Virtual Worlds as Settings for Avatar-Based Innovation Processes

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ABSTRACT

The full potential of Virtual Worlds is still far away from being reached. Whereas innovations are key factors for economic success, the increase of complexity in innovation processes, due to an internationalization of collaborations as well as to an increase in interaction between manufacturers and consumers, represents a major challenge for many companies. In this context Avatar-based Innovation Processes represent promising innovation drivers, as they provide a globally connected working environment for user-centred innovation processes. The use of Avatars and Virtual Worlds allows for an unprecedented form of web based collaboration during the entire innovation process. The paper provides a review of recent developments in Virtual Worlds, analyses how companies may exploit virtual environments and collaborate with Avatars during different stages of the innovation process, and underpins those alternatives with examples.

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1. INTRODUCTION

In today's economy innovations are commonly seen as the key to entrepreneurial success and as the backbone of growth and development. In the past decades, innovation processes have been subject to a severe change, leading away from traditional manufacturer-centred innovation processes and towards much more collaborative forms of user-centred innovation processes. This shift to a relatively novel form of innovation process yields great benefits and reflects the common and ongoing trend leading towards a more service centred economy, in which collaboration between manufacturers and consumers allows the tailoring of products, processes and services to the wants and needs of customers, which results in higher sales and increased customer satisfaction. In this context Avatar-based Innovations represent a new chapter of user-centred innovation processes, allowing for an unprecedented form of web-based collaboration along the entire innovation process chain.

Avatar-based Innovation Processes (ABIP) involve the transfer of the innovation process into a *Virtual World* (VW), where users and manufacturer collaborate and interact during the entire innovation process (Kohler et al. 2011). When VW first emerged, about a decade ago, they have been advertised as "The next big thing" that will revolutionize the social media landscape and e-Commerce in general. However, VW did not turn into the virtual shopping-temples originally envisioned (Turner 2013). Nevertheless, VW became environments for real economic transactions, offering many and very different business opportunities, ranging from virtual commerce (v-commerce), over marketing and market research possibilities to virtual business seminars and conferences (Kaplan & Haenlein 2009). In June 2010 the total global virtual economy amounted to a value of around USD 5 billion. This value was expected to double by June 2013 (OECD 2011). Compared to other Social Media applications such as Facebook, Twitter or YouTube, VW can definitely keep up in terms of user numbers as far as the target group of children is concerned. However, when taking a look at the target group of people aged over 18, VW do not receive the same amount of attention. Nonetheless, a very loyal niche group of users has kept VW alive and turned these virtual spaces into creative social spaces. These facts lead to the assumption that VW might stimulate and support the development of innovations (Novak et al. 2013).

As the field of ABIP emerged only recently, this paper is intended to (1) contribute to the

current research on collaboration possibilities within VW, (2) provide a review of recent developments in VW, and (3) analyses how companies may exploit virtual environments, collaborate with Avatars during different stages of the innovation process and underpins those alternatives with examples. To do so, this paper is structured as follows: Section 2 provides theoretical background on relevant terms and definitions, aspects and developments in context with ABIP. Section 3 discusses and illustrates with examples, how avatars can be incorporated in the different stages of the innovation process. Section 4 discusses major findings as well as future challenges when it comes to ABIP and Section 5 provides conclusions.

2. THEORETICAL BACKGROUND

Bainbridge (2007) emphasizes on the great research potential of VW in the economic, social and behavioural science. In these online environments users work and interact in a somewhat realistic manner. Within this background, we analyse Virtual Worlds, Avatars and Innovations in this section, the three core elements of ABIP. The first subsection takes a closer look at the different fields of application and new possibilities of web based communication thanks to avatars, before focusing on the user itself and thus on the individual human beings behind avatars and their motivations.

2.1 Online Embodiments and Motivational Drivers of Virtual World Users

In order to navigate the three-dimensional spaces of VW, users create and control online embodiments in order to project their identity into the VW (Vasalou et al. 2008). These so-called "avatars" are fully customized, real-time, animated, 3D graphical characters (Ducheneaut et al. 2009). The term "avatar" was originally used in Hinduism to describe the incarnation of their god Vishnu. There are no restrictions on the way these animated, 3D, graphical characters may look like, behave or interact; the basic shape, size, colour and physical fea-tures of an avatar can be easily changed and personally customized. For the purpose of this paper, however, the definition of an avatar is limited to a virtual human controlled by a real-life VW user.

2.1.1 Avatars: Fields of Application, Different Identities and Affective Computing

Avatars can be found throughout the web in many different settings, assuming many different roles. The typical fields of application include the following four areas:

- Gaming, Entertainment, Socializing
- Business Spokespersons
- Virtual Teaching, Education and Conferences
- Simulation and Training.

Probably the most important field of application for avatars is the virtual embodiment of users in games and VW specifically devoted to the purposes of entertainment and socializing. Moreover, companies use avatars frequently as business spokespersons to present information either on their corporate website or in the setting of a VW. An avatar might welcome visitors when arriving at a virtual store and inform them about new products or discounts. Similar an avatar can welcome website visitors and guide them around a corporate website. Furthermore, education can be found among the most promising fields of application for VW and avatars. As of 2011, 150 Universities from all over the world were present in VW such as Second Life and equivalents (OECD 2011). The great advantage of virtual education lies in the fact that people from all over the world can come together at the same time and in the same virtual location to participate in one and the same virtual teaching session and therefore the total learning experience becomes richer and more diverse for everyone. A fourth field of application is the use of avatars for virtual simulations and training sessions (Rickel 1999). As real world trainings are per se cost and time intensive, VW can offer a great and somewhat realistic alternative reducing not only costs but as well hazards. VW are for instance used for medical training purposes and for security and defence trainings by the US Defence Department (OECD 2011).

