Video Games, Technology, and Sport: The Future Is Interactive, Immersive, and Adaptive

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Abstract

While traditional sport spectator numbers decline, the number of viewers in interactive media such as streaming platforms, video games, and esports continue to increase. In response, Pirker offers a characterization of the new generation of consumers and the technologies opening up new avenues for engaging and immersive experiences. She demonstrates that with the help of virtual reality (VR), augmented reality (AR), and artificial intelligence (AI), among other technologies, traditional sports can follow successful strategies from interactive media. But the influence is not one-sided. Pirker also offers a picture of the two-way relationship between sports and videogames and how both industries might develop as technologies improve.

1 Introduction

There is a significant decline in interest in traditional live sports. Every year, the number of spectators in sport decreases; traditional TV stations struggle with declining ratings and an aging audience (Singer 2017). But why? The answer: Generational change. Particularly when we look at the new generations, we see new consumer behavior, expectations, and needs. For example, Generation Z doesn’t know a world without the internet, smartphones, and flexible and personalized forms of entertainment. They are digital natives who grew up in a world that is interactive, adaptable, and fast-moving. As a generation, they require interactivity and personalization. They don’t want to be passively consuming media; they want
to be part of the experience (William 2015; Beall 2016; Northeastern 2014). Traditional TV programs are not flexible enough; so, on-demand and personalized services such as Youtube or Netflix, and interactive formats like Twitch are taking their place.

While many industries are currently suffering from a decrease in audience numbers and ratings, one industry generates more revenue than the digital film industry, the music industry, and the book industry combined: the video game industry. A game like Rockstar Games’ Grand Theft Auto (GTA) generates more revenue than a Hollywood blockbuster like Star Wars (Mitic 2019).

Games are interactive, immersive, and actively involve the users. The fascination with games is multifaceted—they draw users into virtual worlds and engage them for hours. But it is not just the players who enjoy the interactive nature of games. Through services like Twitch, spectators are increasingly involved in the gaming experience (even though they’re watching not playing).

The video game industry plays a major role in the development of innovative technologies and pioneers’ new products that push boundaries for exciting gaming experiences (ESA 2013). For example, technologies such as virtual reality displays offer even more engaging and immersive experiences; they allow more realistic and innovative forms of entertainment and virtual interaction. Users can participate in comprehensive and realistic experiences without leaving the living room (Dede 2009).

Three factors—interaction, engagement, and immersion—seem to be critical drivers of successful media formats such as games and streaming services. In contrast to these interactive, personalized, and fast-paced forms of media, traditional sports seem slow and passive. So, what can we learn from video games, esports, live-streaming services, and immersive technologies to make the future of traditional sport more interactive and motivating? The answer to this and similar questions will be discussed in this chapter; I will also outline a potential future for traditional sport in terms of audience participation, immersive sports experiences, and interactivity.

2 The Role of Interactive Media in Sport

The video game industry, and gamers especially, struggle with several prejudices; for example, some would imagine the typical gamer as a young man playing shooter games alone in the basement all night. However, the number of gaming enthusiasts is large, and gamers are diverse. In America, for example, 65% of adults play video games, 46% of gamers are female, and the average age is 33 years old. They enjoy social gaming experiences; and 63% of adult gamers play with others. Gamers are also probably closer to the world of sports and have more in common with athletes than one would think. They are more likely to exercise (average 4.1 h/week) than average Americans (3.9 h/week). They like games that involve competitive elements as shown by the popularity of certain games; sport and racing
games are among the most popular genres at 11.1% and 5.8% of sales, respectively (ESA 2019). The sports games NBA 2K19 and Madden NFL19 were among the five best-selling video games of 2018. Millennial gamers (between 18 and 34 years of age) and Gen X gamers (between 35 and 54 years of age), in particular, name sports and racing games like Forza, NBA 2K, and Madden NFL as their favorite game.

Video games and simulator experiences have always been inspired by traditional sport experiences; and many of the highest-selling games are sport-based games (Arshad 2014). Video game series such as EA Sports’ FIFA, NBA Live, Need For Speed, F1 2019, and Pro Evolution Soccer have accompanied real sports competitions. These games emulate playing traditional sports and are often popular because the sport itself is popular. They offer non-professional athletes the opportunity to participate in tournaments, drive the fastest cars, or even play on the green of the Bernabéu Stadium.

