Exploring Industry Applications to Ethical and Responsible VR Development

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

Since the release of the first viable consumer virtual reality (VR) headset, the Oculus Rift, back in 2016, the VR industry has undergone a veritable explosion of growth. Accelerated by the onset of the COVID-19 pandemic, which forced people worldwide to stay at home and devise ways of connecting with each other that circumvented isolation requirements, virtual reality seemed, to many, like the ideal way for users to interact with other people safely. This lead to rapid expansions in both the VR user base and VR-related research, development, and market value, and this exponential growth continues even today (Vardomatski, 2022).

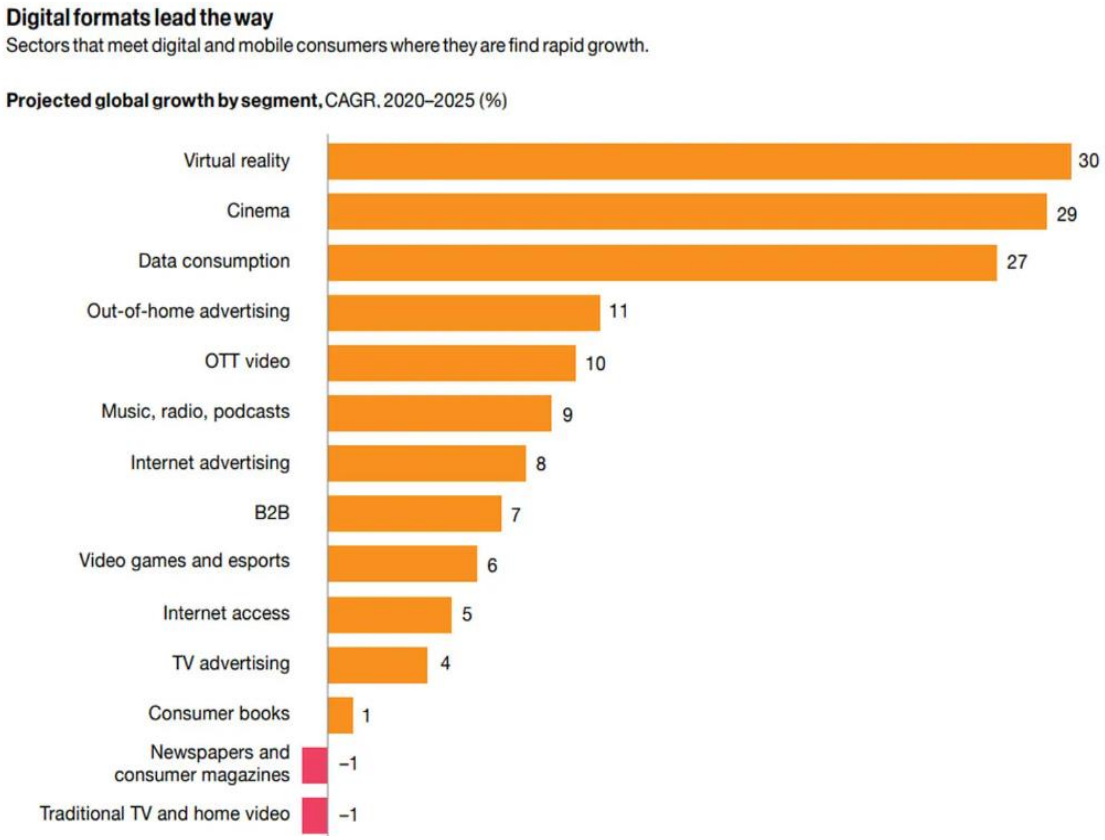
However, given that both that VR is a revolutionary new technology with applications like nothing before it, and that the VR industry is still very much in its infancy, it is difficult to predict what sort of ethical concerns may arise over the course of the technology's advancement. As such, this research paper seeks to answer the following questions: what ethical issues from other, more established industries may pose a potential threat to the development of VR technology in an ethical manner? Further, how can lessons be imparted from these issues, whether they have been successfully addressed or remain outstanding, to the VR industry? And finally, how can these lessons be generalized to best effect across a wide range of VR experiences designed for varying purposes? Through primary use of the Documentary Research methods and the lens of the STS theories of ethics of care and technological momentum, this paper will provide a comprehensive projection into what ethical issues the VR industry may face in future.

