize that VC will be more beneficial to achieve their objectives. This finding goes apart some scientific articles (e.g. Moore (2015), Andersen (2014), and other), nevertheless, this phenomenon can be explained by study limitations (section 5.2).

5.1.3 Choice of VC system

A choice of the right VC product depends on a company's size and purposes for its usage. Nowadays, there are multiple vendors varying by offerings, prices and geographic spans.

Based on the comparison of two VC market leaders, it was decided that for the particular case of Company X, the best choice would be a VC system from Polycom. This conclusion was made on the following criteria: (i) a sound customer service, which may be

extremely helpful for the company that has never used VC systems before and does not have on-site experts; (ii) a compatibility with other VC systems and devices, which is crucial in B2B environment as the company can use VC connections for interactions with foreign customers and suppliers as well as participants connecting from home or another place can use their own devices; (iii) an innovation-driven approach meaning that companies are sure to have a reliable and advanced product; and (iiii) cost-efficiency as Polycom provides budget solutions and requires less bandwidth expenditures.

5.2 Limitations

The presented research has several limitations. The observations gained from the interviews were constrained by a small number of participants due to the interviewer's inability to reach more executives. Moreover, all interviewees were Europeans, hence, the findings can be applied only to the certain population and do not consider possible cultural differences concerning virtual meeting perceptions.

Most of the data are self-reported based on the interpretation of conducted discussions and literature review. This could result in occurring bias, exaggeration subjectivity and selective memory (Brutus et al, 2013). As this thesis is concentrated on video conferencing, there is a possibility that selected sources and methods were positively skewed towards it.

The gained findings are illustrative and do not take into account all possible costs, certain VC applications, all meeting types and specifics of business industries as in some areas in-person meetings play a first-line role. There is not enough publicly available information and generally companies tend to emphasize only benefits and minimize conceivable drawbacks. Further on, some of the study participants did not fully share their opinions or experiences on the discussed topics due to the time limit.

6 Conclusion

The primary objective of this study was to define applications of VC systems. The literature review and conducted analyses showed that virtual meetings are frequently used nowadays. VCs help remote teams to increase overall productivity, ease decision-making and stimulate effective communication. This is an extremely powerful collaboration tool, that companies should embrace. It does not only reduce travel costs but change a way of managing the business.

When considering to invest in VC solutions, the needs and corporate goals should be taken into account. As any other organization change, it requires thorough planning and alinement across all business departments and international subsidiaries. VCs are not meant to completely replace in-person meetings but give more cost-effective and advantageous ways of carrying out selected remote discussions. Whether a F2F meeting or VC session, the meeting format should be scrutinized first.

There are many vendors providing numerous services and products, which differ in connection types, properties and applications. The two biggest VC providers are Cisco and Polycom, whilst the second one is perceived to be more appropriate for a mature MNCs due to its commitment to give a solid competitive advantage to VC end-users.

In general, many researchers agree that modern ICTs are positively contributing to the world economy and society. The more sophisticated and refined technologies used in a company, the more benefits it can gain. The number and geographic reach of MNCs drastically increase, that drives a rising demand for advanced technologies to facilitate management decisions and embrace the full potential of modern business capabilities.

As this study shows a perception of VCs from the managerial perspective, the further research can determine whether employees from different non-managerial positions and cultural backgrounds think the same as their supervisors. Next, the comparison of VCs in MNCs and SMEs can be carried out to see what the difference between them is if any. This work analyses only four types of meetings so the one can verify the patterns and expectations for other twelve meeting kinds. Furthermore, an additional research can be performed to compare on-site and cloud-based VC systems.

