C.A.R.D. Research Proposal

(PG05)

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1. Introduction

1.1. Personal Motivation

I have always been interested in new technology and new media since I was young. On the 24th of February 2016, the UK's first-ever Virtual Reality Festival called “VRUK” was held at Ravensbourne. VRUK brought together some of the biggest companies in virtual reality to share, discover and try out the latest technology. It was one of the greatest experiences of my life. When I attended this event, I realized that was what I wanted to do. As I put the head-mounted display (HMD) on my head, I felt like I was floating around between spaceships in the universe or I was locked in a maze being chased by human-sized Pac-Man ghosts, as if trapped in a nightmare. I was fascinated by the amazing experiences that brought new worlds and remarkable interactions to me in a physically immersive, interactive presentation. That is, there were new things I had never seen before. After that, I wanted like to focus on learning the processes and systems of VR and I chose this system as a medium to realize my project.

1.2. Primary Question

We are seeing a surprising phenomenon that the whole world is being developed by computers and smartphones. It is obvious that our lives have been changed by the development of technology. The change is absolutely natural. Our life is marked by a progression of media to communicate and experience ideas. In the past, we experienced remarkable change called the internet revolution which has transformed the world. The most recent step in the progression is the use of smartphones. It is the trend the internet has moved into the smartphone. Nowadays, this is very common phenomenon that we can often see many people who are addicted to their own smartphones. Obviously, the smartphone is very important thing as a powerful communication tool for people and companies. On this point, I feel that a new trend must appear soon and I think it can be virtual reality. This is because VR is a tremendous technology beyond time and space in that it has huge impacts on the world. This thought process led me to my initial question: “How can Virtual Reality affect various industries?”

In this document, I will research the definition of VR, its history, market and predicted effect. Then I will explain what I have done for my project based on VR.

1.3. Subject, aims and scope of research

In this document, I aim to explore virtual reality (VR) with storytelling and my project deals with a fly called “Diary of a fly” which is the change of perception that creates content through the VR. The reason why I chose the topic is that I found myself trying to swat a fly when I saw it in my room a few months ago. I wondered why I tried to kill it without knowing about it. Obviously, flies are very familiar to us as we can often see them in our daily life. Even if many people do not know about flies they just consider them as harmful insects and try to swat them. In this project, I would like to know about the fly in various ways what it is, how it flies, how it sees the world and I want to provide an experience in perspective of the fly. The purpose of this project is to

learn about virtual reality system and to provide people with a great experience through the VR. The created VR film will be based on an interesting story which also includes experimental values, visual art and effective sound/narration. Furthermore, it will be more developed so that I will create a game as a final project. As a result, I will examine articles that explore what VR is, how it is evolved, what the benefits and drawbacks of VR for us are and how it will change in the future along with researching my topic.

2. Research Process

2.1. What is VR originally?

The meaning of virtual reality as a medium is used in various ways such as a computer simulation of a real or imaginary world. Virtual reality is an artificial environment that is created with software and presented to the user in such a way that the user suspends belief and accepts it as a real environment. In virtual reality, users can be performers who are able to interact with simulated objects or experience new things in real time. This remarkable experience could not only provide users with a sense of depth and immersion but also improve concentration. According to the book called “Understanding virtual reality” (2002) by William R. Sherman and Alan B. Craig, there are four key elements to a virtual reality experience which are virtual world, immersion, sensory feedback and interactivity. The next section explores these elements.

2.2. The four elements of VR

2.2.1 Virtual world

The term virtual world that is created by the computer system is not reality.

A computer-based virtual world is the description of objects within a simulation. When I view that world via a system it brings the objects and interactions to us in a physically immersive situation. Hence, we can experience it through virtual reality (Sherman and Craig, 2002).

Image 1. A future of Virtual world image (The VOID, 2016)

2.2.2. Immersion

This term can be used in two ways: mental immersion and physical immersion.

In discussion of most media, “being immersed” usually refers to an emotional state or a feeling of being involved in the experience. The state of being mentally immersed shows “a sense of presence” within an environment. Physical immersion, which means that people are bodily entering into a medium produces synthetic stimulus of the body’s senses via the technology usage. This does not imply all senses but is only body immersed (Sherman and Craig, 2002).

Image 2. Environmental Awareness – virtual reality (Byrne, 2015)

2.2.3. Sensory feedback

VR can allow participants to select something by using a controller or positioning their body unlike traditional media. The VR system provides direct sensory feedback to participants based on their physical position. That is to say, the system can track the head of the participants and many of the major body joints. In this way, participants can get several sensory feedbacks from the VR environment (Sherman and Craig, 2002).

2.2.4. Interactivity

It is one of the most important elements in the VR. When you are using gloves and HMD (Head-mounted display), you can shoot a gun or fly in the air as a bird. That is, the reacted result that responds to your actions is interactivity. The element encourages participants to engage and get deeply immersed (Sherman and Craig, 2002).

2.3. The history of VR

Virtual reality has a long history that has been developed constantly. I will look at how technology has evolved and how key pioneers have paved the path for virtual reality as we know it today. There were early attempts at virtual reality. Over time mankind has been slowly

but surely creating ever richer ways to stimulate our senses. Things really began to take off in the 20th century, with the advent of electronics and computer technology. The below painting is intended to fill the viewer's entire field of vision, making them feel present at some historical event or scene. The earliest attempt at virtual reality is surely the 360-degree panoramic painting from the nineteenth century.

