

SPORTS BROADCAST AND TECHNOLOGY: IMMERSIVE MEDIA

Produced in Partnership by:



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EXPECTATIONS ARE CHANGING

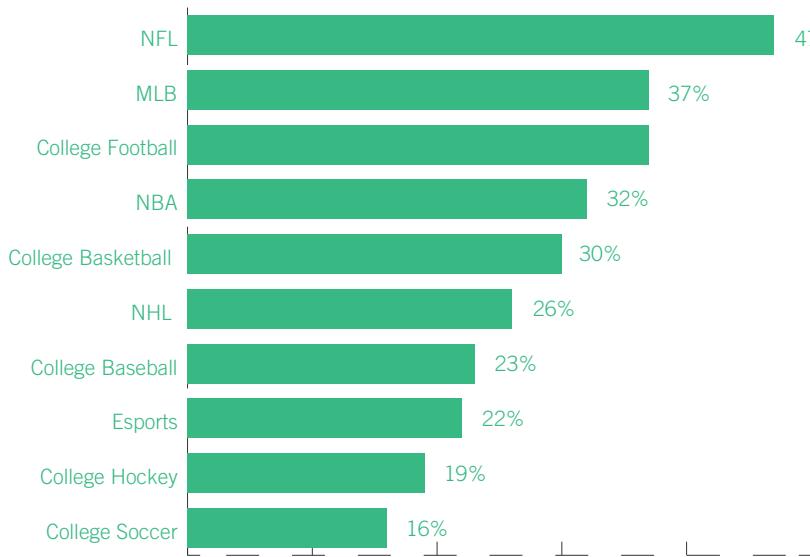
Sports fans expect more. The growth of Over-The-Top (OTT) platforms, improvements to Virtual Reality (VR), new forms of engagement—all are changing the game when it comes to sports content.

Fans want to be able to:

- Get the specific content they want, when they want it, on the devices they want.
- Connect with friends and other fans while they consume sports.
- Have the freedom to customize their experience.
- Do more than just watch. They want to be able to move freely, and they want to be able to interact.

CONSUMERS ARE HUNGRY FOR LIVE-STREAMED SPORTS

PERCENTAGE OF US CONSUMERS WHO WOULD WATCH LIVE-STREAMED SPORTS, BY SPORT



Source: Morning Consult, n=2,151, US adults 2017

Consumers are showing that they have an appetite for live-streamed sports. New distribution channels are offering a mix of mainstream big-league sports and niche content. Niche content or not, sports fans want to watch live streams.

Survey data shows that a significant proportion of sports consumers from the general population would watch sports via live-stream, and even smaller sports like college soccer in the U.S. are generating interest.

Esports, to date, is available almost exclusively by live-stream on platforms like Twitch and YouTube, so while general population data shows an interest at 22%, we expect that a survey of esports fans would score significantly higher.

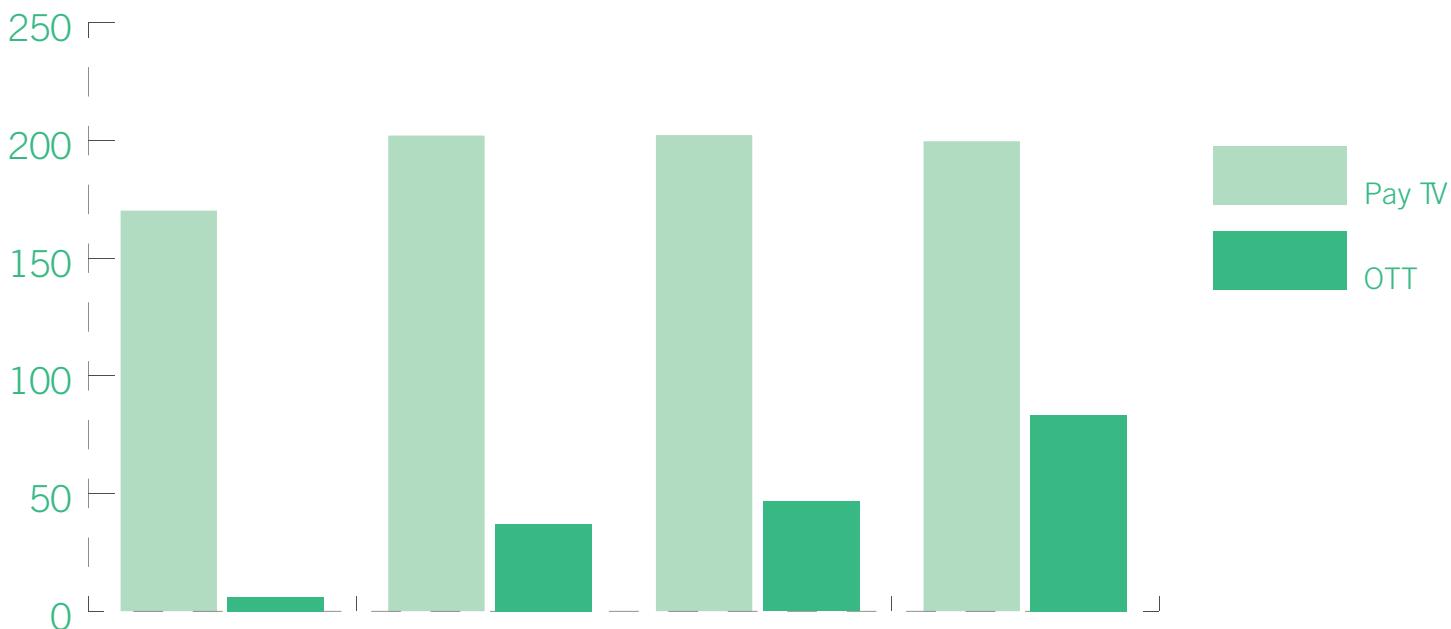
TRADITIONAL BROADCAST TV IS FEELING THE PRESSURE

As Pay TV (cable subscriptions and PPV) revenue flattens, we see continuous growth in OTT revenue. These emerging media platforms are increasingly **social**, **accessible**, and **interactive**. For now, linear broadcast still has a hold on the majority of the sports audiences, but today's young sports fans expect more from their media.