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8 Appendices

Appendix A: Representation of Four Industrial Revolutions
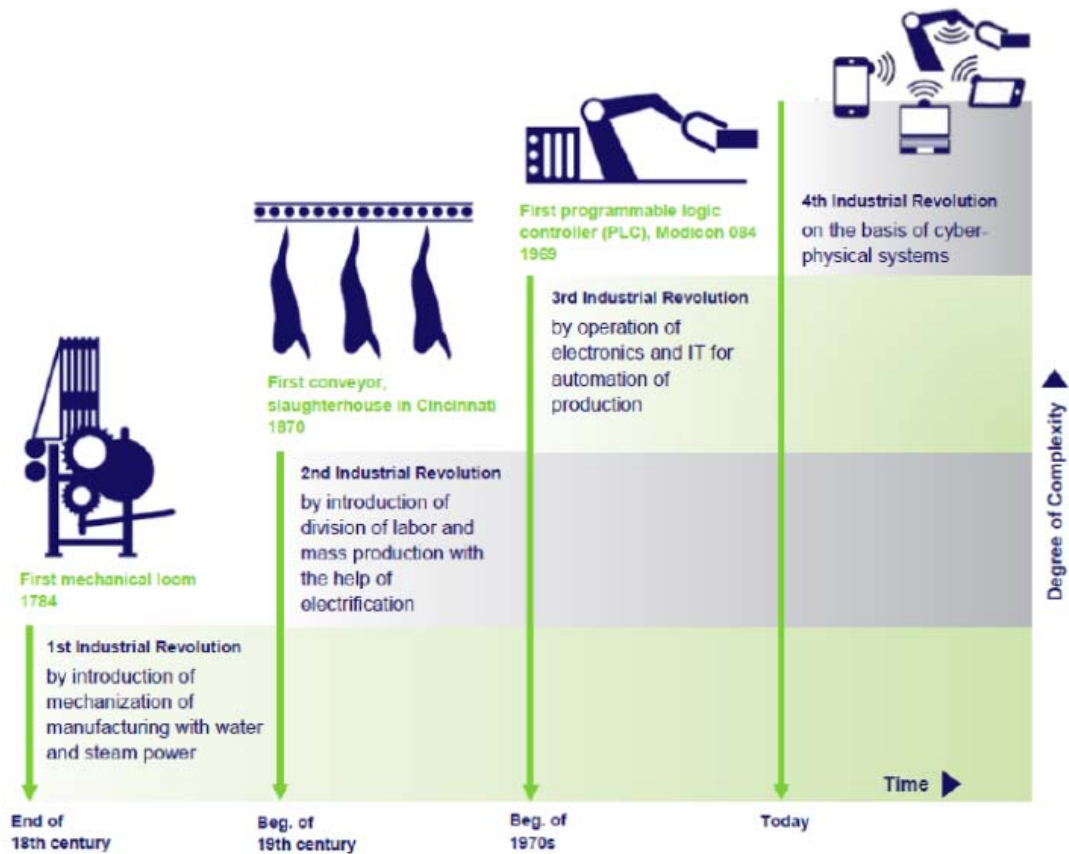
Source: GEHRKE, L., KÜHN, A. T., RULE, D., et al. 2015. A Discussion of Qualifications and Skills in the Factory of the Future: A German and American Perspective. *VDI The Association of German Engineers*, Düsseldorf, Germany, 2015, vol. 15.

Appendix B: Examples of ICT Innovations

Innovation Type	ICT as Innovation Component
Product and Services	- GPS; - Smartwatches / smart houses; - Online payment systems; - E-books; - Online ticket reservation etc.

Process	• Supply chain optimization;
	• Automatization in manufacturing;
	• Service Oriented Architecture for effective integration of processes etc.
Organization	• Virtual collaboration;
	• Video conferencing;
	• SaaS;
	• Customer Support online systems;
	• Databases etc.

Source: Elaboration of Basl & Gala (2009).

Appendix C: Development levels of ICT by region in 2016
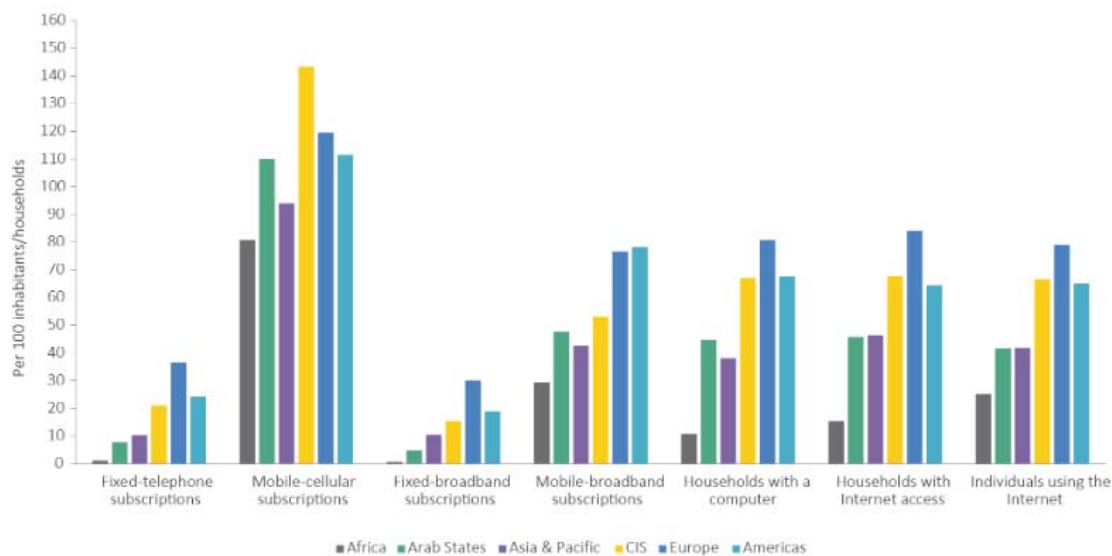
Source: ITU, 2016