Avatars allow users to not only assume different online identities (Hemp 2006, Adrian 2008) but they represent as well a new chapter in science as far as affective computing is concerned, as avatars have the possibility to convey emotions through virtual body movements (Picard 1997). Facial expressions or arm movements for instance can be used to draw

conclusions about a person's state of mind. Although automatic mechanisms which translate human emotions into avatar movements (Kleinsmith et al. 2006), e.g., through motion tracking sensors etc. are still in the future, users can already express their emotions through hands-on devices such as key-board combinations or mouse clicks which allow them to control avatar movements (Badler 1997). The combination of written communication, oral communication and graphical representation, linked with human emotions expressed through facial expressions and gestures, makes avatars appeal more to human senses than ever before, and considerably augments the in-world-experience of users.

2.1.2 Motivational Drivers

Why do people spend time in VW? This question is especially relevant as it deals with the underlying motivational factors and reasons, which motivate human beings to spend time in VW (Schröder 1992). The extrinsic motivation factors include the ease of use and economic value, while entertainment and escapism are examples for intrinsic motivation (Verhagen et al. 2011). The differentiation between extrinsic and intrinsic motivators is also omnipresent in other studies (cf. e.g., Kaplan & Haenlein 2010; Zhou et al. 2011). These authors came to the conclusion that the key motivators for individuals to spend time in VW fall into one of three major categories: functional, experiential and social motivators. Table 1 gives an overview of the main reasons and motivational driver categories for VW-user-participation.

Against this background, the special characteristics of VW and the great variety of communication means encountered, makes them a perfect place for socializing. Furthermore, VW offer rather unexpected opportunities for social innovations including socializing possibilities for handicapped people or persons with diseases such as Parkinson, preventing them from engaging in similar socializing activities in reality due to their state of health (Turner 2013). In addition, research showed that the more time users spend in-world, the more similar their in-world behaviour becomes to their behaviour shown in real life (Kaplan & Haenlein 2010). Moreover, individual motivators translate only into increased VW-user activities, if users find peers who share the same or similar motivational drivers (Eisenbeiss et al. 2012). Thus, it can be concluded that VW-inhabitants typically look for peers who share similar motivational drivers and interests.

Table 1. Categories of Motivational Drivers for VW-Users

Motivational Driver	Individual's Assignment	Main Reason to Participate
Functional	Resident	fulfilling predetermined goals (going shopping, earning money, doing business or attending a virtual university lecture)
	Creativity Seeker	challenging oneself, creating purposes in a place with hardly any limits
Experiential	Explorer	satisfying the constant need to experience something new and exciting including primarily intrinsic motivations (search for fun, diversion and entertainment, role-playing)
	Refugee	immersing into a VW, where dreams or fantasies might come true; unsatisfied users are getting the chance to live a 2nd life
Social	Socialiser	desire to meet and interact with people; a way to keep in touch with family members that are located in other parts of the world and to maintain contact with peers

Subsection 2 will focus on another core element of ABIP, i.e., innovation. User introduced innovation processes, innovation communities and appropriate toolkits for product and process development are especially relevant when it comes to ABIP.

2.2 Innovations, Innovator-Communities and Set of Tools

Due to technological progress, increasing market competition, dynamics and saturation levels as well as ever shorter product life cycles, companies require innovations to remain competitive and to differentiate themselves from competitors (Brockhoff 1999). From a historic point of view innovations were mainly the work of pioneers or the outcome of manufacturer-centred innovation development processes. However, in recent years there has been a significant change in this pattern as user-centred innovations, another core element of ABIP processes, gain more and more importance (Brockhoff 1999; Von Hippel & Katz 2002).

User-introduced innovation processes (UIIP) belong to the group of *Open Innovations*, a term used to describe the implementation of internal and external knowledge, ideas and facilitators for innovation processes. UIIP typically involve the stages of idea generation and screening, product design and development, a pre-launch testing phase and finally the commercialisation phase (Füller et al. 2010; Hoyer et al. 2010). UIIP not only outsource part

of the innovation process to users, but they establish as well a working environment in which manufacturers and users engage actively in the co-creation of new products and processes.

This co-creation manifests itself in a co-creation experience which functions as a motivator for manufacturers and users, as both influence the innovation process and benefit from it (Prahalad & Ramaswamy 2004, Von Hippel 2005). Users can be both, firms and individuals. On the one hand, by giving users the possibility to co-develop and tailor products and services that respond exactly to their needs, users don't have to rely anymore on manufacturers to develop certain products (Von Hippel 2005). On the other hand, manufacturers receive new ideas for the design of products and manufacturing processes and furthermore they gain additional information about customers' desires, motivators and behaviour (Prahalad & Ramaswamy 2004). In this sense the user-centred innovation approach represents as well a certain democratization of the entire innovation process. This is because a user's role is not limited anymore to only having needs, but users may engage actively in the innovation development process.

