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VIRTUAL REALITY ARCHITECTURAL SPACES AND THE SHIFT OF POPULACE IN ONLINE SOCIAL VR PLATFORMS IN 2020

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Abstract
Virtual reality and the digital architectural representations of buildings that exist in the cyber realm are gathering more and more users as their platforms develop spaces better suited for the virtual human. Design of sites and interiors is being carried out by both experienced creators and those completely lacking skill in spatial creativity. Research was conducted during the course of two record gathering sessions lasting two weeks each, one at the beginning of February in the year 2020, the other at the end of the year in the last two weeks of the month of November 2020. Information was gathered about the population status of the most visited worlds at those times, as well as their specificity in architectural design traits. Comparison of the data showed that humans who attend online social gatherings and interactions in virtual reality worlds shifted their favor from median traits to those representing more high-end quality at the end of the year. Demographics show a rise in the amount of users aged between 6-10, and 21-35, in comparison to that of the beginning of 2020 where the dominant age group was between 16 and 21 years old. The global lockdown due to the pandemic attracted people from the home office generation who preferred architectural spaces of higher quality, larger and more complex floor plans, and spatial representations of high-rise residential, nightlife and fictional spaces for virtual human to human socializing and interaction.

Keywords: human 2.0; digital living space; virtual perception; online social platforms; virtual reality architecture

INTRODUCTION

Virtual reality is a unique way of interaction within online worlds, socializing and experiencing long stretches of time spent entirely in digital space. With hundreds of thousands of users, online VR social platforms have allowed their players to have the ability of creating their own fantasies through homemade spatial models representing that of real world architecture. High rise loft styled residential buildings, late night recreational pubs and clubs, or even abstract spaces for both solitude and socializing are just some of the mixed function spaces found in the most popular online worlds. Being called “worlds”, these spaces bear distinct traits that influence their popularity with the daily online VR-goers, and the complexity of these dependencies will be discussed and analyzed in the following text. It is the evolution and development of worlds that match these specific standards that will allow for the growth of the online VR communities [D. Shao, I. J. Lee 2020]. User-created spaces have the same eligibility of being heavily used as those created by field professionals, just as long as they meet distinct criteria. If the current trend continues to develop, more advanced methods of psychological and physiological involvement will be made available to the masses, resulting in a visible shift of the proportion of time spent in the tangible world and the virtual counterpart [C. Montag, S. Diefenbach 2018].

As it is with most things, living conditions of first world countries have developed the need to adapt to the needs of the rapidly evolving society. The desire for ownership of cheap luxury and quick effects has driven the market into supplying the middle class citizens with affordable richness of almost every kind. Whether it is

Fig. 1. One example of a realistic looking world called „The room of the Sleep”; source: screenshot taken by author in VR CHAT platform

reproductions of world class art, cheap but fancy furniture or the ability to rent out almost anything, humans have become familiarized with the ability to possess items at the click of a few buttons. The market has foreseen this and homesteads are steadily becoming smaller and smaller, as our needs become more compact and online based. With the decrease of normal human-human interaction due to recent pandemic events and the constantly shrinking area of personal space could mean that the only way we will be able to socialize is through the use of online solutions. With the lack of natural private space in residential buildings of things like gardens, yards or even balconies in some cases, the availability of limitless space in the online realm is a head turner for many young people. In relation to this, research was conducted by interviewing 100 random virtual citizens in one of the most popular online social platforms through a simple query, thanks to which an insight into the modern digital human will be made possible.

According to a 2016 report by Goldman Sachs on the developing virtual reality market, VR entertainment generally favors three mainstream uses: video games, live stream events and video entertainment (TV, movies, and pornography) [Goldman Sachs 2016]. The first is generally the mainstream media depiction of VR, with amazing graphics, top tier game design and immersive gameplay, while the other two are where most of the user generated development is made; especially of that in live social platforms. Having the technology and knowledge within grasp of the general public, the ability to become homemade designers and digital architects has become somewhat of a standard in the common pop culture of the internet [D. Fonseca et. al. 2021]. Free online tutorials, courses and templates are accessible through downloads and customization, which in turn allows for the mass creation of homemade content, especially that of digital architectural design [K. Słuchocka, B. Siewczyński 2020]. This lead to the creation of a distinct society of mass user made content, where worlds are available for free or for a small sum (often called a micro transaction), in which players can interact with one another, create more worlds, and even have the ability to participate in events that they normally would not attend, or at least not at the given circumstances of age and origin.

One of the leading online VR platforms is “VR CHAT”, a free to play, peer to peer software in which users can talk, move, interact and create worlds with the ability to share between one another. Users log into their account, choose an avatar and land in a personal transitional hub from which they can venture to thousands of different worlds with random players from around the world. The worlds are made by both professional and amateur graphic designers from around the world, with generally available software and reasonably flexible sets of rules. Similar rules apply to the avatars, as even kids are known to have created their anatomical mates of different scale, proportion and style. With game design software such as Unity, players are given game ready templates and free online tutorials that they can use to create both scenes and avatars for the gen-

eral population to use [A. Salwierz, T. Szymczyk 2020]. Architectural spaces found in these vary from world to world as there are almost no regulations for the design and quality input into their creation [B. Świt-Jankowska 2010]. Spaces of futuristic and fantasy designs, monumental and brutal architecture or oversimplified and eerie looking representations of buildings are just some of the areas found in virtual reality social platforms.