Thursday Night Football, presented by FOX, live-streamed on Amazon Prime Video. Note the multiple commentator and language options.

PAY TV AND OTT REVENUE TRENDS (USD BILLIONS)



Source: Broadband TV News, December 5, 2017

BIG DEALS IN OVER-THE-TOP SPORTS BROADCAST



verizon[✓]



Digital rights are being snapped up by media companies like ESPN, as well as tech companies like Verizon and Amazon. New dedicated sports OTT services, such as DAZN and FloSports are filling the gaps for niche content. Competition for larger rights deals is increasing as fan bases expand and investment in OTT grows.

Over 60 dedicated OTT sports channels and aggregators are currently fighting for sport media rights.

NEW TECHNOLOGY MILESTONES ARE BEING REACHED

Immersive sports content is exploding across new markets and channels.

NEW TECH BENCHMARKS

Super Bowl LII in 2018 between the New England Patriots and Philadelphia Eagles set records.



2.6TB

Social media data transferred

59%

Fans in-venue using Wi-Fi

7.87 Tbps

Max Peak Traffic

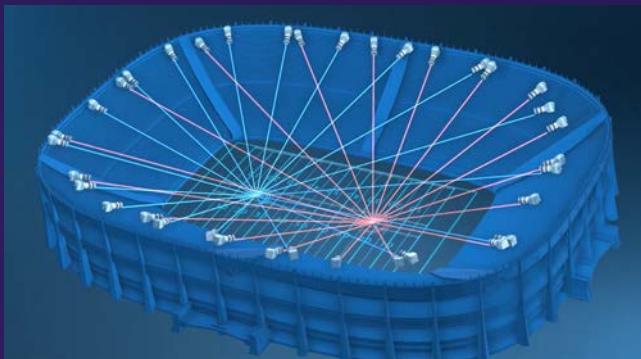
GROWING GLOBAL AUDIENCES

 10.7M

Cricket is one of the most popular sports in the world. The 2018 Indian Premier League final between the Chennai Super Kings and Sunrisers Hyderabad set a record for OTT platform Hotstar, streaming to **10.7 million concurrent users in India alone**.



ENHANCED BROADCAST PRODUCTION



Over 30 of Intel's 5K cameras surround stadiums in the NFL, NBA, NCAA and La Liga, to capture an unprecedented level of detail for each game. These cameras consume one terabyte per 30-second clip but allow for immersive VR experiences and broadcast techniques.

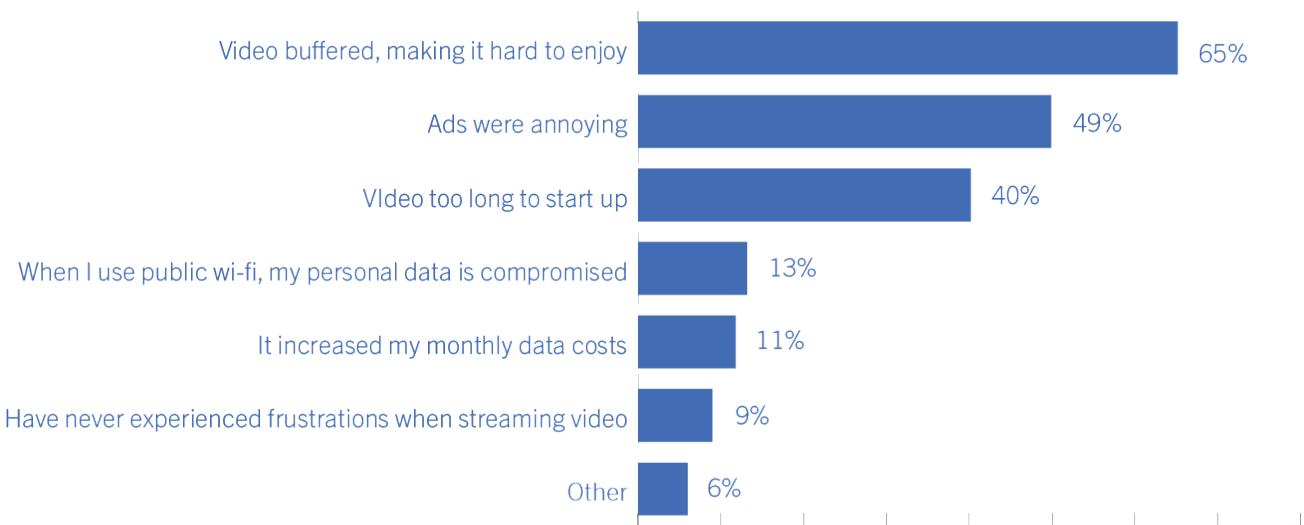


BUT THERE IS STILL WORK TO BE DONE...