2.2.1 Innovator-Communities

Innovation communities can be defined as information nodes, consisting of both individuals and firms, which are interconnected by information transfer links and typically focus on innovations of a specific market niche (Von Hippel 2005). Through sharing individual innovations and ideas, and thus through behaving in a collaborative manner by assisting and supporting each other, innovation communities may increase total social welfare. This is because users can access the existing knowledge base, and draw ideas from other members rather than having to invest resources to come up with similar results. Thus, innovator-communities can increase social welfare, as users are less reluctant to share their innovations with a broader community, compared to manufacturers whose economic wellbeing relies on keeping their innovations a secret. In fact, many users voluntarily publish their work and ideas so that others may profit from their findings. These ideas are frequently picked up by manufacturers, leading to the result, that user-innovations improve the success rate of manufacturers. This can be compared to the well known teamwork effect where the output of a

team is higher than the total sum of all individual outputs. In addition innovation communities are made up by people having very different backgrounds and ideas which stimulate diversity and creativity leading to many and very diverse innovations (Prahalad & Ramaswamy 2004). Thus, the willingness of at least some community members to voluntarily reveal innovations of interest to others is critical to the wellbeing of innovation communities.

Innovation communities typically offer some sort of physical or virtual publication libraries and additional functions such as chat rooms or email lists informing about recent postings in order to support members and the development of innovations in general. Furthermore, when innovator-communities and manufacturers enter into a co-creation relationship, the creation of unique value becomes the aspired and mutual goal. The success of this relationship depends on the quality of interaction between the two parties, which is influenced by the quality of dialog, the availability and access of information and tools, the risk assessment and transparency (Von Hippel 2005).

2.2.2 Innovation Toolkits

More and more manufacturers outsource need-related product development tasks to users by providing them with toolkits. Toolkits are by definition integrated sets of tools which assist end-users to perform tasks regarding product design and prototyping (Von Hippel 2005). The toolkits-approach tackles the innovation-problem by splitting the problem into subtasks and dividing them into tasks that require need-related user information on the one side, and solution-related manufacturer information on the other side. This separation represents one of the key advantages of the toolkits approach, as it allows users and manufacturers to work concurrently on an innovation. Most fabrication aspects have been standardized and can be solved by manufacturers themselves, with the help of product-development information available to them. Design-aspects, however, require need-related user information, which is not available to manufacturers, but can be gained from users. Design-tasks can therefore be entirely transferred to users by equipping them with appropriate tools. By doing so, manufacturers may make sure that the final products are producible and respond exactly to user needs which is a way to enhance market success, as custom made toolkits with

predefined elements, restrict users from creating products that can't be produced due to manufacturing limitations (Von Hippel & Katz 2002).

Well functioning toolkits should allow users to run cycles of trial and error, which allow for learning and constant improvement and which are typical for any innovation process. Furthermore, toolkits need to give users an adequate solution space which does not restrict user's creativity, while ensuring product producibility. In addition toolkits need to be user-friendly as far as handling and working with the provided applications are concerned. This does not only involve user-friendly interfaces but as well libraries containing commonly used elements and modules, which can be embedded into new creations (Von Hippel 2005). The use of VW as a globally connected platform to integrate users along the entire innovation process in the case of ABIP, makes it obvious that VW are counted among up-to-date and novel toolkits. The following subsection is devoted to the third central element of ABIP, namely VW, and will present important milestones in their development as well as types and target groups.

2.3 Virtual Worlds as Stage for Avatar based Innovation Processes

VW are crafted places, located inside computers which represent real or imaginary 3D spaces. VW are designed to accommodate large numbers of people and allow real time user interaction. Although the physical environment is entirely computer-generated, the human social environment of VW is no different from reality. The resulting spill-over effects are not only visible when it comes to human-interaction but above all when it comes to business transactions. This fact is one of the main reasons why VW are becoming more and more important for work collaboration purposes, as they generate real inside-to-outside patterns of influence, which function like a frontier between the cyberspace and reality, where the "here" influences the "there" and vice versa (Castronova 2005). These powerful virtual places are not only the outcome of scientific research, but they have been immensely influenced by the online gaming industry and the social media.

2.3.1 Developments towards Online Gaming and Social Media

In the 1950s and 1960s pioneers such as Turing Award winner Ivan Sutherland envisioned

that computers would be able to create sensations that would seem "real" to their recipients although they would be only "virtually real" as they were generated by computers (Castronova 2005). In those early days of virtual reality (VR), on the one hand, scientists were consumed with creating and refining sensory-input hardware, such as gloves and helmets, in order to create an artificial sensory environment that was aimed to trick users into believing that the computer-generated and portrayed environment was reality. On the other hand, game designers took a completely different approach to VR. An approach that is rooted in the idea of building VR around the willingness to participate by creating a VW that is highly compelling, fantasy-like, interesting, entertaining and simply fun. Thus, while scientists focused on hardware, gamers focused on software and controlling a VW from the inside rather than from the outside. In addition gamers focused on communities, developing faster graphics, faster networks, better artworks and better communication applications (Castronova 2005). Therefore, VW as we know them today are a result of constant improvement of gaming environments.

Countless innovations in technology, devices, hardware and software over the past decades have formed the gaming industry into an extensive network of gaming companies together pulling in 20.77 billion US dollars in global sales in 2013. A phenomenon that is both true for games and VW, is the fact that the more content users generate individually, the more involved they become in a game leading to the fact that it becomes hard to separate the game from its players and vice versa as neither the game nor its players can be fully understood without studying the other. Therefore, a symbiotic emergence of culture and content can be observed just as in real social systems (Messinger et al. 2009).