Video games not only offer the opportunity to simulate real sports, but also make it possible to create sports experiences that would not be possible in real life. One early example is the video game Speedball (The Bitmap Brother 1988), a futuristic and violent cyberpunk sports game that brings together elements of handball and ice hockey. Psyonix’s Rocket League is currently the most prominent example. It combines two popular sports: soccer and car racing; two teams face off in rocket-powered cars to hit a ball into a goal. In 2018, more than 50 million players were counted (De Meo 2018). The fan community is vast; and tournaments and world cups are organized just like traditional sporting events. Both examples demonstrate that sport is an essential inspiration for the digital world. In addition, the digital world offers opportunities to create fictional forms of sports virtually that would otherwise be too dangerous or impossible.

But it is not just sport that shapes the digital world. The digital world also increasingly influences the world of sport. For example, skateboarding was not known to many for a long time; through a video game, the sport has been introduced to millions of children who’d never skated before. Children suddenly talked about their favorite moves in typical skate terms and knew relevant brands, athletes, and even corresponding cultural aspects like music. The game quickly turned a marginal sport into a trendy one, pushing skateboarding into the mainstream and inspiring young gamers to become athletes (Ombler 2019).

Sports-based games are also commonly associated with sports. They have professional competitions and are an increasingly important market and form of audience entertainment for the new generation. The FIFA eWorld Cup, officially held by FIFA and EA Sports, for instance, is the world’s largest video game tournament (Strudwick 2014). The Grand Final of the FIFA eWorld Cup 2019 generated record viewership—online viewership increased by 60% from 29 million views in 2018 to 47 million views in 2019 (FIFA.com 2019). Esport viewership is expected to hit 84 million in 2021. These numbers outperform sports leagues like the NBA and NHL (MBA Syracuse 2019) and demonstrate that we have to pay attention to this relatively young, but extremely fast-growing industry; we must seize opportunities to learn from successful strategies of spectator integration and motivation to revive traditional spectator experiences in sports.
For example, the video game industry has optimized the creation of engaging experiences for gamers and spectators. With services like the Amazon-owned streaming service Twitch, people can watch other people play video games. Through a chat function, the platform allows social interaction with other spectators and the streamer/player and the option to impact the game through commands.

Understanding the current trends in the video games industry, such as interactive audience engagement, can give us insight into how the future of sport competition from the spectator’s point of view could be.

3 The Future of Audience Experiences

Interactivity and involvement separate digital from spectator experiences of traditional games. Traditional sporting events currently leave little room for interaction between athletes and spectators. While the athlete performs, spectators can, at most, cheer and encourage. But this is reconsidered in the digital industry where viewers are increasingly able to be part of the game. In this section, we take a look at how current trends in the game industry shape the spectator experience and how this can influence the future of spectator involvement and engagement in sports.

3.1 The Active Spectator

“What’s your favorite sport?” If you ask this question today, the answer for sports enthusiasts is often not the sport they themselves practice, but the one they like to watch. We can observe a similar phenomenon in the world of digital games. More and more people prefer to follow other players as they play a game rather than playing themselves. Classic esports events draw spectators from all over the world to real stadiums to watch their favorite players. People also use interactive live TV like Twitch to watch players and talk to others. Using alternative platforms to show digital gaming experiences enables various opportunities. Spectators have access to additional information and data about the game, the players, and the match. For instance, spectators can see the whole map of a competition, the perspective of every single player, and access information about specific strategies players choose for the game. This information availability creates new and interesting spectator scenarios and the chance for personalization. Various graphical user interfaces enable the spectator to arrange individualized spectator interfaces (Pirker and Angermann 2019).

Trends like interactive streaming also influence the development process. Video games are no longer designed just for the player; they also contain game elements that make them more interesting for streamers and spectators. The behavior and motives for spectating in sports and video games are similar and include elements like identifying with players, enjoying the aesthetic of the game/play and the excitement and drama of a match, gaining knowledge from the players’ skills,
interacting with other spectators, belonging to a group, and supporting a specific team or a player (Pirker and Angermann 2019; Matsuoka 2014; Alonso Dos Santos and Montoro Rios 2016). But what differentiates video game spectating and traditional sport spectating is the level of interactivity and the options to gain access to additional information.

