PARK LANE

WHITE PAPER SERIES:

VR IN SPORTS

The Virtual Future of Sports Viewing and Training

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INDUSTRY OVERVIEW

At a time when color television was a rare site, the future of entertainment was born. In 1962, Morton Heilig hand-built a fully-functioning three-dimensional video machine, that allowed users to ride a virtual motorbike through Brooklyn, while experiencing the sounds, winds, vibrations and smells of being on the road. The device, named the Sensorama was brilliant and revolutionary.[1]

Morton Heilig's 1962 Sensorama
Source: Wikipedia

Nevertheless, it failed miserably. To say that the Sensorama was ahead of its time would be a drastic understatement. The world was still adopting the idea of color television, let alone virtual reality. People queried at the feasibility of being able to simulate reality in a practicable manner. However, what was once a figment of science fiction imagination, has transformed into a multi-billion-dollar industry.

Virtual Reality (VR) is a computer generated, three-dimensional, environment that can be interacted with by a consumer. The technology is most commonly accessed through the use of a headset which projects images to the eye and reflects changes based on the user's movements.[2] While the price and quality of headsets span a full spectrum, developers are moving quickly to establish market share in their respective niches of the industry. In 2016, VR experienced a worldwide revenue of $1.8 billion. However, by 2020 worldwide revenue is forecasted to reach $28.3 billion. The software component of VR, alone, is projected to hit $16.2 billion by 2020.[3]

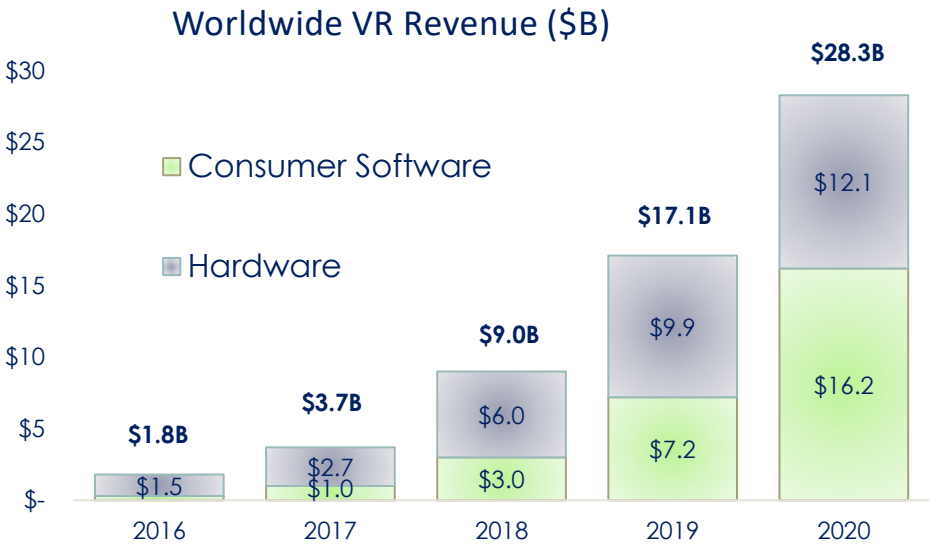

Exhibit 1: Worldwide VR Revenue by Segment
Source: SuperData

THE PAST

In its initial stages, VR was used exclusively for training purposes within high-risk industries. Military operators and medical surgeons utilized the technology as a means for safe, realistic practice without the potential for costly consequences. In the late 1980s and early 1990s, the market began to see the introduction of VR into mainstream entertainment, with Sega and Nintendo vying to create the first totally immersive video

1) Engadget
2) Oxford
3) SuperData

INDUSTRY OVERVIEW CONT.

game platform. Since then, with improved graphics, frame speed and data storage, Sony PlayStation announced Project Morpheus, a VR add-on to their PS4. The industry experienced its first large M&A deal when Facebook acquired Oculus, a vertical VR company that created the Oculus Rift, for $2 billion. Meanwhile, Google introduced a low-cost, cardboard head mounts to create VR universes that can be accessed solely using one's smartphone.[4]

A display of multiple VR headsets
Source: Amazon

THE FUTURE

Investment in VR has grown exponentially over the last decade and is not likely to falter. Ownership of VR headsets is expected to experience a 28.4% year-over-year increase, hitting 68 million by 2021. Technology companies are placing a large emphasis on VR. In 2016, the number of companies working in VR increased by 40%. Facebook has over 400 employees dedicated to the advancement and adaptation of VR. Google, Apple, Amazon, Samsung and other industry-giants are striving to develop the next generation of hardware and software to make VR commercially viable for enterprise.[5]