Today probably the most important segment of online distributed games is made up by the so-called *Massively Multi-Player Online Role-Playing Games* (MMORPGs). In MMORPGs thousands of users interact intensively with one another in the guise of video game characters (Castronova 2005). Examples for such worlds include World of WarCraft, Guild Wars 2 or Eve Online. Although gamers are given a great deal of freedom in these worlds (e.g., avatars may typically wander where they wish from the very beginning on), MMORPGs still follow the tradition of early electronic games in which challenges and designer-intended objectives have to be fulfilled to advance and grow (e.g., avatars may gain skills or the right to enter

restricted areas through earning experience points by participating in challenges and contests) (Messinger et al. 2009). Moreover, in virtual game worlds, predefined rules guide and govern the behaviour of avatars, e.g. you need to be a wizard to perform magic or a cleric to help others. In addition in virtual game worlds avatars are most of the time not allowed to engage in economic activities with others, unlike in VW (Kaplan & Haenlein 2009). Similar to games with user-generated content, in the more purpose-driven worlds of MMORPGs the players' freedom and possibility to interact with each other reveal at the same time social challenges and benefits rooted in the cultural differences of users. A clear distinction between VW and online games seems difficult as both have similar features and purposes. However, the developments of the electronic gaming industry, including user controlled avatars, multi-user interaction, 3D animation, user-generated content and MMORPGs led to important socio-technical innovations that set the stage for and became incorporated within VW.

Another recent development is social media. This term is typically used to describe the wide range of Internet based applications that allow users to share ideas, opinions, insights, experiences etc., and to connect with each other using different forms of new media and technologies nowadays available over the World Wide Web. In this sense the term combines content communities such as *YouTube*, social networking sites or blogs like *Facebook*, collaborative projects such as *Wikipedia* and VW such as *Habbo*, *Kaneva* or *Next Island*. The core features of social media web sites include the easy creation of profiles, stating personal information about members and the possibility to define a circle of trusted friends which offers members the possibility to grant only certain friends the right to access private information. Most profiles may contain not only textual and pictorial information but as well audio and video content. Furthermore, social media encourage communication between members through media applications such as blogging, instant messaging and chats as well as notifications about recent updates of a friend's profile, automatic friend suggestions, and content reviewing, commenting and tagging options (Messinger et al. 2009). Thus, social media sites combine most elements that are commonly know under the term "Web 2.0 Technologies."

As well in Social Media applications one can find multi-player online games, such as the very popular game FarmVille. However, compared to traditional MMORPGs, social media

games put social networking in the foreground, while gaming is only of secondary importance and less time-consuming. Another important feature of social media sites is that they require no technical expertise and can be thus easily handled by their users giving them the freedom to socialize and share content.

Social media led to a change of how communication is done. A change leading away from media monologues such as in the case of radio and television and towards social media dialogues (Brennan 2010). Via social media, information transmitters and receivers are placed at the same level, encouraging participation and dialogue. In this sense social media applications contribute to the democratization process of knowledge and information sharing, just as user introduced innovation processes represent a democratization of the innovation process. This is because users get the opportunity and the right to be not only consumers but as well to produce and publish their own data, content and information. Just as with online gaming there is no doubt about the fact that the emergence of social media led to important innovations and practices that have become adopted within and set the stage for VW (Messinger et al. 2009). Following the discussion of historic milestones and developments which led to the creation of VW the following subsection will now present the great variety of VW and their target groups.

2.3.2 Virtual Worlds: Types and Target Groups

Data on the main target groups of VW users suggests that more than 70% of all VW users are mainly participating in VW devoted to entertainment or gaming. Although this number should be carefully interpreted as the majority of VW offer besides entertainment as well other applications. Therefore, while some users may play and have fun, other users might participate in lectures, simulations or use VW to do research. The second largest target group are Kids Worlds with about 26%, followed by VW exclusively devoted to socializing with about 3% and workspace worlds with 1%. VW users aged between 11 and 35 years, spend on average 20-25 hours per week in VW. These numbers differ only slightly depending on age and gender (OECD 2011). A common categorization of VW defines five major classes (Messinger et al. 2009):

- theme-based VW

- community-specific VW

- children-focused VW

- education-focused VW

- self-determined VW

Theme-based VW usually focus on specific content or some genre such as TV series, fashion and lifestyle, movies, books, sports or music genres. Similar to theme-based VW, community-specific VW focus on a particular community, e.g. from a specific geographical region sharing similar characteristics and interests. Children focused VW, such as *Habbo*, *Club Penguin*, *Stardoll*, *Neopets* or *Poptropica*, focus mainly on gaming, toy and fantasy worlds as well as role-playing and socializing. Education focused VW typically offer training and learning possibilities in areas including skill development, architecture and design or language learning. Finally, self-determined worlds, such as *Second Life*, typically don't follow a specific purpose, and thus allow residents to engage in a very wide range of activities (Messinger et al. 2009).

The fact that *Second Life* belongs to the group of self determined VW, which allow for content creation, creativity and a very high degree of freedom, contributes to the fact that it is one of the most popular VW for adults and makes it highly interesting for corporate use and thus for collaboration and innovation projects. About three quarters of all VW have a target group which is not older than 15 years. With roughly 33.7 million registered users as of May 2013, Second Life is by far not the biggest VW in terms of residents. Nevertheless, Second Life remains the leading VW when it comes to newspaper coverage due to the fact that it is one of the most popular VW for adults with a flourishing economy offering promising opportunities.

Among the biggest VW mainly children- and teen-VW can be found, such as *Habbo*, a social networking online world, owned by the Finnish Sulake Corporation with about 273 million registered users as of August 2012. A mixture of MMORPG and VW is Disney's *Club Penguin* with about 220 million users as of late 2012. In *Club Penguin* users may

participate with their penguin-avatars in games taking place in comic-like settings and socialize with other players. With about 200 million users the Swedish VW *Stardoll* is as well placed among the most popular virtual worlds for teens, offering residents the possibility to play with dolls and dress them up. Furthermore, *Poptropica* with about 265 million registered users and *Neopets* with 77 million users belong as well to the group of VW which are very popular in kid and teen circles. *Poptropica* is a VW offering gaming and socializing possibilities while in *Neopets* residents can hold and play with online pets and take care of them. However, the number of registered accounts per VW-platform should be carefully interpreted as one user might have multiple accounts and inactive accounts might also contribute to the total.