Image 3. Battle of Borodino (Roubaud, 1812)

In 1838 Charles Wheatstone's research demonstrated that the brain processes the different two-dimensional images from each eye into a single object. Viewing two side by side stereoscopic images gave the user a sense of depth and immersion. The later development of the popular View-Master stereoscope was used for "virtual tourism". It enables users to focus and understand on the storytelling the image has. (Smith, 2010)

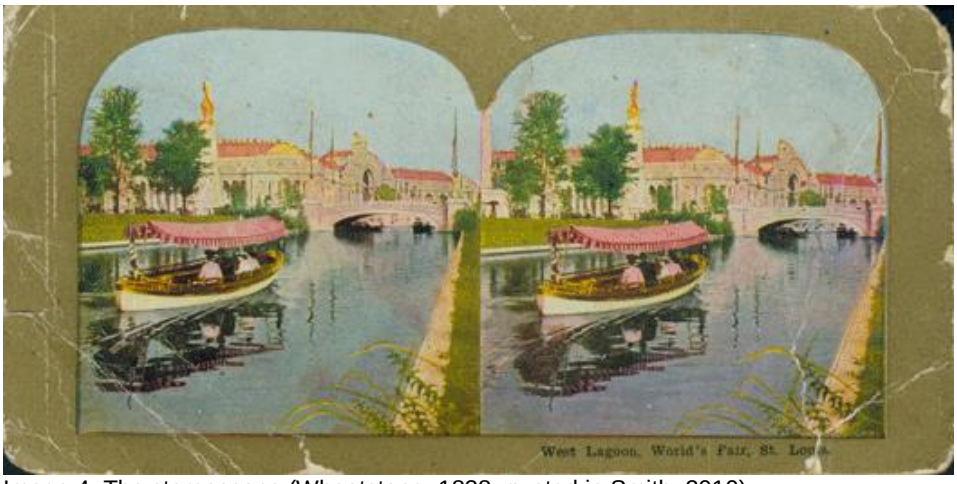

Image 4. The stereoscope (Wheatstone, 1838, quoted in Smith, 2010)

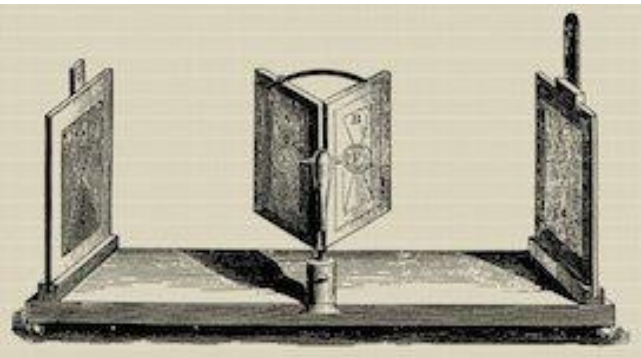

Image 5. The lenticular stereoscope (Brewster, 1849, quoted in Press reader, 2016)

Image 6. The View-Master (Gruber, 1939, quoted in Press reader, 2016)

Link Trainer The First Flight Simulator

In 1929, Edward Link created the “Link trainer”. This device was the first example of a commercial flight simulator, which was entirely electromechanical. It was controlled by motors that linked to the rudder and steering column to modify the pitch and roll. The Link trainer was used for many pilots to train and improve their skills during world war II (JOHNSON, 2001).

Image 7. The Link Trainer (JOHNSON, 2001)

Science fiction story predicted VR

Image 8. Pygmalion's spectacles (Weinbaum, 1935, quoted in Offenhartz, 2016)

In the 1930s, science fiction writer Stanley G. Weinbaum provides people with a new experience through a story with a pair of goggles he made. That was users can experience a fictional world through holographic, smell, taste and touch. It showed a part of possibility how VR device get evolved and strong relationship between VR and storytelling (Offenhartz, 2016).

Sensorama

In 1961, Morton Heilig who was cinematographer created the "Sensorama" which was an arcade-style theatre box that enables users to see all the senses. It contained stereo speakers, a stereoscopic 3D display, fans, smell generators and a vibrating chair. This device was intended to fully immerse the individual in the film (Payatagool, 2008).

Image 9. Sensorama (Heilig, 1961, quoted in Offenhartz, 2016)

The first VR Head Mounted Display

Morton Heilig's next invention was the "Telesphere Mask" and it was the first example of a head-mounted display (HMD) despite for the non-interactive film medium without any motion tracking. The headset provided stereoscopic images and wide vision with stereo sounds (Offenhartz, 2016).

Image 10. Telesphere Mask (Heilig, 1960, quoted in Offenhartz, 2016)

Headsight (First motion tracking HMD)

In 1961, two engineers (Comeau and Bryan) produced "Headsight" which was the first precursor to the HMD as we know it today. It incorporated a video screen for each eye and a magnetic motion tracking system, which was linked to a closed circuit camera. The Headsight was not only developed for virtual reality applications, but also to allow for immersive remote viewing of dangerous situations by the military. Head movements would allow the user to naturally look around the environment. Headsight was really meaningful in that it was the first step in the evolution of the VR head mounted display but it lacked the integration of computer and image generation (Needham, 2014).

Sword of Damocles

In 1968 Ivan Sutherland and his student Bob Sproull created the first VR / AR head mounted display (HMD). It was a large and scary looking contraption that was too heavy for any user to comfortably wear and was suspended from the ceiling. The user would also need to be strapped into the device. The computer generated graphics were very primitive wireframe rooms and objects (Needham, 2014).

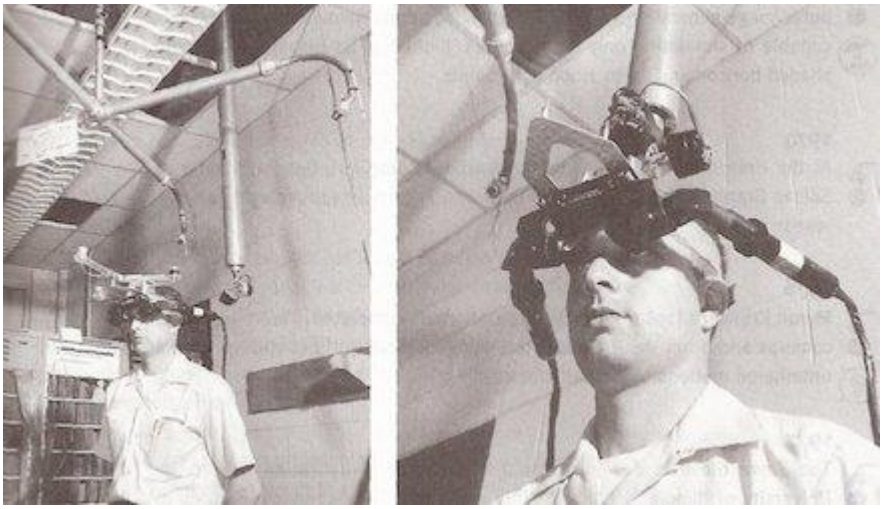
Image 11. Head-mounted-display (Ivan Sutherland, 1968)

Artificial Reality

In 1969, Myron Kruegere who was a virtual reality computer artist created a series of experiences which he termed “artificial reality” in which he made computer-generated environments. This technology enabled people to communicate with each other in a responsive computer generated environment. (Peddie, 2013)

Virtuality Group Arcade Machines

In 1991, The Virtuality Group launched a range of arcade games and machines. Users would wear a set of VR goggles and play on gaming machines with real-time stereoscopic visuals. Some units were also networked together for a multi-player gaming experience (Hodges, 2015).