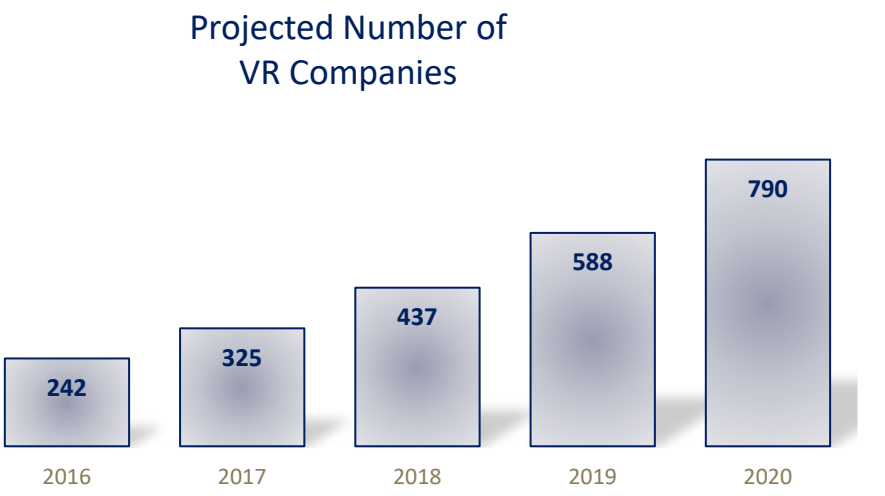

Exhibit 2: Projected Number of VR Companies
Source: SuperData

The commercial use of VR is becoming increasingly viable. Home furnishing stores like IKEA have developed VR systems that provide consumers a real-life visual of how products will fit into their home. Applications of the technology are spreading past expected markets and into unforeseen areas including non-profit organizations such as Amnesty International, UNICEF, and World-Wide Fund for Nature. These organizations utilize VR to bring clients to ground zero of the social, political and environmental issues that they are combating. In the marketing world, VR will continue to disrupt many traditional functions, especially those associated with media, lifestyle, and entertainment.[6] The sports industry, in particular, represents a promising area of expansion for VR. The technology has the potential to completely transform the entire viewer experience by creating an immersive, once-in-a-life-time, on-field experience for users. Park Lane foresees VR impacting the industry by altering the viewer experience and improving the quality and efficiency of athletic training.

4) OSSIC
5) SuperData
6) TechCrunch

VIEWER EXPERIENCE

With VR poised to redefine the viewer experience, the technology's ability to revolutionize how fans consume sporting events generates tremendous untapped revenue potential. VR offers fans the ability to immerse themselves in any sporting event through various features, such as the capability to change one's viewpoint. Sports fans can truly experience a live event firsthand, without leaving the comfort of their own homes.

VR aims to provide fans with a lifelike experience
Source: Orange County Register

The sports consumption medium has shifted over the past several decades. Companies are realizing the value VR broadcasting creates. Sports leagues around the world are searching for strategic initiatives to fully engage younger generations. Many feel that VR will enable leagues to attract this demographic, while further engaging their current fan base.

The sports industry is at a critical intersection where technology and live events are being successfully integrated to optimize the consumer's viewing experience. For example, sports viewers have adapted to the presence of AR in sports. In today's age, watching football without the projected first-down line, or baseball without the strike-zone, would resemble an outdated experience. As these add-ons have become commonplace in the viewing experience, VR is on pace to make a similar impact.

Several companies and leagues have started to shift the sports viewing experience landscape through their own lenses. Of the major sports leagues, the NBA has made the most progress in adopting VR into the fan viewing experience.

VR AND THE NBA

This past year, the NBA and NextVR, a technology company that captures and delivers live on-demand virtual reality experiences, completed their first season of broadcasting live games in VR. The technology provided viewers around the world access to courtside seats.

The NextVR camera at a Warriors games
Source: NextVR

To further amplify the real-life feeling of VR, NextVR is developing software to create a consummate in-venue experience. NextVR CEO, David Cole, declared that "At some point you'll be able to get up and physically

7) SportTechie

VIEWER EXPERIENCE CONT.

walk around inside the experience — whether it's recorded or live — like you're there."[7] NextVR is a clear leader in the professional sports space, having worked with nearly every major sports league. The use of their technology at events such as The Masters, U.S. Open, and Bundesliga matches demonstrate the evolution of the space.