Since every user is granted access to live data of online players in each world, VR CHAT is one of the few public platforms to do so, making it worthy of being the representative of all online virtual reality architectural spaces. Having the ability to check not only the instances of each world themselves but also the general public data, a larger understanding of the characteristics of populace-to-design relationship are within reach of researchers. Uploaded data is refreshed and updated around every five minutes or after a player decides to change worlds via the main menu. Due to the fact that having a few thousand players be in a defined site at one time would be chaotic to say the least, the platform has created an instance system in which players coexist with one another in copies of the given world with the limitation of up to 50 people at any given time. This means that two friends can technically be in the same world, but be in separate parallel instances in which they would not see one another without relogging into the same instance of that world. Numerous instances give the platform the ability to house limitless amounts of inhabitants that can freely migrate between architectural styles and the worlds that house them [D. Kurkiewicz 2003].

In order to comprehend the relationship between different traits of architectural design and population of virtual online worlds, a set of five key traits was established for twenty most popular worlds then available via the VR CHAT platform. Each of these worlds is known to be widely popular among the virtual reality community along with having representation forms similar to those of the real world architecture. Chosen traits are based on several important factors that play a key role in the architectural design of real world buildings, and so would only be suitable to use for the virtual world [B. Urbanowicz, T. Szuliński 2020]. While some sites were quite easily categorized, certain ones with conflicting or clearly mixed traits were placed into the category of the closest possible accuracy. The classification was conducted by the author based on the experience and time spent in VR and especially in VR Chat. The traits are design quality, complexity, function, scale, and asset amount. It is important to note that the populace of the worlds can change drastically in the future, as new worlds with disruptive qualities might migrate a lot of traffic into an entirely new fashion of virtual spaces [H.C. Gómez-Tone et. all 2021]. Disruptive worlds are those that play to the current trends of social media and provoke users to use their new ideas. By creating a trend, worlds that lack an updated inventory would eventually fall off the top ranks and be forgotten all together. The trending worlds would then spawn a new

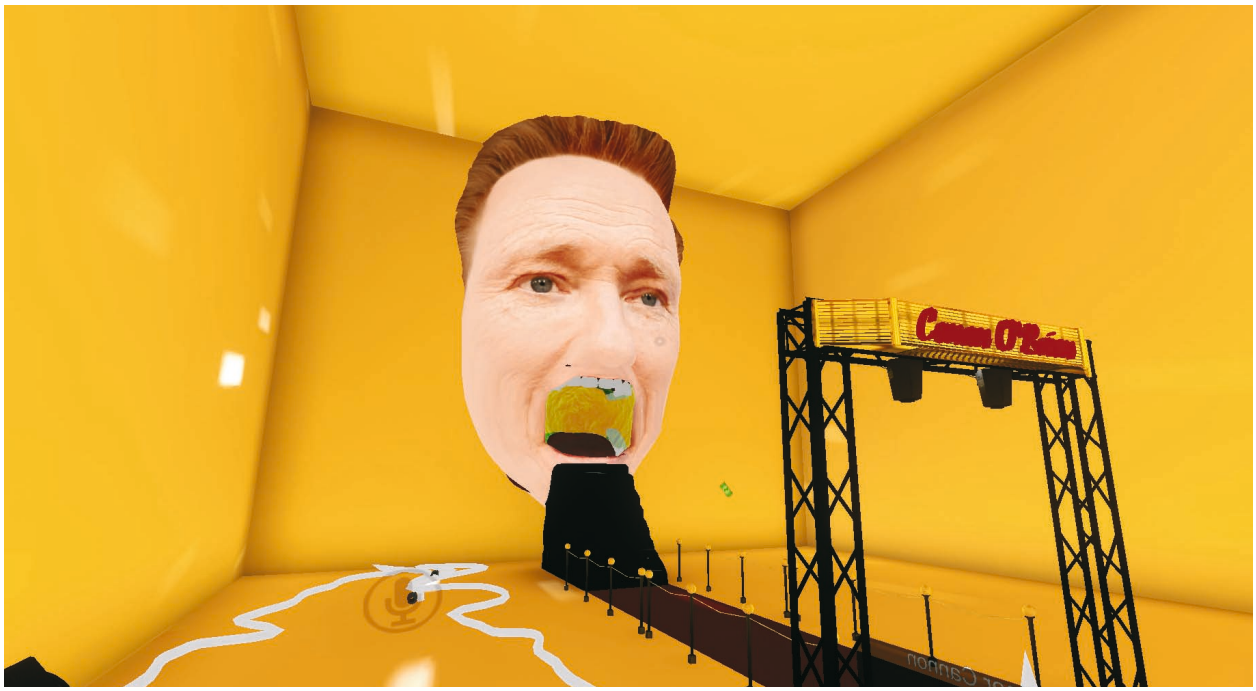

Fig. 2. An example of an abstract, non-realistic VR space called „conan-party";
source: screenshot taken by author in VR CHAT platform

generation of design practices that would appeal to the ongoing fan base and last until the next disruptive world would arise.

Worlds created by the owners of the online virtual platform were also included in this list due to the fact that players choose them even though they are the default areas that players spawn in at the beginning of the game. The world "VR CHAT Home" is the default home for every user, and so it won't take part in the analysis as a choosable world, but will still portray a baseline view in a neutral status. The world "VR CHAT Hub" is technically a default world that has direct access from the VR CHAT Home, but is a separate world, just like any other, and therefore will participate in the analysis. It is important to note that these worlds are similar in design style and have relatively matching architectural elements. While "Hub" and "Home" play an important part in the comparison, they are unique when viewed from an architect's perspective, especially in that of the consistency of the design and asset quality. Their unique architecture is not found in any of the other mentioned worlds, and could be considered original in perspective of the entire platform.