The fact that the majority of VW is targeting young people holds valuable information about the growth potential of VW. This is because users who became familiarized and used VW already in their childhood, will be more willing to incorporate VW as well in their everyday life once they reach adulthood. Just take a look at today's generation of digital natives aged between 15 and 25 years, who grew up with the Internet and personal computers. Similarly, it is very likely that people who grew up with VW will continue to participate in VW for socializing as well as business, work-related, entertainment, or/and educational purposes.

3. AVATAR-INVOLVEMENT THROUGHOUT INNOVATION PROCESSES

ABIP are rooted in the combination of VW, innovation processes and users in the form of avatars, with the aim of enhancing collaboration between manufacturers and users during the entire innovation process. Furthermore, the necessity for ABIP is based on companies' constant need for innovation. In this regard the previously discussed motivation factors, innovation-toolkits and user communities play vital roles. Against this background, we argue that companies can move entire innovation processes to VW in order to develop innovations together with creative individuals. Thus VW function as a working space, which allows collaboration along the entire chain of UIIP phases. While users select avatars and-due to their individual motivators-fulfil one of five roles (resident, creativity seeker, explorer, refugee,

socialiser), companies select appropriate toolkits and VW-types with the aim to find innovative solutions. The selection of a suitable VW platform is critical to the success of ABIP as VW-types and their users differ substantially and some platforms (e.g., self-determined) favour ABIP while others don't. In this context the VW community, which consists of particularly creative individuals, disperses user-needs and ideas which are incur-porated in the virtual development of new products, processes and innovative solutions. In the end, these innovative solutions are tested regarding their real world potential and-in case of feasibility-transferred to the real world. How the different elements of ABIP interrelate is depicted in Figure 1.
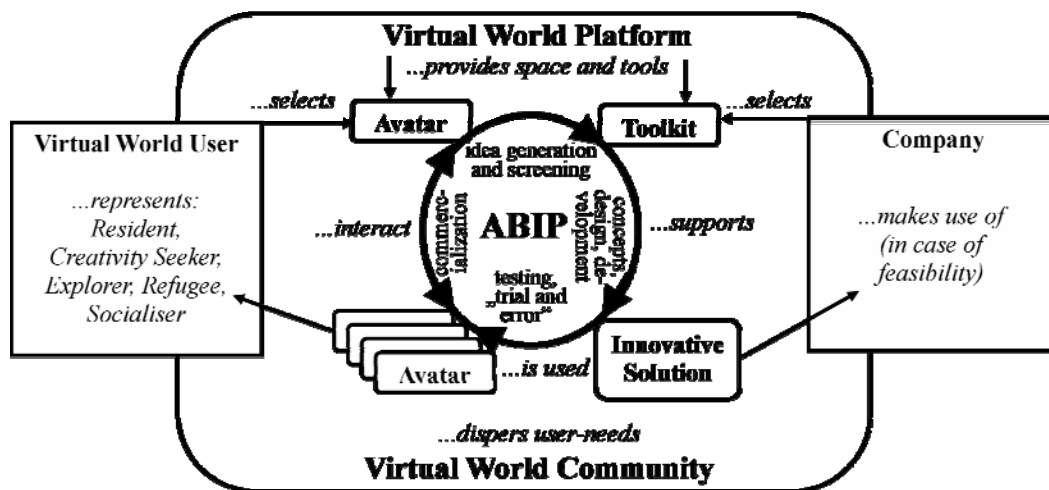

Figure 1. The interrelation of different elements of Avatar-based Innovation Processes

Based on Hoyer et al. (2010), Füller et al. (2010), and Mladenow et al. (2013), this paper refers to the UIIP, including the post-launch, as follows: idea generation and screening, concepts, design and development, testing/trial and error, and commercialization. Through the transferral of innovation processes into VW, avatars and thus users can be integrated along the entire innovation process, assuming different roles during each phase (Füller et al. 2010; Hoyer et al. 2010). In the following the role of avatars and possible VW-activities in each of the different innovation process stages will be discussed in detail; examples are used for illustration (Table 2).

Table 2. Integration of Avatars in Innovation Processes and Underpinning Examples

Phases of the Innovation Process	Role of Avatars	VW-Activities	Examples
Idea Generation and Screening	Source for ideas and creativity	Brainstorming sessions, round table discussions, creativity challenges and contests	IBMs Innovation Outlook, Coca Cola's Virtual Thirst Design Contest
Concepts, Design and Development	Co-creators	Participation in the construction of process models and product prototypes	Business Process Modeling
Testing/ Trial and Error	Users	Testing and evaluation of new products in VW prior to real- world market launch, to improve efficiency and user friendliness	Starwood Hotels and Resorts Group
Commercialization	Customers and Promoters	Purchase and promotion of products, awareness raising among peers, post-sale feedback	Telecom Italia, Endemol, Deutsche Post World Net, Circuit City, L'ORÉAL Paris

3.1 Discussion and Brainstorming in Virtual Innovation Spaces

During the initial phase of the innovation process, the idea generation and screening phase avatars function as a source for ideas and creativity (Füller et al. 2010). During this initial phase companies might invite avatars to participate in brainstorming sessions, round table discussions or creativity challenges and contests in order to tap into the creative potential of VW-residents such as done by IBM and Coca Cola. In December 2009, as part of the IBM's Global Innovation Outlook (GIO), IBM hosted a virtual roundtable discussion in the VW of Second Life with the purpose of exploring new collaboration possibilities within VW. The discussion focused on the topic of "Smarter Cities" and was attended by six IBM employees and 17 students and faculty members from the University of Southern California's Marshall School of Business. As most of the participants had only little experience with VW a preliminary virtual "meet-and-greet" was organized to offer participants the possibility to get familiarized with tools, solve technical difficulties and to get to know each other (Ghandi 2010).

