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Redesigning Experience Consumption in Social VR Worlds : Decentralised Value Creation, Mobilisation, and Exchanges

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Virtual reality technology based corporates have been developing user-driven open markets for over a decade. The most noticeable initial player was Linden Lab, the service provider of Second Life that launched its metaverse world in 2003. The main features of the service were collaborative VR creation interfaces, individual asset management systems, and the virtual currency named Linden dollar. By the main interaction/interface structure, the residents of Second Life could create a pixel world of their own imagination, reserve the value of digital experiences, and exchange the value of imagination, and experience individually or collectively. A decade of life experience of the virtual world gave us lessons of how people interact, communicate, and evaluate virtual goods and experiences. The recent HMD technology emerged the second round of consumer-based Social VR platform race that has become more immersive, realistic, and user-centred.
Relating to the technological leap, recent appeals of Social VR platforms have drawn a great attention from public: Project Sansar of Linden Lab, High Fidelity, and AltSpaceVR to name but a few. The social VR platforms commonly installed co-presence, avatar embodiments, real-time collaborations, and communications over virtual spaces. Project Sansar has conceptually inherited the idea of "the world by residents" from Second Life, its virtual monetisation pilot system. Project Sansar launched creators preview in late 2016, and recruited 3D builders among Second Life business owners, who have potentiality of opening a new business in the Project Sansar platform.

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After over a year of creators preview operation, it tackled major technical issues of building worlds over a HMD enabled VR system, and key storefront features of a consumer based creation system. Apart from their day-to-day trouble shootings, it raised a couple of questions on critical facets of consumer based creation systems. First, the crowdsourced world building needs a common ground of the planning body. How do they build the common ground to give a form of imagination? Even though they run an extremely peripheral structure, ultimately they need an organizational steering that maintains rules, and actions. In short, how can residents share common architecture in a speculative nature? Eventually how does it transit to a planning, designing, building and consuming cycle?

To address these research questions, we conducted a design game research that gathered data from design game participants who were second and third year students (N = 7) in an interaction design course. The participatory design methodology installed a group simulation for creativity that appeared the influences of immersion, and collaboration to a collective design quality. The research results highlighted the key elements of user-driven innovation in the virtual world and consumer based platforms. It gives insightful design guidelines for consumer based virtual reality services those are targeting decentralised monetary system developments in a practical perspective. Theoretically, it has a potential contribution to the complexity area that assimilates innovation models for multi-agents in technical sectors.

***Keywords**: User-Driven Innovation; Consumer-Based Economy; Social VR*

Introduction

The diffusion of immersive technologies using HMD devices has driven the explosive interests in the new ways of human communication in digital world. Especially innovative proposals for social interactions in Social VR environments have stimulated various discourses about the next generation business platform and its requirements. Leading cases of HMD device based Social VR services such as Sansar Project, High Fidelity, AltspaceVR, and VR Chat suggested practical use cases of Social VR platforms. The noteworthy components of those leading Social VR services are, first, user development environments that maximise the performance of realistic objects, and environment building, second, advanced tools for character design, gestures, and emotional representations, and third, new user interfaces for navigations and controls adjusted to the cognitive procedures in 3D environments. However apart from the technically dominant market discourses, what will be the critical requirements for Social VR as a business platform that achieves the consumer goals in the upcoming industrial changes from social dynamic perspectives? The question initiated our research in the beginning. Therefore the research focused on the social and emotional aspects of user behaviours in the emerging Social VR platforms.

To tackle the contextual influences of Social VR structures, and user behaviours, we adopted the theoretical framework of material culture studies. Originally material culture studies in the architectural domain have grounded its academic interests in the built environments as human artefacts (Buchli, 2002). The built environments have embodied social and cultural values of a certain context that consists of a longitudinal structure of a feedback loop circulating human cognition, and decision making. The anthropological tradition of material culture studies offers an insightful theoretical ground how we understand a built environment as a communication tool. The significant value of material culture studies will be the unique position as an experience science methodology that delivers the qualitative inferences about the influences of technological developments to the social and cultural changes that contextually embedded in the evidences of artefacts: how a technology influences social and cultural conditions, and finally how it modifies human emotion, value, and conventions. By utilising the benefits of material culture methodology, the research investigated the