Several problems still plague OTT platforms:

- Stuttering video (lag) remains a problem with live-streamed video
- Buffering still frustrates consumers
- Interruptive ad delivery annoys and distracts customers
- Fast accessible Wi-Fi has not reached a global critical penetration yet

US CONSUMER FRUSTRATIONS WITH MOBILE LIVE-STREAMED CONTENT (% OF RESPONDENTS)



Source Penthera, n=804 who stream video on mobile devices, Feb 22, 2018

"It should not happen, it's a frustration for us and it's even more so for our subscribers... The servers fell in part during the match, then came back. ... Our partners and service providers also had difficulties. Our service provider who paid for the subscription fell for 40 minutes and we lost a lot of viewers. ... The digital universe is growing every day but is still unstable in streaming TV. We have to offer a very high-quality experience because the subscriber wants value for money, which is quite normal."

ALAIN WEILL - COO ALTICE MEDIA, ON THE CHAMPIONS LEAGUE OTT SERVICE OUTAGES

CHALLENGES

Live OTT still suffers delivery hiccups

OTT and social media platforms struggle to service sports fans with the consistent quality they expect from linear broadcast. While there is unquestionably a bright future for streaming live events on the web, online audiences still have not approached those found on cable, satellite, and OTA. Over 35M viewers tuned in for the 2017 Thanksgiving NFL game between the Dallas Cowboys and Washington Redskins, a number which hadn't been achieved for any NFL game on TV since 1995. No OTT service has been tested at this capacity and many have failed with far fewer fans trying to watch. Here are a few examples of the biggest names in tech struggling to keep up with demand:

Amazon Falls Short, Twice



Amazon has faced some difficulty deploying their live-streamed sports at scale. Thursday Night Football streams for the 2017-18 NFL Season received 2/5 stars on Amazon's own review site. Picture quality for the 2018 US Open was so poor, Amazon disabled the stream.

Lost World Cup Coverage



Major events with massive audiences continue to challenge even the largest video providers. Over 4.3 million hours of coverage of the 2018 World Cup Semi-Finals were lost due to poor streaming quality.

Lawsuit Over Botched Stream



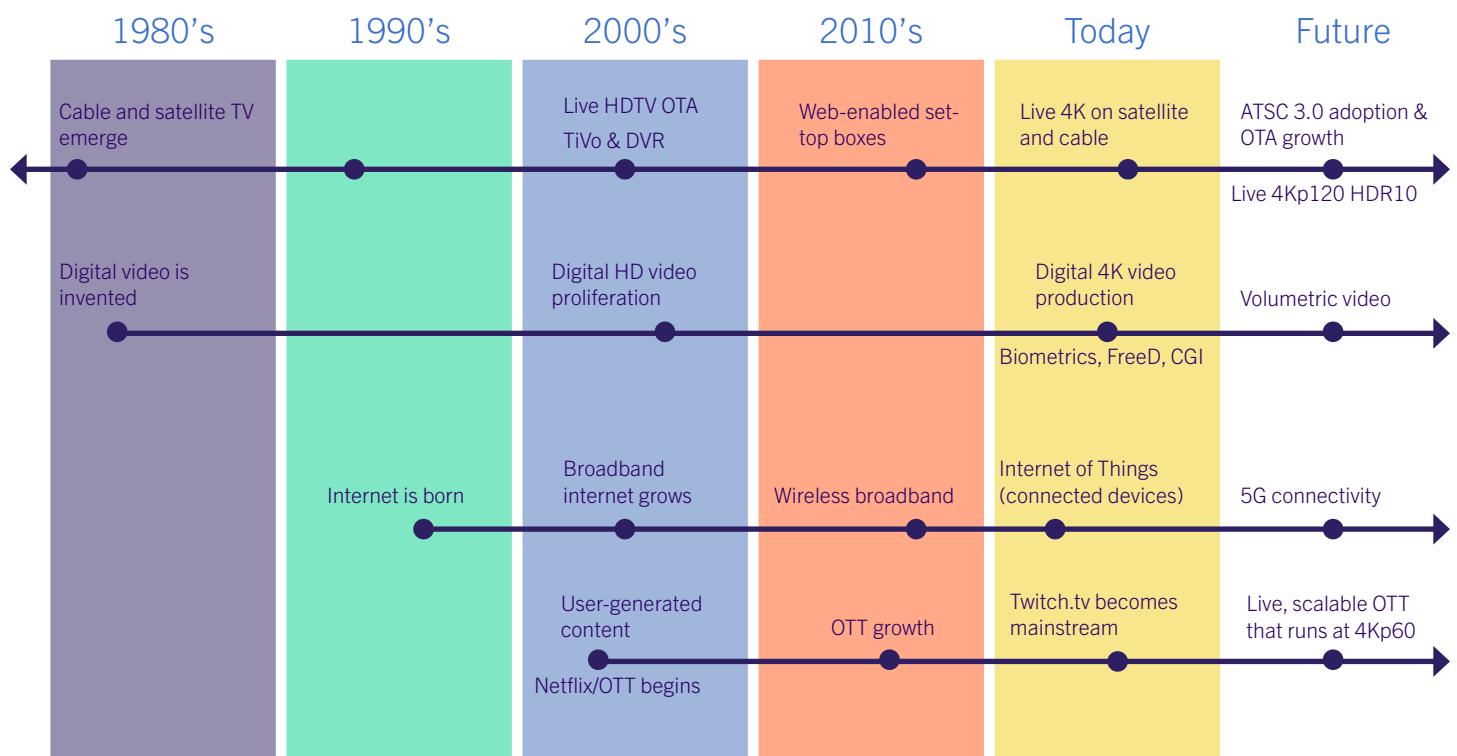
UFC, NeuLion, and Showtime have all been hit with class-action lawsuits as a result of failures in their live-stream of the Mayweather versus McGregor boxing match on Aug. 26, 2017. The streams suffered from buffering and errors that lead to the main bout being delayed by 20-minutes.