The actual roundtable discussion took place on IBM's EduCenter Island in Second Life and was divided into three parts. The first part was a general roundtable discussion held in a

virtual conference room. Just as in real-life discussion settings the tables were arranged in the form of a "u" allowing all participants to watch other participants at all time and offering the discussion-moderator, who also functioned as a facilitator, the possibility to stand in the middle in order to chair the conference. During the second part of the GIO-Meeting the so called *Opinionator*, was used to facilitate the discussion focussing on six subtopics. The *Opinionator* is an interactive polling tool consisting of different areas corresponding to the different answers. Participants were presented with a number of questions and answered by walking into one of the differently coloured areas which represented the six subtopics. The final and third part of IBM's Virtual-GIO was specifically devoted to the topic of education with regards to smarter cities. During this final part the custom-made brainstorming tool *BrainBoard*, was used to assist discussion members. Participants were asked several questions and answered by writing their answers on virtual sticky-notes, which were subsequently placed on the board and once all answers were collected the moderator grouped them into four categories (Ghandi 2010).

Among the lessons learned from the virtual GIO, one can find rules such as simplicity is a key to successful meetings. Simple, 3D and VW-specific tools such as the *Opinionator* worked very well while more complicated tools such as the *BrainBoard*, which requires participants to execute a series of tasks instead of just one, represented a substantial challenge especially for VW-novices. Moreover, including a number of traditional real-world activities into the conference-agenda, e.g., a traditional roundtable discussion, is recommended. The virtual GIO also showed that in the case of virtual meetings, knowing your participants and their background is even more important than in reality, as participants are subject to in-world as well as real-world distractions. Thus, VW-meetings require a well-elaborated agenda, and furthermore, a great amount of time should be invested into finding tools and ways to keep participants focused on VW-tasks (Ghandi 2010).

In May 2007, the *Coca-Cola* Company launched the Coke Virtual Thirst Design Contest in Second Life. As part of this contest, Coca-Cola invited VW-residents to come up with new and creative concepts and ideas for virtual vending machines that dispense not Coca-Cola but a refreshing and invigorating experience which represents the brand. Coca-Cola made three thought-provoking prototypes of virtual vending machines available to participants, but besides

these prototypes participants were given complete creative freedom (Coca-Cola Company Press Release 2007). Concepts could be submitted either directly in Second Life or via Myspace, Youtube and the corporate website. Following the submission, the concepts were evaluated by a panel consisting of VW-residents and designers.

Coca-Cola's Virtual Thirst Design Contest shows how companies can make use of the creative potential of VW-residents during the idea generation phase. According to Michael Donnelley (Director, Global Interactive Marketing at Coca-Cola) VW offer an environment where companies might come across radical innovations induced by residents (Coca-Cola Company Press Release 2007). This is because VW allow avatars to express rather drastic and radical ideas that might only exist in their minds. Companies can uncover those hidden ideas through listening and collaborating closely with community members, which allows gaining valuable insights about communities, desires, brand perception etc. Although the real world potential of those ideas might be limited, it remains a fact that VW are a great source of inspiration (Kohler et al. 2009). In addition, by challenging avatars to come up with ideas for concepts that will dispense an experience, Coca-Cola demonstrated that it understands and values what VW-residents are longing for, namely experiences rather than virtual product replicas.

3.2 Collaborative Business Process Modeling

During the second phase of the innovation process, the design and development phase avatars take on the role of co-creators by participating in the development and construction of process models and product-prototypes. The first two phases of the virtual innovation process are especially appealing and interesting for creativity seekers who enjoy challenging thems-elves in order to come up with new and innovative solutions. The following example illustra-tes how avatars participate as co-creators in the development of a business process model.

Today's very complex, cross-organizational and cross-national working patterns, make the existing 2D representation models for the task of *Business Process Modeling* (BPM) obsolete and call for a new approach. In this regard, Brown et al. suggest using a virtual environment for the collaborative task of BPM (Brown et al. 2011). In order to test their theory they developed a BPM tool entitled *Process Modeler* in the VW of Second Life. The Process

Modeler allows the design of 3D business process models on an interactive grid-surface. When touching one field of the grid system users are presented with a list of standard BPM-Notations to choose from. Thus, the interactive *Process Modeler* allows for continuous modifications throughout the modeling process. In their field experiment Brown et al. modeled a typical Credit Card Application process (Brown et al. 2011). The team consisted of four VW novices and one more experienced team member who took on the role of a facilitator. Besides the *Process Modeler* further tools, including a *Mind Mapper* to support and document the outcomes of team-brainstorming sessions and an *Information Holodeck* in order to display useful information such as the content of websites or pictures from previously created business models, were used.