Video game spectating is an increasingly important aspect of the video game industry. Twitch and similar players are essential marketing platforms for the companies and interesting streaming experiences are crucial for the sale of the games. Active interactions between players and spectators, spectators and the game, and spectators and other spectators are already part of the video game design process. Typical activities to involve and engage spectators are chat inputs, polling, cheering, and game modification (Mirza-Babaei 2018; Stahlke et al. 2018).

What we already see in video games is a new way of interacting and engaging with audiences. The future of sport spectating can be interactive too. With wearables, athletes’ data can be available to the spectator thereby decreasing the space between the athlete and the spectator. In the next sections, three main technologies that can impact the experiences of both the spectator and the athlete will be discussed: (1) interactive sport experience and streaming services, (2) virtual reality technologies, and (3) augmented reality (AR) technologies.

### 3.2 Democratization of Sport Spectating

What is currently state-of-the-art for the computer games industry—a data-based and individualized spectator experience—may become normal for sports broadcasting in the future. More real-time data of athletes will be collected. More cameras will be installed in stadiums. Action-cams and 360° cameras will make it possible to take on the perspective of a favorite athlete, for instance. Through open data interfaces, different users will be able to access the data. This will give viewers the ability to follow individualized information and camera angles on their own displays. With open access to the video data and additional available information about athletes, a movement like a democratization of the spectator experience will be created. Every user can arrange their own displays with several information points, visualizations, chat interactions, and camera angles.

This, however, could also lead to an information overload. On one side, moderators will access various data channels and curate content to offer more specialized channels. On the other side, artificial intelligence (AI)-based processes will be used to automate and personalize the experiences. Through AI-methods it is possible to design individual viewer experiences based on preferences and past interaction data. For example, a Ronaldo-fan can watch the game with more camera views of Ronaldo while chatting to all Ronaldo-fans watching the game.

More spectator involvements and interactions are possible. In a video game, spectators can cheer for their favorite player who get, as a result, a specific in-game reward like a better weapon or an extra life. This system already works in the games industry and is starting to influence the sports industry. With new interfaces to the
sport experience, it is also possible for spectators to influence competitions or even the athletes. For example, this has already been implemented is the Formula E race fanboost system. Here, users vote for their favorite drivers to give them an extra power burst (Formula E Fanboost 2020). Future scenarios could also include voting for referee decisions, rewards or punishment for athletes or teams, or even the support of players through advice from the audience. Through these interactions, spectators and athletes will get closer and more personal bonds will develop.

With the introduction of new hardware, even more options to gather data and forms of experiences can be explored, particularly with AR and VR technologies.

4 Playing with Reality

4.1 Augmented and Diminished Reality

Augmented reality (AR) offers new possibilities for athletes to optimize their training and sports performance, improve skills, and reduce the risk of injury through additional information. For example, smart ski goggles can already provide athletes with information about the course or their performance by displaying speed or suggesting a more optimal route. These use cases and many others have been explored by various studies and showcases.

Technologies such as AR could also offer new opportunities to engage spectators in live-sport events. AR glasses could make it possible to expand reality. Spectators could sit in a stadium and see elements of the playing field (for example, the offside line), names, and data of otherwise invisible players.

One option not often discussed is the use of such technologies to diminish reality. AR applications are mostly designed to display additional information and objects. However, the same technology can also be used to reduce or change the content visible in reality. Faces can be blurred, advertisements can be blackened, and objects disappeared. What if, for example, after a foul, the soccer player is penalized with limited vision?

AR devices offer several interesting possibilities for athletes and for spectators. However, current AR devices such as Microsoft’s HoloLens or the MagicLeap are still expensive and uncomfortable to wear. They will not find a way into the mainstream until the technology is cost-effective and more accessible (Augmented Reality in Sports 2019). Particularly intriguing is the introduction of technologies like smart contact lenses, which could revolutionize the possibilities of augmented (and diminished) reality in the field of sports for athletes and spectators.

