VR Conferencing: a business opportunity underlying virtual reality participation

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Abstract

Advancements in digital technologies continuously prompt changes to both academic and business ecosystems. And by bringing opportunities for sustainable and economically feasible developments in parallel, the organizing capabilities of such technology have received an increasing amount of interest. Building on this momentum, this dissertation sought to investigate the viability of a business opportunity underlying the idea of virtual reality participation at events such as conferences. For the purpose of this research, data were collected through two online surveys. These surveys targeted those who would ultimately provide the participation option (event-organizers) and those who would drive its demand (event-participants). The results, through an expressed measure of interest among the respective samples of 31.6% and 51.5% accompanied by a fair demand and willingness to supply the option, seem to encourage the pursuit of an underlying business opportunity. The analysis further directs future effort by making distinctions in demographics and attitudes in terms of interest and finds thereof that the concept appears to show at least as, or even more, prominence amidst short educational programs. It also shows that the concept can be extended to serve other purposes, for instance, business meetings. Additionally, a business model configuration that could potentially exploit the opportunity is explored, and the model suggested by this work is presented as an intermediate platform. However, more research of which is required prior to the development of a defined business plan.

Title: VR Conferencing: a business opportunity underlying virtual reality participation

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Keywords: VR Conferencing, Virtual Reality Conferencing, Virtual Conferencing, Business Opportunities, Digital Business Models, Business Models

Conferência VR: uma oportunidade de negócio subjacente à participação na realidade virtual

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Abstrato

Os avanços nas tecnologias digitais provocam alterações contínuas nos ecossistemas académicos e empresariais. Paralelamente, ao trazerem oportunidades de desenvolvimentos sustentáveis e economicamente viáveis, as capacidades de organização dessas tecnologias têm recebido um interesse crescente. Com base nesta dinâmica, esta dissertação procurou investigar a viabilidade de uma oportunidade de negócio subjacente à ideia de utilização da realidade virtual em eventos como conferências. Para efeitos desta investigação, os dados foram recolhidos através de dois inquéritos online. Estes inquéritos foram simultaneamente direcionados a indivíduos que proporcionariam a opção de participação (organizadores de eventos) e àqueles que impulsionariam a sua procura (participantes em eventos). Os resultados, obtidos através de uma medida de expressão de interesse entre as respetivas amostras de 31,6% e 51,5%, acompanhada por uma procura razoável e da disponibilidade para fornecer a opção, parecem incentivar a procura de uma oportunidade de negócio subjacente. A análise visa ainda um esforço futuro, fazendo distinções demográficas e de atitudes, em termos de interesse, e conclui que o conceito parece mostrar, tanta ou mais proeminência, no meio de programas educacionais curtos. Mostra também que o conceito pode ser alargado para servir outros propósitos, nomeadamente reuniões de negócios. Além disso, é explorada uma configuração do modelo de negócio que poderia potencialmente explorar esta oportunidade, sendo o modelo sugerido por este trabalho apresentado como uma plataforma intermediária. No entanto, é necessária uma investigação mais detalhada antes do desenvolvimento de um plano de negócios definido.

Título: Conferência VR: uma oportunidade de negócio subjacente à participação na realidade virtual

Autor: André Eftedal Markussen

Palavras-chave: Conferência VR, Conferência de Realidade Virtual, Conferência Virtual, Oportunidades de Negócio, Modelos Digitais de Negócio, Modelos de Negócio

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AR – Augmented reality

HMD – Head-mounted displays

ICT - Information communication technology

MR – Mixed reality

VR - Virtual reality

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1. Introduction

1.1. Background

The growing concern for the environment has placed sustainable development in the spotlight and led it to become a growing driver of business change - this "greening" of businesses is not just due to managers' recognition of the increasing regulatory and social pressures for sustainability, but also of the magnitude of new business opportunities offered by innovation in this area (Seebode, Jeanrenaud & Bessant, 2012). Along with these developments, research into the implementation of low-carbon agendas has received an increase in scholarly attention (Nevins, 2014; Nathans & Sterling, 2016; Cobb, Kalmus & Romps, 2018). And for academics, among others, the problem lies with that a major portion of the environmental load for which it is responsible stems from aviation (Poom et al., 2017; Ciers, Mandic, Toth &Veld, 2019). To face these challenges, there has been a broad acknowledgment of that the deployment of information communication technologies (ICTs) prompt new ways of organizing and can be used as a more environmentally friendly option to travel (Coroama et al., 2012; Haseeb, Xia & Saud, 2019; Toffel & Horvath, 2004). However, as interacting on a screen has been considered an inadequate substitute for being there in person (Chinowsky & Rojas, 2003; Shirmohammadi et al., 2012) and due to an insufficiency of immersiveness and acceptance of virtual technology, the need for air travel has so far seemed to persist (Nevins, 2014; Strengers, 2015). For the future, the acceptance and implementation of virtual solutions to events such as conferences are argued will depend on technologies' ability to replicate or even extend upon the events' social aspects (Glover et al., 2017). Which is where immersive technologies, such as virtual reality (VR) come into play (Pazour et al., 2018; Gunkel et al., 2018).

1.2. Problem Statement and Research Questions

Building on the presented background, the aim of this research is to investigate the viability of a business opportunity underlying the use of VR technology as an alternative to in-person attendance to events such as, but not limited to, conferences. More specifically, this dissertation will examine the interest for, and the potential of, a business model configuration that evolves around providing conference- and other event-holders with the means to offer VR as a mode of participation. This concept of a business opportunity will further be referred to as VR Conferencing. Nonetheless, in light of greater availability of research done related to conferences, primarily from the perspective of academics, this will also be the starting point of

this research. Although, there will be attempts to connect across to business purposes throughout, as there are a lot of similarities.

In pursuit of determining whether the VR participation option to events leaves room for a viable business opportunity, the research scope is narrowed down to the following, more direct, research questions: (1) *To what degree is there interest and potential for VR Conferencing?* (2) *Under which conditions and why is there interest and potential for VR Conferencing?* And finally, (3) *For what purposes, other than those explicitly researched, could the concept of VR Conferencing have merit?* As part of answering these questions, a comprehensive overview of what VR technology has to offer will be provided, not only in terms of its potential for reducing our aggregated carbon footprint but also in regard to the opportunities and challenges it brings to users, businesses, conference and other event-holders. Afterwards, this dissertation will also, as a step towards the development of a business plan, explore a potential business model which can exploit the opportunity.

R.Q.1: *To what degree is there interest and potential for VR Conferencing?*

R.Q.2: *Under which conditions and why is there interest and potential for VR Conferencing?*

R.Q.3: *For what purposes, other than those explicitly researched, could the concept of VR Conferencing have merit?*

1.3. Relevance

From a managerial point of view, this dissertation provides preliminary evidence of the existence of a business opportunity in creating a way of enabling events such as conferences to deploy and scale a VR participation option. It also presents a possible business model configuration with the potential to exploit this opportunity. And the conclusions contribute to further extend on both the direction of efforts of such a business model, as well as for other purposes it might be relevant.

1.4. Methodology

As the primary purpose of this dissertation is to analyze the interest and potential for the concept of VR Conferencing, a descriptive design as well as the concept of concept testing were utilized to evaluate the relevant stakeholders' interest. For which, quantitative data were collected through online surveys and analyzed inductively.

1.5. Dissertation Outline

This dissertation is divided into five parts. After the Introduction, the Literature Review examines and provides a brief description of entrepreneurship, business opportunities, and digital business models to create a solid basis for researching business opportunities in this area. Thereafter, in exploration of whether the VR participation option leaves room for such a business opportunity, the remainder of the section digs deeper into the contextualizations of why such a concept as VR Conferencing might be needed. This is done by looking at the current state of professional air travel, information communication technologies and virtual (video) conferencing, as well as virtual reality and its potential for conference participation. Succeedingly, the design, approach, and method of how data is collected and analyzed are presented in the Methodology section. And the collected data is described and analyzed throughoutly in the Results and Findings section to answer the stated research questions. This section also includes the presentation of a simplistic business model that could exploit the underlying business opportunity. Then, finally, the dissertation is wrapped up by Conclusions, Limitations, and Future Work.

2. Literature Review

2.1. Entrepreneurship

The dominant theories on entrepreneurship have previously revolved around explaining it as a function of the type of people who engage in entrepreneurial activity (Eckhardt & Shane, 2003). As an example, Khilstrom and Laffont (1979) argued that people with higher tolerance to uncertainty were more likely to be entrepreneurs and vice-versa. However, this person-centric perspective, which is dependent on stable, enduring differences among people rather than the differences in information possessed about the presence of opportunities, has proven quite unsuccessful in explaining entrepreneurship (Gartner, 1990).

To date, arguments are still being made for the need for a clear articulation of the exclusive domain of entrepreneurship (Venkataraman, 2019). Definitions range in terms of how clearly they define boundaries as to what distinguishes entrepreneurship from other closely related fields. Eckhardt and Shane (2003), as an extension of Vankataraman's (1997) definition, specifically defines entrepreneurship as "the discovery, evaluation, and exploitation of future goods and services". However, Alvarez and Barney (2013), on a more general basis, refer to entrepreneurs as "those economic actors who seek to exploit opportunities in the pursuit of wealth creation".

Although there are differences in definition, there is a broad consensus among researchers that opportunities play a central role in entrepreneurial research. These opportunities are generally thought of as positive and favorable circumstances leading to entrepreneurial action (e.g., Shane & Venkataraman, 2000; Aldrich & Cliff, 2003; Eckhardt & Shane, 2003; Shane et al., 2010; George et al., 2016). Accordingly, entrepreneurial opportunity research aims towards evaluating "how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated and exploited" (Shane & Venkataraman, 2000).

2.2. Business Opportunities

Entrepreneurial, or business opportunities, are characterized by uncertainty and creativity (Gaglio & Katz, 2001) and is commonly defined as "situations in which new goods, services, raw materials, markets, and organizing methods can be introduced through the formation of new means, ends, or means-ends relationships" (Eckhardt & Shane 2003). There are, however, several theories on how these opportunities are formed and exploited (Alvarez & Barney, 2007; Baron, 2006). From one perspective, opportunities emerge from market imperfections brought

by exogenous factors, such as technological, political and regulatory, and social and demographic changes (Casson 2005; Saemundsson & Holmén, 2011). From an alternative point of view, such market imperfections can be results of endogenous factors such as actions and reactions or simply an entrepreneur's accessibility to try new products and services, or even being exposed to a problem (Sarasvathy, 2001; Baker & Nelson, 2005; Weick, 2015).

Regardless of how such opportunities are formed, the notion of opportunity now emphasizes the entrepreneurship dimension across to similar fields. Recent research in the field of international entrepreneurship for instance has also highlighted the concept of opportunity (Mainela, Puhakka & Servais, 2013). And, there has also been researched on how entrepreneurial opportunities might serve as solutions for sustainable development. Enthoven, Jong, and Ünal (2019) argue that sustainable opportunities originate from social or ecological problems in the environment of the entrepreneur. Hence, the entrepreneur's recognition of the problem is key to find a solution - a sustainable business opportunity.

Such opportunities, once recognized, can be exploited. An entrepreneur can either immediately start to exploit the recognized opportunity or, contrarily, spend time on ensuring that the right resources and capabilities are in place prior to exploitation (Choi & Shepherd, 2004). Although immediately jumping on the opportunity would provide a higher probability of being able to benefit from a first-mover's advantage and prolonged lead time. This does not necessarily mean that it is the right thing to do in every situation. Besides timing, there are other important considerations that need to be taken into account. Consideration of investment in scale, learning, as well as whether the service and/ or product is valuable and durable prior to exploitation can contribute to fewer uncertainties (Lambkin, 1988; Craig and Lindsay, 2002; Choi and Shepherd, 2004). And of which, research into potential customer demand is, for example, an important entrepreneurial activity that can be done prior to exploitation (Chrisman & McMullan, 2000).

2.3. Digital Business Models

A business model is the design or architecture of how organizations create, deliver, and capture value, and as such, is viewed as a route to competitiveness, growth, and profitability (Teece, 2010; 2018). Although business model creation is a continuous process (Chesbrough & Rosenbloom, 2002; Teece, 2010) and the design should be adjustable (Zott & Amit, 2010), Osterwalder and Pigneur (2010) emphasizes the need for a concretized visualization of the parts and interrelations in a business model and suggest that this can be done through the 9 core

elements of the Business Model Canvas. In which, resources are bundled together to create capabilities, allowing firms to construct different business models - a process that has been improved significantly by an economy increasingly led by digital technology (Amit & Zott, 2001). Digitalization, although any empirical assessment on the matter is complex and challenging, has had a wide variety of impacts on both society and businesses (Vendrell-Herrero, Myrthianos, Parry & Bustinza, 2017). And through changing how economic agents interact, produce and commercialize their offerings (Porter & Heppelmann, 2014), digital technologies have brought forth a whole new set of innovative digital business models (Visnjic, Wiengarten & Neely, 2016).

However, digitalization is not only a organization-specific phenomenon. As changes also affect what happens outside of the organization, it also reshapes the competitive landscape and the business ecosystem. The impact, or suitability, of the implementation of innovation-based digital business models is therefore highly dependent on the organization's position in the supply chain (i.e., producer, provider, supplier, intermediary, third-party service provider, or customer). But also, whether the firm is an incumbent or new entrant, and whether it is digitally native or not (Vendrell-Herrero, Parry, Bustinza & Gomes, 2018).

As digital technologies prompt opportunities for lower entry costs, new firms may be able to compete more easily with incumbents (Fosfuri, Lanzolla & Suarez, 2013). As newly created firms also suffer less from path dependency business hysteresis (or inertia), i.e. they are not as constrained by past actions and decisions as established firms, new entrants play a central part in the digital ecosystem. And digital non-native firms can either try to adapt, outsource their digital service function, or gain access to scarce digital capabilities through acquisition or collaborative arrangement with new entrants or digitally native firms. Similar to how producers might benefit from strategic collaborations with service providers or intermediaries (Paiola, Saccani, Perona & Gebauer, 2013; Bigdeli, Bustinza, Vendrell-Herrero & Baines, 2017; Bustinza, Gomes, Vendrell-Herrero & Baines, 2017).

Therefore, as it is perhaps most suitable, new digital business models often come in the form of intermediaries (Müller, Kijl & Visnjic, 2018), and have been introduced into a wide range of industries. Some, thereof, have achieved great success in developing internationalized technology-based business models affecting both local and global value chains (Alcácer, Cantwell & Piscitello, 2016). An example of this could be the case of Wunder Mobility. Wunder Mobility is a tech platform with an operating system that provides start-ups, companies, and

even cities with the means to deploy and scale their mobility services efficiently. And even as a relatively new company, its products are used by over 30 clients in more than 50 cities across 4 continents (Crunchbase, 2020).

2.4. The Current State of Professional Air Travel

The processes of globalization have greatly extended our professional networks. These networks contribute to knowledge creation, accumulation, and dissemination (Miles et al., 1995), and face-to-face interaction is considered an important component for the establishment and maintenance of such networks (Urry, 2003). For academics, Glover et al. (2017) argue that international collaboration has become an increasingly central requirement for promotion and career success. These pressures to become internationally mobile have expanded professionals' reliance on air travel, which in turn posts its own set of challenges to, among others, environmental considerations.