SEGA announce new VR glasses

Sega announced the Sega VR headset for the Sega Genesis console in 1993 at the Consumer Electronics Show in 1993. The prototype glasses had head tracking, stereo sound and LCD screens in the visor. It has some problems that would forever remain in the prototype phase despite having developed 4 games for this product. This was a huge flop for Sega (Matt Hill, 2014).

Image 12. Sega VR headset (Matt Hill, 2014)

Nintendo Virtual Boy

In 1995, the Nintendo Virtual Boy (originally known as VR-32) was a 3D gaming console that was hyped to be the first ever portable console that could display true 3D graphics. It was first released in Japan and North America at a price of $180 but it was a commercial failure despite price drops. The reported reasons for this failure were a lack of colour in graphics, there was a lack of software support and it was difficult to use the console in a comfortable position. The following year they discontinued its production and sale. (Needham, 2014)

Image 13. Virtual boy (Nintendo,1995)

Disney (family arcade centers)

In 1998, Disney opened the first of their DisneyQuest family arcade centers, which featured numerous VR attractions using both HMD and projection-based visual displays (JOHNSON, 2014).

Image 14. Dactyl Nightmare (Disney, 1998, quoted in JOHNSON , 2014)

The Matrix

In 1999, the Wachowski siblings' film **"**The Matrix**"** hits theatres. The film featured characters that are living in a fully simulated world, with many completely unaware that they do not live in the real world. The Matrix had a major cultural impact and brought the topic of simulated reality into the mainstream. This film indicated how important storytelling is and how new technology can change the world in near future (ROLLINS, 2016).

To sum up, the defining features of VR are that it is a medium of communication that also it requires physical immersion. And it provides synthetic sensory stimulation which means it can immerse the user in storytelling.

It is obvious that VR is not the latest technology, it is existing technology from a long time ago. VR has been developed according to desires of human beings that believe people need something to stimulate their senses. The history of VR also shows a relationship between storytelling and technology through fields such as game and film. From now on, I will explore the market of VR focused on software and hardware, what the drawbacks and benefits of VR are, what storytelling is and what the relationship between VR and storytelling is.

2.4. Market (Hardware/Software)

At present, many companies in the world expect that Virtual Reality will become the most innovative industry globally and those companies are investing huge amounts of money in the technology. According to an article on "VRS" (virtual reality society), recent global companies have released interim virtual reality products such as the Google Cardboard, Samsung gear, Oculus and HTC vive. It also seems clear that 2016 will be a key year in the virtual reality

industry. Multiple consumer devices that seem to finally answer the unfulfilled promises made by virtual reality in the 1990s will come to market at that time. These include the pioneering Oculus Rift, which was purchased by social media giant Facebook in 2014 for the staggering sum of $2BN. When the Oculus Rift releases in 2016 it will be competing with products from Valve corporation and HTC, Microsoft as well as Sony Computer Entertainment. These heavyweights are sure to be followed by many other enterprises, should the market take off as expected.

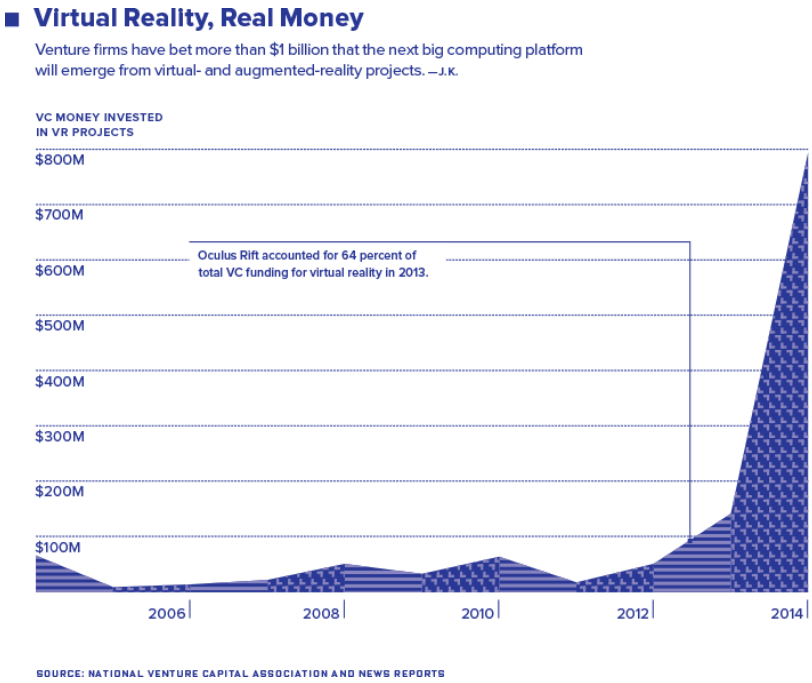

Image 15. Virtual Reality, Real Money (coletta, 2015)

In the image 15 illustrates that there was no significant change in investment in VR until 2012 after which there has been a remarkable increase of investing money for VR since 2013. The real money for VR in 2014 was recorded about at 800 million dollar which has increased about eight times more than in 2013.