4.2 Beyond the Sidelines

Virtual reality (VR) headsets enable wearers to immerse themselves in a virtual space. They can experience things that are otherwise impossible, too expensive, or too dangerous. For example, VR itself is not an invention. The potential of virtual
spaces, which can be quickly entered with head-mounted-displays (HMDs), has been extensively researched over the last 40 years in various disciplines (Freina and Ott 2015; Bruce and Regenbrecht 2009).

For athletes, VR already offers incredible possibilities; and the number of application scenarios will grow as VR headsets become more accessible and lightweight. VR training is already used for football training at Stanford University (VR training make Stanford kicker a hero: Strivr testimonial 2016). Researchers were able to show that this form of virtual training is an effective and immersive form of learning; thereby athletes can prepare themselves for competition through more personalized, cost-effective, and flexible forms of training. Opportunities will increase with future hardware improvements—for example, imagine systems that not only allow users to see the virtual reality but also to feel elements of the experiences through haptic feedback and more natural ways to interact with the experience (e.g. gloves, bodysuits).

VR is also a great way to enable spectators to be part of the experience. For the spectator or a non-athlete, VR can be a tool to better understand the sport, to be part of a sport experience without participating, and to play through realistic simulations that are often too expensive (e.g. driving a race car), too dangerous (e.g. base jumping), or impossible (e.g. flying without additional equipment). Also, through VR, the spectator better understands the point of view of the athlete. The spectator can replay a situation from the goalkeeper’s perspective and see why he or she did not stop the ball. In skiing, for example, it is often difficult to understand speed, the height of the jumps, or the steepness of the terrain with a flat camera setting. VR allows the viewer to sit on the shoulders of Tyrol’s Hahnenkamm and understand the real danger of a specific race. For the spectator, VR is a big and realistic chance to make sport more attractive, accessible, and engaging.

In a more distant future, VR could also enable real athletes and sportsmen to compete with athletes from the digital world. New sport experiences can be created and entirely new sport genres invented.

5 When Gamers Become Athletes and Athletes Become Players

The sports games and digital sports simulations have reached a peak of realism. In combination with smart devices such as indoor bike trainers, hardware vehicle simulators, and treadmills, various sports games can be performed not only visually but also physically from the living room. Here, we have to ask ourselves how much video games or sports simulations still differ from traditional sports.

Due to recent events, we are one step close to a fusion of these two worlds. In 2020, the coronavirus pandemic hit the world of professional sports. Most competition had to be canceled; and training was severely restricted as training in teams and any training with potential health risks (e.g. crashes with the bike) had to be
stopped. The sports world had to look for new training and competition methods to minimize financial and sporting losses. So, the esports phenomenon spread to various traditional sports disciplines; and various online initiatives by sports associations were launched.

The eCycling League Austria, for instance, was launched as an online bike racing series (ÖRV 2020). The competitions are open not only to professionals but to all cycling enthusiasts with the required equipment, a smart indoor bike trainer with heart rate and watt power measurement. In this case, the bike represents the game controller. In this series, gamers have the chance to compete with professional athletes.

Also, Formula 1 launched the F1 Esports Virtual Grand Prix series as a virtual alternative to their races (Formula 1 2020). The races are broadcast on typical esports channels such as Twitch, Facebook, or YouTube. As a platform, Codemasters’ official F1 2019 PC video game is used, and current F1 drivers are becoming gamers. This is not only a good way to entertain Formula 1 fans, but also to get people interested in the sport even after the competition restrictions are over.

In the future, more sports devices and sensors will enable the physical execution of various sports at home or in special studios and connect realistic sports simulations and games. In combination with VR, an even more realistic experience will be enabled. With the help of such realistic setups, it is possible for athletes to compete against each other regardless of their physical location. On top of that, it will also allow non-professional athletes—gamers—to compete with top athletes.

6 The Future of Games

The games industry has driven many significant technological advancements including important innovations in hardware such as capable graphic processing units, AI research, software tools such as powerful game engines, and spectator experiences, VR, and AR. It is clear that the future of games will revolve around major technological leaps.