emerging economic activities of a group of role playing gamers who create the value of virtual goods in the virtual world.
The major economic activities of VR gamers are production and sales of 3D items, technical supports to other VR gamers, production of entertainment events, and artworks, and virtual land sales. The gamers trade their virtual estates with a virtual currency in the inworld monetary system. The virtual currency value is linked to real world currencies by an exchange system that is working quite similar to a foreign currency exchange market in real world. Therefore the virtual market is technically an independent economic entity that works like a foreign country in terms of the currency boundary. The roles of a gamers in the virtual space are decided by their social locations in their shared virtual experience storytelling. The size of economy is highly correlated to the level of immersiveness that is accumulated by how much the participants immerse into the game world. The shared experience, and shared stories are embodied by their memories from their real life experiences synthetically reused and recreated in the virtual world. The memories contain symbolic, cultural, collective marks of their phenomenological incidences. The hybrid nature of how we perceive the altered self-image and virtual life experience has been discussed from the early stage of digital built environment study. The human perception in the imaginary world widens the life experience, and constitutes the 3rd space of habitats. An early ethnographic study in ActiveWorlds concluded that what revealed from the 30 days of collective virtual world building was “not only community and design in a virtual environment, but also views on the increasingly blurred boundaries between what is real and what is virtual (Hudson-Smith, 2002).”

The most outstanding dynamics of virtual social interaction has been visually constructed by an avatar, an extended self of a human behind. The avatars have been posed as representative pivot in the centre of the universe, and an ultimate form of imagination and self-reflection. The degree of emotional engagement to an avatar often promises the genuine satisfaction of virtual interaction. In this study, we look into the correlation between the experience supply chain and economic activities that constitutes the virtual experience, and will project a growth model of the future virtual consumer market that would be characterised by gamers’ experiential and cognitive traits.

Theoretical Background

Speculative Architecture

The collective virtual world building is a projective articulation process. The speculative architecture framework, which is widely adopted in the futuristic architectural study, suggests how human imagination creates the future of life spaces. The speculative architecture advocates develop creative scenarios of projections on how architects make changes for the future of cities under the influences of technology that will inevitably deliver social, and phenomenological consequences. The speculative architects are not specifically interested in forming a physical output.

> *"As a speculative architect, I don't design buildings as endpoints or outputs, but I would still argue that what I do is architectural, or at least it's architecture in some form. Instead of creating buildings themselves, I tell stories about cities. The dominant forces of the past that shaped our cities, buildings, and public spaces are now being displaced by technologies, systems, networks, and stacks. Thus, the architect needs to change their model of practice in order to remain relevant. The architect now needs to intervene in these systems beyond shaping the physical building. And that is really about telling stories about how they operate. Speculative architects mostly create narratives about how new technologies and networks influence space, culture, and community. They try to imagine where new forms of agency exist within the cities changed by these new processes." (Liam Young Interview, Babkin, 2017)*

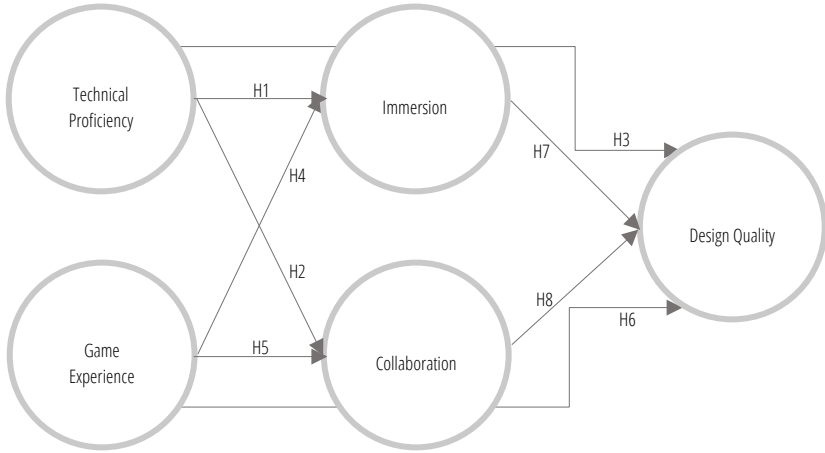
As we can infer from the interview with Liam Young, one of the most active speculative architects at this moment, the main interests of speculative architects are stories, imaginations, and the possibilities of the future. The orientation of speculative architects is pretty identical to that of virtual reality creators who develop virtual spaces, and construct virtual life in the virtual space of fictional stories. Those creators concentrate on fabricating a narrative that tells how new technologies, and networks influence spaces, cultures, and communities. We better say they dream about the future, and make stories about cities rather than build a form of buildings.