1. VIRTUAL ARCHITECTURE WORLDS AND THEIR USERS OF EARLY 2020

Population status of architectural worlds was based on the highest occurrence during a two week period in the beginning of February 2020, being checked around every 8 hours for updates. This process proved to be very time-consuming as data had to be recorded manually, as the platform administrators refrained from providing any data. Even though the beginning of February was already a time for drastic change in the way we functioned due to the pandemic, it was still a time of uncertainty for many countries and can technically be considered as a time not yet influenced by newcomers in VR. Through uncertainty, it is meant that the global situation was not yet clear as to how long the virus would spread and if it would spread at all, thus the fairly docile society of online VR platforms was still relatively pure at that point. So it was decided that the first two months of 2020 would be a viable representation of a time before the global Covid-19 pandemic.

Chosen worlds mostly resemble non game oriented territories with lenient rules / interactions, on the

Tab. 1. Listed key traits, their scale and a brief explanation of each one

GRADE	Professional (grade A)	High quality textures, high quality models, consequent style in the entire scene, advanced interactions, basic or advanced scripting, appropriate special effects
	Adept (grade B)	Mixed quality textures, range of high, medium and low quality models, consequent style for most elements, simple interactions, basic scripting, simple special effects
	Beginner (grade C)	Low quality textures, oversimplified models / low quality models, no consequence in style, none or very few interactions, none or very poor special effects
COMPLEXITY	Low	Single room, simple flat area, able to see other "end", no separated rooms / areas via door or portal
	Medium	Stair cases, multi room, fairly modulated, several corridors, doors to closed off rooms, portals
	High	Extensive room layouts, multi-story buildings, intricate designs of hallways, passage ways, numerous entrances
FUNCTION	Night Life	pubs, clubs, dance halls, nightlife representation,
	Residential	homes, parts of homes, lofts, relaxed areas, interiors
	Urban	cities, suburbs, exteriors of residential areas, fictional areas representing urban centers
	Fictional	Space, non-existing function, not fitting to other types
SCALE	XS	Single room, dimension of approximately up to 5 x 5m
	S	Small space, dimensions of approximately up to 10 x 10m, or ranging from 25m2 to 100m2
	M	Average area, floor plan of roughly between 100m2 to even 200m2, typical of a multi roomed area
	L	Large open areas of varying complexity, resemble entire sites, exterior and interior scenery, large interiors
	XL	Almost open world maps, with extremes in terms of size and complexity, unable to quantify floor space
ASSETS	Low	Scarce or non-existing items, mostly empty spaces, limited interactions
	Medium	Average placement of objects, with tendency to stay on the lower amount, modern hotel like object scarcity
	High	Areas packed with numerous objects of both passive and interactive nature, each fragment of space has at least a few objects laying around

Source: prepared by the author

Tab. 2. List of the most popular virtual worlds in early 2020, with the assigned traits / grading

NR.	WORLD NAME	GRADE	POPULATION	SIZE	FUNCTION	COMPLEXITY	ASSETS
1	MMD Dance World	C	102	S	Fictional	Low	Low
2	VR CHAT Hub	A	181	M	Fictional	Medium	Low
3	MERoom	B	611	M	Residential	High	Medium
4	Murder 2	B	332	L	Fictional	High	Medium
5	The Great Pug	B	265	XL	Night Life	High	High
6	Japan Shrine	A	252	XL	Urban	Medium	Medium
7	Midnight Rooftop	A	772	M	Residential	Medium	High
8	Summer Solitude	A	227	M	Residential	Medium	High
9	Void Club	A	96	XL	Night Life	High	Low
10	The room of the sleep	B	121	S	Residential	Low	Medium
11	The room of the rain	B	318	XS	Residential	Low	Medium
12	The Black Cat	B	490	L	Night Life	Medium	Medium
13	Root's home movies and animes	B	249	M	Night Life	Medium	Medium
14	Rest and Sleep	A	130	M	Residential	Medium	Medium
15	Sala Pak Jai	C	189	XS	Urban	Low	Low
16	The Black Barn	B	108	M	Residential	Medium	High
17	Yayoi Summer Nights	B	101	M	Urban	Low	Medium
18	Furries Convention	A	98	XL	Public	High	High
19	Drinking Night	B	76	L	Night Life	High	Medium
20	Hwabon Night	C	268	M	Urban	Medium	Low
21*	VR CHAT Home	A	1264	S	Fictional	Low	Low

Source: prepared by the author

exception of "Murder 2" which is one of the more popular games on VR Chat available 24/7. These worlds present medium to large amounts of user created architectural designs of various qualities and quantities, but are visibly populated by virtual buildings and interiors. The matter of authors was not taken into account in the record taking process, as some worlds are known to have been created by a group of people rather than a single designer. Author information is readily available for all users, but none the less that data will not be present in the following assessment. The last position marked as nr 21* "VR CHAT Home" is the neutral world into which every player is placed in upon logging in. Through observation, this room is attended for only a few minutes at a time and is treated as a transitional room. The updates on the population show that the numbers fluctuate quite aggressively which would suggest a large ingoing – outgoing traffic. As mentioned before, the population column shows the most visited moment for a given world, and so the population status is a median throughout the time of day and dates of recording data.