Virtual and augmented reality will be an essential element of the future of video games. VR experiences can create entirely new and fully immersive game experiences. But this also requires new game design guidelines. In VR games, users usually play the game through a first-person view. As a result, more games will be created as first-person games. In most successful sports games, the player sees a view similar to TV broadcasts (soccer games, NHL, NBA, skateboarding). Few games are currently played from the first-person perspective (racing, cycling), though they do allow players to become athletes with the associated smart training equipment. Because of VR, the future will bring more first-person sports experiences and complementary equipment to players. For example, imagine a VR climbing experience combined with a tread wall for climbers or a VR New York city marathon combined with a treadmill for runners.
Video games will become increasingly adaptive and personalized. With data analysis, games can be adapted automatically to specific play styles, player types, or the skills of a player. This will enable full engagement and optimize the effect of the training. Such personalized experiences will also impact digital sports experiences. A Formula 1 pilot can train engagingly with the help of a smart AI-based ghost system, which instructs the pilot in a personalized way to find the ideal line. Also, game engines will be increasingly advanced and influential in the future. Game engines are the software tools used to create games. Since the release of free and user-friendly game engines such as Unity or Unreal Engine, the development process has become more accessible and open to a larger user group. Some game engines enable the creation of games without game development or programming knowledge. Architects can use game engines to plan buildings, archeologists can recreate archaeological sites, and historians can create virtual museums. Also, athletes will be able to develop their virtual training or VR marathon experience and share it with other enthusiasts around the world. In the future, the athlete will become not only a gamer, but also a game developer.

7 Conclusion

Following the video game industry, the future of sport holds many exciting possibilities. We already see the need for spectators not just to watch, but to interact directly and actively. Facilitated by interactive streaming services, video game spectators can interact with other spectators, the player, or the game itself. Future technologies will also enable spectators in sports to be involved more actively. This will also enable a stronger bond between spectators, the athletes, and the sports experiences.

Currently, game viewers can reward or punish players based on their performance. Similar developments are conceivable in the world of sport. While initial attempts have already been made in more technologically advanced sports such as racing (Formula E Fanboost), technological enhancements such as AR and VR can extend this possibility to traditional sports such as football or skiing. AR, for example, enables viewers to obtain extra information about the sports scene. On the one hand, this allows athletes various optimization possibilities (e.g., optimal driving lines when skiing), but it could also develop new sports scenarios by changing the viewpoint or shortening the scope of sight (for example, as a penalty for a foul).

These technologies also offer the possibility of personalization. The viewer can quickly elect the viewpoint of the striker, the referee, or the downhill skier by means of virtual reality. Enthusiasm and understanding of the sport and the performance of the athlete will increase; the spectator is right in the middle of the action and not just a passive part of the experience.
The future of the two industries—video games and sports—will be exciting and multifaceted, but not without many challenges. Collecting additional data will enable personalized sports and spectator experiences and advanced versions of the training. However, this also results in information and data overload. The digitalization of sports also opens more loopholes and opportunities for cheating. As a result, security experts and computer scientists will become a more integral part of sports organizations.

But, bringing the games and sports industry closer together will be beneficial for both. Among the benefits, gamers can be part of professional sports competitions from their living rooms and athletes can train and compete in a more flexible way independent of time and place. Realistic VR sports experiences will make sport experiences, which are otherwise impossible, too dangerous, or too expensive, accessible to everyone. Anyone with a VR setup and peripherals such as smart climbing mills can enjoy ascending Mount Everest from home. Although such experiences can be realistically simulated, they cannot replace the feeling of a real ascent, where the unexpected and the potential danger are an essential part of the experience. At least, not yet.

References

Alonso Dos Santos, M., & Montoro Rios, F. J. (2016). Scale of spectators’ motivations at soccer events. Soccer & Society, 17(1), 58–71.

Arshad, S. (2014, May). 10 most successful sports “Video Games” franchises. Retrieved from https://www.tsmplug.com/games/most-successful-sports-games-franchises/.

Augmented Reality in Sports. (2019). Retrieved from https://thinkmobiles.com/blog/augmented-reality-sports/.

Beall, G. (2016, May). 8 key differences between gen z and millennials—The Huffington Post. Retrieved from http://www.huffingtonpost.com/george-beall/8-keydifferences-betweenb12814200.html.

Bruce, M., & Regenbrecht, H. (2009). A virtual reality claustrophobia therapy system—implementation and test. In Virtual Reality Conference, 2009, VR 2009 (pp. 179–182). IEEE.