Background and Significance

Even before the onset of the COVID-19 pandemic, the virtual reality industry represented one of the fastest-growing digital markets. During the boom to the industry aided by the pandemic, the VR industry achieved a 31.7% increase in profits in fiscal year 2020 (Acadicus, 2021) and is projected to maintain a 30% compound annual growth rate over the next five years (Fig. 1).

Figure 1

Projected Compound Annual Growth Rates by Industry



Due to the wide variety of production purposes and lack of standardization in where these VR applications are available from as a result of multiple companies vying for market share, data is sparse on the prevalence of specific categories of software that are available right now in terms of virtual reality applications. However, it is abundantly clear that industries across the board are

waking up to the potential of virtual reality to cause monumental shifts in their standard operating procedures. Furthermore, a full 78% of Americans are aware of the presence of the virtual reality industry, aided in part by the pandemic (Dataprot, 2023), yet only one in five American adults have ever tried VR. Given the extensive consumer awareness of VR products and rapid growth in profits for the VR industry, it is a foregone conclusion that the VR industry is hitting its stride in terms of expansion. It is not a question of if VR will become mainstream, but when.

Given this exponential growth, it is imperative that ethical issues unique to virtual reality be preemptively identified and countermeasures be put in place by the industry as a whole to contain or eliminate the potential harm to users.

Research Methods

Given the litany of print sources on ethical issues facing a variety of industries as well as the proliferation of VR technology, this paper will seek to answer the questions outlined in the introduction via the use of the Documentary Research method. Peer-reviewed articles written by industry experts, as well as statistical data generated through both artificial intelligence applications and other research methods by statisticians, are the primary documentations used to produce the conclusions contained within this paper.

Results and Discussion

The fields of medical technology, general industry job training, and consumer video games currently are projected to dominate the VR industry in the near future (Acadicus, 2021). As such, it is prudent to analyze these fields and ethical issues that face them as the primary source of future projections of VR ethical issues.

a) Medical Applications

One of the most prolific applications of virtual reality technology is that of mental or physical wellness VR experiences, ostensibly under the purview of the medical industry. One of the most well-known advances in the medical industry is the passing of the Health Insurance Portability and Accountability Act (HIPAA) in 1996, which mandated national standards on caregivers keeping patients' health information private without the patient's explicit consent to reveal such data, at least in most cases (Centers for Disease Control and Prevention, 2022). This act remains in force today as the baseline law to protect patients' data privacy and the right to keep access to sensitive personal information about themselves limited to persons of their choice.

However, there already exist a number of health and wellness VR applications for which standards have not been developed or enforced – instead, such applications are not properly governed by rules and regulations pertaining to keeping information private. For example, placing on a VR headset naturally means that an application, to work correctly, has access to users' height and physical movements, and some may choose to collect and retain information about users' emotional states, voices, and facial expressions (Slater et al., 2020). As these applications are often unlicensed for medical treatment and distributed to users without significant oversight, they bypass many of the regulations that legitimate medical treatment must comply with, potentially violating that data privacy.

In addition, many of the VR experiences that already exist which market themselves as health and wellness applications are of objectively poor quality by medical standards. In a study on free VR applications available to consumers, researchers found that a mere 22% of 50 applications identified as possible tools for therapeutic purposes and meeting study criteria were judged to have *any* mental care potential upon trial (Bell, 2021). It is possible that free market principles will naturally weed out the poor quality applications, ensuring that only those of high quality remain viable and profitable. However, for an individual user to determine that an application does not work for them, they generally will try it out in some capacity first before making that conclusion. This is a significant problem when considering that poorly implemented VR experiences may have significant negative impacts, especially on vulnerable populations such as those struggling with mental illness, even when only used once (Boeldt et al. 2019). This is woefully reminiscent of the state of the healthcare industry under full free-market principles before regulators stepped in to enforce standards – fad "medicines" such as snake oil claimed to treat diseases in the 19th century, doing more harm than good to consumers, just as many VR applications claim to treat mental health issues despite having no scientific or medical basis for such assertions.

As such, to avoid the potentially catastrophic effects of unlicensed and poorly developed medical applications, the VR industry should seek to adapt medical standards into experiences listed as being for health and wellness, and VR companies must aggressively enforce these standards to prevent the distribution of experiences that do not meet them. While self-regulation is by no means a reliable solution, it is the best stopgap measure until VR becomes a large enough industry for government regulators to take effective action. This would avoid the worst

effects of belatedly addressing these ethical concerns in the medical industry, where harm to patients and public outcry was what forced the creation of HIPAA in the first place.

b) Job Training Applications

VR developers have already created experiences designed to teach necessary industry-related skills, especially in scenarios that are difficult to replicate in a real-world training environment (Cipresso et al., 2018). While this offers unmatched benefits in terms of being able to replicate an environment without consequences to train professionals in skills that they may not be able to practice effectively otherwise, it carries with it the imported ethical issues from the industries for which applications are being designed.