VR AND THE MLB

Professional leagues are using VR to enhance the fan's experience at-home and at the stadium. The MLB has partnered with Intel's True VR to personalize the fan experience of watching games remotely. The model allows fans to customize their viewing experience, based on their unique preferences. By using a remote, fans can toggle between camera angles, audio forms and statistic visuals. This shift further differentiates VR from traditional TV by creating an interactive atmosphere.[8]

The MLB attracts home viewership through VR
Source: Eon Sports VR

While certain aspects of VR are discouraging attendance and interaction, the San Francisco Giants are utilizing the newfound technology to engage fans while in the ballpark. The VR headsets are used to engross fans in inaccessible environments, such as in the dugout or at home plate. Using VR to supplement, rather than replace, traditional viewing mediums provides teams with a greater opportunity to captive their fan's viewing experience.[9]

The Giants offer a unique virtual reality expierence for their fans
Source: San Fransico Giants Twitter

CORRECTING THE DOUBTS

One of the few criticisms of VR is the loss of the social aspect of attending or watching a sporting event. Undoubtedly, the social element is a vital component of the sports viewing experience that cannot be ignored. Despite the validity of this concern, Park Lane feels there are mitigating options, including the implementation of interactive applications with VR. Social media has simplified the idea of virtual interaction as a means of social interaction. Many people, particularly younger generations, use social media as one of their primary forms of communication. With this in mind, Park Lane foresees social media playing a major role in the viewer experience. Facebook itself has become involved in VR with its acquisition of Oculus, a prominent VR platform. Other companies, such as LikeLive, are aiming to fill this social void in VR. Eventually, Park Lane envisions the VR industry incorporating the social element of viewing sporting events. We believe that as the VR experience sees widespread adoption, the social aspect will follow.[10]

8) Intel
9) SportTechie
10) LA Times

ATHLETIC TRAINING

VR has established itself as a powerful training resource for athletes that can provide a competitive edge. VR enables athletes the opportunity to relive games, competitions, practices and much more. Athletes can utilize the technology to improve technique, learn specific plays or better understand certain concepts, without the risk of physical injury. While many professional and collegiate coaches have voiced their support for VR, Arkansas head football coach, Bret Bielema, is especially keen on utilizing the technology to enhance training:

"It literally changes the dynamic of trying to teach someone on a learning curve in a short amount of time; it allows you to process and learn the game without actually playing."[11]

FILM REVIEW

VR is especially useful for film review sessions. The immersive qualities that VR provides athletes allows for an extremely enhanced and more realistic viewing experience. As a result, athletes and coaches can gain significantly more valuable information from film sessions than ever before. Details in film that might have gone unnoticed prior to the introduction of VR can now can be examined to a great extent. The greater detail can allow players or coaches to discover weaknesses that could be potentially exploited. The technology greatly enhances the efficiency and accuracy of film sessions.

IMPROVING PERFORMANCE

STRIVR Labs, a company that utilizes VR to improve athletic performance, provides athletes the ability to view film from specific vantage points. For example, a quarterback can relive and reanalyze previous games from his own point of view. This can allow him to reexamine plays and better understand an opposing defense. By being able to study the visual cues of a blitzing defense, he will be better prepared for future games. When asked about STRIVIR, Joe Montana, NFL Hall of Fame Quarterback, stated "I wish I had this when I was playing."[12]

The Michigan football team mutilizing VR for training
Source: Sports Illustrated

The company was founded by two Stanford University graduates and has garnered support from many clients, such as the Dallas Cowboys and the New England Patriots. STRVIR's success in improving athletic performance in the NFL did not go unnoticed and the company has since been able to expand their services to several other professional leagues, including the NBA, NHL, NCAA and WNBA.

In 2015, the Washington Wizards partnered with the tech company to become the first NBA team to utilize the new technology.[13] STRIVIR films the team's practice and then uploads the content in 3D. This adds an extra benefit to the training session as it presents

11) NBC Sports
12) STRIVR
13) Washington Post

ATHLETIC TRAINING CONT.

athletes with the opportunity to view their sessions from a third-person perspective. Many Wizards' players have expressed their enthusiasm for the technology and claim that being able to analyze their shooting form from different perspectives has been extremely helpful in improving their mechanics and overall training. Ernie Grunfeld, Wizard's President and General Manager, said that the entire organization has embraced the technology and feels it greatly supplements their player's development:

"STRIVR's software is a fantastic teaching tool that allows us to reach our players in new and exciting ways while enhancing the current programs we have in place for player development. Our staff has shown great ingenuity and creativity in finding applications for the virtual reality system, and out players have responded with enthusiasm about the technology."[14]

Marcin Gortat, of the Washington Wizards, uses VR to simulatae live-game action.
Source: Washington Post

The Washington Capitals represent the NHL pioneer in utilizing VR to enhance training. Similar to the Wizards, the Capitals film their training sessions with STRIVR's cameras to allow their players the opportunity to view the session in 3D. Goaltenders, in particular, have found the technology to be extremely useful in examining their footwork and positioning. Capital's Senior Vice President and General Manager, Brian MacLellan, has expressed his enthusiasm for the technology and plans to continue utilizing it.