The intergovernmental Panel on Climate Change (IPCC) considers carbon dioxide the principal greenhouse gas, and the environmental load from which to entail a wide variety of impacts on ecosystems, climate, and health. Whereof, a significant portion of the global annual carbon dioxide emissions from human activities come from aviation (IPCC, 1999) and these emissions continue to rise (Airbus, 2019; European Aviation Environmental Report, 2019).

As a result of growing public awareness, as well as the impact of the environmental image of organizations on public opinion, the environmental impact of travel has become an increasingly important consideration over the past few decades (Faulconbridge et al., 2009; Gustafson, 2012). According to the Paris 2015 agreement, one of the seventeen sustainable development goals also targets climate action, according to which we all must vastly increase our efforts if to solve this problem before it is too late to act. Further, it states that; "many businesses and investors are committing themselves to lower emissions, not just because it is the right thing to do, but because it makes economic and business sense as well" (United Nations, 2018). However, as of now, air travel constitutes a large portion of the carbon emissions produced by academia, as well as knowledge-intensive business services (Poom et al., 2017; Ciers, Mandic, Toth & Veld, 2019). Which in turn implies a potential for improvement in this area. Accessing and maintaining wide-spread networks generates costs in terms of time, money, and environmental load. Hence, there is value in an alternative that reduces these costs without putting too much strain on the objectives underlying the travel.

2.5. Information Communication Technology and Virtual Conferencing

In light of these developments, an increasing number of scholars are seeking new ways in which to implement a low-carbon agenda (Nevins, 2014; Nathans & Sterling, 2016; Cobb, Kalmus & Romps, 2018). Nevertheless, due to a lack of price comparable alternatives to air travel, simply a reduction in travel is argued to be required (Glover et al., 2017). Moving forward, an increase in digitalization and technological advancements prompt new opportunities to address these challenges (Rachinger, Rauter, Müller, Vorraber & Schirgi, 2018), and there is a common consensus that the deployment of information communication technology (ICT) strategies has potential to provide solutions for carbon emission reduction (Coroama et al., 2012; Haseeb, Xia & Saud, 2019; Toffel & Horvath, 2004). Of these, the perceived potential of teleworking and teleconferencing, i.e. virtual conferencing, has been found relatively high (Lo et al., 2013).

Telework or telecommuting is traditionally the use of telecommunication technology to partially or fully replace the commute to and from work by having employees remotely connected via the internet. Telecommunication as a transport strategy has for a relatively long time been an important element of transportation/ air quality planning and has found its way into several public policies (Mokhtarian, 1991; Kitou & Horvath, 2003). Teleconferencing or virtual conferencing, including wireless business meetings, have also been explored for its purposes of substituting professional travel. And, given continuous improvements in ICT's features, as well as audio and video quality, this is getting increasingly feasible (Toffel & Horvath, 2004). In practice, virtual conferencing can partly replace travel to large international conferences (Hischier & Hilty, 2002), and provides options for either entirely virtual experiences, add-ons to in-person conferences, or even connecting multiple conference-venues together for joint conferences. These options enable the arrangement of educational, as well as organizational information transfer, development, networking, and discussion, whilst at the same time overcoming two of the most pressing challenges faced by traditional conferencing - accessibility and carbon footprint - through facilitating the reduction of time, as well as financial and environmental costs (Frazer et al., 2017).

Coroama and colleagues (2012) explored the effects of virtual multiple-site conferences on greenhouse gas emissions. They organized a large conference simultaneously on two continents and measured the carbon emissions caused by the participants' travel, plus the additional ICT equipment needed to connect the two venues in the multiple-site alternative. Then, with

information extracted through a survey, compared it to the emissions which would have been caused by either of the single-site alternatives. The results from the experiment show that not only does the ICT-enabled multiple-site model produce substantially less carbon emission, but it also attracts a larger number of aggregated participants. Attendees' experience, also based on the survey, was clearly positive and the experiment supports that the multiple-site format may serve as an acceptable alternative to the traditional conference format.

However, despite a manifold of advantages, virtual conferencing also comes with a set of challenges. Limitations to virtual conferencing entail concerns surrounding unreliability of the technology which is needed (Erickson et al., 2011; Shirmohammadi et al., 2012), the effectiveness of communication and networking (Bell & Shank,2006; Welch et al., 2010), and a general perception that virtual formats will never be able to replicate in-person contact. Although one can interact with other participants on a screen, this is often not considered a fair substitute for being there in person (Chinowsky & Rojas, 2003; Shirmohammadi et al., 2012). These limitations are not only due to an insufficiency of immersive communication technology, but also the persistent norms in relation to conference sociality. The perceived necessity of physical attendance and air travel therefore seems to persist (Nevins, 2014; Strengers 2015). Yet, Glover and colleagues (2017) acknowledge that these norms may be shifting in line with the growth of e-conferences and other forms of virtual meet-ups and that it will further depend on the development of the degree that immersive and virtual environments can offer the same quality of interaction as actual co-presence. The further acceptance of virtual attendance implementation will, hence, depend on its ability to replicate or even extend upon the social opportunities associated with conferences.

2.6. Virtual Reality

Virtual reality (VR) is a medium composed of interactive computer simulations that sense the user's placement and movement and replace or augment the feedback to one or more senses - giving the feeling of being mentally immersed or present in a three-dimensional, simulated reality. Certain VR applications are designed to combine virtual representations with the physical world, in this case, it is referred to as augmented reality (AR), often used interchangeably with the term mixed reality (MR) (Sherman & Craig, 2019, p. 16 & 22). In other words, VR technology can provide highly lifelike and interactive immersions into virtual

environments and, although aiming for being indistinguishable for the real world in the long run, already enables a manifold of new opportunities for collaboration online.

Interest in VR technology devices and ways to utilize its potential for practical purposes have shown increasing growth over the past few years. And technological advancements in the graphical capabilities of modern head-mounted displays (HMDs), as well as, motion -, and body tracking can reasonably be argued to be important drivers for this growth (Pazour et al., 2019). Currently, although foremost known for its prominence within entertainment, and despite a lack of research on its commercial potential, VR has found its way into a variety of system functions and areas (Berntsen, Palacios & Herranz, 2016). One area subject to research for the deployment of VR technology is, for example, education. By broadening the range of learning style possibilities, the utilization of these HMDs has shown an increase in involvement and motivation felt by the user (Freina & Ott, 2015). For further purposes, Zhao (2009) proposes three distinct categories in which we can distinguish VR systems: training drill, planning design, and presentation entertainment. Together, these categories can potentially cover a vast number of application functions and, with the introduction of better and cheaper VR systems for commercial purposes, is believed to create opportunities to revolutionize our day-to-day life in the future (Berntsen et al., 2016).

2.7. Virtual Reality for Conferencing

There are multiple studies that seek to illustrate and call for further research on the opportunities as well as the positive collaborative effects of VR (Jackson, Taylor & Winn, 1999; Jackson & Fagan, 2000; Thorsteinson & Page, 2010). Whilst the previously discussed virtual conferencing format involves sound as well as video on screen. The entire concept of VR, which is enabled by VR-specific technologies such as the HMDs, is to let people have realistic experiences over the internet. Hence, it is arguable that VR has the potential to mitigate some of the shortcomings related to virtual conferencing, i.e. quality of interaction and immersiveness. In fact, Pazour and colleagues (2019) ran a VR conferencing application prototype which enabled meetings and collaboration in a virtual environment and, through experiments, compared the perceived feeling of presence felt with the VR headset versus without - only using the application in desktop mode (Immersive vs. non-immersive). The results indicated a clear increase in all measures; general, spatial presence, experienced realism, as well as involvement when wearing the VR headset. And the authors argue that, through the measurable advantage regarding

immersion, VR is well applicable for cheap and environmentally friendly methods of collaboration and conferencing and that further advancements will only increase immersion and acceptance. Similarly, Campbell and colleagues (2019), in examining how the use of existing VR technology systems (HTC VIVE) compares to the widely used video conferencing software (Skype), also found that participants felt closer and more immersed when having a conversation using VR.

For ordinary virtual conferencing, concerns have been raised that the virtual participation options only do a good job delivering the actual content that is presented, but still lack the opportunities for networking and being fully engaged in the conference (Fellermann et al., 2019). VR applications, however, already offer opportunities for higher immersion and involvement, improving quality of interaction (Campbell et al., 2019; Pazour et al., 2019), and can go further in replicating the social opportunities that are associated with conferences. Something which Glover and colleagues (2017) acknowledge is the key to acceptance of the implementation of virtual participation measures. Even though the price of the necessary equipment to render such realistic environments is still high, which is one of the most hindering factors for its use for professional purposes (Pazour et al., 2019), VR is still expected to be an important part of the future social environment - enhancing the way in which we communicate remotely (Gunkel et al., 2018). It remains to see whether the VR participation mode will be accepted and adopted by conferences, as well as their participants.

3. Methodology

3.1. Research Design

The primary purpose of this dissertation was to analyze the interest and potential for the business concept of VR Conferencing. But also, to examine under which conditions and why this interest and potential might be the case – constructing an image of for whom, when, and why such a concept is relevant. And further purposes it could be directed to serve. Furthermore, it sought to explore a business model configuration that could exploit the potential business opportunity underlying the use of VR technologies as an alternative to in-person attendance (or ordinary virtual (video) participation). Secondary sources, reviewed in the Literature Review section, were utilized to discuss the latter. However, to answer the actual research questions presented in this thesis, the chosen descriptive research design, in general, offers portrayal and description of people, events, situations, as well as phenomena of interest from an individual, organizational, and industrial perspective (Miller, 1991; Saunders, Lewis & Thornhill, 2009). The survey method is further employed, as it is a common way in which to gather data for a descriptive research design (Jackson, 2009).

The survey method, with its strengths in establishing variation and patterns, was predominantly conducted and analyzed to answer the stated research questions. This comprises a cross-sectional design in the data, and data are usually collected by a questionnaire or structured interviews (Bell, Bryman & Harley, 2018). Online surveys, or questionnaires, were carried out in order to collect quantitative data for this research. The choice of method is justified through that it helps the researcher gather large amounts of data in a short amount of time (Lefever, Dal & Matthiasdottir, 2017), and removes geographical restrictions (Evans & Mathur, 2005). The survey format also makes aggregation and analysis of collected data easier through providing consistency in both questions and answers across the sample (Brace, 2018), as well as it reduces bias-effects from the interviewer in comparison to personal interviews (Bronner & Kuijlen, 2007).

For the purpose of this research, two of these online surveys were employed to gather data. One survey was directed at organizers of conferences and short educational programs, while the other was aimed towards the attendees of the same types of events. This, in order to enable a more accurate comprehension of the viability of the concept – determining the acceptance and willingness to adopt the VR participation option by hypothesizing its supply and demand. Based on the organizers' willingness to provide this option and the attendees' willingness to

participate in it, this research aims to deduce whether VR Conferencing is a viable business opportunity.

3.2. Research Approach

In the process of evaluating VR Conferencing as a concept, concept testing was carried out to evaluate the relevant stakeholders' interest. This, in terms of how the surveys were constructed. Concept testing is the process of evaluating how a concept will be received by the market prior to introducing it to the market and is also mostly done through surveys (Schwartz, 1987).

Furthermore, due to the relative novelty of the concept, an inductive approach, often referred to as a "bottom-up" approach (Lodico, Spaulding & Voegtle, 2010) was followed in analyzing the data. Although the primary source for answering our questions will be based on quantitative data, which is most commonly associated with a deductive approach, quantitative data offers opportunities to be analyzed through inductive reasoning with the help of exploratory data analysis (Alexandiris, 2006). Exploratory data analysis, as an approach in descriptive statistics, is concerned with summarizing a data set's main characteristics and is primarily used for exploring the data beyond what is done by formal modeling or hypothesis testing (Chatfield, 1995). As with similarity with this dissertation, the inductive approach aims to generate generalizations and patterns from the data collected and does not necessarily need any pre-stated hypotheses to be tested (Goddard & Melville, 2004; Saunders et al., 2012). Following, in that, "the primary purpose of the inductive approach is to allow research findings to emerge from the frequent, dominant, or significant themes inherent in raw data" (Thomas, 2006), the researcher can be free of preconceptions and biases in the data collection.

3.3. Research Methods

As previously elaborated, the collection of primary quantitative data for this research was done through online surveys. Two of these surveys were conducted. One of them was to be explicitly answered by attendees to either conferences or short educational programs (e.g. summer schools). The other was aimed at those related to organizing these same types of events. Short educational programs were added (to a somewhat lesser degree) for the simple purpose of broadening the scope of this research to see how well the concept might be welcomed into

slightly different settings. Therefore, perhaps creating a clearer image of which circumstances this concept might go along with better. The organizer sample did not distinguish between those who are already involved and have experience with organizing events and those who "plan to be involved", as both groups' attitudes will affect how events such as these are carried out in the future. However, by the way in which the survey is distributed, which is described in the following paragraph, it is reasonable to assume that those already involved will constitute the majority of respondents. Both surveys were constructed using *Qualtrics Software.*

Due to the complexity of random sampling for these populations, a non-probability sampling technique was employed. The referral/ snowball sampling technique was used for both groups. And a list of 300 conferences and 135 short term educational programs was created and functioned as a basis for reaching out to organizers related to the events. Reaching out to organizers listed on conference and summer school websites as well as social media groups was also done as a more specific measure to get more responses from this particular group. For the distribution of the survey directed towards attendees, the convenience sampling technique was further made use of to ensure more diversity in the responses and data was collected through social networks as well as from *Amazon Mechanical Turk.* Reaching out to conferences and short educational programs was carried out in collaboration with the Smart City Innovation Lab (SCIL) at Católica-Lisbon.

Furthermore, neither of the surveys contained many open-ended questions. However, if the respondents indicated that they did not think that the concept was relevant or necessary, a question that allowed for text-entry would be displayed, giving them the opportunity to give a reason. This structural choice was done in line with the choice of gathering quantitative data. Close-ended questions are much easier to aggregate and analyze (Jackson, 2009). Both surveys also finished off by letting the respondents make comments on the survey they participated in and request a summary report of the study via email.

Also, in that the surveys aimed to collect international data, a split into cultural clusters such as those utilized in *The GLOBE Study of 62 societies* (House, et al., 2004) could, therefore, have been justified. This could have been used in order to examine the cultural differences in the survey participants' attitudes towards the concept more specifically. However, for the purpose of this dissertation, a distinction between geographical regions/ continents was deemed more appropriate. This was done in hope of getting more respondents in each of the groups as there are fewer continents than there are cultural clusters, but also because respondents might not

have known to which cultural cluster they belong. However, as there are similarities between the two ways of differentiating, i.e. geographical areas, there are still possibilities to reason that some of the differences in attitudes also might stem from differences in culture.

These surveys, both individually and together, served the purpose of answering the stated research questions. By hypothesizing the supply and demand for the VR participation option as well as the enabling business configuration among various conferences and short-term educational programs, inferences can be made concerning the interest and potential for the concept of VR Conferencing, along with under which underlying conditions and why it is relevant. The results from the attendees' survey will also provide an indication of which other uses they think the concept might be relevant for.