Additionally to the population and trait status, a simple demographics query was conducted between 100 random users in those worlds at random times. The query would have players answer about their age, country of current stay, work / student status, field of work if applied, gender, and the type of VR gear they were currently using. Questions were asked inside digital buildings, alongside architectural representations in digital form, and in spaces that could be considered as conceptual architectural designs [A. Asanowicz 2014]. It proved to be significantly difficult at times to get an honest answer from the users during the query pro-

cess. Most players would state their age as improbably or doubtfully high, or with a non-numerical answer such as “old enough” after being politely inquired. Others would run away or not answer at all once hearing the mentioned set of questions. This may be caused by the fact that the players’ behavior is commonly erratic and spontaneous with minimal responsibility as an anonymous avatar in an online realm. Therefore a more serious approach generated odd answers, and resulted in a waste of time for the most part. Those who did answer truthfully did not try to make fun of the query, and so their answers mostly matched the way that the provided age group would have normally behaved. For example, tone of voice for males resembled the stated age, and the gender statement also could be verified by tonal response. A seemingly particular group of users avoided contact more than anyone else, and that would be young players in the ages between 6 and 10. Their reaction to hearing the set of questions would mostly silence them and have them either move away, block the authors avatar (and voice), or switch worlds. This may be due to the fact that kids are being taught not to trust online strangers and for this reason, the actual demography of the VR worlds may be inaccurate for region of younger ages. The following chart depicts the gathered age data, as well as the approximate correction in the number of young players (marked by the additional line in the younger age region).

Gathered results show that a vast majority of online VR Chat players are people between the ages of 15 and 21, with an estimated correction of the amount of young players in relation to the general population. From those one hundred people, with an average age of just over 18 years old, 86% were male and 14% were female, 64% were in the either student age or were currently studying, 16% were unemployed, with the rest 20% working full time. The vast majority of players in VR Chat were from the United States, with 56% stating so, while the United Kingdom had 13%, Canada 10%, and Germany 8%. The rest of the players ranged from countries like South Korea, Japan, Belgium, Australia, New Zealand, Italy as well as singularities from other countries all across the globe. The young player base is a result of targeted marketing that favors teenagers and young adults from whom many of which virtual reality and online socializing is almost natural [D. Shao, I. J. Lee 2020].

2. VIRTUAL ARCHITECTURE WORLDS AND THEIR USERS OF LATE 2020

Recorded data of the online digital space users was gathered in the month of November during the last two weeks of the month. Like in the beginning of the year, populace was noted around every eight hours by hand, while viewing the most updated information regarding the most popular worlds. The end of the year 2020 had greatly changed the way people used the internet on a daily basis. Since most people were stuck home in their home office new standard of work and school, their dependency on the use of online social platforms significantly increased as compared to the beginning of the year. VR platforms such as VR CHAT saw a noticeable rise in the amount of users logged in during this period, and especially those with fresh new accounts. It should be noted that during this time the US had their Thanksgiving holiday which could have influenced the numbers of current users, but as the data was not constrained to the American population, it will not be taken into account for the greater picture. Also, worlds created to fit the Halloween theme were also on the decline at this time, and would not

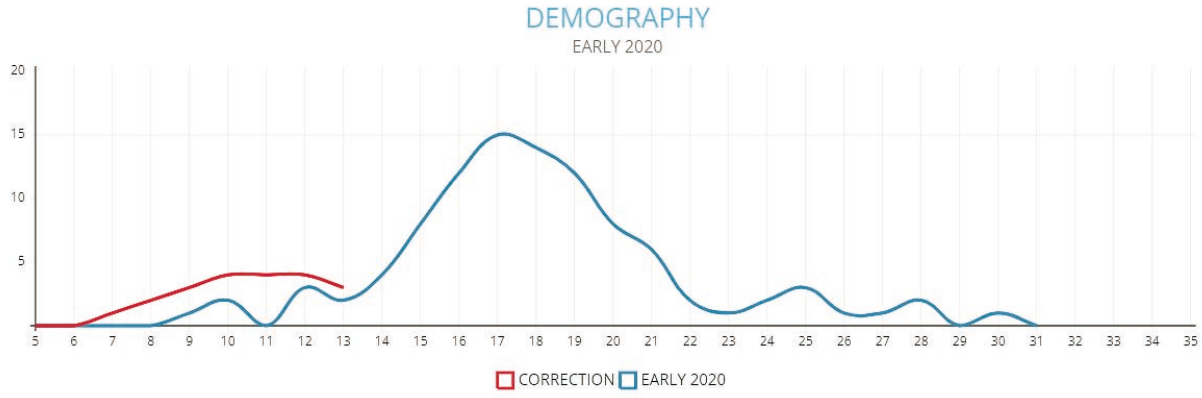

Fig. 3. Graph depicting demography of mentioned architectural worlds in early 2020 with approximate correction of younger ages; source: prepared by the author based on the own survey

Tab. 3. List of the most popular worlds in late 2020, with the assigned traits / grading

NR.	WORLD NAME	GRADE	POPULATION	SIZE	FUNCTION	COMPLEXITY	ASSETS
1	Among us	A	1911	S	Fictional	Low	Low
2	Test Pilots	C	968	XL	Fictional	High	Low
3	MERoom	B	519	M	Residential	High	Medium
4	Murder 4	A	1957	L	Fictional	High	High
5	The Sky House	B	744	XL	Residential	High	Medium
6	Japan Shrine	A	288	XL	Urban	Medium	Medium
7	Midnight Rooftop	A	1245	M	Residential	Medium	High
8	Summer Solitude	A	652	M	Residential	Medium	High
9	Just B Club	A	1149	XL	Night Life	High	Medium
10	Smart Karaoke	C	254	XS	Fictional	Low	Low
11	The room of the rain	B	906	XS	Residential	Low	Medium
12	The Black Cat	B	2356	L	Night Life	Medium	Medium
13	Root's home movies and animes	B	407	S	Night Life	Medium	Medium
14	Rest and Sleep	A	487	M	Residential	Medium	Medium
15	Sala Pak Jai	C	354	XS	Urban	Low	Low
16	Single MERoom	B	184	S	Residential	Low	Medium
17	Cozy Apartment	A	314	S	Residential	Medium	High
18	Putt Putt Pond	A	424	L	Fictional	High	High
19	Drinking Night	B	334	L	Night Life	High	Medium
20	Hwabon Night	C	179	M	Urban	Medium	Low
21*	VR CHAT Home	A	3351	S	Fictional	Low	Low

Source: prepared by the author

affect the representation of the virtual human during the Covid-19 pandemic. If anything, it would have provided entirely new users for this time period as schools and workplaces have days off during this time. The following chart depicts the new popular worlds and their average user amount during the mentioned data recording period.