Material Culture

While speculative architects design narratives of urban spaces, and architectural structures, the anthropologists, who study material culture, discover and record stories and narratives that are embedded in the various human artefacts including spaces and architectural structures (Buchli, 2002). The ingredients of narratives for their speculations are not future technologies, and networks, but the residents of our times, and archetypes of material culture that are gradually cultivated in the community. If we carefully look into the context of collaboration among Second Life residents who have been the profound archetype of communities that is replicated by emerging Social VR services, we can read their material culture that gave a birth to collective fictional stories of Sci-Fi, Cyberpunk, Steampunk, 19th century European cities, and contemporary urban life, and the storytellers who built the spaces of the communal world. What interactions and social factors will enhance the planning, designing, and consuming cycle of virtual experiences for the human race in the future? To address this research question, we conducted a design game study that invited 7 game participants to join the collective creation process.

Research Model

Figure 1. Research Model



By setting a design game in an early social VR platform, we tested the hypotheses on the future virtual world building.

H1. Technical proficiency of individuals gives rise to game immersion.
H2. Technical proficiency of individuals gives rise to game world collaboration.
H3. Technical proficiency of individuals gives rise to design quality.
H4. Game experience of individuals gives rise to game immersion.
H5. Game experience of individuals gives rise to game world collaboration.
H6. Game experience of individuals gives rise to design quality.
H7. In-situ game immersion gives rise to design quality
H8. In-situ collaboration gives rise to design quality.

Research Method

Design Game

Design game is a branch method of participatory design research that facilitates an innovative design process in the conceptual design stage. From its participatory co-design property, it installs a virtual space of design articulations. The participants are alienated from their real world, and absorb into the "dialogue" of the game that leads the participants to get involved into the creative design process of a "magic circle." By the nature, the design research is related to the speculative design (Dunne, 2014) tradition that opens up the space of articulation for design problems. Vaajakallio & Mattelmäki (2014) explained the design game as a design instrument from the three different perspectives.

> *"For a designer , design games are tools to organise dialogues among different stakeholders in order to support participants' and designers' empathic understanding of each other and/or a particular user group that is meaningful, and to identify, frame and solve design problems together with users and other stakeholders."*
>
> *For players, design games appear as a mindset that creates an experience of being in a game world, a magic circle, which is a physical and ideal playground with a special ordering of time, roles and rules.*

For a design game designer, design games offer a structure with tangible design game materials that are explicit while open to reinterpretation, rules and performance roles that can be manipulated depending on contextual needs."

Table 1. Play framework illustrating the three distinct perspectives related to design games and the qualities and functions typical for each category. (Adopted from Vaajakallio, K., & Mattelmäki, 2014)

Design	Games	
Practical application context with its objectives and characteristics	Play-qualities drawn from design and games, play and performance	
Designer's perspective: design games as a tool	Player's perspective: design games as a mindset	Design game designer's perspective: design games as a structure
Organising dialogue – combining purposes of instrument, competence and an agenda	Transporting participants into another world – a magic circle as physical and ideal playground	Supporting idea generation, collaboration and interplay between now and the future by game materials, which work as: visual stimulus
Supporting empathic understanding – combining subjective and collective interpretations	Proceeding within its own boundaries of time and space – symbolic time for moving between past, current and future	for exploring alternatives, boundary object, visual reference for shared focus of attention, documentation, reminder, illustration of progress and as visual indicator of being in a special game world
Gaining several contributions – designing with users and other stakeholders building on	Creating positive tension by providing boundaries while being open for new interpretaions – action governed by rules	Utilising performance roles appointed by the game

direct and indirect user involvement		

The Toolkit

The central driving force of Context Mapping methodologies including design game as a research method come from a tactful setting of its design toolkit. In our research, the Second Life game environment has been set to the basic platform of a toolkit for the design game. We introduced Inworld 3D development tools, LSL(Linden Script Language), and 3D store items in Second Life Marketplace to the design game participants and the participants built up their own avatars, designed their homes, and travelled inworld destinations. At the last design game phase, the participants were asked to compose 3 minutes long machinimas that captured their Second Life stories showing their avatars, homes, and travel destinations. The film making process of each participants was open to the all participants via personal blogs, and they could discuss, and review the each process of virtual film making; character design, home building, conversations with other Second Life residents, storyboading, and video editing. Sanders(2014) explained how toolkits of design game connect participants and stakeholders of design outputs. She sketched up the procedure by making comments, “Using design games, stories and scenarios are all very playful and experimental tools that engage the participants in co-design activities. The approaches make ideas, concepts and visions concrete and hereby acceptable and negotiable for relevant people in the design process. In this way co-design is rehearsing the future.”