3.4. Measurement Scales

The measurement scales used in this research can be summarized as follows: A 2-point scale was used for direct, unambiguous (e.g. yes/ no) questions. The 5-point Likert scale was widely used for measurements such as respondents' degree of interest, appeal, necessity, advantageousness, etc. The 5-point scale was also used for "bottom-up" evaluations in the form of scales. A net promoter score for recommendation likelihood. And, sensitive information such as age and income was retrieved through ranges.

The Likert scale, which assumes attitudes to be linear, has an equal number of positive and negative responses. It, therefore, offers opportunities to quantify hard-to-measure data and is both widely used and considered very reliable (Pavlov et al., 2019). Analyzing such scales is done by evaluating respondents' attitudes according to direction (positive vs. negative), as well as intensity (very vs. slightly) (Albaum, 1997). Similarly, scales are also evaluated according to intensity. Otherwise, for multiple-choice sections, where respondents were asked to indicate which statements they agreed with or felt were of the strongest importance, strength is measured through "number of mentions". These sections were created purposefully to avoid having too many matrices.

4. Results and Findings

4.1. Data Collection and Treatment

In treating the collected data, a protocol was established to disregard any responses that were labeled incomplete. This was done in order to ensure consistency throughout the analysis. And as there were incomplete answers from both groups, both the surveys had a greater number of recorded responses than were used for the analysis.

4.1.1. Survey 1: Attendees

This survey had a total of 241 responses. 41 of which were incomplete, and thus, were disregarded. 200 of these responses made it into the analysis.

4.1.2. Survey 2: Organizers

27 responses were recorded through the efforts to reach out to this distinct group. 8 were, however, eliminated due to incompleteness. Apart from that, all the completed answers were considered valid, and 19 of these responses were analyzed.

4.2. Descriptive Statistics

To get an overall overview of the two samples prior to the analysis, their basic and most characterizing traits in demographics are presented in the following sections.

4.2.1. Survey 1: Attendees

As previously mentioned, this survey had 200 responses that made it into the analysis. Out of those 200, 74.5% were men and 25.5% were women (Figure 1). The most prevalent age group of these respondents was 20-29 (52%%), but other age-groups were also represented in the following order: 30-39 (31.5%), 40-49 (11.0%), 50-59 (3.0%), 60-69 (1.5%), 70 or above (0.5%), and under 20 (0.5%) (Figure 2). Of which, 28.5% were from Asia, 10.5% from Europe, 46.0% from North America and 15.0% from South America. No responses were collected from Africa, Antarctica, or Australia (Figure 3 & Table 1).

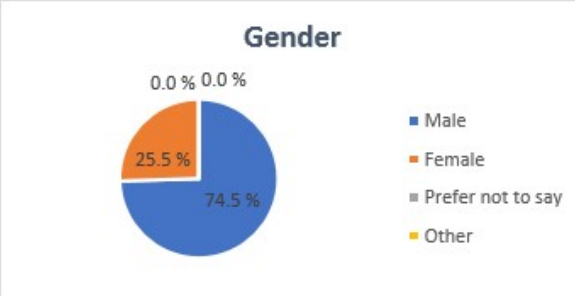

Figure 1 – Attendees' Gender

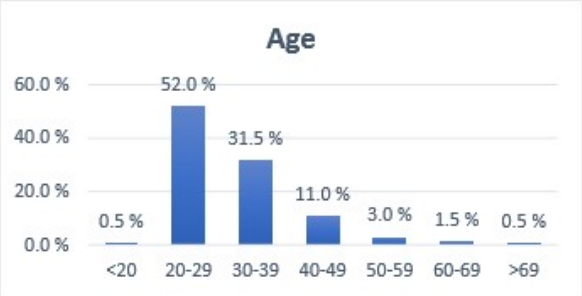

Figure 2 – Attendees' Age

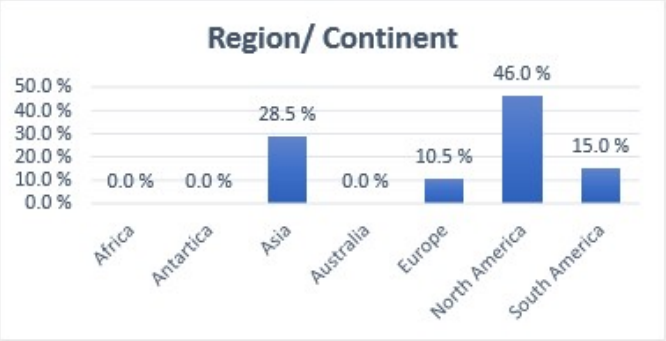

Figure 3 – Attendees' Region/Continent

Moreover, 92.0% of the survey participants were with an education of bachelor's degree or higher (Figure 4 & Table 2). A majority of the sample indicated being in academia, education, and/ or other services (Table 3), and the respondents were spread across annual household income levels, notably with an average in the €30,000- €39,999 range (Figure 5 & Table 4).

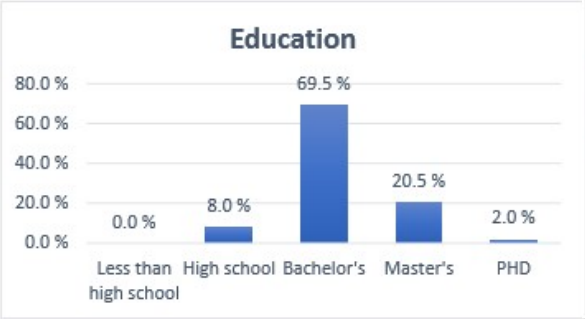

Figure 4 – Attendees' Education

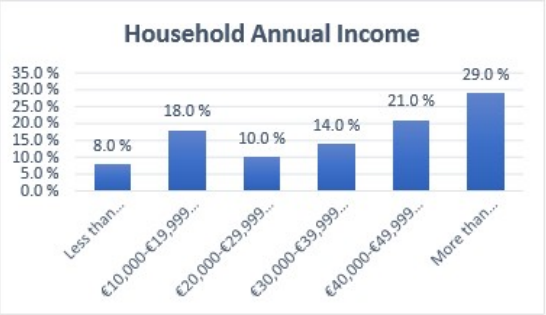

Figure 5 – Attendees' Annual Household Income

The respondents attended on average the lower side of 2-3 conferences a year counting both domestic and international, and the higher side of 1-2 times per year of these were international occurrences (Table 5, Table 6 & Figure 6). Most of them, 89.9%, also indicated that they either had experience with or intention of going to short educational programs such as summer schools

(Table 7). 13.5% of these instances were international, or a combination of international and domestic (Table 8).

Furthermore, information about the respondents' relevant categories was gathered through a number of mentions. The most popular categories were: Engineering, architecture, planning, information, and technology (81 mentions, 40.5%), business, economics, and law (80 mentions, 40.0%), and academia and education (51 mentions, 25.5%) (Table 9 & Figure 7).

Lastly, respondents indicated their habits on transportation to and from these events (Figure 8).

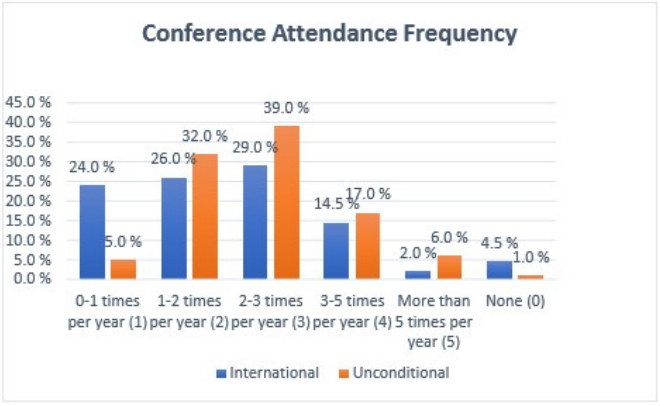

Figure 6 – Attendees' Conference Attendance Frequency

Figure 7 – Attendees' Relevant Conference/ Short Educational Program Category

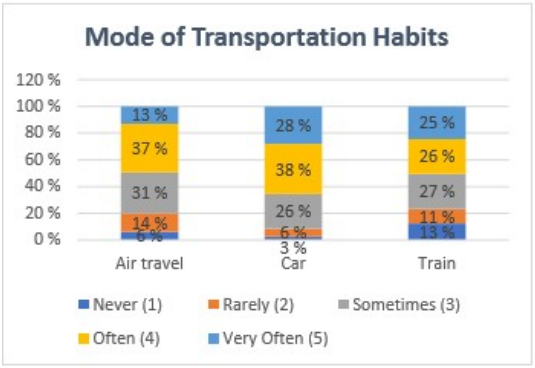

Figure 8 – Attendees' Transportation Habits

4.2.2. Survey 2: Organizers

The 19 responses considered valid for the analysis from this survey consisted of 13 conference- (68.4%) and 6 short educational program organizers (31.6%) (Figure 9 & Table 32). The respondents, similar to the other survey respondents, were asked to indicate which event categories were most relevant to them. The most prevalent categories were business,

economics, and law (13 mentions, 68.4%), humanities, life science, and psychology (5 mentions, 26.3%), and academia and education (4 mentions, 21.1%), but the other categories were also represented (Figure 10 & Table 33).

Figure 9 – Type of Organizer

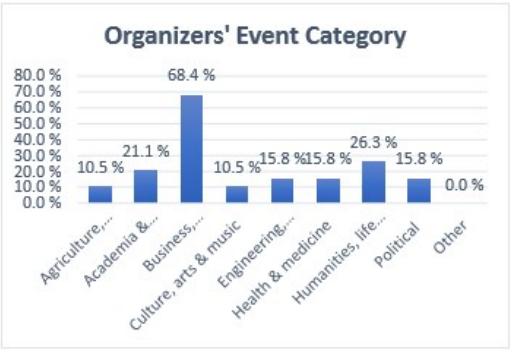

Figure 10 – Organizers' Event Category

The respondents were mainly organizing events happening in Europe (78.9%). However, there were also one or two answers from people organizing events in Australia (10.5%), Africa (5.3%), and North America (5.3%) (Figure 11 & Table 34). These events ranged in size from less than 50 participants to between 500 and 700. The majority was distributed in the ranges between 50 and 300, and the average event held the lower side of between 100 and 300 participants (Figure 12 & Table 35).

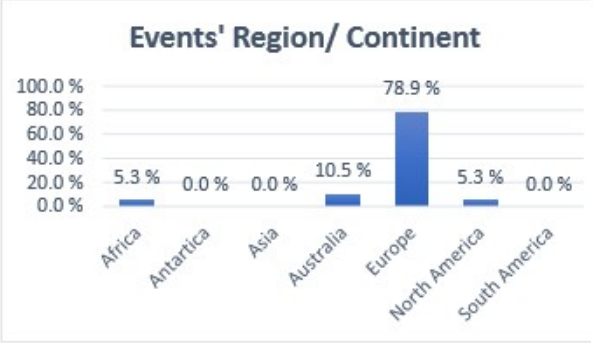

Figure 11 – Organizers' Region/ Continent

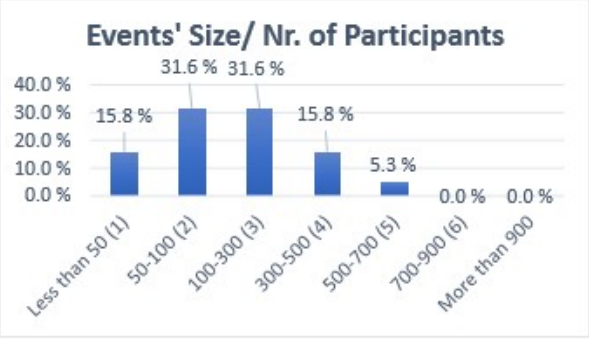

Figure 12 – Organizers' Size/ Nr. of Participants

4.3. Interest and Potential

R.Q.1. To what degree is there interest and potential for VR Conferencing?

Following the Literature Review section, VR, due to technological advancements, already enables a manifold of opportunities for online collaboration. The potential of VR as a participation mode is therefore primarily dependent on the relevant stakeholders' interest and

willingness in adopting it. The viability of the VR Conferencing concept as a business opportunity is also conditional on their willingness to consume a new service enabling it. Thus, to address R.Q.1., interest and willingness of both those who would provide the option (organizers) and those who would wish to attend these events (attendees) are analyzed in order to evaluate the potential of VR Conferencing.

4.3.1. Attendees

As end-users, the attendees are crucial drivers for the demand for this service. If attendees are interested and willing to pay for the VR participation option, then organizers have an incentive to provide it to them.

Prior to being presented with the concept, the attendees were asked some general questions about their thoughts on virtual participation, as well as, about VR. Approximately two thirds (67.0%) of the respondents answered that they considered virtual participation options important (Table 14), and 78.0% that it will be more important in the future (Table 15) – showing an agreement with Glover et al. (2017), among others, that virtual formats are getting increasingly important. The preferred virtual participation options, according to how many indicated 4 or 5 out of 5, were ranked followingly: Entirely virtual events (72.5%), two or more sites connected virtually (72.5%), virtual participation (72.0%), and then virtual presentation (67.5%). Entirely virtual events also had the most indications for 5 out of 5 (37.5%) (Table 12). Subsequently, 64.5% said that they had good knowledge of VR (Table 16), although only 24.5% were either very likely to buy or already owned the necessary equipment (Table 17).

The concept of VR Conferencing, as it is presented to the attendee sample, is the idea of being sent ready-to-use VR equipment over the course of the event to participate virtually. 69.5% of the attendee sample responded positively towards the concept, whereof 27.0% showed a particularly high degree of liking (Table 21). Correspondingly, they indicated 68.5% and 25.0% for the degree of personal relevance (Table 22). With the purpose of determining whether the respondents are interested in exploiting the opportunity, the number of interested parties is considered those who both find the concept attractive and personally relevant. These constitute 51.5% of the sample (Table 23).

As for demand, or willingness to adopt, the respondents were told to imagine a hypothetical, non-domestic conference/ summer school that they would consider going to. The registration

fee for in-person attendance to this event was €400. They were further asked about their likelihood of choosing the presented VR participation option to this event, compared to in-person, at different price levels. For no reduction in the registration fee (0% off), 25.0% of all, and 34.0% of the interested respondents indicated that they would be more likely to take advantage of the VR participation option than attend in person. Similarly, 33.5% and 48.5% at a slightly reduced price (20% off), 40.4% and 53.4% if it was significantly reduced (50% off), and 44.0% and 60.2% if the price only covered the cost of renting the equipment plus a small additional fee. These numbers seem to support previous findings that such solutions can attract a larger number of aggregated participants. And on average, the respondents were at least the same amount of likely to go for the VR option in all scenarios (Table 25 & Table 26). However, as this was as an alternative to in-person attendance, they were also asked how they compare this option to ordinary virtual (video) participation. Following Table 24, 60.5%, 81.6% of those interested, answered that they considered VR the superior option, while 85.5% and 92.4% thought it was "about the same" or above.

4.3.2. Organizers

Moving forward to the organizers' point of view. The objective is to understand whether those who organize these events are willing and interested in taking advantage of a third-party service to provide VR participation to their participants.