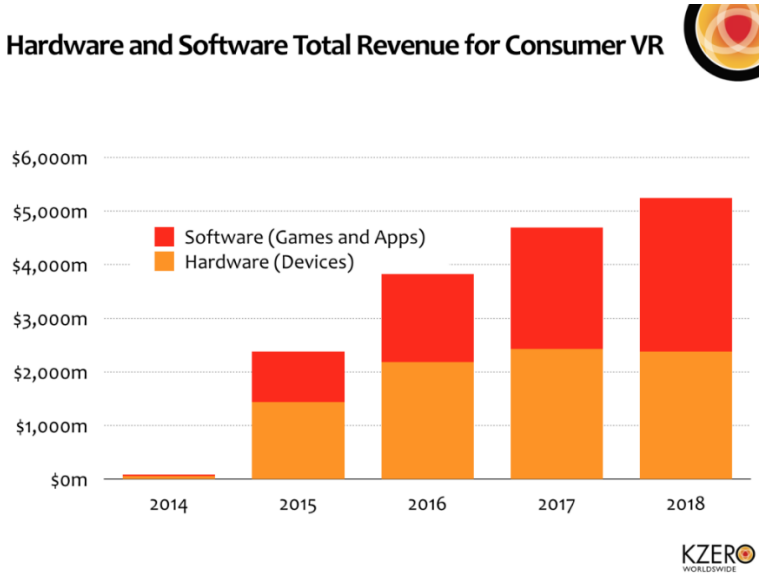

Image 16. Hardware and Software Total Revenue for Consumer VR (Kzero, 2014)

In regards to image 16 above, it indicates that the number of hardware devices has increased but the amount of software is quite less than hardware in 2015. However, it forecasts that the amount of software will continue to increase and eventually it will be close to the hardware revenue in 2018.

Overall, images 15 and 16 show how many potential possibilities the VR industry has in the future. We can tell from these charts and images that companies and customers not only have a great deal of interest in the development of the VR industry but also the companies investigate to dominate the VR market in advance. I would say the advanced technology such as the VR system could have a huge effect on modern societies in the world.

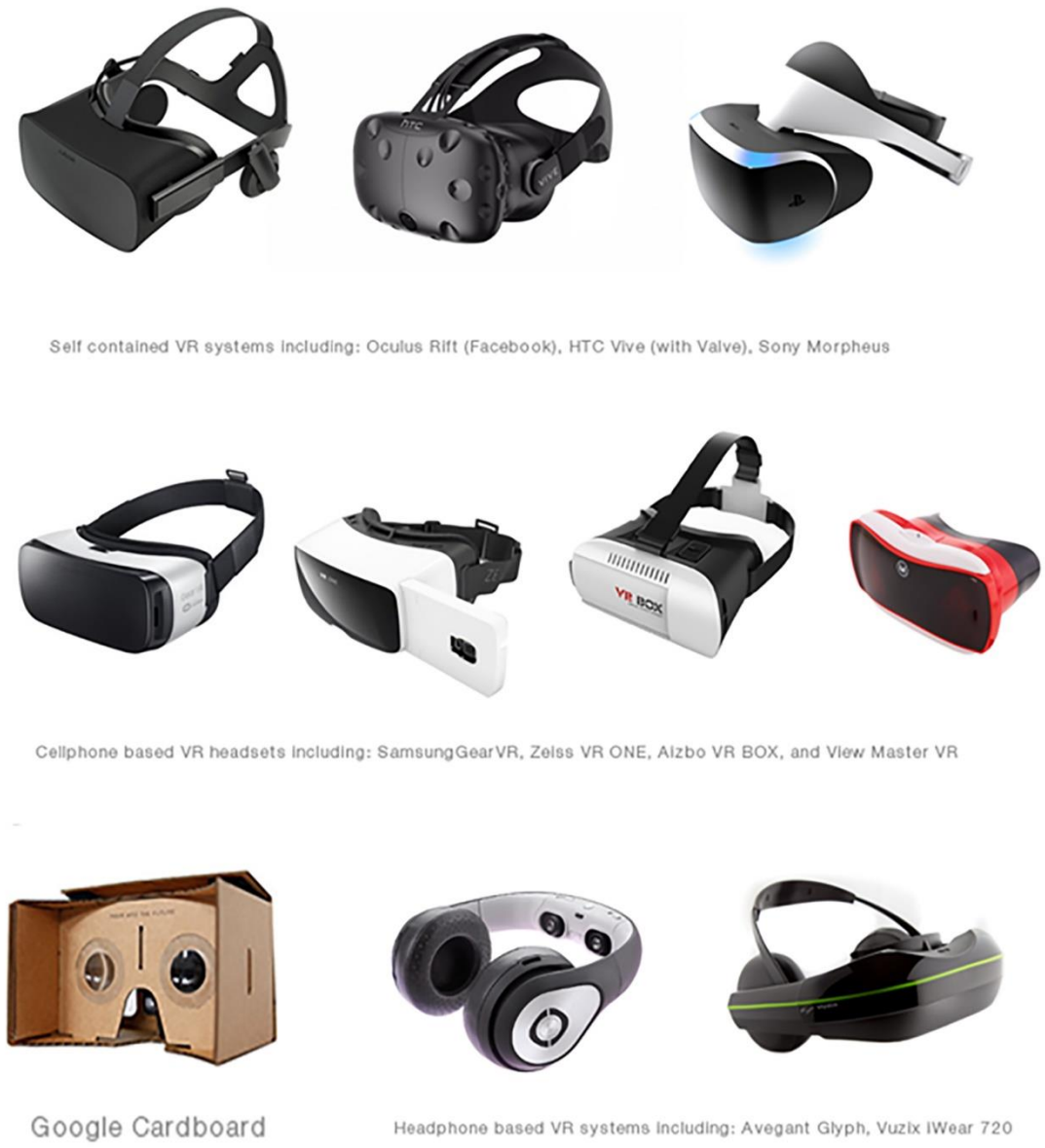

Image 17. VR hardware systems (Gigantic, 2016)

2.5. Advantages and disadvantages of VR

2.5.1. What are advantages of VR?

VR can expand the range of communication in the future.

Some people can meet their friends in person and talk to each other using VR system whilst staying at home. That is, the VR can go beyond computer screens like limited-space as well as time. In this point, VR is a more advanced technical innovation than the smartphone. Many people could build their dreams or imaginations through VR. They go anywhere and anytime in the VR. For example, people can explore jungles or oceans without going there in person. It will be really useful for disabled people as well. VR can be used in a wide range of industries. For instance, armies can train soldiers for military purposes without risk of accident. Medical accidents could be reduced by using VR technology. In the case of the film industry, VR can provide much more immersive experiences to people when they watch a movie.