The Participants

The levels of design game participants’ previously adopted 3D production and game experiences were widely varied. Their nationalities and native languages were diversified. The communication language during the participatory design sessions were English. Many of them had never heard of Second Life before the design game. Few participants had known the Second Life metaverse idea, however, did not have experiences of playing. They joined the design game as a part of the Interaction Design curriculum. They were in their 2nd or 3rd year of undergraduate courses. Commonly they had great interests in 3D technologies, and game design. Before the design game sessions proceeded, the instructor evaluated the participants’ creative

orientations based on their submitted design portfolios. Table 2 shows the distribution of participants' skill levels and creative orientation.

Table 2. Technical Knowledge and Use Experience of the Design Game Participants

Participants	3D Modeling	Game Development	Creative Orientation
P1	1	2	Designer
P2	1	1	Artist
P3	3	5	Engineer
P4	2	4	Artist
P5	3	4	Engineer
P6	1	2	Artist
P7	3	5	Engineer

The Research Duration

The sequential design game sessions proceeded for 3 months from September to November 2017. The design game participants explored the game world and built up 3D objects such as avatars, furniture, houses, and skyboxes during their game design studio class. The 7 members of the collaborative design course were granted course credits and game money for their voluntary participations.

The Research Process

The study was composed of 5 phases of gradual development stages. In phase 1, we had 2 weeks of exploratory period that participants could learn the inworld tools, and environment. In phase 2, the each participant received L$13,000 (approximatively equivalent to USD 50) and ran for the first production round for their avatars and landscapes. In phase 3, the participants uploaded the screen captures of their production, and

exploration history on their personal Flickr account, and observed other participants' progresses. At the time they complete the phase 3, the class begun the machinima creation coursework, and participants were asked to furnish their machinima storyboards, and give a presentation in class. After they completed their storyboards, the research moved on to the phase 4, and each participant got paid L$ 10,000 (approximatively equivalent to USD 40), and finalised their inworld creation. In phase 5, the participants filmed the machinimas using their own avatar, landscapes, and storyboards (Figure 3). The participants submitted machinimas that recorded in a time-based narrative form of 3 months journey in Second Life.

Figure 3. Design Game Process

Data Collection & Analysis

The participants' skill levels and design performances were measured by 5 point Likert scales. The 3D modelling skills and previous game experiences were measured in the ranges of (1) Very poor, (2) Poor, (3) Fair (4) Good (5) Very Good. The degrees of immersion and collaboration of individual participants were measured in the ranges of (1) Very low, (2) Low, (3) Fair, (4) High (5) Very high. The table 3 shows the phase 3 evaluation results collected from participants' performances of their round 1 avatar and environment building. In phase 3, two measurements of performances were game immersion, and collative participation in the game world. We only could observed the correlation between 3D modelling skill and collaboration in a marginal level (r= 0.67). An interesting result from the phase 3 observation were previous game experiences do not influence to the current game immersion (r=0.23).

Table3. Game Immersion and Collaboration Measurements Regarding to Technical Knowledge and Use Experience of the Design Game Participants

Participants	3D Modelling	Game Experience	Immersion	Collaboration
P1	1	2	2	1
P2	1	1	4	3
P3	3	5	5	5
P4	2	4	3	2
P5	3	4	4	4
P6	1	2	2	1
P7	3	5	2	2

After phase 5 completion, we tested the correlation between 3D modelling skill levels and design quality of inworld creations, and the correlation between previous game experiences and design quality of inworld creations. The result proved previously adopted 3D skill of individuals only marginally influenced to design quality (r=0.43). Surprisingly the design quality did not depend on the degree of previous game experiences that were subjectively reported by game participants (r=0.27). This result indicates subjective game engagements do not guarantee the creative performances in novel virtual reality worlds to come. On the contrary, current game immersion (r=0.89) and active collaboration (r=0.86) are significantly correlated to the design quality of the new world building. The table 4 shows the full sequences of evaluation process results.