Appendix D: Indicators used for calculating ICT Development Index

ICT access	Reference value	(%)
1. Fixed-telephone subscriptions per 100 inhabitants	60	20
2. Mobile-cellular telephone subscriptions per 100 inhabitants	120	20
3. International Internet bandwith (bit/s) per internet user	976'696*	20
4. Percentage of households with a computer	100	20
5. Percentage of households with Internet access	100	20

ICT use	Reference value	(%)
6. Percentage of individuals using the Internet	100	33
7. Fixed-broadband subscriptions per 100 inhabitants	60	33
8. Active mobile-broadband subscriptions per 100 inhabitants	100	33

ICT skills	Reference value	(%)
9. Mean years of schooling	15	33
10. Secondary gross enrolment ratio	100	33
11. Tertiary gross enrolment ratio	100	33

Source: ITU

Appendix E: Comparisons of successful business behaviors and practices between virtual teams and on-site teams (2012)
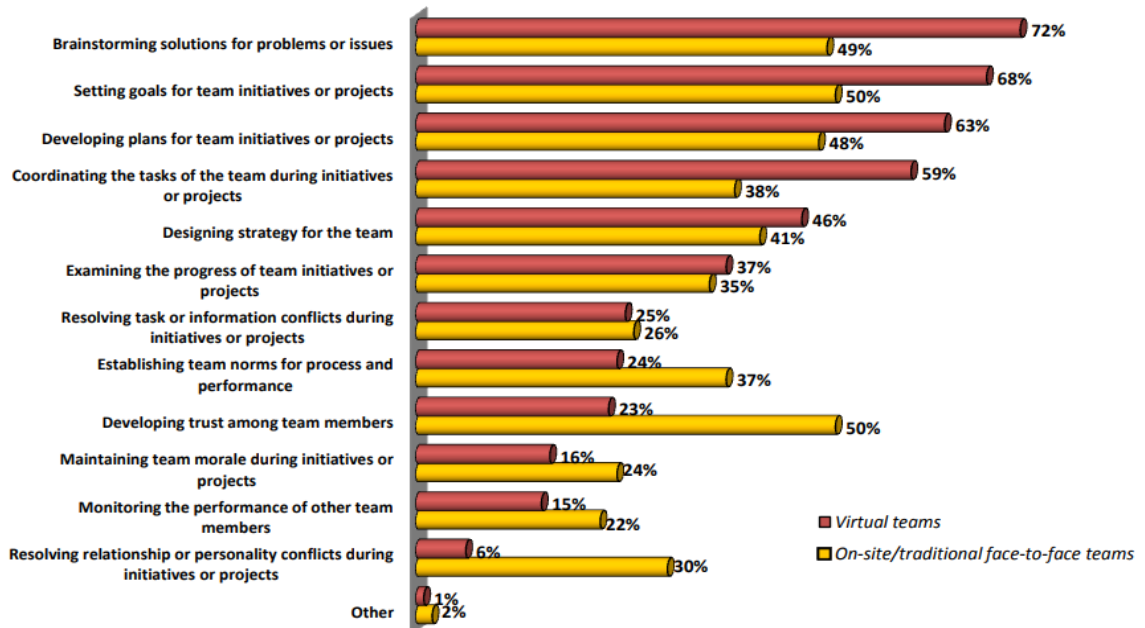
Note: n = 112. Only respondents whose organizations use virtual teams were asked this question. Percentages do not total 100% due to multiple response options. Respondents were asked to select the top five options.