2.5.2. What are drawbacks of VR?

VR might prevent people from fulfilling their sense of achievement

For example, if someone tries to climb a mountain and reaches at the top, they may feel achievement through the process of climbing. In other words, they would be proud of themselves. However, if it happens the same way in VR, they would never know the feeling. VR can also have negative effects on human health. Sometimes, there are several technical problems in the VR system and these issues can cause simulator sickness like vomiting and dizziness when experiencing it. The simulator sickness is similar to motion sickness. When you have motion sickness, your body thinks you are moving, and your brain does not. The inner ear is telling the brain it senses motion, but the eyes are telling the brain that everything is still. The most common scientific theory behind motion sickness is that the body assumes it is poisoned and hallucinating, and responds by vomiting to void the perceived toxin (Orsini, 2014).

It is expensive to experience VR for the public because the VR system requires a high quality of computer and particular devices to be operated. In other words, people who want to experience it need to pay a lot of money. In addition, VR devices like HMD, controllers and data-gloves do not look so good and make people uncomfortable when wearing them. Their look should be more simple than before. Many people in modern society suffer from social isolation. It is not real relationships in the VR. They might feel even more difficulty in how to communicate with others face to face when they are living in VR.

2.6. Storytelling in VR

2.6.1. Why is storytelling important?

Storytelling has numerous important effects on our daily lives. It has been one of the most effective sources of inspiration known to people. Storytelling is a very powerful and interactive

source and a fantastic teaching tool, imparting lessons of life to individuals of all ages. Originating with the dawn of society and enduring into this age of near instantaneous access to all information, storytelling has proven its resilience and necessity beyond any shadow of doubt. Its effect has shaped our world in numerous and varied ways, some obvious to see and understand and some which remain more obscure and elusive in their significance. The value of storytelling holds as a source of inspiration and, as a teaching tool, makes it the most important tradition mankind possesses. In some industrial fields such as advertising and film production, storytelling has a strong power that not only enables customers to get more engaged in the brand. That is, storytelling encourages development of emotions and feelings in people.

2.6.2. The relationship between VR and storytelling

For a long time, varied media have used different forms of storytelling to convey key messages or promote brands. The media have been widespread in almost every field. Computers and smartphones what we have known are good examples of that. However, VR has now firmly emerged as new technology. That is to say, it can change the pre-established paradigm of communication as well as the whole world. In the old days, we only had pantomime and a black and white camera standing in front of the theater. Then we learned to use the camera, panning it around, trying out different shooting techniques and points of view (POV), zooming into people's faces, cross-cutting, multiple locations that cinematography was born. Nowadays, VR in a film is a new form of medium. It will completely change the game industry when we figure it out. The POV and cinematography break the 4th wall that separates the actors, and camera goes away. The users of VR are not just passively looking at a flat screen and they will be able to move around too. Hence, VR could encourage users to immerse in the film and it provides them with a new experience. In this way, this VR as a new medium will have a good impact on my project that allows users to get more engaged in storytelling compared to other media.

2.6.3. The elements of VR storytelling

To make a storytelling in VR, several elements should be considered (Gajsk, 2016). The below tips are some main factors to consider when building the virtual storyline:

Tip 1. Ease it in

The first aim has to achieve with the users is making them feel comfortable. Oculus Story Studio recommends 30-second introduction video. This will give the users time to adapt to the headset first and familiarize themselves with the new medium. This "settling in" period is enough for most users to adapt to the environment and relax before the storyline begins (Gajsek, 2016).

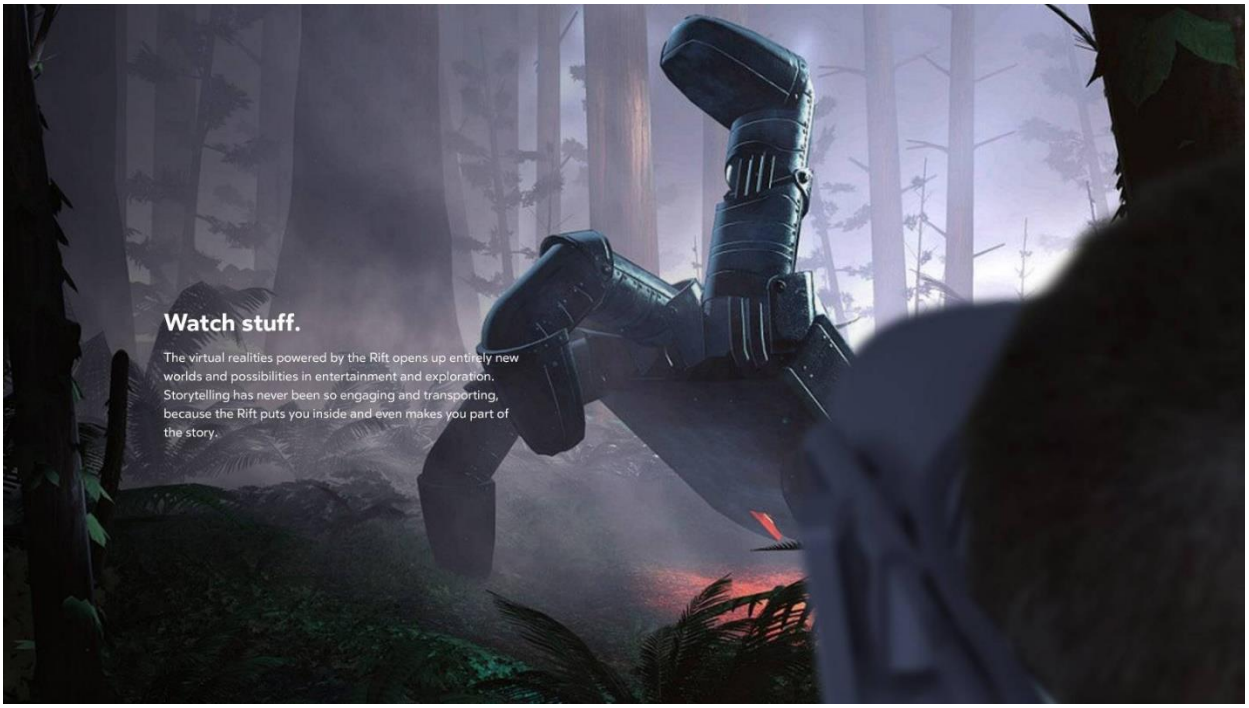

Image 18. Lost (oculus story studio, 2015)

Tip 2: Guide the Viewer's Attention

There is no rule or guideline where to look when users are experiencing VR. The director should decide beforehand how to guide the user's attention in VR. This guideline can be sound or lighting cues to attract their attention which will encourage the users to focus on storytelling (Gajsek, 2016).