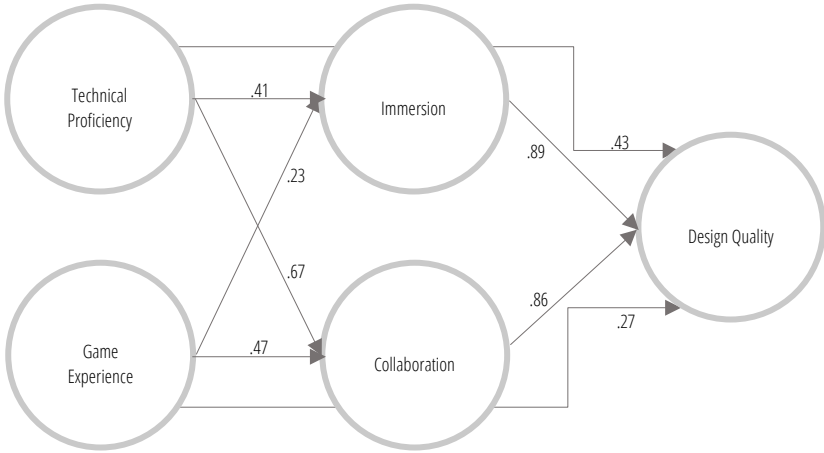
Table 4. Final Evaluation of Design Quality

Participants	3D Modelling	Game Experience	Immersion	Collaboration	Design Quality
P1	1	2	2	1	2
P2	1	1	4	3	3
P3	3	5	5	5	5
P4	2	4	3	2	3
P5	3	4	4	4	5
P6	1	2	2	1	2
P7	3	5	2	2	1
STD	1.00	1.60	1.21	1.51	1.53
Mean	2.00	3.29	3.14	2.57	3.00
Confidence Interval (95%)	0.74	1.19	0.90	1.12	1.13

Results & Conclusions

H1. Technical proficiency of individuals gives rise to game immersion. (N/S)
H2. Technical proficiency of individuals gives rise to game world collaboration. (Supported)
H3. Technical proficiency of individuals gives rise to design quality. (N/S)
H4. Game experience of individuals gives rise to game immersion. (N/S)
H5. Game experience of individuals gives rise to game world collaboration. (N/S)
H6. Game experience of individuals gives rise to design quality. (N/S)
H7. In-situ game immersion gives rise to design quality. (Supported)
H8. In-situ collaboration gives rise to design quality. (Supported)

Figure 3. Research Results



The most noticeable result from the analysis was in-situ game immersion and collaboration were proved to be the utmost important factors for the delivery of successful outcomes from its creative experience in VR environments. Previously gained 3D modelling skills or game experiences hardly ensured the design quality of novel virtual world building. The result indicates a counterintuitive finding from the design game research that simulated the upcoming consumer-based social VR services. The emerging services are highly focusing on the development of hyper realistic VR environments, and inworld authoring processes. On the contrary to the enterprises' innovation strategy, the research finding calls the attention to social and emotional factors such as who they work with, how they feel about the collaboration, if the collaboration is pleasurable and enjoyable, and how efficiently communicate with collaborators, will predominantly steer the successes of experience as a service. From the results, we could possibly predict the future of Social VR constructs will be highly integrated into social representations. Shove and Warde (2001) magnified the social aspects of consumptions, and proposed the peer effect of modern consumer behaviours. People pursuit novel products and technologies by a number of generic mechanisms including social comparison, the creation of self-identity, metal stimulation and novelty, matching or "Diderot effect,"

and specialization. Among these mechanisms, specialization implies the narrowly segmented consumption that would be presumably connected to the material culture argument that conveyed artefacts as carriers of meaning, distinction, and value." They described the user-driven innovation process, and pointed the generative nature. "As the range of activities in which one might participate increases, so does the range of specialized products, each targeted at a specific group of practitioners. The separation of once-similar activities into increasingly specialized fields fosters the production and consumption of ever more precisely differentiated goods and services." Their notions on consumption and material culture efficiently describe how the decentralised virtual estate systems will gain the dynamics and vitality. Apparently we may infer from the result that consumers will take the major roles in the designing – consuming cycle of the future market in immersive environments.

Limitations and Future Studies

The study aimed to investigate the promising features of emerging Social VR services, and clarify the requirements for viable managerial strategies considering the new economic transformation and ecology. As the research is still in the primitive stage, the research progress has not reached to the sufficient level of data collection, and evaluation yet. Obviously 3 months of design game trials with 7 subjects have revealed quite limited incidences, and findings. It is certainly accountable that the research should expand the size, and view of empirical data as well as it should be carefully revised and tested to seek the original research goal. Therefore future studies will diversify the test platforms, and participants that will enhance the reliability and validity of research data. Apart from the insufficient data, and the lack of empirical richness, the research should have grounded a strong theoretical explanations on observed facts. How will specification be a competitive driver for the decentralised market system? How will the virtual currency enhance the influence to internal and external supply chains? In what circumstances, the experience as a service will strengthen the value aggregations among the consumers? We must construct the bridge between design research observations and theoretical explanations more firmly and precisely in future studies.

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