Overall, the experiment showed that BPM in VW de facto facilitates the collaborative process between team members and helps to overcome many of the challenges encountered with 2D-models, especially when facing geographical dispersions (Brown et al. 2011). This is because VW not only allow the design of three-dimensional models which are much more appealing to human senses, but above all they considerably improve communication and the modeling process itself. Furthermore, concurrent collaboration is possible as all members work on one model at the same time in the same virtual place. Communication is considerably augmented as team members can observe other team member-avatars while working on specific parts of the model. Therefore, the mixture of non-verbal cues, such as the recognition of gestures, signals and the observation of team members along with more traditional ways of communicating in virtual settings e.g. audio chats or text messaging considerably enhances group communication. Moreover, the experiment showed that-due to the fact that the environment of VW is surprisingly similar to the classical look and feel approach of BMP-participants had no problems handling the virtual-tools as they were guided by their intuitiveness.

3.3 Virtual Product Testing

Once a prototype has been developed avatars assume the role of users in order to test and evaluate the new product in the virtual environment before it is launched on the real market. Through running cycles of trial and error in VW both avatars and companies can benefit and

help to make products and processes more user-friendly, efficient and reduce the risk of failure. An example of a company, which used a VW as a test market is the Starwood Hotels & Resorts Group. Before launching Aloft, a new branch of design hotels, they used Second Life as a test market, which led to a series of design changes thanks to supportive Second Life-residents (Kaplan & Haenlein 2009).

3.4 Virtual Commerce and Product Promotion

Once the innovation process reaches its final commercialization phase, avatars assume the roles of both customers and promoters. Besides buying products and services in virtual-stores, avatars also provide valuable post-sale feedback and help to raise awareness among peers. The most common way of engaging in virtual-commerce (v-commerce) for businesses is to sell digital equivalents of products and services offered in real life stores such as done by Telecom Italia and Endemol. Other companies offer services that create a bridge between VW and the real world. Examples include the Deutsche Post World Net and Circuit City. Deutsche Post World Net offers avatars in Second Life the possibility to send virtual post cards which are delivered as real life postcards to users around the globe. Circuit City, an American consumer electronics retailer sells real life products in its virtual flagship store which are then dispatched as real life items to the user's home (Kaplan and Haenlein 2009). When it comes to v-commerce the possibility of virtually experiencing a product is likely to positively influence a user's attitude towards a product both in the virtual and real world and can thus result in higher sales (Schlosser 2003).

An example for a company which successfully leveraged the fact that avatars might help to promote products in VW is L'ORÉAL Paris. Together with the Virtual World Research & Advertising specialist KZERO-Worldwide, the company launched four virtual make-up looks to apply to an avatar, each featuring a famous actress. These make-up looks were available, for free, in different Second Life locations. The campaign was promoted via in-world product placements, including a supersize Handbag, aimed to catch the attention of curious avatars and billboards. In addition, the campaign was promoted outside of VW, as advertisement on websites devoted to virtual fashion and clothing and in the form of print ads in Second Life magazines. The idea to promote the campaign not only in-world but as well in reality made it

a successful co-branding strategy, spanning from reality to the virtual world. (De Mesa 2009) Moreover, by offering make-up looks as freebies, in order to provide users a way to further customize their avatars, the company did not only catch traffic and used avatars as promoters but it demonstrated as well that it understands, values and cares about avatars and the culture and special characteristics of VW.

4. DISCUSSION

ABIP represent a recent development when it comes to user-centred innovation processes as they link open innovation processes with VW. As the influence of VW on the real-world increases, due to increasing economic activities within VW and increasing participation in general, avatars use virtual environments to design prototypes of real-world products and processes (Hemp 2006). In this context VW represent an unprecedented media-rich environment allowing direct and real-time interaction between companies and users. There are numerous reasons why VW are a breeding ground for innovations including unprecedented web-based collaboration possibilities, virtual product and process development toolkits, simulation possibilities and above all the opportunity to collaborate with particularly creative and inventive avatar-communities.

VW erase problems of geographical dispersion, as all persons involved can work at the same time and in the same place on one and the same model or prototype. In addition, the creative potential of Avatar-Communities as well as their primarily intrinsic motivation factors, including the constant thirst for new and compelling experiences (Eisenbeiss et al. 2012), and general willingness to freely reveal and share ideas with others contribute to the fact that they are perfect collaboration partners for companies during innovation processes. Moreover, VW offer insights into what people are longing for and thus what they might also look for in the real world. A further reason why VW offer a great environment for collabo-rative processes, are the encountered communication possibilities, which surpass all previous forms of web-based communication thanks to the combination of verbal, written and non-verbal communication. Furthermore, virtual product and process prototypes as well as virtual trial and error sessions and simulations help to reduce costs, are less time consuming than in the real-world and help to make the final innovation more user-friendly, more efficient and

thus less risky.

Today only few companies use VW for innovation processes. This is caused by several negative examples of VW-pioneers and a very slow organizational adoption rate (Yoon 2013). Also, there is still a lack of methods to evaluate and quantify the costs and benefits of VW activities for companies. Nevertheless, the great potential of ABIP, is already evident from today's point of view.

One of the major challenges for the bright future of VW is to find ways to attract VW-residents to participate in manufacturer's innovation processes. To do so the general perception and reputation of VW needs to improve and appropriate user-innovation tools need to be created. E-Commerce solutions such as Adidas's "Virtual Footwear Wall" and mobile apps such as "Bitstrips" function in this regard as familiarization-tools as they accustom users to the idea of virtual embodiments and VW in general. Bitstrips is a mobile app that allows the designing of cartoons, including personalized characters, which are subsequently shared via the social media platform Facebook.

