# An Overview of Commercial Virtual Reality, Application and Social Consequences

## Introduction

Virtual reality (VR) is not a new idea. In 1935, Stanley G. Weinbaum’s short story *Pygmalion’s Spectacles* first talked about a virtual reality system with holographic recording of smell and touch. With the development of computer technologies, VR is no longer a mere dream, but a tool that a lot believe will be everywhere in our world in a near future. In this article, we will first briefly introduce recent progress on the commercial VR field, followed by the impact and changes that VR can bring into our society.

## Definitions

VR, abbreviation for virtual reality, refers to technologies that bring virtual things into human’s world. There are three major types of VR, which are complete VR, mixed reality and augmented reality.

Complete VR replaces the real world. The entire environment and all the items are artificial and virtual. Examples are HTC Vive and Oculus Rift. It’s worth noting that complete VR is not a well-defined terminology, but in this article, we use complete VR to distinguish this category of VR with VR as a concept.

 Augmented Reality (AR) provides an interface on top of reality. AR device doesn’t create a new world. It adds additional information and/or objects based on real world. Google Glass is a typical AR device.

 Mixed Reality (MR) is a mixture of VR and AR, where real and virtual objects coexist and cooperate with each other (Paul Milgram, 1994). Microsoft HoloLens is a MR device.

## Recent Progress

Here we use four important milestone products to illustrate the recent progress on commercial VR field.

Google Glass. Google Glass caught people’s eye immediately after it was announced in 2012. It integrated with lots of advanced technologies like prism projector for display, bone-conduction transducer, voice recognition, and gave people a glimpse of future daily life.

Oculus Rift and HTC Vive. They are the first modern complete VR headsets that mass produced and publicly available, both equipped with similar hardware and aiming to give user fully immersive experience. Both are already supported by over 1000 games SteamVR, including big titles like Resident Evil 7, and receive generally positive customer feedback online.

Microsoft HoloLens. HoloLens is a completely new device, with which users can see through the lenses, and user can add, remove, interact naturally with any virtual objects into the real world. As mentioned, real and virtual objects coexist and cooperate with each other in MR. HoloLens is the first implementation of this concept.

Smartphone VR. Smartphone VR is a simplified version of complete VR. What makes it special is its accessibility and relatively much lower price. The only requirement is a smartphone, which is ubiquitous in daily life. And their prices are much lower compared with its competitors. However, its experience is not as good as these premium products because of the constraints of smartphone and cost. This gives people a chance for experiencing VR with low price.

## Application

### Games & Movie

Entertainment is what VR are mostly about nowadays. It’s easy to understand that game and movie experience with VR will be more immersive and excited, since you are surrounded by the circumstances. Maybe the man in this photo will be if you are playing a horror game or switching a horror movie using VR.

What’s more, new game types will emerge as VR improves. Microsoft demonstrated its Project X-ray, a game in which people fight against aliens on their home. Currently player can only interact with virtual objects in a virtual world. The interactivity between real and virtual world gives infinite possibilities for future game experience.

The improvement will be more substantial for movies. Not like games which rely highly on real time rendering, movies have abundant time and computing power to render every frame to ensure its graphical quality. What’s more, the sense of presence will be enhanced on top of 3D, IMAX and more technologies that have already been applied and proved successful. Imagine standing on an alien planet where epic story took place beside you.

### Education

Students usually find it hard to understand 3D objects. It is hard to reproduce 3D objects from their 2D projections, especially when the edges and lines are too complicated. However, VR provides an environment where students can observe objects from difference angles, or even interact and operate with it, which makes the learning process more effective. Microsoft demonstrated a way to learn human body in a more effective way via HoloLens.

### More

Communication can benefit from VR. Previous communication ways fail to convey personal characteristics, expressions and moods so that it became less natural. But VR can do that by simulating a body in front of you and making it feel like talking face-to-face. What’s more, VR can be used to visualize the idea to minimize the cost on explaining an idea, which leads to better efficiency during a talk.

VR can improve productivity as well. We use prototyping as an example. Prototyping is an essential process on manufacturing which usually costs a lot. But if prototyping can be done in a virtual world, its cost will be lowered greatly, the method and process are simplified, and designer can also adjust it at his/her will, instead of having to reproduce another prototype with lots of time and money.

## Social Consequences

### New Huge and Promising Market

With all these advantages and changes that VR can bring into our life, VR is another huge market which may recover the depressing economy.

Take touch screen for an example. Touch screen is another invention that significantly changed how people interact with machine. In 2012, it’s expected that the global shipment of touch screen displays would be doubled to 2.8 billion in 2016. Today, touch screens are everywhere in our life. Similarly, VR, as another invention that will change the interactivity between human and machine, will have a market with billions of dollars. Current VR market is already big with 13.9 billion, but this figure is expected to reach up to 143.3 in 2020, which is massive.

This is one of the reasons that vast amounts of investments are being done into this field by lots of leading companies in technologies in recent years. This list shows the investments that are announced after CES 2017.

These investments and products that have already been developed strongly prove the viability and potential of VR.

### Productivity Boost

VR’s potential on productivity is immense.