Source: SHRM

Appendix F: Application of some ICT in remote teamwork

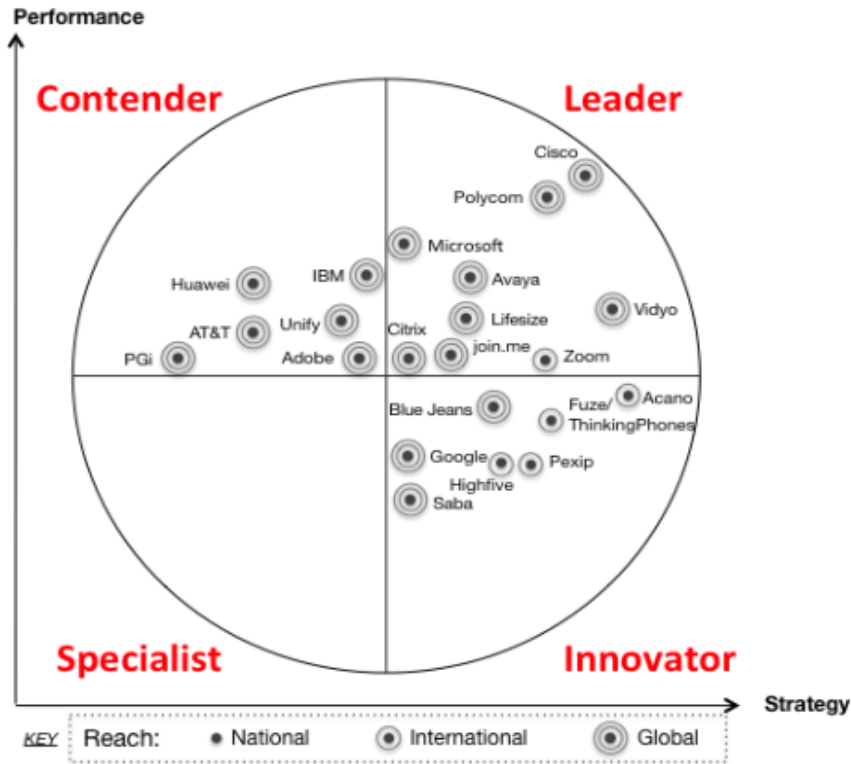| ICT	Advantages	Disadvantages
Email	• Help non-native English speaking people who can write and read English better than speak it (particularly if they have learnt English in a formal classroom setting) • Provide record of communications which will help reduce misunderstanding	• Lack of social presence since no non-verbal cues • Lack of rapid feedback

Discussion Forums	• Have the above advantages
	• Postings can be edited
	• Sometimes have search facilities
	• Easier for members from different language background since:
	  o It is more structured, because a reply has to be connected to someone else's posting according to a topic
	  o Allow members to fine tune and re-examine the messages before posting
	• Enable members from different languages to spend extra time reading discussion threads without being obliged to post themselves
		• Lack of social presence since no non-verbal cues
		• Lack of rapid feedback

Chat Rooms	• Informal and ease of use • Good for building relationships • Rapid feedback	• To participate actively, user has to able to type quickly and write short, quick sentences • Put people who don't know the terms used in chat or who are from other language backgrounds at a distinct shortcoming
Intranet	• Quick dissemination of information across team members • Reduce problems of different accents and poor understanding of spoken English	
Groupware	• Appropriate for sharing information to a mass audience • Flexibility provided by range of tools such as intranet, Web, discussion forums, email, etc. • Informal and spontaneous • Good for relationship building among members	

Tele-conferencing	• Allows people to convey emotion relatively easily (more verbal cues)
	• Allows rapid feedback
		• Difficult for members to:
		  o actively participate if they are not fluent in the language used
		  o enter the conversation without seeing the other people and being able to pick visual cues. Hence misinterpretations often occur
		• Lack of ability to fine tune and re-examine the messages which put member from different language backgrounds in disadvantage

Video-conferencing	• High level of social presence: enables team members to see facial expressions, gestures and many other visual cues • Better than teleconferencing but not as good as face-to-face meetings • Good for relation building because allows members to 'put a face to the name'. • Allow rapid feedback	• Lack of ability to fine tune and re-examine the messages which put members from different language backgrounds at the disadvantage
Mobile Technologies	• Allow rapid feedback • Flexibility provided by range of functions	• Lack of ability to fine tune and re-examine the messages which put member from different language backgrounds at the disadvantage