"I have not seen a live event on the internet that can serve 25 million concurrent users at a high quality... It's one of these things that will need to be resolved, because money is not the issue."

BRIAN ROLAPP - CHIEF BUSINESS AND MEDIA OFFICER, NFL

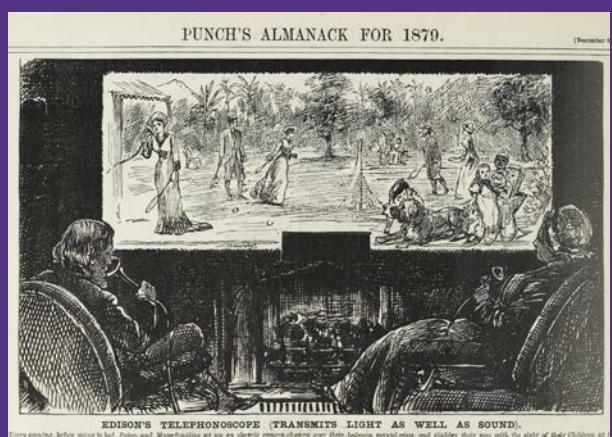
IMMERSIVE MEDIA: AN EVOLUTION

While Immersive Media technologies are ushering in brand-new ways to engage and interact with sports, the developments are part of a much longer story of media change that accelerated over the last four decades.



ENVISIONING THE FUTURE OF MEDIA

Media innovation has captured the public imagination for centuries. In fact, early concepts for television imagined a two-way conversation—like FaceTime or Skype—not the more established broadcast approach. *Punch's Almanack* (1879) even falsely attributed a concept for a “telephonoscope” to famed inventor Thomas Edison to lend the idea credibility (image on report cover).



SPORTS IS PART OF A LARGER IMMERSIVE MEDIA EVOLUTION

OTT isn't the only technology that still needs time to mature: virtual reality is still early in its development and still has much to prove. Despite their current shortcomings, Immersive Media technologies continue to revolutionize the way we experience sports.

- Your Call Football is experimenting with platforms that let fans call plays that the teams run on the field for free online and mobile.
- The Drone Racing League combines motorsports with virtual reality to create an entirely new way to race.
- Augmented reality league HADO brings physicality to esports and shows us what the future of sports could be.
- Intel and AT&T are working to bring us 4K OTT Live Sports using 5G wireless technology at the next US Open.