First, working on a virtual world can be silent, distraction-free, which leads to increase on productivity. Taking on a VR headset, the user can completely immerse themselves on their work without external visual or aural distractions. What’s more, the user can even personalize their own virtual environment to meet their practical and/or aesthetical needs, make the most use of them and get things done quicker and better.

What’s more, collaboration works more efficiently. Collaboration is a key factor in real world because of the complexity of modern research and engineering. As described above, communication can be improved by simulation and reproduction of human expressions and by visualization and realization of ideas and prototypes. This also eliminates distance between communicators, and allows remote real-time collaboration possible. People can work together even though they are in various locations physically.

Third, one in a virtual environment can have adequate equipment to aid work. For example, the worker can have as many monitors as he/she wants in a VR environment. For jobs like programmer, designer and editors, multiple monitors can significantly improve productivity, because they make large amount of information displayed and accessible quickly without frequently interacting with keyboards and/or mouse to change the windows. It’s possible to buy multiple monitors and set them up in a real world, but it costs so much, and the space in real world is limited, whereas on virtual world getting a new monitors costs nothing, and space is unlimited.

### Addiction

Addiction is that a person is obsessed in virtual world to an extent that normal life is negatively influenced. Internet addiction, especially video game addiction, has caused broad attention and discussion in our life, which will continue with the arrival of VR.

Factors leading to video game addiction remain and even are more powerful. For example, Massive Multiplayer Online Role-Playing Games (MMORPGs), like World of Warcraft, are games where player spends time on finishing assignments, but they can never finish all of them due to regular addition of tasks. A research was done and revealed the existence of a group of people who played an average of 63 hours per week and shows negative symptoms. Principal factors, like reward mechanism (in MMORPGs, it is finishing tasks and getting rewarded; in First Person Shooter, it is killing enemy and winning the game), don’t vary much no matter whether playing current game or VR games. What’s more, the efforts on increasing graphical quality, sound effect, attractiveness of game plot won’t be as direct and useful as putting the player right into the virtual world and enabling them to get involved themselves. The sense of immersion and involvement when exploring VR world can be so addictive that it would finally interfere normal life, just like video games on addicted people.

Therefore, anti-addiction must be put into consideration before VR gets popular and mass applied. Restriction of VR usage of specific group, like teenagers, can be helpful, but what’s more important is to guide people to use VR appropriately and positively. Realize the nature of VR as a tool, and utilize its full potential, but never miss the chance to enjoy life with the unique and magical experience that VR can provide.

### Losing Willingness for Real World

Consider a virtual world where there is fresh air, blue sky, infinite food supply, advanced technology and anything you want, then will you enjoy yourself in virtual world or work hard in real world? Consider a shop where you can do anything in a virtual world with just few dollars, then how much time will you spend in it?

It makes sense that many people would choose to live within a happy virtual world rather than the challenging, tiring, and complicated real world. In this case, virtual world replaces the real world to a degree that people are more willing to stay in virtual world instead of real one.

Obviously, this means slowdown and even backward of human development. Just like the case in late Qing dynasty where people, including ordinary people and officials, were addicted by opium and spent hours on smoking instead of studying or working every day, which contributed to the weakness of China during that period, it can significantly slow down the development of humanity. It’s saying that VR may be the last invention of humanity, for after that, people are obsessed by virtual world, and there won’t be any development any more. There is an explanation to Fermi paradox that after all physical needs are satisfied, the “social and entertainment technologies”, like VR, instead of productivity or exploration, will become the main driver of social development, and scientific research and development are deserted. As a result, they are limited and “prisoned” in their home planet (Webb, 2006).

What’s even worse is that people may lose the ability to distinguish from real and virtual world. In the case of movie *Matrix*, hardly had anyone realized that they are no longer in real world, and anyone who realized it would be hunted and finally eliminated by machines. In the case of *Fallout 3*, which is set in a post-nuclear-war world, survivors in Vault 112 designed a system to immerse themselves within a virtual world to escape sufferings in real world. They designed a computer to administrate the system, but finally, they are slaved by the computer.

It’s a severer version of addiction. In fact, when technology is advanced enough, whether it’s appropriate to allow “emigration to virtual world” is controversial: It does make life better (by satisfying anything people want), but it is a revolutionary change of humanity and no one knows what it would lead to. but it is a revolutionary change of humanity and no one knows what it would lead to. What’s clear is that it is a one-way path from people lose willingness in real life to people lose the chance to return to real world; when the last human who knew that people were living in a virtual world passed away, so did the real world.

## Conclusion

Nowadays, commercial VR products have been/are being developed, demonstrated and even available to public. They show us what daily life will be like, how entertainment will be like, and how our life can be improved in a forecastable future, and even give us a chance to experience the immersive experience by ourselves with various cost. VR, as an intuitive and natural interaction between human and machines, applying in games, movies, education, communication, manufacturing etc. opens a huge and promising new market, and boosts productivity. However, addiction becomes a topic that everyone should pay attention to, and if not dealt with properly, addiction may cause significant problem to and fundamental change of humanity. If measurements are taken to maximize the pros and minimize the cons, we can expect a new world where real and virtual objects coexist and cooperate with harmony.