Similar to the attendee sample, prior to being introduced to the concept, the organizers were asked a few general questions about virtual participation and VR. Most organizers (73.7%) agreed that virtual participation options to their event were important (Table 41), and even if not, 89.5% were convinced that virtual participation options would be more important in the future (Table 42). They further indicated that they were most attracted to the virtual presentation option (57.9%), then virtual participants (42.1%) and entirely virtual events (42.1%), and lastly, two or more sites connected virtually (21.1%) (Table 39). Showing that, although the multiple-site model has received acknowledgment for being an acceptable alternative to the traditional format, the other options may be more attractive. Relatedly, 57.9% were either currently or planning to allow for virtual presenters, 42.1% for virtual participation, 36.8% entirely virtual events, 0.0% for two or more sites connected virtually, and 26.3% who neither currently nor planned to provide any of the options (Table 38). In regard to VR, although only 21.1% ranked their knowledge about VR as either 4 or 5 out of 5 (Table 43), 63.2% were positive towards the

idea of implementing VR to their event. Of which, a small percentage of 5.3% was especially positive to the idea (Table 44).

As the organizers are on the contrary side of the attendees, i.e. they will supply their demand, the concept was introduced in a slightly different manner. The concept of VR Conferencing was presented as a third-party service provider, functioning as an intermediate between the event and its attendees. This service was to enable the orchestration of relatively cheap and easy-to-use participation solutions with the necessary, ready-to-use VR equipment, system, and technical support. 78.9% indicated that they liked the concept, of which 10.5% liked it a great deal (Table 47). Similarly, 31.6% and 5.3% found it relevant or very relevant for their event (Table 48). Table 49 shows that those who found it relevant for their events also expressed that they liked the concept. These 31.6% will be considered the interested organizers.

Told to assume demand, the willingness of organizers is caught up similarly as the attendees. They are asked how likely they would provide the VR participation option at different price levels. 26.3% of all, 33.3% conditional on interest, said they would be likely to provide the option given demand at no reduction in price. Likewise, 73.7% and 83.3% at a slightly reduced price (20% off), 42.1% and 50.0% if significantly reduced (50%), and 31.6% and 16.7% where the price only covered the cost of renting the equipment plus a small fee. With exception of for no reduction in price, willingness to provide decreased with reductions in the registration fee (Table 57 & 58). Also here, a relatively large portion, 57.9% and 83.3% expressed preference for VR above ordinary virtual (Table 50).

When respondents were asked whether they would consider the third-party service necessary if they were to implement VR participation. 84.4% of all and 100.0% of those interested considered it necessary (Table 51).

4.4. Underlying Conditions and Reasons

R.Q.2. Under which conditions and why is there interest and potential for VR Conferencing?

The conditions under which the concept is most suitable are dug deeper into to further investigate the interest and viability of VR Conferencing. As interest is variable, a clearer image of which circumstances the concept might go along with better and why could assist a

hypothetical business configuration to direct its effort and generate traction and more interest. In addressing R.Q.2., those relevantly interested, i.e. those who found it both attractive and relevant, are compared to the overall samples to see whether there are any particular instances in which they differ. Hence, portraying for whom, when, and why this concept has merit. For practical purposes, only those tables that either show patterns or large enough differences to be considered interesting is presented.

4.4.1. Attendees

Relevant to which underlying conditions, by whom and when the concept has more probable potential is a separation of those classified as interested in terms of demographics and habits. The first noticeable instance occurs regarding where the respondents reside. Comparing the interested sub-sample to the entire sample results in an increase of respondents residing in Asia from 28.5% of all to 35.9% of those interested, i.e. an increase of 7.4% percentage points (p.p.) (which is the measure that is used throughout) or a 26.0% percentage change. Similarly, there was an increase of 3.4% p.p. in South America, but a decrease for both North America and Europe of -8.1% and -2.7%, respectively (Table 1). Such differences were also found relating to education, household income, occupation, frequency of attendance, transportation habit, as well as type and category of events. The characteristics of the interested respondents included an 8.6% higher likelihood of being with a master's degree (Table 2). 8.4% more in the three annual household income levels between €20,000 and €49,999 (neither the lowest nor the highest income ranges) (Table 4). And 3.6% more of them belonged to "other professional services" - -3.8% of those neither in academia, education, nor professional services (Table 3).

As for their transportation to and from the events, it comes forth by Table 29 that indications of either "often" or "very often" on the use of the different modes of transport all increased in relative size. Air travel, with an additional 9.7% among the interested, was the most considerable. Followed by train (7.8%) and car (5.4%).

Furthermore, whether or not the respondent had experience or intention of attending a short educational program showed a change of 3.2% in favor of those who had (Table 7). Most relevant categories, however, as percentages were measured as a function of mentions over number of respondents, went down. On average there was less variability in relevant categories per person who was interested. The greatest decreases were among business, economics, and law (-7.0%) and culture, arts, and music (-3.8%). Although there were still increases of 3.2%

and 2.3% for engineering, architecture, planning, information and technology, and political events. Nonetheless, business, economics, and law, as well as engineering, etc. were still the two most represented categories by both groups (Table 9).

Likewise, as a separation in demographics and habits can create an image of under which conditions the concept is most relevant, so can a distinction in reasons and perceptions perhaps contribute to explain why. All respondents were asked questions related to which aspects they consider the most important in attending these types of events, but also common reasons for not going. Subsequently, they were asked how well they think VR can deliver those previously mentioned aspects as well as reasons to use VR in terms of the degree it lowers the common obstacles. The aspect deemed important by most people was learning and experiencing something new (69.5%). This aspect was also subject to the greatest increase in comparison from the interested respondents with an additional 3.3% (Table 10). And, although all aspects were thought could be replicated better through VR by the interested parties – supporting the argued connection between acceptability of virtual formats and their ability to replicate social opportunities. The learning and experiencing something new aspect had the most significant change of people that thought it could be delivered better than attending in person (13.2%) (Table 20).

Going forward, the foremost common reasons for not attending such events were health/ hygiene reasons, time-consumption, and costs. For the interested sub-sample, the cost-obstacle was considered more important and time-consumption, less. Thus, making environmental considerations the third most likely obstacle for this group (Table 11). Relatedly, ranging from a rise of 8 to 18%, the sub-samples' measures of why they would use VR for its potential to reduce common obstacles included the most considerable; time (18.0%), environmental load (17.1%) and increased accessibility (11.6%) (Table 28).

Other characterizing traits of those who found the concept both attractive and relevant included an increase in all virtual participation options' attractiveness (5.2-9.2%) (Table 13), a greater acknowledgment of its importance today (13.6%), as well as for the future (15.2%) (Table 14 & 15), and an overall higher degree of proclaimed knowledge about VR (13.2%) (Table 16). In agreement with the higher expectations on how well VR can replicate the important aspects of attending an event, as well as reasons to use VR for its potential to mitigate common obstacles. The interested sub-sample represented more of those who both liked VR technology

in general, but also those who did not consider it too unreliable to be used for events such as conferences and short educational programs (Table 18). Notably, they were also more likely to either buy or already own the equipment themselves (Table 17).

4.4.2. Organizers

Corresponding distinctions were made between those organizers who found the concept both relevant and attractive and those who did not. The conditions under which the concept has more potential is then determined by increases in portions among the interested sub-sample in terms of demographics.

As for location, the survey's recorded responses from Africa and Australia did not show any particular interest in the concept. The relative size of responses from Europe and North America, therefore, grew with 4.4% and 11.4% p.p., respectively (Table 34). The type of event the organizers were involved in, i.e. either conferences or short educational programs, was subject to a 35.1% change in favor of the latter (Table 32). Whilst only 15.4% of the conference organizers were classified as interested, 66.7% of those involved with short educational programs were. Out of both types, 17.5% more belonged to engineering, architecture, planning, information and technology, and an additional 12.3% to academia and education. However, the other categories, with the exception of political, were less represented - also here, there was a decrease in average category mentions per person (Table 33). In addition, it is noticeable that potential candidates of the concept were associated with small to medium-sized events. The two ranges 50-100 and 100-300 both had an increase of 18.4%, whilst, due to a lower portion of the other ranges, the average size of the events went down among the interested (Table 35).

Whether or not the respondent's event already had implemented or was planning to implement practices for virtual participation, more showed signs of correlating tendencies with relevance. Therefore, among the organizers, also interest. Compared to all respondents, the interested group had a larger percentage of events with current or planned practices for all applicable virtual participation options (8.8-13.2%). Similarly, there was a decrease of those who neither currently nor planned to implement any of the given options (-9.6%) (Table 38).

In examining the differences in reasons and perceptions, the organizers, akin to the attendees, were asked about what they thought were the most important aspects of attending, as well as common obstacles not to attend their event. The overall sample resembles the attendees in that

the top three, for both questions, are the same. Although in a different order. Networking, followed by learning and experiencing something new, were most noted by the organizers. Which only got more visible among the interested (Table 36). Time-consumption, albeit losing significance with the interested attendees, stands as the most common obstacle perceived by the organizers and grows even more with the sub-sample. Other than that, health/ hygiene and cost, as well as the other obstacles all increased in portion (Table 37).

Other characterizing traits of the interested respondents included a higher indicated attractiveness for all virtual participation options (8.8-41.2%) (Table 40), a greater perceived importance of virtual participation options both to own event (9.6%) and in the future (10.5%) (Tables 41 & 42), and a larger portion that indicated knowledge about the technology (12.3%) (Table 43). They also had a more positive attitude towards implementing VR in general (20.2%) (Table 44). Furthermore, as follows from Table 45 about statements, those interested had less concern about their own and other's interest in VR implementation. However, prior to being introduced to the concept, they showed a greater concern about such as cost and time, participants not having the equipment, and confidence in implementing it themselves.

Furthermore, as part of determining whether the respondents viewed the VR participation option as an advantage for their attendees, which 42.1% of all and 83.3% of those interested did (Table 52). Information is extracted concerning to what degree they consider the different advantages in cases such as mitigating common obstacles of attending their event. In their opinion, more often than not, the VR participation option would be an advantage in most instances. In fact, lowering the environmental load is a recognized advantage by all interested parties. However, the VR option in terms of fun and enjoyable experiences is downplayed compared to the attendee-group (Tables 53 & 54).

The respondents were also asked if they thought the VR option would increase the total number of attendees to their event. Approximately half of all, two-thirds of those interested thought it would (Table 56). And along with an increased portion of those who were optimistic about attendees' reaction to being sent VR equipment for virtual participation (Table 46), 83.3%, compared to an overall 52.6%, considered it to be an advantageous option for their event (Table 55).

4.5. Additional Purposes

R.Q.3. For what purposes, other than those explicitly researched, could the concept of VR Conferencing have merit?

To further broaden the scope of this, future research, and the concept, the attendee sample were asked a question about for which other purposes they thought the concept could be relevant. They were given options such as consulting, concerts, as well as planning, modeling, and design, etc. and interest was measured through the number of mentions. Business meetings with 127 mentions (63.5%) and education and training with 100 (50.0%) were the most considerable. And as they are also in the literature along with conferences as subjects of research in the regard of virtual solutions, these findings may serve as support that there is an agreement between what people want and the direction of research in the area. Furthermore, tourism (14.0%) and retail (7.0%) received the least mentions. Some changes occurred when looking at the interested sub-sample. Such as an additional 4.8% for planning, modeling, and design, 4.4% for education and training as well as -3.3% for concerts. But these changes were not considerable enough to alter neither the most nor least mentioned purposes (Table 30).

4.6. Business Model

In addition to providing an overview of what VR technology has to offer in terms of event-participation. Hypothesizing the supply and demand for the VR participation option, as well as the demand for the concept of VR Conferencing - seeing whether it leaves room for a business opportunity. This thesis will explore a potential business model that can exploit this opportunity. A business's advantages and disadvantages in pioneering, late entry, as well as responding to late entries as an incumbent are largely dependent on the business model it utilizes (Markides & Sosa, 2013). But also, as a requirement prior to developing a business plan, to have a concept of the business's main drivers and costs, it is necessary to have figured out the rationale of how the business should create, deliver and capture value. However, as this is not the primary objective of this research, this section will merely present a simplified potential business model that could prove viable to exploit the opportunity.

The notion of the business model, as also presented in the survey, is the providing of relatively cheap and easy-to-use solutions for organizers to allow for VR participation to their events. A significant concern by the organizers in implementing VR participation was that the attendees would not have the necessary equipment (Table 45). This was also confirmed in the attendee

survey - most of them do not (Table 17). Therefore, as it is now, if an event would want to allow for VR participation they would either have to assume that those attendees who would wish to participate already have the equipment, expect that they are willing to provide it themselves, or provide it for them. They would also have had to provide the necessary equipment for their own event by either aligning with one or more VR technology rental firms or actually buying the equipment. Perhaps related to how cumbersome this could prove to be, most organizers expressed that they considered a third-party service that took care of these things necessary if they were to implement VR participation (Table 51).

Hence, in line with both the Literature Review section and the Results and Findings, a potentially viable business model could be one that works as an intermediate between those early-adopting events who wish to provide the VR participation mode, those who wish to participate, but also providers of VR technology equipment, systems, and technical support. This intermediate could be in the form of a platform. A scalable platform with an operating system that enables automatic ordering systems, organizing capabilities, and algorithms to match events and their attendees with close by suppliers of VR technology and service to facilitate the proper means.

Moving forward, the following segments will present a more concretized visualization of the parts and interrelations in the business model along with Osterwalder and Pigneur's (2010) idea of a *Business Model Canvas.*

1. Value proposition

By orchestrating the means of deployment for VR participation efficiently through a tech platform containing a global presence of VR technology and service providers. The purposed business model would bring value to events and their participants. It would not only make it easier for events to allow for VR participation, but it would also bring value to these VR providers in terms of additional demand.

2. Customer segments

The customer segments this business model aims to target are primarily those early-adopting events interested in VR participation – initially targeting those characterized under R.Q.2., their attendees, and VR rental providers.

3. Customer channels

The proposition would be brought directly to the market through a website and social media. It is also reasonable to assume that there will be a need for an additional support/ sales channel, especially towards the events and perhaps rental providers. From there, hosting events will work indirectly as a partner channel in reaching out to interested participants.

4. Customer relationships

Wide and mutually beneficial relationships with VR technology and service providers would allow for the retention of organizers through cross-side network effect should they eventually get more options for this service. However, to acquire and retain them as customers in general, personal assistance and user support might be deemed a necessity for long terms relationships and follow-up with the event organizers. The relationship with the events' attendees, as they expressed a greater interest for the concept as well as they are also reached out to indirectly, could be more automated. However, both groups would be met through a website and through social media.

5. Revenue streams

The business model's revenue model, as simple as possible, would involve a flat order fee rate resulting from one-time payments of rental and services bought through the platform. Included is a small order fee for organizers and their attendees and, if feasible, a marketing and advertising fee for the VR rental providers.

6. Key activities

The foreseen key activities involve searching for additions to the global network of VR rental and service providers, platform development, management and promotion, website, selling, as well as the provisioning of support and service to interested events. As part of the platform development, it will be crucial to create and maintain the algorithms which orchestrate the matchmaking and placing, picking up, transportation, and delivery of the order.