"STRIVR's virtual reality is a helpful tool for our team and has the capability to be a powerful teaching method. We look forward to continuing to experiment and find ways to implement virtual reality training with our players."[15]

To prove the benefits of utilizing VR in training, STRIVIR conducted a study to evaluate one's ability to read and react to a shifting football defense. The study recorded the individual's reaction time and accuracy, while using VR, and compared the results to a control group, who completed the same exercise on a tablet. The study's results heavily demonstrated the VR's superior ability to recognize acute details. The group utilizing the technology improved their recognition of defenses and reaction time by over 10%.[16]

VR products are being developed to simulate randomized play, thus giving athletes the ability to practice the strategic aspects of a game, such as court positioning or playbook memorization, without physically taxing their bodies. In today's age, player safety within professional sports is a very debated and discussed topic. VR addresses this issue by creating the opportunity to improve performance, without physical impact.

Eon Sports VR, one of the leaders in the development and advancement of sports VR,

14) SportTechie
15) NHL
16) STRIVR

ATHLETIC TRAINING CONT.

created a product that can greatly improve the batting performance of baseball players. The breakthrough product, called the WIN, synthesizes data provided by the MLB to replicate a pitcher's release style, common pitches, spin rate and breaking point. By being able to simulate an opponent's exact pitching style, EON creates one of the greatest opportunities for player preparation. The Tampa Bay Rays serve as a major proponent of the technology and have partnered with the company.[17]

Japan's Yokohama DeNA Baystars partnered with Eon Sports to create a state-of-the-art VR training system
Source: Eon Spoorts

ADDED BENEFITS

Within sports, VR extends far past athletic development and can be an extremely valuable resource for coaches, officials and trainers. Currently, the NBA is exploring the possibility of using VR to provide officials extra repetitions on foul call decisions. The English Football Association and the NFL are exploring the possibility of using VR headsets to detect mechanisms that can diagnose brain injuries. The technology aims to improve and objectify medical evaluations regarding a player's ability to return to gameplay after potentially suffering a concussion. While much of the technology surrounding VR is immature, early products are emerging to set a precedent for the future of athletic improvement, and to support the betterment of leagues and their sporting communities entirely.[18]

An athlete utilizes VR for rehab purpposes
Source: The Post Athens

VR Products are generally being developed for professional and recreational use, but cost is driving short-term development towards customers willing to pay high prices. As economies of scale and technology advancement drive down cost structures, the value to the amateur athlete is immense. Applications for consumers are endless, imagine having the value of a personal training facility and professional coach in your back yard or living room, but for the price of a VR headset.

17) Fortune
18) Phys

ANALYSIS

A key reason for VR's minimal impact on the media to date is the lack of VR content. This creates a fundamental constraint due to the scarcity of broadcast grade or semi-professional cameras capable of capturing VR content. VR's capability is likely to progress in the near future, as processing power improves, screen resolution increases, data storage advances and content creators learn how to create for the format.

As such, commercial adoption and viability is still to be determined. The market has seen flops from early-stage augmented reality products such as Google Glass. On the other hand, it took only 48 hours for the $99 version of Samsung's Gear VR to sell out over Christmas 2016. However, quality and content volume has been underwhelming for many consumers. Consumer and investor interest in the VR industry is clear, but it may take considerable time for the products to become sustainable. Further, while trade show visitors and tech enthusiasts may be willing to buy a state-of-the-art $1000 headset, a realistic addressable market for VR companies has been difficult to pinpoint. Industry trends point to a strong uptick in premium device consumption and a severe decrease in basic products. While, in 2016 light headsets accounted for over 90% of the units sold, premium headset shipments are expected to nearly triple in 2017. The primary question surrounding VR is whether or not there will there be enough consumer scale to cover the high costs of hardware and content creation. Goldman Sachs predicts that hardware costs will fall about 10-15% annually. As hardware costs fall and device quality improves, content creators will be enticed by growing demand. However, it is difficult to predict when this will occur, and how long it will take. Super Data Research anticipates that this trend will begin in the near future. They project that that light mobile headsets, such as the Google Cardboard, that currently dominate the industry will dissipate in upcoming years. Additionally, premium mobile device sales are expected to surpass light mobile by 2019, and nearly double by 2020.

Park Lane believes that 2017 and 2018 will be years of commercial exploration for VR, with teams, leagues and mass media enterprises navigating the product landscape to determine which products will help their business models over time. In such a nascent field, there are large opportunities for first-movers. However, in an industry of intense technological dynamism and investor scrutiny, a thorough selection process will be paramount to success. Investors must focus on companies that are at the forefront of technological development, and have the ability to adapt and develop tomorrow's technology.

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ABOUT PARK LANE:

Founded in 2005, Park Lane is a boutique sports investment bank that offers services such as M&A advisory, capital raising, business development, valuations, and restructuring to clients including professional sports teams and sports-based businesses.

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