Dede, C. (2009). Immersive interfaces for engagement and learning. Science, 323(5910), 66–69.

De Meo, F. (2018). Rocket league reaches 50 million players worldwide in its fourth year. Retrieved from https://wccftech.com/rocket-league-50-million-players/.

ESA. (2019). 2019 essential facts about the computer and video game industry. Retrieved from https://www.theesa.com/wp-content/uploads/2019/05/ESA_Essential_facts_2019_final.pdf.

Formula 1. (2020). Retrieved from https://www.formula1.com/en/latest/article.formula-1-launches-virtual-grand-prix-series-to-replace-postponed-races.1znLaBzBbCQPj1DMeiOi.html.

Formula E Fanboost. (2020). Retrieved from https://fanboost.fiaformulae.com/.

FIFA.com. (2019, August 14). FIFA eWorld Cup 2019—News—FIFA eWorld Cup 2019 Grand Final generates record viewership. Retrieved from https://www.fifa.com/fifaworldcup/news/fifa-eworld-cup-2019-grand-final-generates-record-viewership.

Freina, L., & Ott, M. (2015). A literature review on immersive virtual reality in education: State of the art and perspectives. In The International Scientific Conference Elearning and Software for Education (Vol. 1, p. 133). Carol I National Defence University.

Matsuoka, H. (2014). Consumer involvement in sport activities impacts their motivation for spectating. Asian Sport Management Review, 7, 99–115.
MBA Syracuse. (2019, January 18). With viewership and revenue booming, esports set to compete with traditional sports. Retrieved from https://onlinebusiness.syr.edu/blog/esports-to-compete-with-traditional-sports/.

Mitic, I. (2019, September 12). Video game industry revenue set for another record-breaking year. Retrieved from https://fortunly.com/blog/video-game-industry-revenue/.

Mirza-Babaei, P. (2018). Beyond player experience: Designing for spectator-players. User Experience Magazine, 18(1). Retrieved from https://uxpamagazine.org/beyond-player-experience/.

Northeastern. (2014, November). Meet generation z—Full survey results. Retrieved April 16, 2017, from http://www.northeastern.edu/innovationsurvey/pdfs/Innovation_Summit_GenZ_Topline_Report.pdf.

Ombler, M. (2019, September 4). ‘It inspired a generation’: Tony Hawk on how the Pro Skater video games changed lives. Retrieved from https://www.theguardian.com/games/2019/sep/04/tony-hawks-pro-skater-playstation-games-skateboarding.

ÖRV (2020). ‘Ritzinger und Machner gewinnen den historischen Auftakt der eCycling League Austria’. Retrieved from https://www.radsportverband.at/index.php/aktuelles/radsport-news/allgemein/4832-ritzinger-und-machner-gewinnen-den-historischen-auftakt-der-ecycling-league-austria.

Pirker, J., & Angermann, R. (2019). Tackling audience experiences in games. In Game Developers Conference 2019.

Singer, D. (2017). We are wrong about millennial sports fans. Retrieved from https://www.mckinsey.com/industries/media-and-entertainment/ourinsights/we-are-wrong-about-millennial-sports-fans#0.

Stahlke, S., Robb, J., & Mirza-Babaei, P. (2018). The fall of the fourth wall: Designing and evaluating interactive spectator experiences. International Journal of Gaming and Computer-Mediated Simulations (IJGCMS), 10(1), 42–62.

Strudwick, C. (2014, July 3). Watch live: Gamers battle out to win at record-breaking FIFA Interactive World Cup. Retrieved from https://www.guinnessworldrecords.com/news/2014/7/watch-live-gamers-battle-out-to-win-at-record-breaking-fifa-interactive-world-cup-58551.

The Bitmap Brother. Speedball. Game [Amiga]. (1988). Image works, UK.

VR training make Stanford kicker a hero: Strivr testimonial. (2016). Retrieved from https://www.strivr.com/resources/customers/stanford/.

Williams, A. (2015, September). Move over, millennials, here comes generation z. The New York Times. Retrieved from https://www.nytimes.com/2015/09/20/fashion/move-over-millennials-here-comes-generation-z.html?r=0.

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