Tip 3: Presence

Total immersion is often the end goal of VR storytelling. The first obstacle director needs to overcome is a functional technology. This means that director has to prevent or repair the stitching issues; use the highest quality picture possible and the right sound equipment. Second, the director has to trick the user's brain into thinking that the VR world is "real" by figuring out a way to trick the mind to accept things that are clearly not real (Gajsek, 2016).

Tip 4: Pacing

A sudden shift from flat screen frame to a 3D immersive world can be confusing and overwhelming at first. This problem can cause a sickness such as headaches or nausea. Directors need to set up comfortable environments for users in VR (Gajsek, 2016).

Tip 5: Conditional Storytelling

Will you take a red pill or a blue pill? The below scene is from the film “Matrix” where two types of pill result in different consequences which indicates an example of interactivity in VR storytelling. This element in VR provides users with an immersive experience (Gajsek, 2016).

Image 19. Matrix (The Wachowskis, 1999)

Tip 6: Experiment

The tips so far are not the rules of VR because there are not proper guidelines for VR storytelling and the VR will be improved by artists, studios and related companies constantly in the future. Through many trials and errors, VR will be more advanced to be the mainstream medium (Gajsek, 2016).

2.6.4. What are the differences between VR and 360-degree video?

VR comes in different forms, either Computer Generated Images (CGI) or display live images from the physical or real world. There are Heads Up Displays (HUD), or Heads Mounted Displays (HMD) that can superimpose CGI onto the real-world . This function is often referred to as mixed or Augmented Reality. A 360-degree video, also known as 3D VR and Stereoscopic VR, use multiple cameras that capture the image from 360 degrees. There are some differences between VR and 360-degree video in that 360 video is not really a VR. Many people tend to misunderstand the differences between VR and 360-degree video. According to The Jungle's Sarah Ullman, there are several key differences between 360-degree video and VR. The really substantive differences between 360 and VR occur when VR headsets are not 'tethered' or connected to a computer that restricts movement in a physical space (Ullman, 2015).

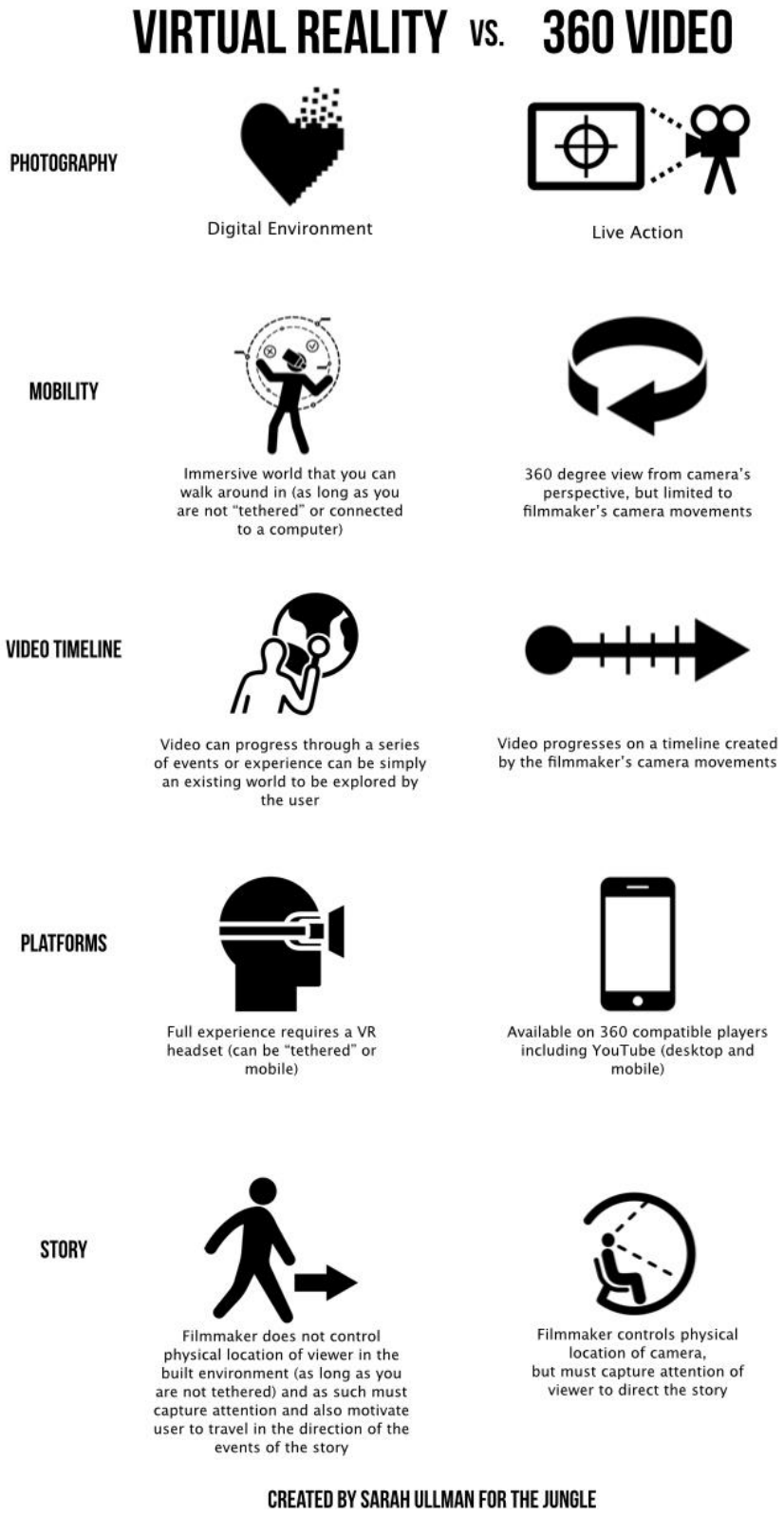

Image 20. Virtual Reality vs 360 Video (Ullman, 2015)

3. Final outcome

“Diary of a Fly”

This project is the story of a fly made with virtual reality (VR). The change of perception is the main concept and its aim is to provide audiences with immersive and interesting experiences that the users can fly like superman in the project.