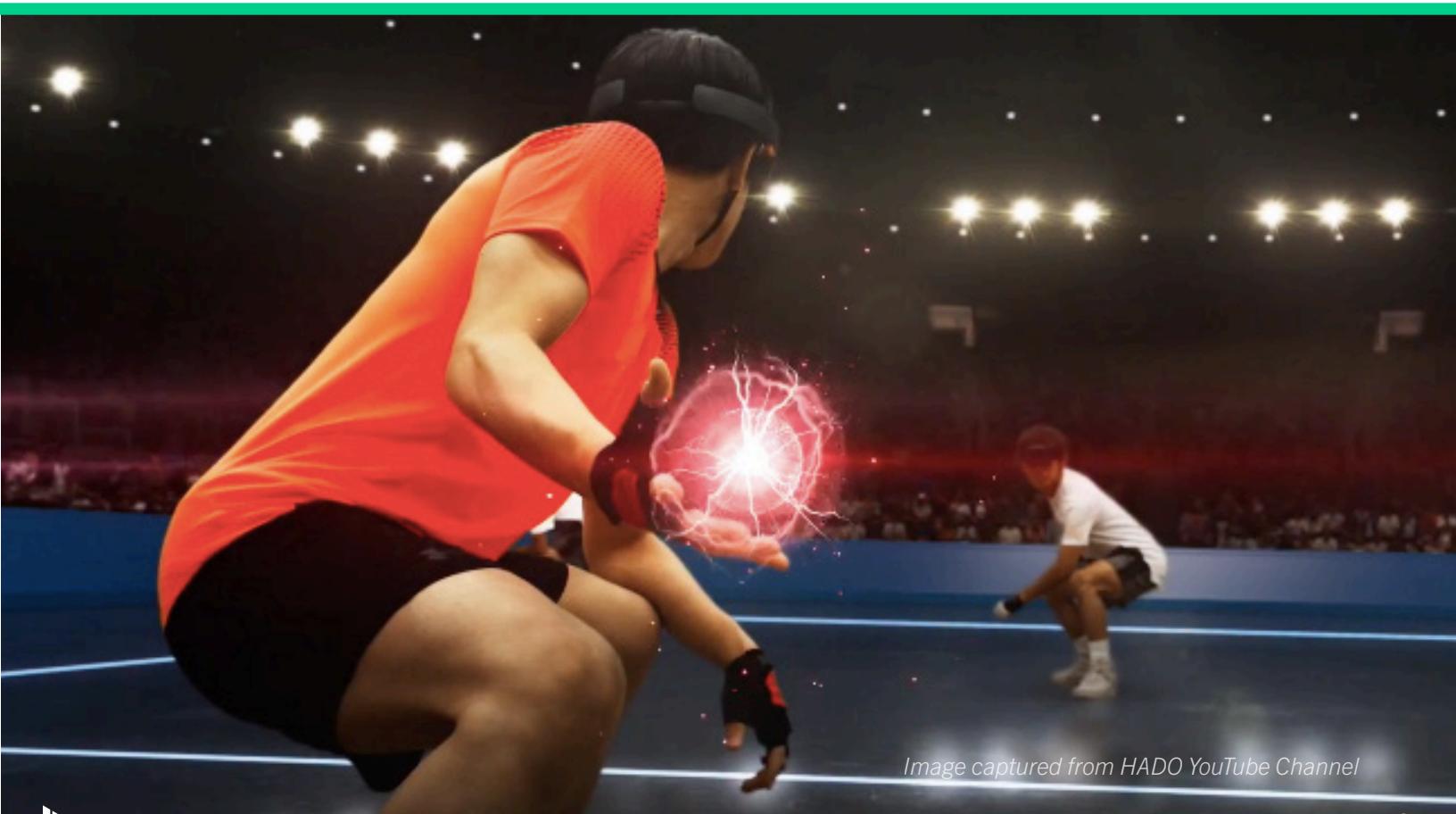


Image captured from HADO YouTube Channel

IMMERSIVE MEDIA TESTED IN SPORTS

The evolution of media technology is inextricably tied up with the evolution of global sports. Newspaper, radio, television, cable and satellite, the Internet, HDTV, OTT—these technologies connect fans to the sports they love. This continuing convergence of sports, media, and technology is creating new entertainment experiences that we define as Immersive Media.



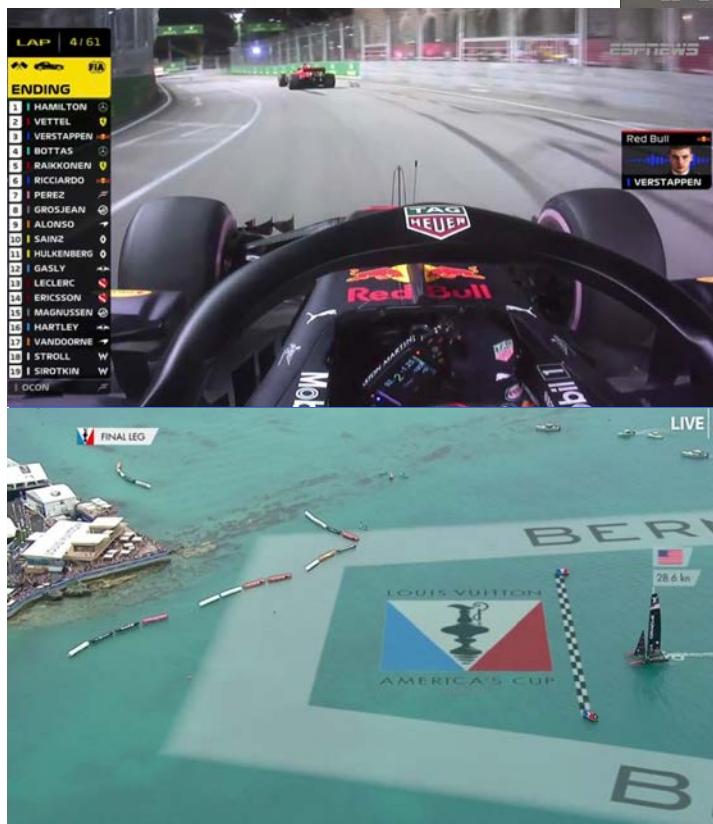
TELLING STORIES WITH DATA

VIEWERS CRAVE DATA

There are new types of sports data being used in broadcast, such as the heart-rate monitor that can be seen in Eleven Sports' broadcast of squash.

ESPN's broadcast of F1 featured new presentations of car data, including wheel orientation.

Sensors and data will continue to bring deeper and more engaging experiences to sports fans.



ACCESSIBLE & CLEAR INFORMATION

F1 Singapore Grand Prix on ESPN

- Detailed and clean weather display
- Flat graphics that complement the color of the track and night-time atmosphere
- Information on KPH and wheel orientation
- Dynamic camera work - multiple POV
- Racing coach avatar with audio

America's Cup on NBC

- Flat graphics
- Dynamic camera work - multiple POV
- Data points on distance and speed of boats

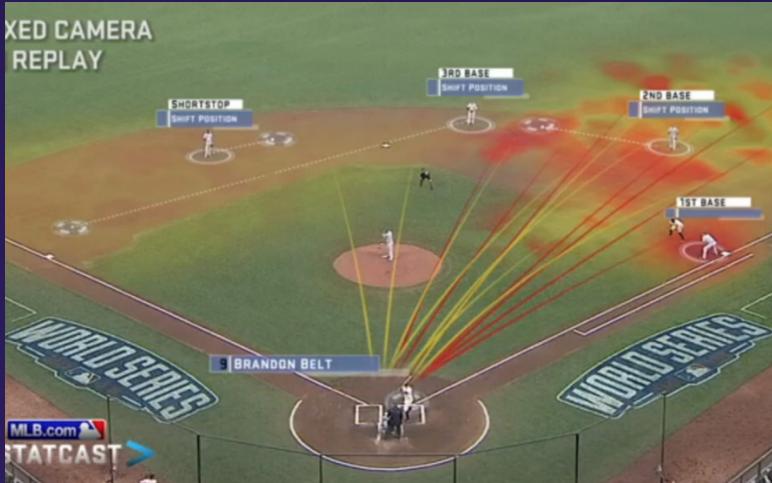


WORLD CUP 2018 - VIZRT STUDIO

Vizrt has been working in sports for years, but more recently they have been experimenting with advanced graphical techniques and augmented reality to bring a more immersive experience to gameplay analysis.

CRICKET - HAWK-EYE CAMERA

Hawk-Eye cameras have been in use since 2001 to assist with officiating in ICC cricket matches. Today, they are used in broadcast to show ball trajectories and calculate play odds.