Source: Nataatmadja & Dyson (2005)

Appendix G: Example of VC usage by different business departments

Executive and Management	♦ Board Meetings ♦ Operations Review ♦ Strategic Planning Sessions ♦ Staff Meetings
Human Resources	♦ Investor & Public Relations ♦ Press Conferences ♦ Interviews & Recruiting ♦ Benefits Rollout ♦ New Employee Orientation ♦ Company Announcements ♦ Employee Dispute Resolution ♦ Training
Sales & Marketing	♦ Team Building ♦ Forecasting & Staff Meetings ♦ Product Announcements ♦ Project Management ♦ Focus Groups ♦ Customer & Vendor Meetings
Customer Service & Operations	♦ HelpDesk/Call Centers ♦ Account Management ♦ Logistical and Strategic Planning
Finance & Accounting	♦ Budget Development ♦ Strategic Planning ♦ Audit Reviews ♦ Legal Consultation
Plant Management & Engineering	♦ Design Reviews ♦ Instant review of development hurdles ♦ Remote Technical Support or Management ♦ Customer reviews ♦ Eliminate lingual or translation issues with overseas operations
Legal	♦ Strategic Planning ♦ Mergers & Acquisitions ♦ Depositions or Remote Expertise ♦ Settlement Negotiations

Source: VSGi (2005)

Appendix H: Web and Video Conference Providers (2015)

Source: Smith & Lundy, (2015)

Appendix I: Types of Meetings

Source: Keith (2017)

Appendix J: Exemplary Interview Questions

ICT-related questions	Do you agree that ICTs have become a crucial part of your daily workflow?
	What technologies do you use the most?
Meetings	What types of meetings do you distinguish? What are integral components of any meeting?
	What are benefits when your geographically dispersed team meet in-person? How often? With what purpose?
	How often do you have ad-hoc meetings? How do you arrange them?
	Does your company/department arrange any optional pieces of training? If yes, how are they organized?
Meetings abroad	How do you monitor/supervise your international teams? How do you recruit new subordinates abroad?
	Do you believe you can retain more employees (have a better relationship) if you reduce their time away from home?
	Would you like to reduce the number of your own trips? When scheduling a meeting abroad, do you take into consideration travel costs?
Videoconferencing	How often are you using VC? When? For what kind of meetings?
	Is VC usage a part of the overall corporate culture? Do all company's locations have implemented VC systems? Is there any dedicated training?
	Do you agree that VC enable faster decision making? Personal contact? Creating a common purpose among participants?
	Do your customers or third-parties use VC systems? How often do you use VC for external meetings?

Appendix K: Overview of Cisco and Polycom

Company Ownership	Public	Private
Year of origin	1984	1990
Domestic country	USA	USA
Global presence	380 Cisco offices in 165 countries (72,900 employees)	64 offices in 31 countries across 5 continents (2,800 employees)
Number of patents*	~ 2900 issued/pending	~ 850 issued/pending
Products for meeting solutions**	- Cisco Spark - Cisco WebEx - Jabber - Collaboration Meeting Room - Video Communications Server - Expressway - Cisco Telepresence - IX Series - MX Series - Cisco TX Series	- RealPresence - HDX Series - RealPresence Trio - RealPresence Group Series - RealPresence Collaboration Server - RealPresence Clariti
Product warranty Basic (limited) terms	- Hardware – 90 days - Software – 90 days	- Hardware (return to factory repair) – 1 year - Hardware (repair cycle time) – 30 days - Software – 90 days
Mission	Shape the future of the Internet by creating unprecedented value and opportunity for our customers, employees, investors, and ecosystem partners.	Polycom changes the rules of the workspace by powering rich human connections, wherever and whenever people need to collaborate.
Vision	Changing the Way We Work, Live, Play, and Learn.	To unleash the power of human collaboration.
Customers*	100% of the Fortune 100; 95% of the Fortune 500; 415,000 worldwide	More than 400,000 companies and institutions worldwide: - The world's top 12 pharmaceutical companies - Top 10 universities worldwide 90% of the world's top 20 e-Governments worldwide - The world's 10 largest banks;

Largest bank in Turkey
- 6 largest insurance companies
- The world's top 3 aerospace companies

Notes:
*Data available only for 2013
** Not an exhaustive list

Sources: Cisco official website; Polycom official website