There are two types of project which are a short film and a game. In the film, it deals with the story of a fly that looks back on its past from the larvae to adult life. The film is being developed into a game that all scenes are focused on the story of film and users can experience interaction with it. The project is based on creative visual images and sounds are shown by head-mounted display (HMD). Through the “Diary of a Fly”, I would like to make people think about the fly in a new way in that the fly is also a creature which should be cherished.

3.1. Short film

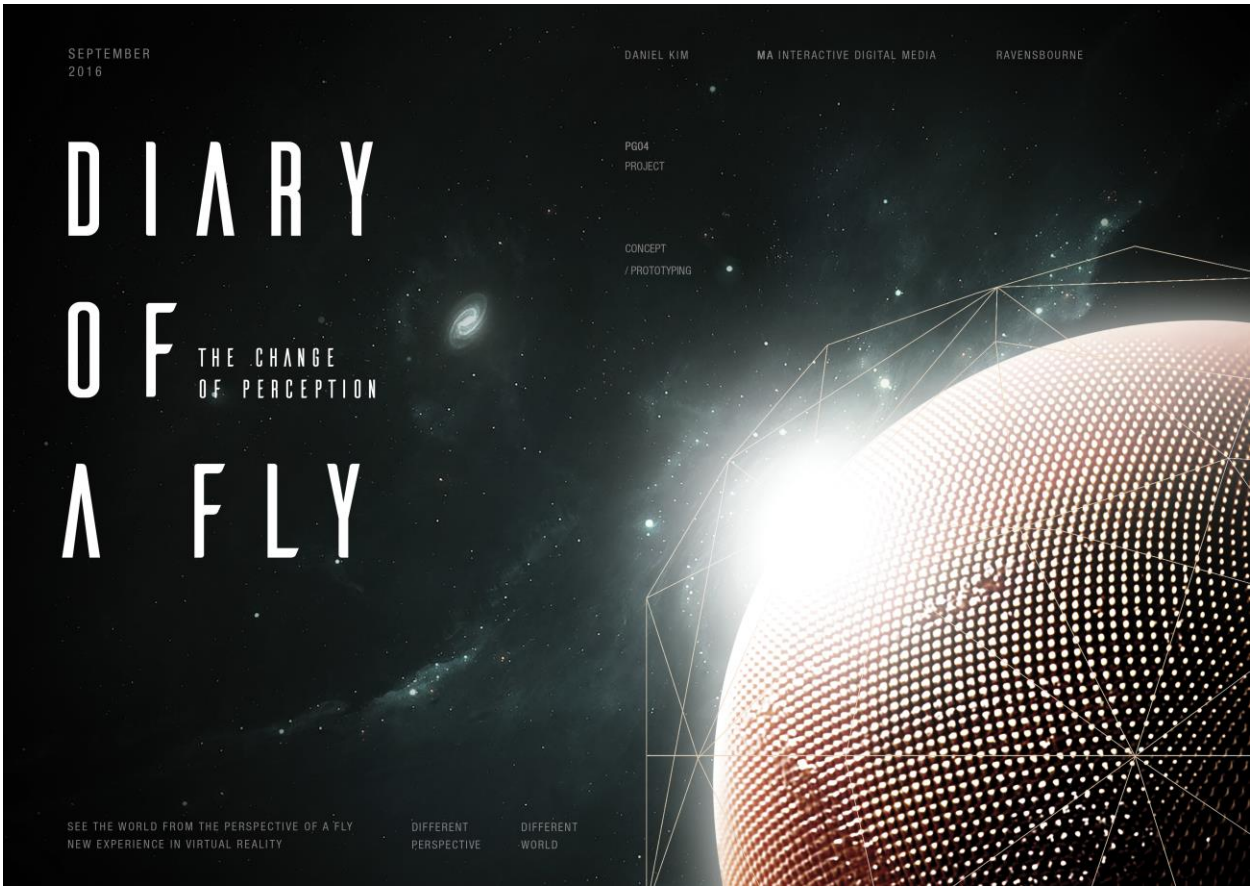

Image 21. The main poster of “Diary of a Fly” (Kim, 2016)

3.1.1. Narration script

The narration is one of the most important elements in the film. The whole story is written by myself and It is narrated by Samuel Lee who is my Korean friend.

“When I was young, I was abandoned by my parents and grew up at a dumping ground.

As I was disabled from birth, I couldn’t walk well and have never been far away. I always hid in the dark and a quiet place that no one ever came. For me, there is no such thing as freedom.

Most of the people treated me like a fool and they hated me because I look ugly and disgusting

Every day was painful and miserable. And then one day, I found myself floating in the air and I realized that I could fly! Since then, everything has changed. I can still remember that very moment. It was awesome! From then, the world looked beautiful and I had no reason to hide in the darkness anymore, Now I can fly faster than anyone else and see the world in a wide perspective that nobody else could. Finally, I found freedom and I am living a gorgeous life. No matter what anyone says, I am going to go my way. I am a great fly.”

3.2. Game development

I was wondering why insects are attracted to lights, and why they keep circling around the light.