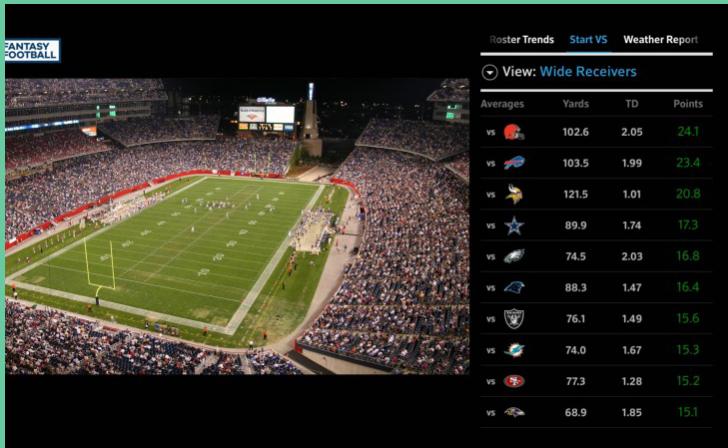
MAJOR LEAGUE BASEBALL - STATCAST

The MLB's STATCAST provides new ways to display spray chart information in replays. In the example on the left, information about the batter's past performance shows viewers what is likely (or unlikely) to happen.

"In the face of intensifying competition from alternative entertainment formats, brands, and rights holders need to wake up and smell the coffee. We are approaching a tipping point, where digital is overtaking linear in terms of media consumption. This does not mean 'more of the same' through different channels: content needs to be better and stand out in order to keep fans engaged. Attention is the main currency of the entertainment industry, which sports can no longer deny being a part of."

DAVID DELLEA - HEAD OF PWC'S SPORTS BUSINESS ADVISORY TEAM

INTERACTIVE FEATURES



LESSONS FROM FANTASY SPORTS

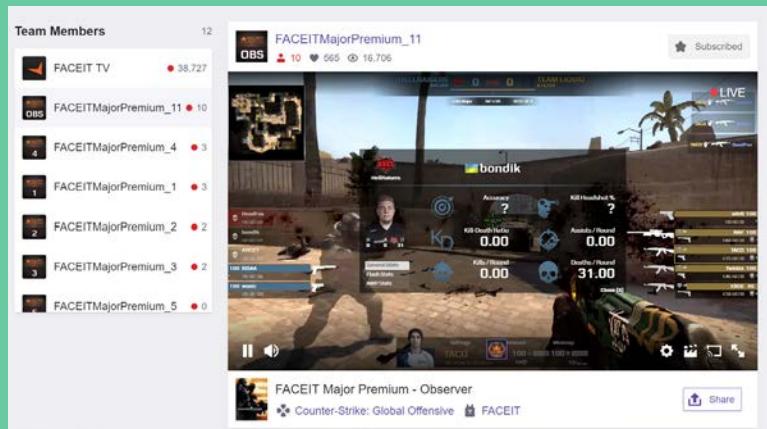
Fantasy sports' success can be viewed as a leading indicator for interactive sports features, and provides precedent for how sports data can be integrated into broadcast. In the example on the left, Comcast has directly integrated fantasy sports stats into the step-top-box cable viewing experience.

INTERACTIVE & GAMIFIED EXPERIENCES

There are many ways to implement social and interactive features to OTT platforms. On the right there are examples of esports OTT gamification from Maestro (a), instant invites from gaming chat program Discord (b), and a frictionless video clipping feature from Twitch (c).

Three screenshots illustrating interactive and gamified experiences:

- (a) Maestro's Quests feature: A screenshot showing a quest for a CS:GO Jungle Map with a reward of a CS:GO Jungle Map and a task to visit the CS:GO channel on Csgo.
- (b) Discord's instant invites: A screenshot of the Discord interface showing a list of channels including # general, # tfmclips, # tfm-mascots, and # foodie-nom-noms.
- (c) Twitch's clips feature: A screenshot of the Twitch interface showing a pop-up for "Introducing Clips" with instructions to capture favorite moments with a single click and hit the Clips button below.



PERSONALIZED VIEWING EXPERIENCES

During the FACEIT London Major 2018, Twitch and Genvid offered a premium viewing experience for \$4.99. Viewers could choose between nine different viewpoints during a live esports match, as well as customize the layout of match's information directly on top of the video.

VIDEO AUTOMATION AND AI

INCREASING SPEED WHILE DECREASING COST

Artificial intelligence technologies such as machine learning, computer vision, and natural language processing, are ushering in a new era of sports content.