One ethical issue is that of how effectively these training applications are being designed to accurately reflect the complexity of problems as they appear in reality, which introduces the potential for maltraining. For example, because VR applications are designed by humans who carry individual biases, such biases may manifest themselves in the design of the applications. One such example is in a virtual reality training program that was tested on police officers to measure the effectiveness of a VR experience on dealing with neurodivergent individuals. Police officers were placed into a VR training environment to practice de-escalation tactics when interacting with such individuals (Kent et al., 2022) – however, the virtual neurodivergent individuals were instead acted out by neurotypical persons to play the part of what they thought those who are neurodivergent would act like. The training program did not produce measurable benefits when compared to standard classroom instruction. However, the officers who participated reported far greater engagement and immersion with the VR program as compared to the classroom instruction.

The core lesson to be taken from this is that regardless of their effectiveness, the all-encompassing environment that virtual reality applications provide indisputably causes the VR experience to be far more memorable to average users, and as such, the experience will be far more impactful on a user. Since the population of VR developers does not tend to overlap with the population of various industry professionals, the development of VR experiences must be heavily policed by those professionals to ensure that training experiences meet a very specific set of requirements. If they do not, it is easy for such experiences to fail to provide good training, teaching skills incorrectly with potentially catastrophic results. In the case of the above study, if an officer attempts to de-escalate in the field with a tactic that worked in the training simulation with a neurotypical individual, the training failure could lead to injury or loss of life. Standards must be developed and enforced for training applications, as with any industry standard job skills program, to make certain that maltraining does not happen.

c) Video Game Industry Applications

Despite burgeoning uses in medical and job training applications, consumer VR applications still dominate the market in terms of how much they are used by those who have VR headsets. 64% of VR users cited gaming as the primary functionality that they use their headsets for, followed by TV/movies, watching sports, and social media as the next most preferred categories (Dataprot, 2023). Given this, it naturally follows that ethical issues facing the wider video gaming industry are likely to be ported into the virtual reality industry if explicit action is not taken to prevent this. One of the most significant ethical issues facing the gaming industry as a whole is the widespread use of insidious tactics by game companies related to designing their software applications to increase user retention and monetization, often resulting in crippling financial burdens on users and gaming addictions.

The foremost example of these tactics is the monetization strategy of employing “chance algorithms” in video games, where individuals will pay real money in return for the chance of winning an in-game reward rather than buying such a reward outright. Unlike standard gambling, where it is illegal for children to participate, no such law exists to counteract children engaging in spending real money on these algorithms, which essentially offer the same addictive potential on the developing mind. In one study of 611 UK individuals aged 13-24, one in ten individuals had spent money that they could not afford to repay when spending money on such chance algorithms (Rpsh, 2020). Additionally, the use of these algorithms is heavily linked with the development of addiction to mobile games, which is linked to depression, anxiety, and a myriad of mental health issues that significantly decrease quality of life (Wang, et al. 2019).

For-profit game developers must make money, and the same is true of virtual reality developers. While games available on the virtual reality platform are, for the most part, sold for a single price without transactions contained within them, the immersion granted by the virtual reality platform in concert with the heavily marketed benefits of VR for both the standard consumer and vulnerable populations alike naturally encourages game studios to implement convincing, enthralling game worlds that entice users to spend inordinate amounts of time in them, and to proceed to use these harmful and predatory monetization tactics. Rather than simply being on a phone or computer screen, instead, it is the very world designed by a developer which is being tuned in just the right way to squeeze as much money as possible out of its users. With non-VR development studios already consciously aware of this profit potential, it is only a matter of time before the most popular VR gaming applications adopt this monetization method if steps are not taken to prevent it. As such, an important balance must be struck – development studios need to take care to design their VR applications not to prey on vulnerable users who are

susceptible to overspending, and to implement systems that are conscious of the addictive potential of an escapist VR world and try to keep users from falling into an addictive habit with their game.

d) Generalization

Individually, industries' ethical concerns and how professionals in those industries counteracted them provide useful insight into how the VR industry can avoid creating applications that bring unintended harm to users. However, it remains important to generalize this insight, as VR developers' time is limited and combatting all of these issues individually poses too great of a challenge for them while still meeting the requirements of an industry-pace software development lifecycle. First, I will explain how the STS theories of technological momentum and ethics of care relate to VR ethics to provide context for this paper's conclusions, summarize the main lessons from ethical issues facing VR from the perspective of the industries I have discussed, and combine both into a discussion on the most likely source of ethics issues as VR technology continues to advance.