According to the Infosci-dictionary, it explains the reason why certain insects are attracted to lights. The insects use the light as a navigational aid. This phenomenon called “phototaxis” which means they are naturally attracted to it. That is to say, the phototaxis is a kind of behavior that occurs when whole organism navigates or tracks in response to a light stimulus. The main idea of the game (Diary of a Fly) is from this theory and a behavior of finding lights in the game is the same as flies trying to find freedom for their lives as a storyline. There are four levels which environments are composed of shell of larvae, city, nature and space in the game. Each level requires a mission that tries to find light and enter the next step. During the game, users can feel like flying and looking around great landscapes.

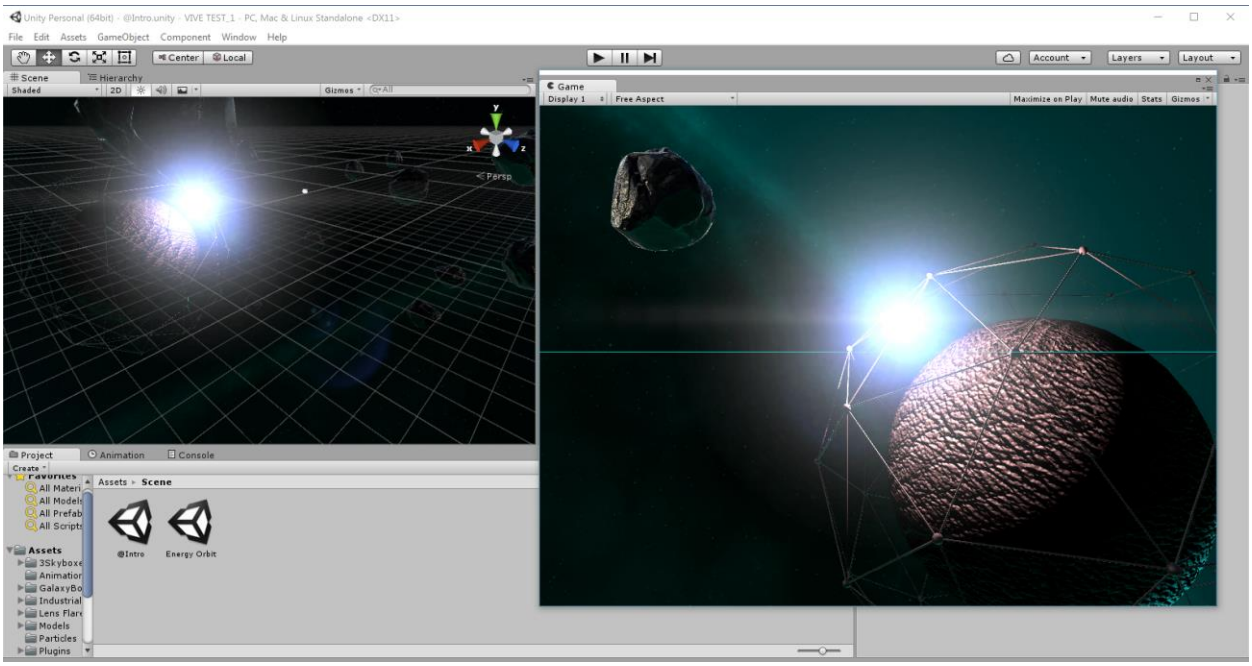

Image 22. Introduction scene in the game (Kim, 2016)

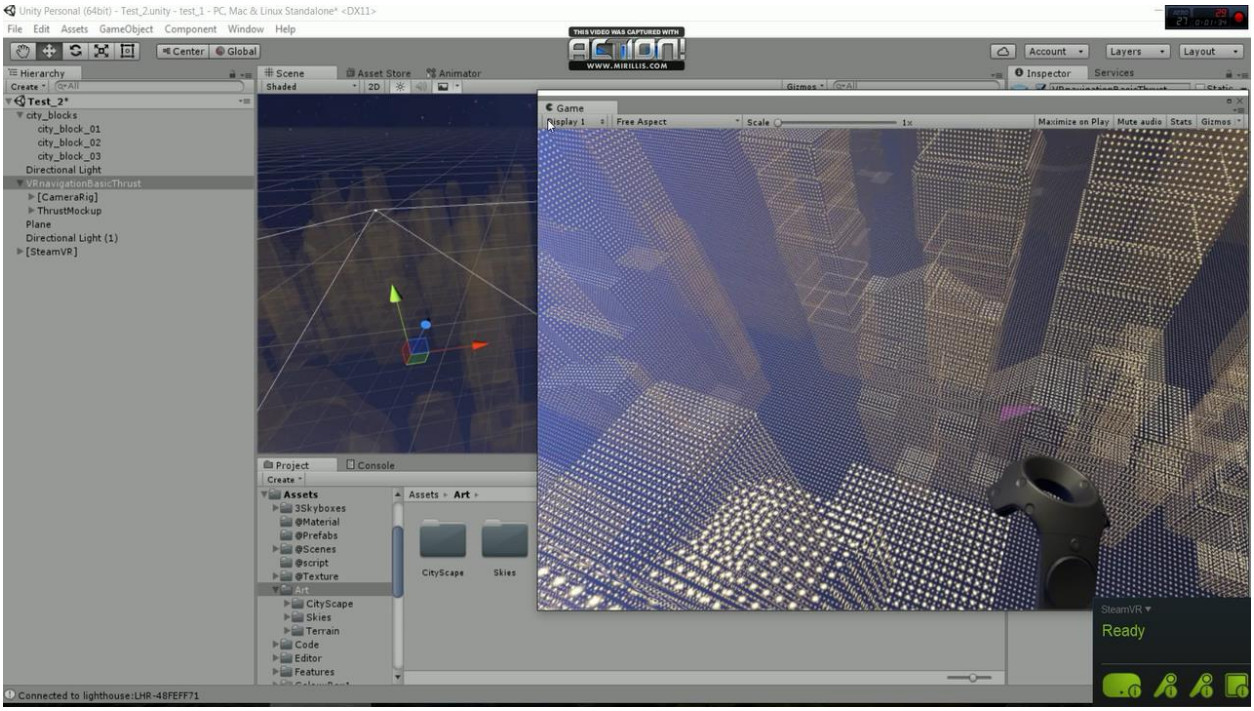

Image 23. A part of scenes in the game (Kim, 2016)

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