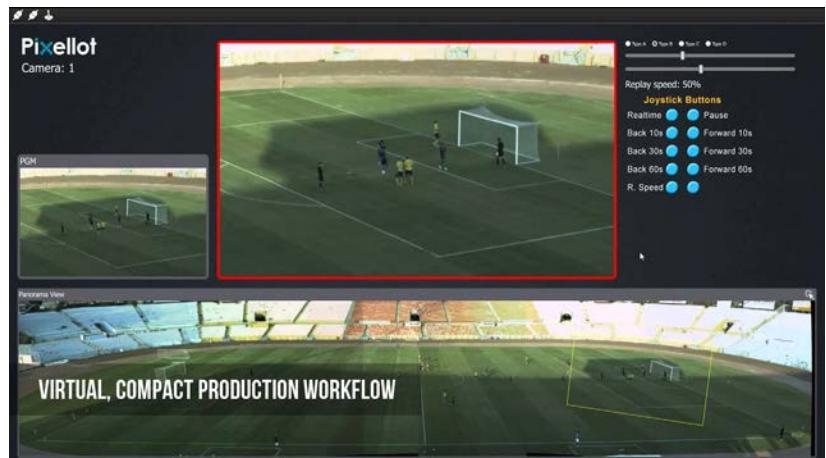
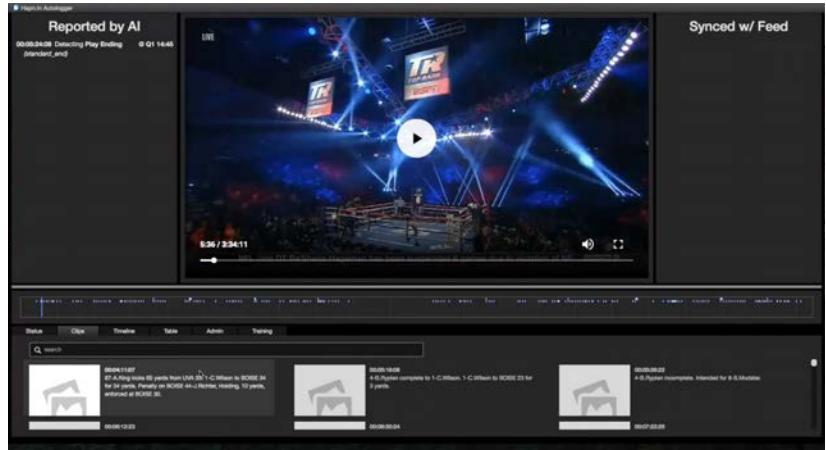
The applications for these new technologies are far-reaching, and change the very nature of sports production.

AI decreases production costs while increasing production speed.

The result is more video for fans.

AI can also assist with:

- Player tracking
- Coaching
- Officiating
- Live-streaming
- Score and penalty recognition
- Automated highlights
- Automated metadata



"Incorporating machine learning into our systems and practices is a great way to take understanding of the game to a whole new level for our fans and the 30 clubs. We...are looking forward to working with the Amazon ML Solutions Lab on a number of exciting projects, including detecting and automating key events, as well as creating new opportunities to share never-before-seen metrics."

JASON GAEDTKE - CTO, MLB

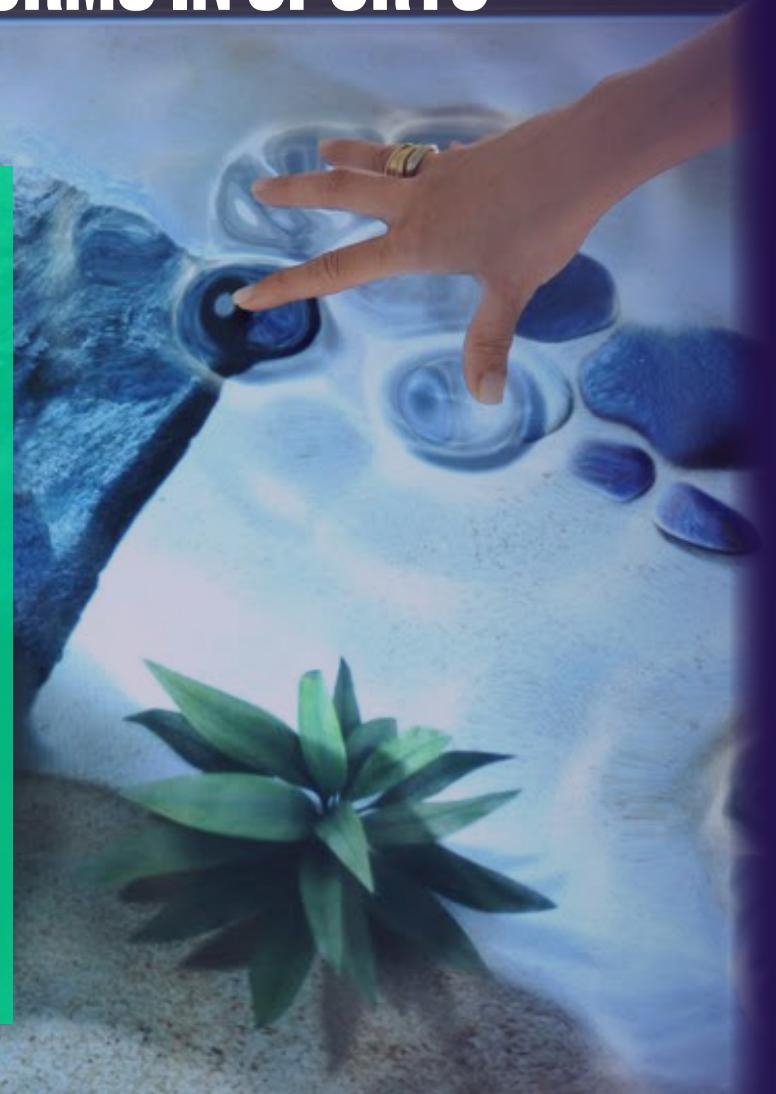
TECHNOLOGY SPOTLIGHT: IMMERSIVE MEDIA PLATFORMS IN SPORTS

ENGAGEMENT AND MONETIZATION

Engaging viewers is more than providing social media buttons, and it's bigger than generating clicks, follows, and retweets. A new group of technologies have emerged to provide engagement and monetization solutions.

Engagement is about providing deep interactivity, analyzing users' behavior, delivering personalized content, and retaining their attention.

Platforms that quantify and add to these experiences power monetization solutions.



"It is a truly transformative time for live sports viewing. Shifting consumer expectations and mobile's ability to add to the experience with apps, social media access and even augmented and virtual reality can bring the game to a new, more interactive level."