Regarding the worlds themselves, the most popular non-game world is still "Midnight Rooftop" with one of the best looking content available on the platform at that time. The architectural style is futuristic, with a great influence of LED and Neon lights, minimalism, science fiction and high tech architecture incorporated into almost every room in the site. The scene is located on a high-rise rooftop, hence the name, and allows the player to travel down into the apartment like complex just below the surface of the roof. Littered with all kinds of futuristic assets, the interior design is well balanced, and visibly consistent between the areas of the entire building. The majority of the materials used in the interior design are architectural concrete, hardwood, composite like surfaces, high quality textiles and vivid LED / Neon lights in every part of the scene. The world of "Midnight Rooftop" is fairly small when compared to others, and allows for the simultaneous use for 24 players in its instances, keeping the potential crowd to a fairly small size.

Another world worth mentioning is "Sala Pak Jai", one of the least completed and least complex worlds available in VR Chat. The architectural style is representative of traditional Southeast Asian pavilions, especially that of Thailand, but with a very low skill in 3D creation and architectural design. The world is very small and greatly limited by the design itself as the play

Fig. 4. One of the most popular “A” graded architectural spaces called „Midnight Rooftop”;
source: screenshot taken by author in VR CHAT platform

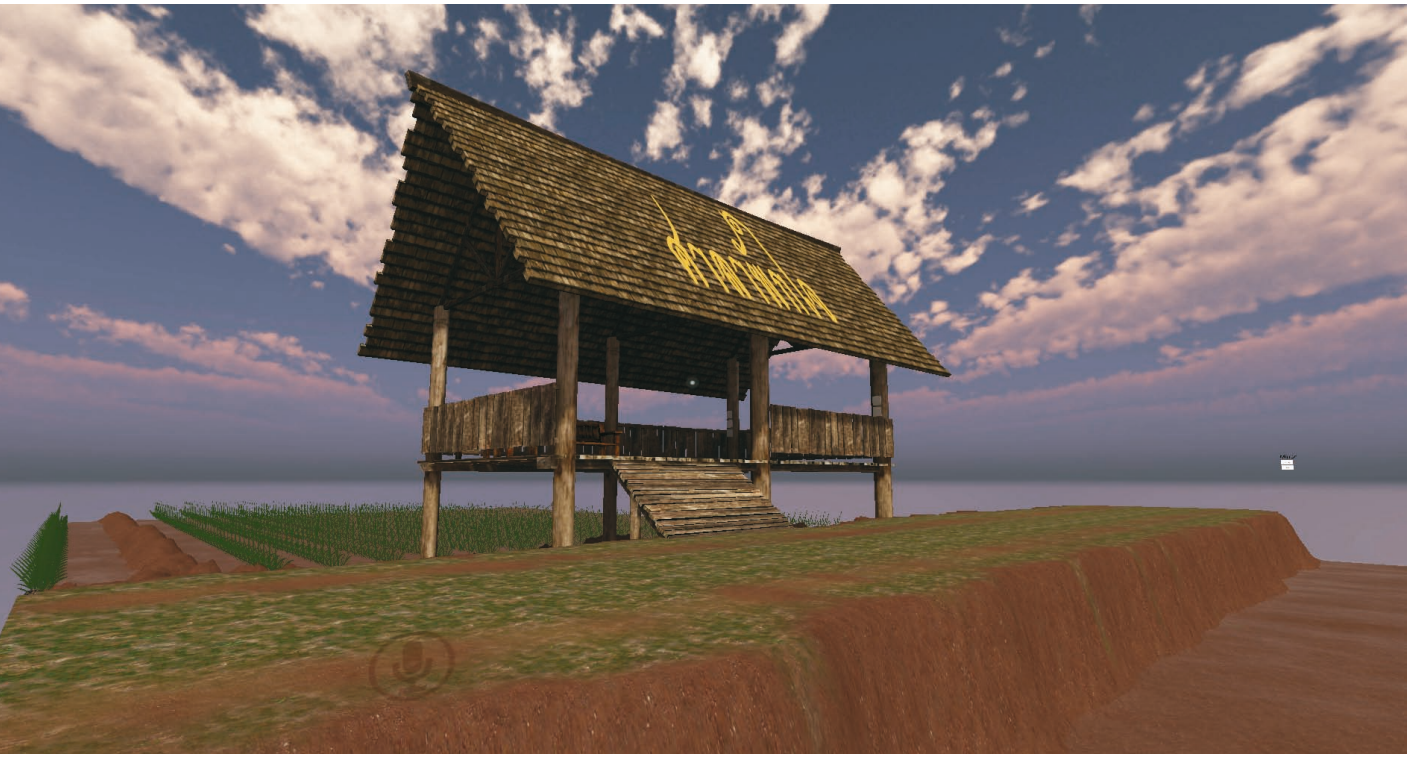

Fig. 5. One of the most popular “C” graded architectural spaces called „Sala Pak Jai”;
source: screenshot taken by author in VR CHAT platform