7. Key resources

The key resources would be closely related to the ends of the key activities. In other words, the platform, its systems, and the website. But also, a global network of partnerships with VR rental providers as well as delivery partners and event organizers.

8. Key partnerships

To work, the business model is dependent on having partnerships with VR rentals spread across borders and continents. Even if one rental firm had all the necessary equipment needed for both the event and its participants, it would be a lot more expensive to send such equipment long distances. Optionally, the model can eventually include either an acquisition or creation of a VR rental provider itself. Another is with early-adopting events and their organizers. Not only would these events function as a channel towards the attendees, but events and their organizers are often recurring.

9. Costs structure

Finally, the costs that are expected to be incurred to support the business model are primarily those related to the key activities, i.e. costs associated with technology development and management, web hosting, acquiring partners, sales, marketing and support.

5. Conclusions, Limitations and Future Work

In conclusion, this dissertation aimed at evaluating the interest and potential for a business model configuration that enables VR as a mode of participation to certain events – a concept throughout referred to as VR Conferencing. It comes forth by the Literature Review section that the possibility and potential of the concept depend on the relevant stakeholders' interest. And as immediately exploiting an identified business opportunity is not necessarily the right course of action. A choice was made to research the viability of the concept both from the perspective of those who would provide the option (organizers) and those who would participate (attendees). Through online surveys, this was done by looking at their interest in, and therefore the potential of, VR Conferencing, under which conditions and why it might receive interest and potential, and for which purposes other than those explicitly researched it might have value.

From the results, although the preferred order of virtual participation options varied, both the organizers and attendees seemed to acknowledge the increasing importance of virtual participation solutions. However, the attendees, with a larger portion of the sample having higher perceived knowledge of VR, were also somewhat more interested in the concept than the organizers. Organizers' interest appeared to be more correlated with whether they found it relevant to their event. Furthermore, the interested respondents, for both groups, were more likely to take advantage of the option at most registration fee levels. The exception was that the interested organizers were less likely to provide the option if the fee merely covered the cost of renting the equipment plus a small fee – perchance due to a greater consideration of aspects such as financials by those interested. However, albeit another outlier for the organizers, it followed the same pattern. The attendees' demand increased with the reduction in price, whilst the organizers' willingness to supply, decreased. The outlier might account to organizers thinking it, anyways, was not likely to provide the option for the same price as in-person attendance. Thus, looking at demand and supply at different fees, an equilibrium for the option would most likely be either at a slightly or significantly reduced registration fee, could attract a larger number of aggregated participants, and have potential to allow for value to be extracted.

Overall, the result seems to support that there is be a viable business opportunity underlying the concept of VR Conferencing. Not all would immediately jump on the opportunity to supply or participate in the VR participation mode, but some are recorded to be willing to supply it and quite a few to attend. For those potential users, the organizers expressed a necessity of a third-party service to orchestrate the deployment and a concern that the attendees would not have the

equipment. The attendees further confirmed that most of them were neither very likely to purchase one of the systems nor already own it.

Moving on, those classified as relevantly interested were compared to the overall samples with the aim to investigate for whom, when, and why the concept would have the most value. Found, were for instance relative size increases among the interested from Asia and South America for the attendee sample, and Europe and North America for the organizers. That these two do not match does not necessarily have to be a drawback as those who indicated interest were also more probable to perceive their frequency of air travel as either often or very often. Also, as reducing air travel was one of the core rationales for the idea and the opportunity in the first place.

Another underlying condition for which the concept of VR Conferencing seemed more prominent became visible through a positive relationship between interest and being associated with either attending or organizing short educational programs. This, perhaps also due to the fact that they were easier to separate through questioning in this regard, was more visible among the organizers. Either way, according to this research it appears that the concept is at least as, or even more, relevant for short educational programs as conferences. Nonetheless, there were also some indications for particular demographics such as education, occupation, size and category of event.

Altogether, there were visible differences between those classified as interested parties and the totals for both survey groups. Investigating them helped create a clearer picture of the circumstances in place for a higher likelihood of success for the concept. However, none of the variations among the total and the sub-groups suggested that the concept is only applicable and has value under certain conditions.

Interest in the concept, as also supported by an increased likelihood of self-purchase and indications for liking the technology on the attendee side, was more dependent on whether the respondent was interested in VR in general. They thought VR to be a better replicator of important social aspects of attending, and both interested attendees and organizers agreed that it would be a greater mitigator of common obstacles. Relatedly, with superior knowledge about the technology, the sub-samples further showed a higher degree of attractiveness, perceived importance as well as expectations about the future with regards to virtual participation and VR.

As for other purposes the concept could be directed to serve, business meetings, and education and training stood out as particularly relevant as they received either half or more of the possible indications from the attendees.

All this points to a viable business opportunity, guides the way for further effort, and perhaps also expands on the initially designated purposes of VR Conferencing. And furthermore, in accordance with both the Literature Review and the Results, a potential business model that could exploit the opportunity was presented as one that works as an intermediate third-party. The purposed business model that comes forth by this work is a scalable platform that enables the deployment of VR participation solutions through indirectly facilitating the means to both organizers and attendees through VR technology rental providers.

Notwithstanding, this work has limitations. First of all, the novelty of the concept caused a limited amount of useful information that could be drawn into and from the Literature Review. Thus, the research, as well as the questioning had to be set up from the basics. And the conclusions were virtually, solely drawn based on the respondents' answers. Secondly, in spite of extensive effort to reach out to the two populations, for the purposes of separating by demographics, the number of answers might neither have been numerous nor diverse enough. Especially those from the organizers. Resulting from this are restricted conclusions that can be made - both in terms of the variability of demographics that can be compared against each other but also the strength of the variability that could be examined.

Moreover, much because of time constraints, the evolving circumstances surrounding COVID-19, and a lack of equipment, interviews as well as a potential simulation pilot with the relevant stakeholders were not performed as initially planned. This leads to a suggestion for future work. To further extend the research, interviews could provide a more thorough understanding of peoples' views and motivations on the specific matter. As well as allow for a greater elaboration and perhaps the discovery of aspects that are important to the interviewee, not previously considered relevant by the researcher. Further, an examination of whether the concept is more interesting after they know more about how VR performs for this function, or if it is something that participants would want to take part in recurrently could have been done by a pilot. And a further look into the relationship with different VR technology rental providers and platform developers would also be a benefit for the development of a defined business plan.

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Appendix 1 – Tables

	N (all)	% (all)	N (int.)	% (int.)	Δ
Africa	0	0.0 %	0	0.0 %	0.0 %
Antartica	0	0.0 %	0	0.0 %	0.0 %
Asia	57	28.5 %	37	35.9 %	7.4 %
Australia	0	0.0 %	0	0.0 %	0.0 %
Europe	21	10.5 %	8	7.8 %	-2.7 %
North America	92	46.0 %	39	37.9 %	-8.1 %
South America	30	15.0 %	19	18.4 %	3.4 %

Table 1 - Attendees' Region/ Continent

	N (all)	% (all)	N (int.)	% (int.)	Δ
Less than high school	0	0.0 %	0	0.0 %	0.0 %
High school	16	8.0 %	6	5.8 %	-2.2 %
Bachelor's	139	69.5 %	66	64.1 %	-5.4 %
Master's	41	20.5 %	30	29.1 %	8.6 %
PHD	4	2.0 %	1	1.0 %	-1.0 %

Table 2 - Attendees' Education

	N (all)	% (all)	N (int.)	% (int.)	Δ
Academia and/ or education	114	57.0 %	58	56.3 %	-0.7 %
Other professional services	156	78.0 %	84	81.6 %	3.6 %
Both	95	47.5 %	48	46.6 %	-0.9 %
Neither	25	12.5 %	9	8.7 %	-3.8 %

Table 3 - Academia, Education And/ Or Other Professional Services (Attendees)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Less than €10,000 (1)	16	8.0 %	6	5.8 %	-2.2 %
€10,000-€19,999 (2)	36	18.0 %	16	15.5 %	-2.5 %
€20,000-€29,999 (3)	20	10.0 %	12	11.7 %	1.7 %
€30,000-€39,999 (4)	28	14.0 %	17	16.5 %	2.5 %
€40,000-€49,999 (5)	42	21.0 %	26	25.2 %	4.2 %
More than €50,000 (6)	58	29.0 %	26	25.2 %	-3.8 %
Average		4.09		4.16	

Table 4 - Attendees' Annual Household Income

	N (all)	% (all)	N (int.)	% (int.)	Δ
0-1 times per year (1)	10	5.0 %	5	4.9 %	-0.1 %
1-2 times per year (2)	64	32.0 %	32	31.1 %	-0.9 %
2-3 times per year (3)	78	39.0 %	43	41.7 %	2.7 %
3-5 times per year (4)	34	17.0 %	17	16.5 %	-0.5 %
More than 5 times per year (5)	12	6.0 %	6	5.8 %	-0.2 %
None (0)	2	1.0 %	0	0.0 %	-1.0 %
Average		2.84		2.87	

Table 5 - Attendees' Uncontidional Conference Attendance

	N (all)	% (all)	N (int.)	% (int.)	Δ
0-1 times per year (1)	48	24.0 %	29	28.2 %	4.2 %
1-2 times per year (2)	52	26.0 %	23	22.3 %	-3.7 %
2-3 times per year (3)	58	29.0 %	33	32.0 %	3.0 %
3-5 times per year (4)	29	14.5 %	12	11.7 %	-2.8 %
More than 5 times per year (5)	4	2.0 %	2	1.9 %	-0.1 %
None (0)	9	4.5 %	4	3.9 %	-0.6 %
Average		2.31		2.25	

Table 6 - Attendees' International Conference Attendance

	N (all)	% (all)	N (int.)	% (int.)	Δ
Yes	178	89.0 %	95	92.2 %	3.2 %
No	22	11.0 %	8	7.8 %	-3.2 %

Table 7 - Attendees' Short Educational Program Experience/ Intention

	N (all)	% (all)	N (int.)	% (int.)	Δ
Domestic	154	86.5 %	84	88.4 %	1.9 %
International	6	3.4 %	2	2.1 %	-1.3 %
Both	18	10.1 %	9	9.5 %	-0.6 %

Table 8 - Attendees' Short Educational Program Location

	N (all)	% (all)	N (int.)	% (int.)	Δ
Agriculture, environment & science	29	14.5 %	12	11.7 %	-2.8 %
Academia & education	51	25.5 %	23	22.3 %	-3.2 %
Business, economics & law	80	40.0 %	34	33.0 %	-7.0 %
Culture, arts & music	31	15.5 %	12	11.7 %	-3.8 %
Engineering, ... , information & technology	81	40.5 %	45	43.7 %	3.2 %
Health & medicine	39	19.5 %	19	18.4 %	-1.1 %
Humanities, life science & psychology	26	13.0 %	13	12.6 %	-0.4 %
Political	7	3.5 %	6	5.8 %	2.3 %
Other	2	1.0 %	0	0.0 %	-1.0 %

Table 9 - Attendees' Conference And Short Educational Program Categories

	N (all)	% (all)	N (int.)	% (int.)	Δ
Catching up with people and relevant topi	96	48.0 %	51	49.5 %	1.5 %
Learning and experiencing something new	139	69.5 %	75	72.8 %	3.3 %
Networking and getting to know new peo	113	56.5 %	59	57.3 %	0.8 %
Giving and receiving feedback	59	29.5 %	31	30.1 %	0.6 %
Coordinating with current and future colla	47	23.5 %	25	24.3 %	0.8 %
Other	0	0.0 %	0	0.0 %	0.0 %

Table 10 - Reasons To Attend (Attendees)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Too costly	88	44.0 %	53	51.5 %	7.5 %
Too time-consuming	89	44.5 %	38	36.9 %	-7.6 %
Health/ hygiene reasons	107	53.5 %	55	53.4 %	-0.1 %
Environmental consideration	72	36.0 %	39	37.9 %	1.9 %
Not accessible enough	30	15.0 %	15	14.6 %	-0.4 %
Other	0	0.0 %	0	0.0 %	0.0 %

Table 11 - Reasons Not To Attend (Attendees)

	1	2	3	4	5	(4 and 5)
Virtual participation	2.5 %	3.5 %	22.0 %	39.0 %	33.0 %	72.0 %
Virtual presentation	2.5 %	6.0 %	24.0 %	35.5 %	32.0 %	67.5 %
Two or more sites connected virtually	2.5 %	4.0 %	21.0 %	42.0 %	30.5 %	72.5 %
Entirely virtual events	4.5 %	4.0 %	19.0 %	35.0 %	37.5 %	72.5 %

Table 12 - Virtual Participation Options' Attractiveness (All) (Attendees)

	1	2	3	4	5	(4 and 5)
Virtual participation	-1.5 %	-1.6 %	-5.5 %	-4.1 %	12.6 %	8.6 %
Virtual presentation	-1.5 %	-4.1 %	-3.6 %	3.3 %	5.9 %	9.2 %
Two or more sites connected virtually	-1.5 %	-0.1 %	-3.5 %	5.6 %	-0.4 %	5.2 %
Entirely virtual events	-3.5 %	0.9 %	-4.4 %	3.8 %	3.3 %	7.1 %

Table 13 - Virtual Participation Options' Attractiveness (All - Interested Respondents) (Attendees)

	N (all)	% (all)	N (int.)	% (int.)	Δ
1	4	2.0 %	1	1.0 %	-1.0 %
2	12	6.0 %	2	1.9 %	-4.1 %
3	50	25.0 %	17	16.5 %	-8.5 %
4	82	41.0 %	50	48.5 %	7.5 %
5	52	26.0 %	33	32.0 %	6.0 %
Average		3.8		4.1	0.0 %
4 and 5		67.0 %		80.6 %	13.6 %

Table 14 - Virtual Participation Options' Importance (Attendees)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Definitely not (1)	3	1.5 %	1	1.0 %	-0.5 %
Probably not (2)	2	1.0 %	0	0.0 %	-1.0 %
Might or might not (3)	39	19.5 %	6	5.8 %	-13.7 %
Probably (4)	80	40.0 %	45	43.7 %	3.7 %
Definitely (5)	76	38.0 %	51	49.5 %	11.5 %
Average		4.1		4.4	0.00 %
4 and 5		78.0 %		93.2 %	15.2 %

Table 15 - Will Virtual Participation Be More Important In The Future**?** (Attendees)

	N (all)	% (all)	N (int.)	% (int.)	Δ
1	1	0.5 %	0	0.0 %	-0.5 %
2	18	9.0 %	6	5.8 %	-3.2 %
3	52	26.0 %	17	16.5 %	-9.5 %
4	85	42.5 %	54	52.4 %	9.9 %
5	44	22.0 %	26	25.2 %	3.2 %
Average		3.8		4.0	0.0 %
4 and 5		64.5 %		77.7 %	13.2 %

Table 16 - Virtual Reality Knowledge (attendees)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Very unlikely (1)	13	6.5 %	4	3.9 %	-2.6 %
Somewhat unlikely (2)	15	7.5 %	3	2.9 %	-4.6 %
Neither likely nor unlikely (3	36	18.0 %	8	7.8 %	-10.2 %
Somewhat likely (4)	87	43.5 %	51	49.5 %	6.0 %
Very likely/ owner (5)	49	24.5 %	37	35.9 %	11.4 %
Average		3.7		4.1	0.00 %
4 and 5		68.0 %		85.4 %	17.4 %