Under the theory of technological momentum (Hughes, 1969), new technologies start under the influence of societal pressures, but slowly become intertwined with society and become far more difficult to actively control. This provides the impetus for decisive action to be taken to address the issues, as any entrenched operating practices that the VR industry implements will become far harder to change as the technology gains ground. Essentially, any necessary changes must be made while the industry remains in a state that is small enough to affect change on a large scale- further expansion and development of the VR industry would

make effecting change exponentially more difficult, ultimately limiting the possible timeframe of any changes to the near future.

In addition, the ethics of care theory can be applied- the VR industry, as a revolutionary new technology, should be seeking to use all possible avenues to make its impacts positive for the community; otherwise, its users will fall prey to poor practices and have their experience worsened. This could be simply for the duration of their experience, or perhaps, as with the medical impacts on vulnerable populations, cause lasting harm due to catastrophic mental or physical experiences. The VR industry has an ethical duty to address these concerns in a methodical and meaningful way, as the health and wellbeing of their users depends on it.

Through the lens of these theories, for the VR industry to operate under the optimal state with respect to ethics, a primary concern for the industry should be to ensure that applications only have positive effects under ethics of care, and that decisive action is needed to correct the course of the industry before practices become established under technological momentum.

Additionally, the primary takeaways from ethical issues facing VR for the three main industries listed above are this: for medical VR applications, care must be taken to ensure that treatments meet medical standards, or in other words, follow guidelines for real-world treatment. For job training VR applications, it is essential that, to avoid maltraining, VR applications correctly reflect the environments they are designed to replicate. For the video game industry, VR applications should avoid predatory monetization tactics and ensure they are not encouraging escapism and addiction, to keep their users grounded in the importance of healthy habits and their real-world lives. These lessons have a consistent throughline and point to a single conclusion: as VR technology improves in scope and capability in the future, the most important

ethical issue is to ensure that VR developers do not make their experiences diverge too far from reality in the pursuit of advancing the technology.

Ever since virtual reality technology came into being, developers and consumers alike have fantasized about the creation of a true virtual paradise, where everybody can go to escape reality and where the physical limitations of the real world need not apply. There, the worries and hardships of life would vanish in the face of designing the world itself to be perfect.

While an interesting goal, there is much ground to tread between that idealistic view of what VR could be and where it is now, and the truth of the matter is that "virtual reality" is just that – virtual. The experiences of those using VR clearly have tangible impacts on them in the real world, and this theoretical bar of separation between the virtual world and the real one is, for the foreseeable future, an impossibility. There is much temptation for the trailblazers of the VR industry to surge forward and pursue this dream, but right now, it is important to develop VR experiences with an acknowledgement of what VR is right now – a fascinating technology with incredible potential, but fundamentally, an aid to normal life in the real world rather than an escape from it.

What this concept means in practice is that the reins need to be pulled on the industry. The novelty of VR is not a blank check for anyone to develop anything that they want to and distribute it to users under the idea that there is no harm to do so, or that the impacts of what happens in virtual reality are also contained within virtual reality. Development in the industry needs to proceed slowly and deliberately – every application that is produced with flaws makes it more difficult to effect change across the industry as a whole.

Conclusion

While the virtual reality technology moves towards entrenchment in our society at a breakneck pace, it still remains possible to rein it in and ensure that VR development occurs in an ethical manner, consistent with societal and engineering principles of conscious design meant to bring benefits to users and to protect them from potential harm. It is vital that we adapt the lessons learned from the mistakes of well-founded industries into the virtual reality industry; after all, errors are to be expected when treading on new ground. In addition, it is essential for the industry to consider the ramifications of pursuing at all costs the desired end-state of the VR industry, a true virtual paradise. The greatest tragedy possible would be for the VR industry to repeat the failures of the past and stumble over the challenges it is inevitably going to face, especially when so much potential exists in it to change the world for the better.

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