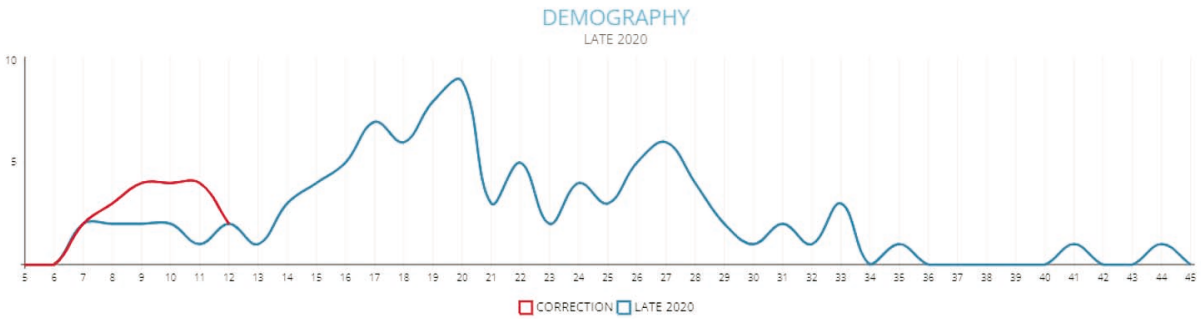

Fig. 6. Graph depicting demography of mentioned architectural worlds in late 2020 with approximate correction of younger ages; source: prepared by the author based on the own survey

area is roughly 20 x 40 meters, with just one simple wooden like structure placed in the center and an eerily oversimplified terrain that somewhat resembles a rice field. When inquired, players mostly associated with countries of Southeast Asia, and stated that the reason why they choose this world is because it somewhat resembles their country and it is very lightweight computational wise, allowing them to play without "lag" or without the platform crashing altogether [N.T.T. Van et. all 2020]. According to some users, this world allows for people with old, out of date computers to enjoy the VR platform in the very limited space that the world offers, but with just enough social interaction and freedom of movement.

The new population of these virtual reality architectural spaces consists of users aged between 7 and 35, with a few singularities of ages over 40. With an average age of 21 years, 82% were male and 18% were female, 62% were either school or college students, with an unemployment rating of 25% and 13% working full time. As the concept of unemployment varies between countries, some high school and college students answered that their employment status was that of unemployed, even though they were not asked about it due to the fact that they are studying, and so a player that provided information regarding having a school status was not taken into account in terms of employment. Similar to the beginning of the year, most users identified as being either an American or currently residing there with a 51% rating, with the United Kingdom being in second place with 13%, Germany third with 8% and the remaining 27% being spread all across the world in similar 2-3% proportions. Like in the case of early 2020, young attendants did not want to provide information regarding their age, and so an estimated correction was placed (additional line in 5 – 12 year region)

3. COMPARISON OF RESULTS

Mentioned architectural worlds were then pinned up against each other in the five categories with the population status as the main quantification criteria. The graphs show how different traits begin to form a public favorite based on the amount of people residing there as an average of the recorded time frame. Final results show an insight into the most desirable traits of the virtual realms, as the use of the populace as a value proved to be a seemingly accurate valuing system for the dependencies and reason of choice. While comparing the data gathered from the two record tracking sessions, in the beginning of 2020 and in the end of the year, all aspects seem to be fairly similar except for the "grade" and "size" trait. In February 2020, users seemed to favor an average grade of "B", which signifies that the chosen architectural spaces were neither photorealistic nor of low quality. However, the players of late November 2020 chose more borderline worlds with exceptionally good quality and although proportionally less, worlds of low design quality. It should be mentioned that low quality worlds of late 2020 may have proportionally fell behind the better ones, but they still outmatch in sheer numbers which tripled that of the early 2020. Due to the fact that the end of 2020 boasted a significantly higher player base than that of early 2020, the graphs were scaled in order to show the relationship between them. The left hand scale is applied to "Early 2020" and the right hand scale to "Late 2020".

The reason for this outcome is possibly because of the influx of both new players and the increase of users with good computing stations. Being stuck at home for an extended period of time might have given people the opportunity to upgrade their PCs' and reach out for new means of socializing with the intention of advanced interaction methods. New players with older generations of computers chose worlds that allowed

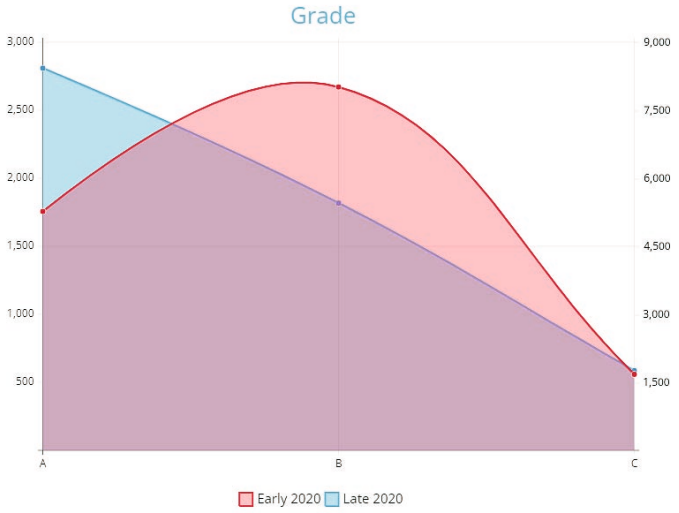

Fig. 7. Graph depicting comparison of "Grade" of worlds based on population between early (red) and late (blue) 2020; source: prepared by the author