Table 17 - Likelihood Of Buying Own VR Equipment (Attendees)

	N (all)	% (all)	N (int.)	% (int.)	Δ
I like VR technologies	103	51.5 %	65	63.1 %	11.6 %
I understand the usefulness of VR at events such as conferences	108	54.0 %	55	53.4 %	-0.6 %
I consider VR too unreliable to be used for such events	64	32.0 %	23	22.3 %	-9.7 %
I think I would need help to be able to use a VR system	57	28.5 %	30	29.1 %	0.6 %
I believe VR will be more relevant in the future	85	42.5 %	47	45.6 %	3.1 %
I would not be comfortable using VR to attend events	8	4.0 %	2	1.9 %	-2.1 %

Table 18 - Agreed Upon Statements (Attendees)

	Much better (5)	Slightly better (4)	About the same (3)	Slightly worse (2)	Much worse (1)
Catching up with people and relevant topics	12.00 %	30.50 %	26.00 %	23.50 %	8.00 %
Learning and experiencing something new	17.50 %	30.50 %	21.00 %	21.00 %	10.00 %
Networking and getting to know new people	12.50 %	25.00 %	31.00 %	19.00 %	12.50 %
Giving and receiving feedback	15.50 %	25.50 %	29.00 %	20.50 %	9.50 %
Coordinating with current and future collaborators	15.08 %	28.14 %	23.12 %	20.60 %	13.07 %

Table 19 - How Well Can VR Replicate the Following Aspects Of Attending An Event (All) (Attendees)

	Much better (5)	Slightly better (4)	About the same (3)	Slightly worse (2)	Much worse (1)
Catching up with people and relevant topics	6.5 %	4.5 %	-6.6 %	-2.1 %	-2.2 %
Learning and experiencing something new	8.7 %	4.5 %	-4.5 %	-8.4 %	-0.3 %
Networking and getting to know new people	6.0 %	3.2 %	-2.8 %	-5.4 %	-0.8 %
Giving and receiving feedback	8.8 %	2.7 %	-5.7 %	-2.1 %	-3.7 %
Coordinating with current and future collaborators	5.5 %	5.2 %	-0.6 %	-8.8 %	-1.3 %

Table 20 - How Well Can VR Replicate the Following Aspects Of Attending An Event (All - Interested) (Attendees)

	N (all)	% (all)
Dislike a lot (1)	7	3.5 %
Dislike a little (2)	22	11.0 %
Neither like nor dislike (3)	32	16.0 %
Like a little (4)	85	42.5 %
Like a lot (5)	54	27.0 %
Average		3.79
4 and 5		69.5 %

Table 21 - Attractiveness Of The Concept (Attendees)

	N (all)	% (all)
Very irrelevant (1)	9	4.5 %
Somewhat irrelevant (2)	21	10.5 %
Neither relevant nor irrelevant (3)	33	16.5 %
Somewhat relevant (4)	87	43.5 %
Very relevant (5)	50	25.0 %
Average		3.74
4 and 5		68.5 %

Table 22 - Personal Relevance Of The Concept (Attendees)

	Very irrelevant	Somewhat irrelevant	Neither relevant nor irrelevant	Somewhat relevant	Very relevant
Dislike a lot	1.5 %	0.0 %	0.5 %	1.5 %	0.0 %
Dislike a little	0.0 %	1.0 %	1.5 %	6.0 %	2.5 %
Neither like nor dislike	0.0 %	3.0 %	6.0 %	5.5 %	1.5 %
Like a little	2.0 %	4.5 %	8.5 %	21.5 %	6.0 %
Like a lot	1.0 %	2.0 %	0.0 %	9.0 %	15.0 %

51.5 %

Table 23 - Relationship Between Attractiveness And Personal Relevance Of The Concept (Attendees)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Much better (5)	45	22.5 %	32	31.1 %	8.6 %
Slightly better (4)	76	38.0 %	52	50.5 %	12.5 %
About the same (3)	50	25.0 %	13	12.6 %	-12.4 %
Slightly worse (2)	24	12.0 %	4	3.9 %	-8.1 %
Much worse (1)	5	2.5 %	2	1.9 %	-0.6 %
4 and 5		60.5 %		81.6 %	21.1 %
Average		3.66		4.05	0.39

Table 24 - VR Participation Option In Comparison To Ordinary (Video) Virtual (Attendees)

	Much more likely (5)	Somewhat more likely (4)	As likely (3)	Somewhat less likely (2)	Much less likely (1)	(4 and 5)
... the same? (0% off)	8.0 %	17.0 %	29.5 %	30.0 %	15.5 %	25.0 %
... slightly reduced? (20% off)	7.5 %	26.0 %	32.5 %	24.5 %	9.5 %	33.5 %
... significantly reduced? (50% off)	17.7 %	22.7 %	27.8 %	19.2 %	12.6 %	40.4 %
... the cost of renting the equipment plus a small additional fee?	24.5 %	19.5 %	25.0 %	19.0 %	12.0 %	44.0 %

Table 25 - How Likely, Compared To In Person, Would You Exploit The VR Option If The Price Was... (All) (Attendees)

	Much more likely (5)	Somewhat more likely (4)	As likely (3)	Somewhat less likely (2)	Much less likely (1)	(4 and 5)
... the same? (0% off)	13.6 %	20.4 %	22.3 %	30.1 %	13.6 %	34.0 %
... slightly reduced? (20% off)	14.6 %	34.0 %	24.3 %	18.4 %	8.7 %	48.5 %
... significantly reduced? (50% off)	25.2 %	28.2 %	20.4 %	12.6 %	13.6 %	53.4 %
... the cost of renting the equipment plus a small additional fee?	37.9 %	22.3 %	18.4 %	13.6 %	7.8 %	60.2 %

Table 26 - How Likely, Compared To In Person, Would You Exploit The VR Option If The Price Was... (Interested) (Attendees)

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)	(4 and 5)
... lower environmental load	5.0 %	9.5 %	21.0 %	46.0 %	18.5 %	64.5 %
... less money spend	2.0 %	8.0 %	26.0 %	39.0 %	25.0 %	64.0 %
... less time spend	3.5 %	9.0 %	21.0 %	35.0 %	31.5 %	66.5 %
... health/ hygiene reasons	2.5 %	8.0 %	20.0 %	45.0 %	24.5 %	69.5 %
... increased accessibility	3.5 %	5.0 %	22.5 %	40.0 %	29.0 %	69.0 %
... fun/ enjoyable experiences	2.5 %	7.5 %	18.0 %	43.0 %	29.0 %	72.0 %

Table 27 - Reasons To Use VR In The Future (All) (Attendees)

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)	(4 and 5)
... lower environmental load	-2.1 %	-7.6 %	-7.4 %	6.4 %	10.6 %	17.1 %
... less money spend	-1.0 %	-4.1 %	-4.6 %	0.8 %	9.0 %	9.8 %
... less time spend	-3.5 %	-5.1 %	-9.4 %	5.8 %	12.2 %	18.0 %
... health/ hygiene reasons	-2.5 %	-3.2 %	-2.5 %	-2.3 %	10.5 %	8.2 %
... increased accessibility	-1.6 %	-4.0 %	-6.0 %	-1.2 %	12.8 %	11.6 %
... fun/ enjoyable experiences	-2.5 %	-4.6 %	-3.4 %	-0.3 %	10.8 %	10.5 %

Table 28 - Reasons To Use VR In The Future (All - Interested) (Attendees)

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Very Often (5)	4 and 5
Air travel	-0.2 %	-0.4 %	-9.1 %	10.1 %	-0.4 %	9.7 %
Car	-0.6 %	-0.2 %	-4.6 %	-4.5 %	9.9 %	5.4 %
Train	3.0 %	-1.8 %	-9.0 %	-2.7 %	10.5 %	7.8 %

Table 29 - Mode Of Transportation (All - Interested) (Attendees)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Consulting	66	33.0 %	37	35.9 %	2.9 %
Business meetings	127	63.5 %	67	65.0 %	1.5 %
Other professional services	66	33.0 %	36	35.0 %	2.0 %
Concerts	59	29.5 %	27	26.2 %	-3.3 %
Other entertainment purposes (e.g. game:	68	34.0 %	34	33.0 %	-1.0 %
Planning/ modeling/ design	68	34.0 %	40	38.8 %	4.8 %
Education and training	100	50.0 %	56	54.4 %	4.4 %
Tourism	28	14.0 %	17	16.5 %	2.5 %
Retail	14	7.0 %	7	6.8 %	-0.2 %
Other	1	0.5 %	0	0.0 %	-0.5 %

Table 30 - Other Purposes For The Concept Of VR Consulting (Attendees)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Detractor	37	18.5 %	8	7.8 %	-10.7 %
Passive	78	39.0 %	38	36.9 %	-2.1 %
Promoter	85	42.5 %	57	55.3 %	12.8 %

Table 31 - Likelihood Of Recomendation (Attendees)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Conference	13	68.4 %	2	33.3 %	-35.1 %
Short educational program	6	31.6 %	4	66.7 %	35.1 %

Table 32 - Type of Organizer

	N (all)	% (all)	N (int.)	% (int.)	Δ
Agriculture, environment & science	2	10.5 %	0	0.0 %	-10.5 %
Academia & education	4	21.1 %	2	33.3 %	12.3 %
Business, economics & law	13	68.4 %	4	66.7 %	-1.8 %
Culture, arts & music	2	10.5 %	0	0.0 %	-10.5 %
Engineering, ... , information & technology	3	15.8 %	2	33.3 %	17.5 %
Health & medicine	3	15.8 %	0	0.0 %	-15.8 %
Humanities, life science & psychology	5	26.3 %	1	16.7 %	-9.6 %
Political	3	15.8 %	1	16.7 %	0.9 %
Other	0	0.0 %	0	0.0 %	0.0 %

Table 33 - Organizers' Conference And Short Educational Program Categories

	N (all)	% (all)	N (int.)	% (int.)	Δ
Africa	1	5.3 %	0	0.0 %	-5.3 %
Antartica	0	0.0 %	0	0.0 %	0.0 %
Asia	0	0.0 %	0	0.0 %	0.0 %
Australia	2	10.5 %	0	0.0 %	-10.5 %
Europe	15	78.9 %	5	83.3 %	4.4 %
North America	1	5.3 %	1	16.7 %	11.4 %
South America	0	0.0 %	0	0.0 %	0.0 %

Table 34 - Events' Region/ Continent (Organizers)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Less than 50 (1)	3	15.8 %	0	0.0 %	-15.8 %
50-100 (2)	6	31.6 %	3	50.0 %	18.4 %
100-300 (3)	6	31.6 %	3	50.0 %	18.4 %
300-500 (4)	3	15.8 %	0	0.0 %	-15.8 %
500-700 (5)	1	5.3 %	0	0.0 %	-5.3 %
700-900 (6)	0	0.0 %	0	0.0 %	0.0 %
More than 900	0	0.0 %	0	0.0 %	0.0 %
Average		2.63		2.5	

Table 35 - Organizers' Event Size/ Nr. Of Participants

	N (all)	% (all)	N (int.)	% (int.)	Δ
Catching up with people and relevant topi	10	52.6 %	2	33.3 %	-19.3 %
Learning and experiencing something new	12	63.2 %	5	83.3 %	20.2 %
Networking and getting to know new peo	13	68.4 %	6	100.0 %	31.6 %
Giving and receiving feedback	4	21.1 %	0	0.0 %	-21.1 %
Coordinating with current and future colla	5	26.3 %	2	33.3 %	7.0 %
Other	1	5.3 %	1	16.7 %	11.4 %

Table 36 - Reasons To Attend (Organizers)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Too costly	8	42.1 %	3	50.0 %	7.9 %
Too time-consuming	11	57.9 %	4	66.7 %	8.8 %
Health/ hygiene reasons	7	36.8 %	3	50.0 %	13.2 %
Environmental consideratio	1	5.3 %	1	16.7 %	11.4 %
Not accessible enough	4	21.1 %	2	33.3 %	12.3 %
Other	2	10.5 %	1	16.7 %	6.1 %

Table 37 - Reasons Not To Attend (Organizers)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Virtual participation	8	42.1 %	3	50.0 %	7.9 %
Virtual presentation	11	57.9 %	4	66.7 %	8.8 %
Two or more sites connected virtually	0	0.0 %	0	0.0 %	0.0 %
Entirely virtual events	7	36.8 %	3	50.0 %	13.2 %
None of the above	5	26.3 %	1	16.7 %	-9.6 %
Other	0	0	0	0.0 %	0.0 %

Table 38 - Current Or Planned Virtual Participation Practices (Organizers)

	1	2	3	4	5	(4 and 5)
Virtual participation	15.8 %	15.8 %	26.3 %	15.8 %	26.3 %	42.1 %
Virtual presentation	5.3 %	10.5 %	26.3 %	26.3 %	31.6 %	57.9 %
Two or more sites connected virtually	15.8 %	31.6 %	31.6 %	15.8 %	5.3 %	21.1 %
Entirely virtual events	15.8 %	26.3 %	15.8 %	26.3 %	15.8 %	42.1 %

Table 39 - Virtual Participation Options' Attractiveness (All) (Organizers)

	1	2	3	4	5	(4 and 5)
Virtual participation	-15.8 %	0.9 %	-26.3 %	17.5 %	23.7 %	41.2 %
Virtual presentation	-5.3 %	6.1 %	-9.7 %	-26.3 %	35.1 %	8.8 %
Two or more sites connected virtually	34.2 %	-14.9 %	-31.6 %	17.5 %	-5.3 %	12.3 %
Entirely virtual events	0.9 %	-26.3 %	0.9 %	7.0 %	17.5 %	24.6 %

Table 40 - Virtual Participation Options' Attractiveness (All - Interested) (Organizers)

	N (all)	% (all)	N (int.)	% (int.)	Δ
1	1	5.3 %	0	0.0 %	-5.3 %
2	1	5.3 %	0	0.0 %	-5.3 %
3	3	15.8 %	1	16.7 %	0.9 %
4	10	52.6 %	5	83.3 %	30.7 %
5	4	21.1 %	0	0.0 %	-21.1 %
4 and 5		73.7 %		83.3 %	9.6 %
Average		3.79		3.83	0.04

Table 41 - Virual Participation Options' Importance To Own Event (Organizers)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Definitely not (1)	0	0.0 %	0	0.0 %	0.0 %
Probably not (2)	0	0.0 %	0	0.0 %	0.0 %
Might or might not (3)	2	10.5 %	0	0.0 %	-10.5 %
Probably yes (4)	12	63.2 %	4	66.7 %	3.5 %
Definitely yes (5)	5	26.3 %	2	33.3 %	7.0 %
4 and 5		89.5 %		100.0 %	10.5 %
Average		4.16		4.33	

Table 42 - Do You Think Allowing For Virtual Participation Options Will Be More Important In The Future? (Organizers)