When it comes to ABIP one shouldn't ask whether it is better or worse to conduct innovation processes in VW compared to reality, but one should keep in mind, that VW are modern toolkits which represent an unprecedented and qualitative comparable alternative to real world environments, when choosing the setting for innovation processes. The great possibility here is to see VW not only as a place for entertainment and to get away from reality, but as a supplemental and globally connected working space which can be used to overcome challenges encountered in the real world, e.g., limited resources, as a place for learning and knowledge sharing and as a collaborative environment which is especially suitable to find new and innovative solutions with real world potential. As the use of VW is most likely to increase in the future due to grown-up digital-natives, further research is needed to develop tools based on quantitative methods that support managers in their decisions on ABIP and VW-activities.

5. CONCLUSION

ABIP are routed in the combination of Avatars, Innovations and VW which allows for the intermediate and interactive design, development and testing of new products and processes,

as depicted in Figure 2.

AVATAR-BASED INNOVATION PROCESSES

VIRTUAL WORLDS	**AVATARS**	**INNOVATIONS**
- 3D Environments - Globally accessible - Real time interaction - Enhanced communication possibilities	- Graphical characters - Motivational drivers - Sources for inspiration and creativity - Users, co-creators, customers, promotors	- Open/user centred innovation processes - collaboration - Key to entrepreneurial success

- **Immediate, collaborative and concurrent design, development, testing and commercialization of new products and processes**
- **Collaboration between users and manufacturers along all phases of the innovation process despite geographical dispersions**
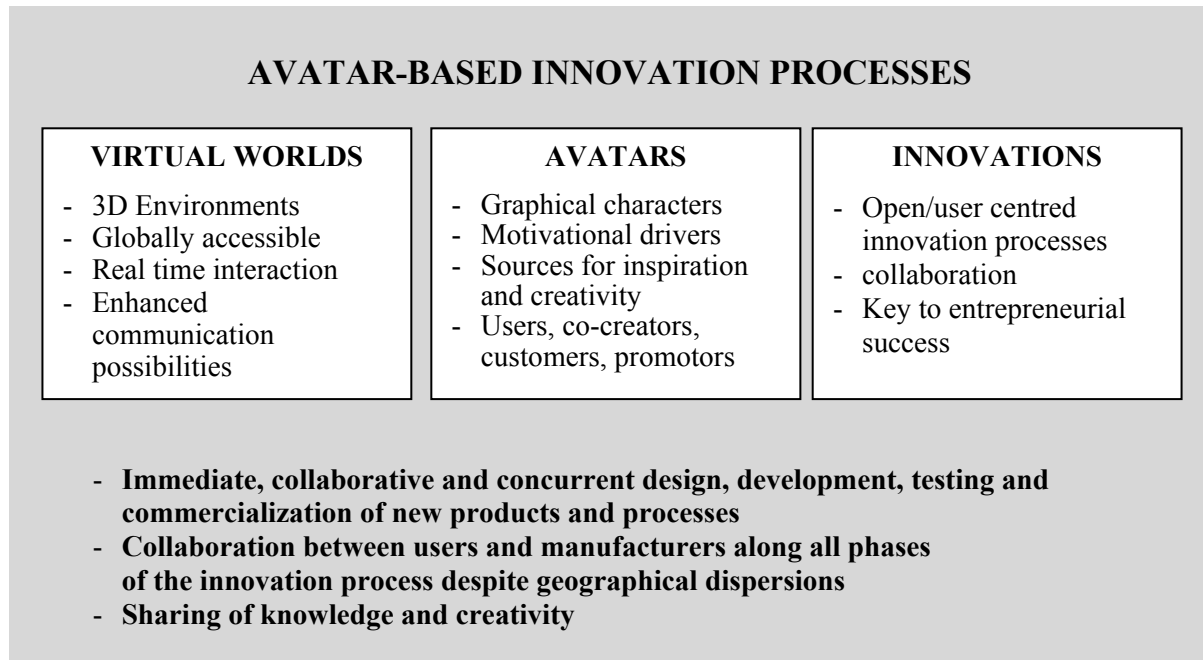- **Sharing of knowledge and creativity**

Figure 2. Avatar-Based Innovation Processes

Moreover, collaboration and the exchange of knowledge and ideas between users and manufacturers are enabled along the entire innovation process despite geographical dispersions. This web-based collaboration relies on the willingness of VW-residents to participate in innovation projects, which in turn is guided by the functional, experiential and social motivators. Thus ABIP allow to integrate customers during all four phases of the innovation process: idea generation and screening, concepts, design & development, testing/trial & error, and commercialization. During these innovation-process-phases avatars assume different roles (source for ideas, co-creators, users, customers/promoters) and companies provide them with appropriate toolkits which allow for a mutual development of innovative solutions in virtual spaces. Once these innovative solutions have been sufficiently tested regarding their real world potential, they can be transferred to the real world and markets.

Among the biggest challenges of ABIP, one can find questions such as "How to keep avatars focused on the task?" and "What is the real world potential of innovations created in

VW?" Possible solutions include the usage of simple and real-world tools to put VW-novices more at ease and the evaluation and testing of ideas and products created in VW regarding their real world potential, before being launched in reality (cf. Eisenbeiss et al. 2012).

VW have not reached their full potential yet. This belief is strongly rooted in the fact that the majority of VW is targeting children, who will grow up and increasingly incorporate VW into their everyday life. As the use and number of VW-residents increases as well companies will increase their VW activities, boundaries between VW and reality will become even more blurry. Google for example will eventually have built a 3D replica of the real world, which will allow people to not only walk the streets of e.g., New York in reality, but as well in the virtual shoes of their avatars. Possible future developments might also include linking existing corporate VW with open VW, allowing avatars to travel from one VW to another one. To do so the existing challenges of interoperability and different standards have to be overcome. Further important requirements for the future of ABIP include improved user friendliness and advanced, better performing hardware and infrastructure to ensure a smooth and enriching experience.

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