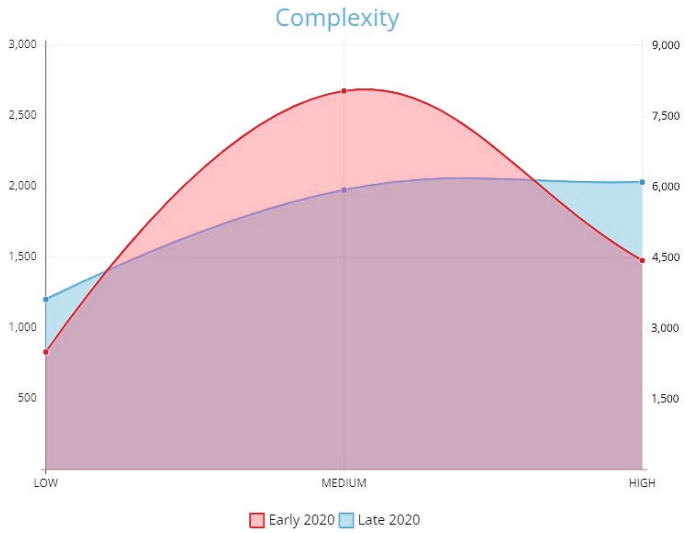

Fig. 9. Graph depicting comparison of "Complexity" of worlds based on population between early (red) and late (blue) 2020; source: prepared by the author

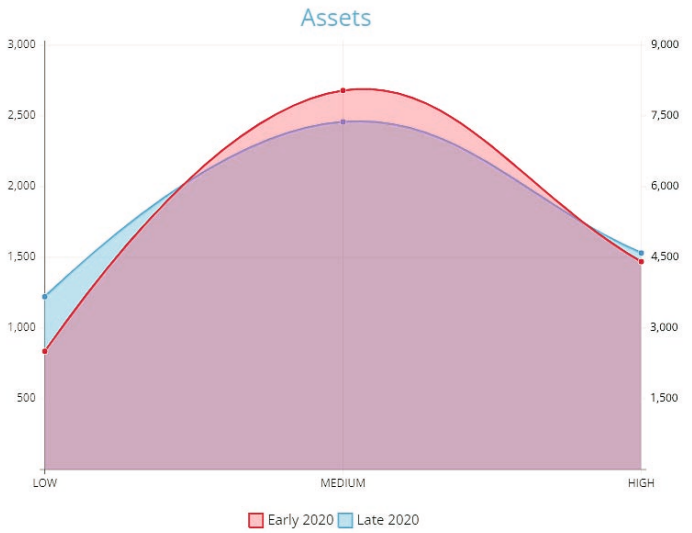

Fig. 8. Graph depicting comparison of "Assets" of worlds based on population between early (red) and late (blue) 2020; source: prepared by the author

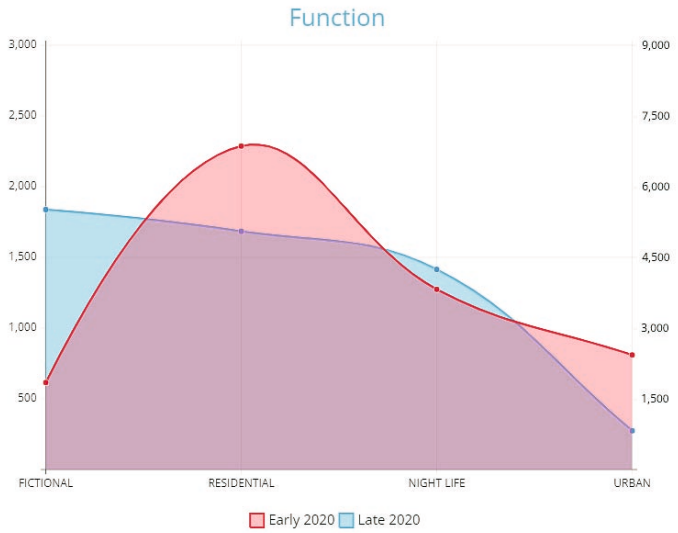

Fig. 10. Graph depicting comparison of "Function" of worlds based on population between early (red) and late (blue) 2020; source: prepared by the author

them to play without technical problems, while the existing population and the more prosperous new players could seamlessly enjoy social interactions in worlds of high quality and general good architectural design. Another possibility is the factor of age and reminiscence of past gaming experience in what would be considered today as low graphic quality scenery [O. Skoczylas 2018]. As the VR platform gathered more players in the ages of 25-35, their background and past experience with gaming started out before the modern age of high graphic quality content. Choosing worlds with what would be now considered out of date graphics could be an attempt to relive the time when simple games were mainstream and provided those players with positive memories.

It seems, that the late 2020 trends for the VR market tended to favor worlds of a professional design and build quality, with a room area of average proportions, with rooms and floors of a medium complexity and asset amount and a function greatly resembling that of a modern urban homestead as well as undefined, fictional use of space. Although a lot of existing worlds on the platform fit the mentioned favorable traits, they did not place rank on the most visited architectural worlds. Even those created by what would seem professional designers gathered little to no popularity and even ceased to exist during the course of 2020. While research in this area is still young and emerging, it might seem that certain designs were simply not up to

par with the picky nature of online guests. Architectural spaces of good craftsmanship and surprising designs still gather populace of just over 20 players during the course of the day, even though they greatly represent the favorable traits of digital architectural space.