	N (all)	% (all)	N (int.)	% (int.)	Δ
1	0	0.0 %	0	0.0 %	0.0 %
2	6	31.6 %	2	33.3 %	1.8 %
3	9	47.4 %	2	33.3 %	-14.0 %
4	3	15.8 %	2	33.3 %	17.5 %
5	1	5.3 %	0	0.0 %	-5.3 %
4 and 5		21.1 %		33.3 %	12.3 %
Average		2.95		3.00	

Table 43 - Virtual Reality Knowledge (Organizers)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Very negative (1)	2	10.5 %	1	16.7 %	6.1 %
Somewhat negative (2)	1	5.3 %	0	0.0 %	-5.3 %
Neither positive nor negative (3)	4	21.1 %	0	0.0 %	-21.1 %
Somewhat positive (4)	11	57.9 %	4	66.7 %	8.8 %
Vert positive (5)	1	5.3 %	1	16.7 %	11.4 %
4 and 5		63.2 %		83.3 %	20.2 %
Average		3.42		3.67	

Table 44 - General Attitude Towards The Implementation Of VR Based Participation (Organizers)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Technical inadequacies	9	47.4 %	3	50.0 %	2.6 %
Costly and time-consuming	12	63.2 %	5	83.3 %	20.2 %
Participants do not have the equipment	16	84.2 %	6	100.0 %	15.8 %
Participants would not want it	5	26.3 %	0	0.0 %	-26.3 %
Lack of confidence in implementing it	5	26.3 %	3	50.0 %	23.7 %
Lack of interest in implementing it	3	15.8 %	0	0.0 %	-15.8 %
Other	0	0.0 %	0	0.0 %	0.0 %

Table 45 - Concerns With Implementing VR Participation (Organizers)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Definitely not (1)	2	10.5 %	0	0.0 %	-10.5 %
Probably not (2)	2	10.5 %	0	0.0 %	-10.5 %
Might or might not (3)	5	26.3 %	1	16.7 %	-9.6 %
Probably yes (4)	5	26.3 %	2	33.3 %	7.0 %
Definitely yes (5)	5	26.3 %	3	50.0 %	23.7 %
4 and 5		52.6 %		83.3 %	30.7 %
Average		3.47		4.33	

Table 46 - Do You Think Your Events' Attendees Would Like Being Sent Ready-To-Use VR Equipment To Participate In Your Event Virtually (Organizers)

	N	%
Dislike a great deal (1)	0	0.0 %
Dislike somewhat (2)	3	15.8 %
Neither like nor dislike (3)	1	5.3 %
Like somewhat (4)	13	68.4 %
Like a great deal (5)	2	10.5 %
Average		3.74

Table 47 - Attractiveness Of The Concept (Organizers)

	N	%
Very irrelevant (1)	1	5.3 %
Somewhat irrelevant (2)	6	31.6 %
Neither relevant nor irrelevant (3)	6	31.6 %
Somewhat relevant (4)	5	26.3 %
Very relevant (5)	1	5.3 %
Average		2.95

Table 48 - Relevance Of The Concept For The Event (Organizers)

	Very irrelevant	Somewhat irrelevant	Neither relevant nor irrelevant	Somewhat relevant	Very relevant
Dislike a lot	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %
Dislike a little	5.3 %	5.3 %	5.3 %	0.0 %	0.0 %
Neither like nor dislike	0.0 %	5.3 %	0.0 %	0.0 %	0.0 %
Like a little	0.0 %	21.1 %	21.1 %	26.3 %	0.0 %
Like a lot	0.0 %	0.0 %	5.3 %	0.0 %	5.3 %

31.6 %

Table 49 - Relationship Between Attractiveness And Relevance Of The Concept (Organizers)

	N (all)	% (all)	N (int)	% (int)	Δ
Much worse (1)	0	0.0 %	0	0.0 %	0.0 %
Somewhat worse (2)	2	10.5 %	0	0.0 %	-10.5 %
About the same (3)	6	31.6 %	1	16.7 %	-14.9 %
Somewhat better (4)	7	36.8 %	3	50.0 %	13.2 %
Much better (5)	4	21.1 %	2	33.3 %	12.3 %
4 and 5		57.9 %		83.3 %	25.4 %
Average		3.68		4.17	

Table 50 - VR Participation Option In Comparison To Ordinary (Video) Virtual (Organizers)

	N (all)	% (all)	N (int)	% (int)	Δ
Very unecessary (1)	0	0.0 %	0	0.0 %	0.0 %
Somewhat unecessary (2)	1	5.3 %	0	0.0 %	-5.3 %
Neither necessary nor unecessary (3)	2	10.5 %	0	0.0 %	-10.5 %
Somewhat necessary (4)	7	36.8 %	2	33.3 %	-3.5 %
Very necessary	9	47.4 %	4	66.7 %	19.3 %
4 and 5		84.2 %		100.0 %	15.8 %
Average		4.26		4.67	

Table 51 - If To Implement VR Based Particiaption, How Necessary Would You Consider A Third Party Offering This Service? (Organizers)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Very disadvantageous (1)	0	0.0 %	0	0.0 %	0.0 %
Somewhat disavdantageous (2)	4	21.1 %	0	0.0 %	-21.1 %
Neither avdantageous nor disavdantageous (3)	7	36.8 %	1	16.7 %	-20.2 %
Somewhat avdantageous (4)	8	42.1 %	5	83.3 %	41.2 %
Very avdantageous (5)	0	0.0 %	0	0.0 %	0.0 %
4 and 5		42.1 %		83.3 %	41.2 %
Average		3.21		3.83	

Table 52 - How Advantageous Do You Consider The VR Participation Option For Your Attendees? (Organizers)

	Strongly agree (5)	Somewhat agree (4)	Neither agree nor disagree (3)	Somewhat disagree (2)	Strongly disagree (5)	(4 and 5)
... lower environmental load	26.3 %	52.6 %	15.8 %	5.3 %	0.0 %	79.0 %
... less money spend	21.1 %	31.6 %	15.8 %	10.5 %	21.1 %	52.6 %
... less time spend	26.3 %	26.3 %	10.5 %	31.6 %	5.3 %	52.6 %
... health/ hygiene reasons	31.6 %	36.8 %	21.1 %	10.5 %	0.0 %	68.4 %
... increased accessibility	31.6 %	26.3 %	26.3 %	10.5 %	5.3 %	57.9 %
... fun/ enjoyable experiences	15.8 %	26.3 %	36.8 %	5.3 %	15.8 %	42.1 %

Table 53 - The VR Particiaption Option Will Be Advantageous For Your Attendees In Terms Of...? (All) (Organizers)

	Strongly agree (5)	Somewhat agree (4)	Neither agree nor disagree (3)	Somewhat disagree (2)	Strongly disagree (5)	(4 and 5)
... lower environmental load	23.7 %	-2.6 %	-15.8 %	-5.3 %	0.0 %	21.1 %
... less money spend	-4.4 %	18.4 %	0.9 %	-10.5 %	-4.4 %	14.0 %
... less time spend	23.7 %	-9.7 %	-10.5 %	-14.9 %	11.4 %	14.0 %
... health/ hygiene reasons	1.8 %	-3.5 %	-4.4 %	6.1 %	0.0 %	-1.8 %
... increased accessibility	18.4 %	-9.7 %	-9.7 %	-10.5 %	11.4 %	8.8 %
... fun/ enjoyable experiences	0.9 %	-9.7 %	29.8 %	-5.3 %	-15.8 %	-8.8 %

Table 54 - The VR Particiaption Option Will Be Advantageous For Your Attendees In Terms Of...? (All - Interested) (Organizers)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Very disadvantageous (1)	2	10.5 %	1	16.7 %	6.1 %
Somewhat disavdantageous (2)	2	10.5 %	0	0.0 %	-10.5 %
Neither avdantageous nor disavdantageous (3)	5	26.3 %	0	0.0 %	-26.3 %
Somewhat avdantageous (4)	10	52.6 %	5	83.3 %	30.7 %
Very avdantageous (5)	0	0.0 %	0	0.0 %	0.0 %
4 and 5		52.6 %		83.3 %	30.7 %
Average		3.21		3.50	

Table 55 - How Advantageous Do You Consider The VR Participation Option For Your Event? (Organizers)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Definitely not (1)	0	0.0 %	0	0.0 %	0.0 %
Probably not (2)	5	26.3 %	1	16.7 %	-9.6 %
Might or might not (3)	5	26.3 %	1	16.7 %	-9.6 %
Probably yes (4)	8	42.1 %	3	50.0 %	7.9 %
Definitely yes (5)	1	5.3 %	1	16.7 %	11.4 %
4 and 5		47.4 %		66.7 %	19.3 %
Average		3.26		3.67	

Table 56 - Do You Think Allowing For VR Participation Would Increase The Total Number Of Attendees To Your Event? (Organizers)

	Very unlikely (1)	Somewhat unlikely (3)	Neither likely nor unikely (3)	Somewhat likely (4)	Very likely (5)	(4 and 5)
... the same, €400? (0% off)	26.3 %	26.3 %	21.1 %	5.3 %	21.1 %	26.3 %
... slightly reduced, €320? (20% off)	21.1 %	5.3 %	0.0 %	42.1 %	31.6 %	73.7 %
... significantly reduced, €200? (50% off)	31.6 %	15.8 %	10.5 %	21.1 %	21.1 %	42.1 %
... just covering the cost of renting the equipment plus a small additional fee?	31.6 %	10.5 %	26.3 %	21.1 %	10.5 %	31.6 %

Table 57 - Under Demand And Compared To In-Person Registration Fees, How Likely Would you Provide VR Participation If The Price Was... (All) (Organizers)

	Very unlikely (1)	Somewhat unlikely (3)	Neither likely nor unikely (3)	Somewhat likely (4)	Very likely (5)	(4 and 5)
... the same? (0% off)	16.67 %	33.33 %	16.67 %	0.00 %	33.33 %	33.3 %
... slightly reduced? (20% off)	16.67 %	0.00 %	0.00 %	33.33 %	50.00 %	83.3 %
... significantly reduced? (50% off)	16.67 %	16.67 %	16.67 %	50.00 %	0.00 %	50.0 %
... just covering the cost of renting the equipment plus a small additional fee?	33.33 %	33.33 %	16.67 %	16.67 %	0.00 %	16.7 %

Table 58 - Under Demand And Compared To In-Person Registration Fees, How Likely Would you Provide VR Participation If The Price Was... (Interested) (Organizers)

	N (all)	% (all)	N (int.)	% (int.)	Δ
Detractor	11	57.9 %	4	66.7 %	8.8 %
Passive	8	42.1 %	2	33.3 %	-8.8 %
Promoter	0	0.0 %	0	0.0 %	0.0 %

Table 59 - Likelihood Of Relevant Recomendation (Organizers)

Appendix 2 – Surveys

Attendees

Start of Block: Product Concept Testing

Instruction
Dear participant,
Thank you for accepting to take part in this survey. In the context of the virtual conferencing project of the Smart City Innovation Lab at Católica-Lisbon with the University of Queensland, Australia we would like to ask you a few question regarding your perspective on virtual conferences which shouldn't take longer than 5 to 6 minutes.

There are no right, or wrong answers and all the collected information is anonymous. It will be used exclusively for the purpose of this research and will be kept confidential.

For questions of any kind please contact info@smartcityinnovationlab.com.
Your contribution is very valuable. Thank you for your time and your participation!
Kind regards,

Andre Markussen and Mariana Sarmento (lead researchers)

In this first section, you will be asked about your habits and attitudes towards attending conferences and short educational programmes (e.g. summer schools).

For these questions, please disregard the current situation following COVID-19, but try to answer as sincerely as possible.

Page Break

1
Unconditional conference attendance |
How often do you on average attend, or imagine yourself attending, conferences **in general**?

- ○ 0-1 times per year (1)
- ○ 1-2 times per year (2)
- ○ 2-3 times per year (3)
- ○ 3-5times per year (4)
- ○ More than 5 times per year (5)
- ○ None (6)

Page Break

2
International conference attendance

How often do you on average attend, or imagine yourself attending, conferences **internationally**?

- ○ 0-1 times per year (1)
- ○ 1-2 times per year (2)
- ○ 2-3 times per year (3)
- ○ 3-5times per year (4)
- ○ More than 5 times per year (5)
- ○ None (6)

Page Break

3
Short educational programme attendance

Have you attended, or intention of attending, any short educational programmes (e.g. summer schools)?

- ○ Yes (1)
- ○ No (2)

Page Break

Display This Question:
If Short educational programme attendance Have you attended, or intention of attending, any short... = Yes

Short educational programme location
Was/ is this programme in the country you reside in?

- ○ Yes (1)
- ○ One or more, but not all (2)
- ○ No (3)

Page Break

4
Category
Please select the conference/ short educational programme category that is most relevant to you. (You may select more than one option)

- ☐ Agriculture, Environment & Science (1)
- ☐ Academia & Education (2)
- ☐ Business, Economics & Law (3)
- ☐ Culture, Arts & Music (4)
- ☐ Engineering, Architecture, Planning, Information & Technology (5)
- ☐ Health & Medicine (6)
- ☐ Humanities, Life Science & Psychology (7)
- ☐ Political (8)
- ☐ Other (9) _____

Page Break

5
Mode of transportation

In getting to and from such events, how often do you utilize the following modes of transportation?

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Very often (5)
Air travel (1)	○	○	○	○	○
Car (2)	○	○	○	○	○
Train (3)	○	○	○	○	○

Page Break

6
Reasons to attend

Which of the following aspects of attending a conference or summer school programme do you consider the most important?
(You may select more than one option)

- ☐ Catching up with people and relevant topics (1)
- ☐ Learning and experiencing something new (2)
- ☐ Networking and getting to know new people (3)
- ☐ Giving and receiving feedback (4)
- ☐ Coordinating with current and future collaborators (5)
- ☐ Other (6) _____

Page Break

7
Reasons <u>not</u> to attend

Imagine that you found a conference or summer school that you would have wanted to atten but you decided against going. Which of the following reasons were most likely important to your choice?
(You may select more than one option)

- ☐ Too costly (1)
- ☐ Too time-consuming (2)
- ☐ Health/ hygiene reasons (3)
- ☐ Environmental consideration (4)
- ☐ Not accessible enough (5)
- ☐ Other (6) _____

Page Break

Virtual participation attractiveness and importance

Nowadays, virtual technologies provide opportunities for virtual participation and presentation, connecting two or more venues together for joint conferences, or even entirely virtual experiences.

8 From 1 to 5, how attractive do you find the following virtual participation options?
(Where 1= "Not attractive at all" and 5= "Extremely attractive")

	☆	☆	☆	☆	☆
Virtual participation (1)					
Virtual presentation (2)					
Two or more sites connected virtually (3)					
Entirely virtual events (4)					

9 From 1 to 5, how important do you consider virtual participation options?
(Where 1="Not at all important" and 5="Extremely important")

- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)

10 Do you think that virtual participation will be more important in the future?

- ○ Definitely yes (1)
- ○ Probably yes (2)
- ○ Might or might not (3)
- ○ Probably not (4)
- ○ Definitely not (5)

Page Break

Virtual reality technology

You will now be asked some questions about your experience and thoughts about **virtual reality** (**VR**) technology and its use to participate in conferences and short educational programmes.

11
From 1 to 5, how much do you feel you know about virtual reality?
(Where 1="Nothing at all" and 5="A great deal")

- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)

Page Break

Display This Question:

If From 1 to 5, how much do you feel you know about virtual reality? (Where 1="Nothing at all" and 5... = 1

Virtual reality (VR) is a simulated, highly lifelike, and interactive experience provided by equipment such as head-mounted displays or multi-projected environments. These environments may or may not be similar to the real world and create a manifold of opportunities for collaboration online.

Page Break

12
VR ownership and perceptions

How likely are you do buy the proper VR equipment for yourself?

- Very likely/ I already have it (1)
- Somewhat likely (2)
- Neither likely nor unlikely (3)
- Somewhat unlikely (4)
- Very unlikely (5)

13 Please indicate which of the following statements that you agree with.
(You may choose more than one option)

- ☐ I like VR technologies (1)
- ☐ I understand the usefulness of VR at events such as conferences or short educational programmes (2)
- ☐ I consider VR too unreliable to be used for such events (3)
- ☐ I think I would need help to be able to use a VR system (4)
- ☐ I believe VR will be more relevant in the future (5)
- ☐ I would not be comfortable using VR to attend events (6)

14 How well do you think VR technologies can deliver the following aspects compared to in-person?

	Much better (1)	Slightly better (2)	About the same (3)	Slightly worse (4)	Much worse (5)
Catching up with people and relevant topics (1)	○	○	○	○	○
Leaning and experiencing something new (2)	○	○	○	○	○
Networking and getting to know new people (3)	○	○	○	○	○
Giving and receiving feedback (4)	○	○	○	○	○
Coordinating with current and future collaborators (5)	○	○	○	○	○

Page Break

Perceptions and relevance of concept

Imagine there is a conference or a summer school in a different country that you would consider going to. Registration fee is € 400 (excluding travel cost, accommodation, etc.).
You are presented with the option of being sent ready-to-use VR equipment to join the event in a virtual participation mode.

15
What is your initial thought about the concept, do you like it?

- Dislike a lot (1)
- Dislike a little (2)
- Neither like nor dislike (3)
- Like a little (4)
- Like a lot (5)

16 How relevant is the concept for you personally?

- Very relevant (1)
- Somewhat relevant (2)
- Neither relevant nor irrelevant (3)
- Somewhat irrelevant (4)
- Very irrelevant (5)

17 How do you feel this option compares to ordinary virtual (video) participation?

- ○ Much worse (1)
- ○ Somewhat worse (2)
- ○ Neither better nor worse (3)
- ○ Somewhat better (4)
- ○ Much better (5)

Page Break

Display This Question:

If How relevant is the concept for you personally? = Very irrelevant

Or How relevant is the concept for you personally? = Somewhat irrelevant

Why do you think the concept would be irrelevant to you?

_____

Page Break

18
Demand

If this option was available, how likely, compared to attending in person, would you be taking advantage of it if the registration price was...

	Much more likely (1)	Somewhat more likely (2)	As likely (3)	Somewhat less likely (4)	Much less likely (5)
... the same, €400? (0% off) (1)	○	○	○	○	○
... slightly reduced, €320? (20% off) (2)	○	○	○	○	○
... significantly reduced, €200? (50% off) (3)	○	○	○	○	○
... just covering the cost of renting the equipment plus a small additional fee? (4)	○	○	○	○	○

Page Break

19
Reasons, uses and recommendations

My decision to use VR in the future would be because of...

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
... lower environmental load (1)	○	○	○	○	○
... less money spend (2)	○	○	○	○	○
... less time spend (3)	○	○	○	○	○
... health/ hygiene reasons (4)	○	○	○	○	○
... increased accessibility (5)	○	○	○	○	○
... fun/ enjoyable experiences (6)	○	○	○	○	○

20 For which of the following do you believe this concept also could be relevant for? (You may choose more than one option)

- ☐ Consulting (1)
- ☐ Business meetings (2)
- ☐ Other professional services (3)
- ☐ Concerts (4)
- ☐ Other entertainment purposes (e.g. games, social rooms...) (5)
- ☐ Planning/ modelling/ design (6)
- ☐ Education and training (7)
- ☐ Tourism (8)
- ☐ Retail (9)
- ☐ Other (10) _____

21 On a scale from 1 to 10, how likely do you think you would recommend VR participation to a friend/ colleague/ family member?

- 0 (0)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)

Page Break

Demographics
It is almost over! We would just like to know a little bit more about you. All answers are still anonymous and you can continue being honest.

22
Gender

- Male (1)
- Female (2)
- Prefer not to say (3)
- Other (4)

23 Age

- (1)
- 20-29 (2)
- 30-39 (3)
- 40-49 (4)
- 50-59 (5)
- 60-69 (6)
- >69 (7)

30
Feedback and comments

If you have any comments or something to add, please use the text field below. We appreciate any feedback you could give us.

Page Break

24 Where do you currently reside?

▼ Africa (1) ... South America (7)

25 What is you highest degree of education?

- Less than high school (1)
- High school (2)
- Bachelor's (3)
- Master's (4)
- PhD (5)

26 Do you work in academia and/ or education?

- Yes (1)
- No (2)

27 Do you work in other professional services?

- Yes (1)
- No (2)

28 How much is your annual household income?

- Less than €10,000 (1)
- €10,000-€19,999 (2)
- €20,000-€29,999 (3)
- €30,000-€39,999 (4)
- €40,000-€49,999 (5)
- More than €50,000 (6)

Page Break

29
Request report
Please indicate whether you would like to receive a summary report of the study via email

- Yes, I am interested in receiving a report via email (1)
- No, I am not interested in receiving a report via email (2)

Page Break

Display This Question:
If Request report Please indicate whether you would like to receive a summary report of the study vi... = Yes, I am interested in receiving a report via email

Please give us your email
(We will not send you anything more than the requested summary report)

Page Break

Organizers

Start of Block: Product Concept Testing

Instruction
Dear participant,
Thank you for accepting to take part in this survey. In the context of the **virtual conferencing project** of the Smart City Innovation Lab at Católica-Lisbon with the University of Queensland, Australia we would like to ask you a few question regarding your perspective on virtual conferences which shouldn't take longer than 7 to 10 minutes. The result will be a comprehensive report that we will share among all participants.

There are no right, or wrong answers and all the collected information is anonymous. It will be used exclusively for the purpose of this research and will be kept confidential.

For questions of any kind please contact info@smartcityinnovationlab.com.
Your contribution is very valuable. Thank you for your time and your participation!
Kind regards,

Andre Markussen and Mariana Sarmento (lead researchers)

In this first section, you will be asked a few questions about the event you are involved with organizing, its attendees, as well as your current practices on virtual participation.

Page Break

1 **Organizer** Are you involved, or plan to be involved, in organizing a conference or a summer school?

- ☐ Conference (22)
- ☐ Summer school (23)

Page Break

2 **Category** Please select the conference / summer school category that is most relevant to you.
(You may select more than one option)

- ☐ Agriculture, Environment & Science (1)
- ☐ Academia & Education (2)
- ☐ Business, Economics & Law (3)
- ☐ Culture, Arts & Music (4)
- ☐ Engineering, Architecture, Planning, Information & Technology (5)
- ☐ Health & Medicine (6)
- ☐ Humanities, Life Science & Psychology (7)
- ☐ Political (8)
- ☐ Other (9) _____

Page Break

3 **Region** Where is your event being held?

▼ Africa (1) ... South America (7)

Page Break

4 **Size** Roughly, how many participants will attend your event?

- ○ (1)
- ○ 50-100 (2)
- ○ 100-300 (3)
- ○ 300-500 (4)
- ○ 500-700 (5)
- ○ 700-900 (6)
- ○ >900 (7)

Page Break

5 **Participants' reasons to attend** Which of these aspects are the most important to your event's attendees? (You may choose more than one option)

- ☐ Catching up with people and relevant topics (1)
- ☐ Learning and experiencing something new (2)
- ☐ Networking and getting to know new people (3)
- ☐ Giving and receiving feedback (4)
- ☐ Coordinating with current and future collaborators (5)
- ☐ Other (6) _____

Page Break

6 **Participants' reasons <u>not</u> to attend** Which of these reasons are most commonly preventing people who are interested in your event from attending? (You may choose more than one option)

- ☐ Too costly (1)
- ☐ Too time-consuming (2)
- ☐ Health/ hygiene reasons (3)
- ☐ Environmental consideration (4)
- ☐ Not accessible enough (5)
- ☐ Other (6) _____

Page Break

Virtual participation practices, attractiveness and importance Nowadays, virtual technologies provide opportunities for virtual participants and presenters, connecting two or more venues together for joint conferences, or even entirely virtual experiences.

7
Does your event currently provide, or plan to provide, any of the following virtual participation options?
(You may choose more than one option)

- [ ] Virtual participants (1)
- [ ] Virtual presenters (2)
- [ ] Two or more physical conference sites connected virtually (3)
- [ ] Entirely virtual event (4)
- [ ] None of the above (5)
- [ ] Other (6) _____

8 From 1 to 5, how attractive do you find the following virtual participation options?
(Where 1= "Not attractive at all" and 5= "Extremely attractive")

Virtual participants (1)	☆ ☆ ☆ ☆ ☆
Virtual presenters (2)	☆ ☆ ☆ ☆ ☆
Two or more physical conference sites connected virtually (3)	☆ ☆ ☆ ☆ ☆
Entirely virtual events (4)	☆ ☆ ☆ ☆ ☆

9 From 1 to 5, how important do you consider virtual participation options for your event?
(Where 1="Not at all important" and 5="Extremely important")

- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)

10 Do you think that allowing for virtual participation will be more important in the future?

- ○ Definitely yes (1)
- ○ Probably yes (2)
- ○ Might or might not (3)
- ○ Probably not (4)
- ○ Definitely not (5)

Page Break

Virtual reality technology For this next part, you will be asked a few questions about your thoughts on **virtual reality** (**VR**) technology and its use for your event.

11 From 1 to 5, how much do you feel you know about virtual reality? (where 1= "Nothing at all" and 5= "A great deal")

- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)

Page Break

Display This Question:
If From 1 to 5, how much do you feel you know about virtual reality? (where 1= "Nothing at all" and... = 1

Virtual reality (**VR**) is a simulated, highly lifelike, and interactive experience provided by equipment such as head-mounted displays or multi-projected environments. These environments may or may not be similar to the real world and create a manifold of opportunities for collaboration online.

Page Break

12 **VR implementation attitude and concerns** In general, how positive are you about the implementation of VR based participation?

- ○ Very positive (1)
- ○ Somewhat positive (2)
- ○ Neither positive nor negative (3)
- ○ Somewhat negative (4)
- ○ Very negative (5)

13 Which of these are your biggest concerns with VR participation? (You may choose more than one option)

- [ ] Technical inadequacies (1)
- [ ] Costly and time-consuming (2)
- [ ] Participants do not have the equipment (3)
- [ ] Participants would not want it (4)
- [ ] Lack of confidence in implementing it (5)
- [ ] Lack of Interest in implementing it (6)
- [ ] Other (7) _____

Page Break

Perceptions and relevance of concept
Imagine there was a service that enabled relatively cheap and easy-to-use participation solutions with the necessary, ready-to-use VR equipment, system and technical support.

14 Do you think your attendees would like the option of being sent ready-to-use VR equipment to join your event in a virtual participation mode?

- Definitely not (1)
- Probably not (2)
- Possibly (3)
- Probably (4)
- Definitely (5)

Display This Question:
If How relevant is this concept to your event? = Very irrelevant
Or How relevant is this concept to your event? = Somewhat irrelevant

Why do you think the concept would be irrelevant to you event?

_____

Page Break

15 What do you think about the concept, do you like it?

- Like a great deal (1)
- Like somewhat (2)
- Neither like nor dislike (3)
- Dislike somewhat (4)
- Dislike a great deal (5)

Display This Question:
If If you were to implement VR as a mode of participation, how necessary would you consider a third... = Very unnecessary
Or If you were to implement VR as a mode of participation, how necessary would you consider a third... = Somewhat unnecessary

Why would you not consider the service necessary if you were interested in implementing VR/ AR? Do you have another alternative?

_____

16 How relevant is this concept to your event?

- Very irrelevant (1)
- Somewhat irrelevant (2)
- Neither relevant nor irrelevant (3)
- Somewhat relevant (4)
- Very relevant (5)

Page Break

19 **Advantageousness: Participants** How advantageous do you think the option of VR participation is for...

... your participants?

- Very disadvantageous (1)
- Somewhat disadvantageous (2)
- Neither advantageous nor disadvantageous (3)
- Somewhat advantageous (4)
- Very advantageous (5)

17 How does this option compare to ordinary virtual (video) participation?

- Much better (1)
- Somewhat better (2)
- About the same (3)
- Somewhat worse (4)
- Much worse (5)

20 The opportunity to participate through VR technologies will be advantageous for attendees in terms of...

	Strongly agree (1)	Slightly agree (2)	Neither agree nor disagree (3)	Slightly disagree (4)	Strongly disagree (5)
... lower environmental load (1)	○	○	○	○	○
.... less money spent (2)	○	○	○	○	○
.... less time spent (3)	○	○	○	○	○
... health/ hygiene reasons (4)	○	○	○	○	○
.... increased accessibility (5)	○	○	○	○	○
... fun/ enjoyable experiences (6)	○	○	○	○	○

18 If you were to implement VR as a mode of participation, how necessary would you consider a third party offering this service?

- Very necessary (1)
- Somewhat necessary (2)
- Neither necessary nor unnecessary (3)
- Somewhat unnecessary (4)
- Very unnecessary (5)

21
Advantageousness: Event

How advantageous do you think the option of VR participation is for...

...your event?

- Very advantageous (1)
- Somewhat advantageous (2)
- Neither advantageous nor disadvantageous (3)
- Somewhat disadvantageous (4)
- Very disadvantageous (5)

22 Would allowing for VR participation increase the total number of attendees to your event?

- Definitely not (1)
- Probably not (2)
- Maybe, maybe not (3)
- Probably (4)
- Definitely (5)

Page Break

23
Supply

Assume that there is demand for VR participation.

For the following registration fees for VR participation (compared to in-person price), how likely do you think your event would implement and provide the option?

	Very unlikely (1)	Somewhat unlikely (2)	Neither likely nor unlikely (3)	Somewhat likely (4)	Very likely (5)
Same price (0% off) (1)	○	○	○	○	○
Slightly reduced price (20% off) (2)	○	○	○	○	○
Significantly reduced price (50% off) (3)	○	○	○	○	○
Price only covering the cost of renting the equipment plus a small fee (4)	○	○	○	○	○

Page Break

24
Recommendations

On a scale from 1 to 10, how likely do you think you would recommend VR participation to other event organizers?

- 0 (0)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)

Page Break

25
Request report

Please indicate whether you would like to receive a summary report of the study via email

- Yes, I am interested in receiving a report via email (1)
- No, I am not interested in receiving a report via email (2)

Page Break

Display This Question:

If Request report Please indicate whether you would like to receive a summary report of the study... = Yes, I am interested in receiving a report via email

27 Please provide your email address if you would like to receive the report.

_____

Page Break

27
Feedback and comments

If you have any comments or something to add, please use the text field below. We appreciate any feedback you could give us.

_____

End of Block: Product Concept Testing