Real world play area and the platform algorithms may influence the use of VR and the platform itself. First, users generally play from their homes, as it is common knowledge that recreational multimedia is generally enjoyed at the comfort of one's own four corners. With the use of such technology at home, it may be so that the reason of choice of the residential function worlds might just mirror that of the natural surroundings of the given player. Basically, being home makes users want to stay at home, with comfort and light recreation unconsciously being the target activity [C. Montag, S. Diefenbach 2018]. Second, VR CHAT is intelligent software with its own system for promoting certain worlds or styles. Players who visit their interactive menu are placed in front of suggestions from the main system, in which the most popular world is chosen. Since humans have always been attracted to large gatherings of other peers, it's no surprise that a simple reason for choosing a certain world is the fact that it's the most populated. The main advertised goal of this VR platform is interaction, fun and virtual socializing, and so it would only make sense that users want to go to worlds with numerous other players and meet new people.

Results state that in the duration of 2020, a median attribute was initially favored by the general public, as almost all of the charts suggest a non-aggressive quality of a given worlds design traits. As the year progressed, and users updated and upgraded their equipment, a tendency has risen to favor more complex, higher quality and larger sized architecture to spend time in. Since players are free to roam around the numerous worlds, their conception of a relative scale is quickly defined after visiting several different worlds and seeing the architectural styles and design decisions implemented by the creators. By having to interact in extremely large worlds and extremely small ones, those that represent real world scenarios seem to be the most fitting for virtual human to human interactions [C. H. Bum et. al. 2018]. Very small worlds generate an audible chaos in vocal and visual communication as players seem to yell over one another in order to be heard, and perform different acts of grabbing attention when feeling outshouted. On the other side of the scale, extremely large worlds require players to travel long distances in order to socialize with other players. Perhaps if the player limit was greatly increased in such worlds their popularity would become greater. It is important to note that a lot of low quality world users do not own a VR headset and so their gameplay is limited to traditional flat screen viewing, which is in stark contrast to that of the high quality worlds with players owning relatively expensive VR tech. What makes gameplay slow are avatars that some of the players use, and their extremely high polygon count and very large textures often take a long time to load and render. Players have the ability to turn off foreign avatars in order to better optimize gameplay, but it takes out a lot of the fun in virtual socializing. Some players go as far as using full body suits that allow for motion tracking every single limb and using it as an interactive part of the virtual player counterpart [E. Karuzaki et. all 2021]. This just goes to show that different users have different approaches to virtual reality worlds and the architecture that envelopes them.

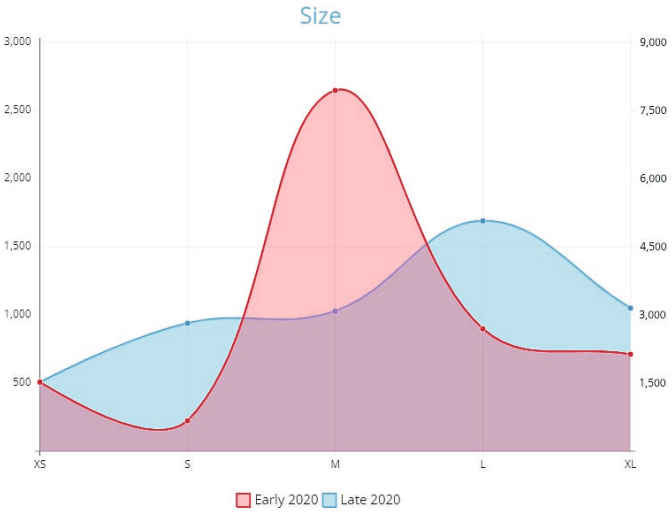

Fig. 11. Graph depicting comparison of "Size" of worlds based on population between early (red) and late (blue) 2020; source: prepared by the author

CONCLUSIONS

Virtual reality and the cyber architecture associated with it are scaled representations of a sandbox like design conditions when compared to the real world. The space created in these virtual worlds will more than likely never exist in the real world as it is uneconomical and in most cases still impossible and impractical to build. VR does not require the vast majority of technical and specialist equipment to support the general functionality of a building, and so those designs are pure fantasy for the most part. However, if humanity does decide to shift the amount of time spent online rather than in the consciousness of the real world, then those supporting elements and constraints of real world ar-

chitecture will not be needed [H. H. Achten et. all 2000]. HVAC installations, sanitation equipment and piping, structural reinforcement, electrical infrastructure and all the other crucial elements of buildings could be simplified and kept in the real world, while the aesthetic features of buildings will be reimbursed in the virtual world. Brutal, simple, lackluster interior designs with minimal decoration of the tangible building, and the lavish, on demand customization with infinite budget and possibilities of Virtual Reality and digital graphical representations of space may be what the foreseeable future might hold in store for humanity.

Designers and architects that will work purely in the digital world will have a task of constantly upgrading knowledge of trends in the digital world, just like those of the tangible world, with the exception of updates and "patches" to their designs [E. Komarzyńska-Świeściak et. al. 2021]. The profession of an architect will start to become entangled with that of a programmer, as it is happing now with parametric architecture and the use and design of robotics in prefabrication, site prep and specialist fabrication means. Coding skills and the ability to create simulations is no longer a futuristic aspect of the 21st century designer, as most architectural companies require workers to hold knowledge in those fields. The difference between tasks of an architect of the real world and that of the virtual counterpart would be that buildings could be updated very easily with little effort, unlike that of real world architecture that requires time, effort and considerable funds. Digital architects of tomorrow will need to shift their knowledge from the structural and engineering field to the programming and CGI specializations that go hand in hand with the creation and maintenance of virtual reality and the society that finds shelter inside.

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