- KENT STEFFEN, PRESIDENT, ASCENDON DIGITAL SERVICES AND OTT

SPORTS EXPERIENCES



TWITCH.TV - ESPORTS FAN BROADCAST

- Non-linear: viewers can chat with broadcaster
- Anyone can broadcast
- Embeddable widgets directly on the video provide limitless interactivity



FOX SPORTS - MAJOR LEAGUE SOCCER

- Virtual Reality experience
- Multiple viewpoints: 360-video and standard perspectives
- Interactive game data
- Socialize with others in VR



MAGIC LEAP GLASSES - NBA

- Augmented reality experience
- Visualized statistics
- Interactive game data
- 3D court allows for any viewpoint



EPIC GAMES - FORTNITE

- Highly competitive
- Players can voice-chat and socialize
- Available on all consoles, PC, and mobile
- Very interactive experience

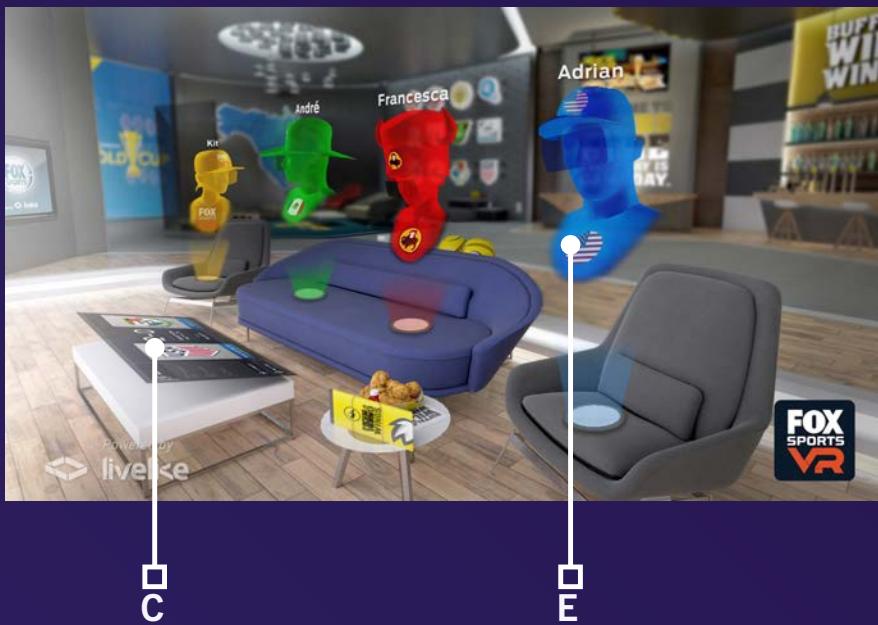
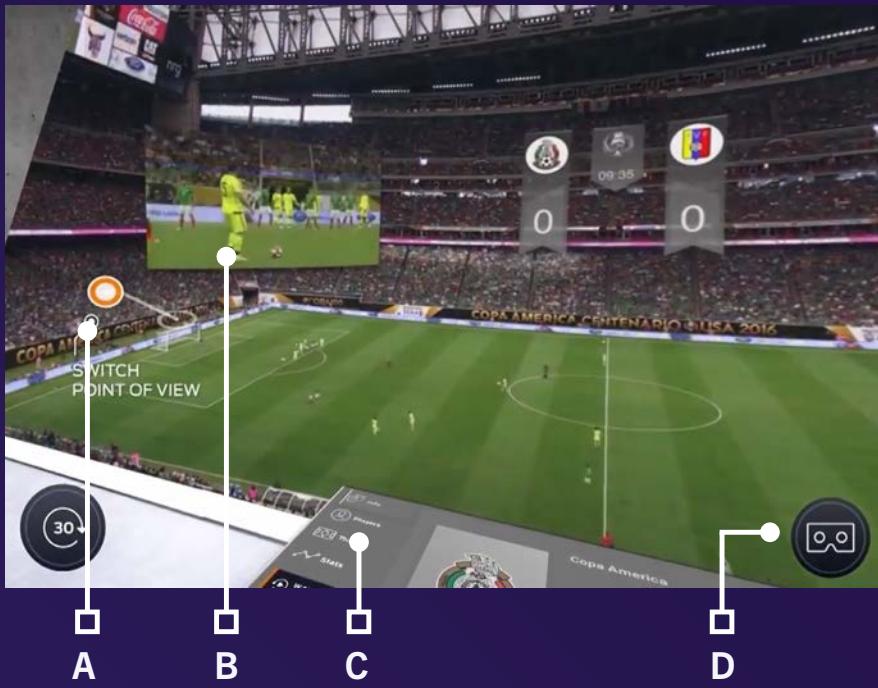
FEATURE SPOTLIGHT: TWITCH.TV & SOCIAL INTERACTION

WHAT IS TWITCH?

Twitch is an online live-video streaming service that is freely available to anyone. Services like Twitch are changing the way viewers are consuming video content. Twitch is highly accessible, very interactive, and deeply social. Here are the specific features that make Twitch a strong example of where sports OTT should be headed.



FEATURE SPOTLIGHT: FOX SPORTS & VIRTUAL REALITY



BEST OF BOTH WORLDS

Fox teamed up with LiveLike to produce the Fox Sports VR experience. This app can be downloaded for free, and even works on mobile, so those without headsets can still participate. It is possible to watch nearly all of Fox's sports offerings in this app's theater mode, and several prerecorded events can be enjoyed in full virtual reality. Other features include:

- A. Multiple viewpoints
- B. Normal broadcast still viewable
- C. Accessible and interactive data panels
- D. Easy toggle between normal mobile-mode and VR modes
- E. Users can invite their friends, and talk to one another using microphones built into VR headsets

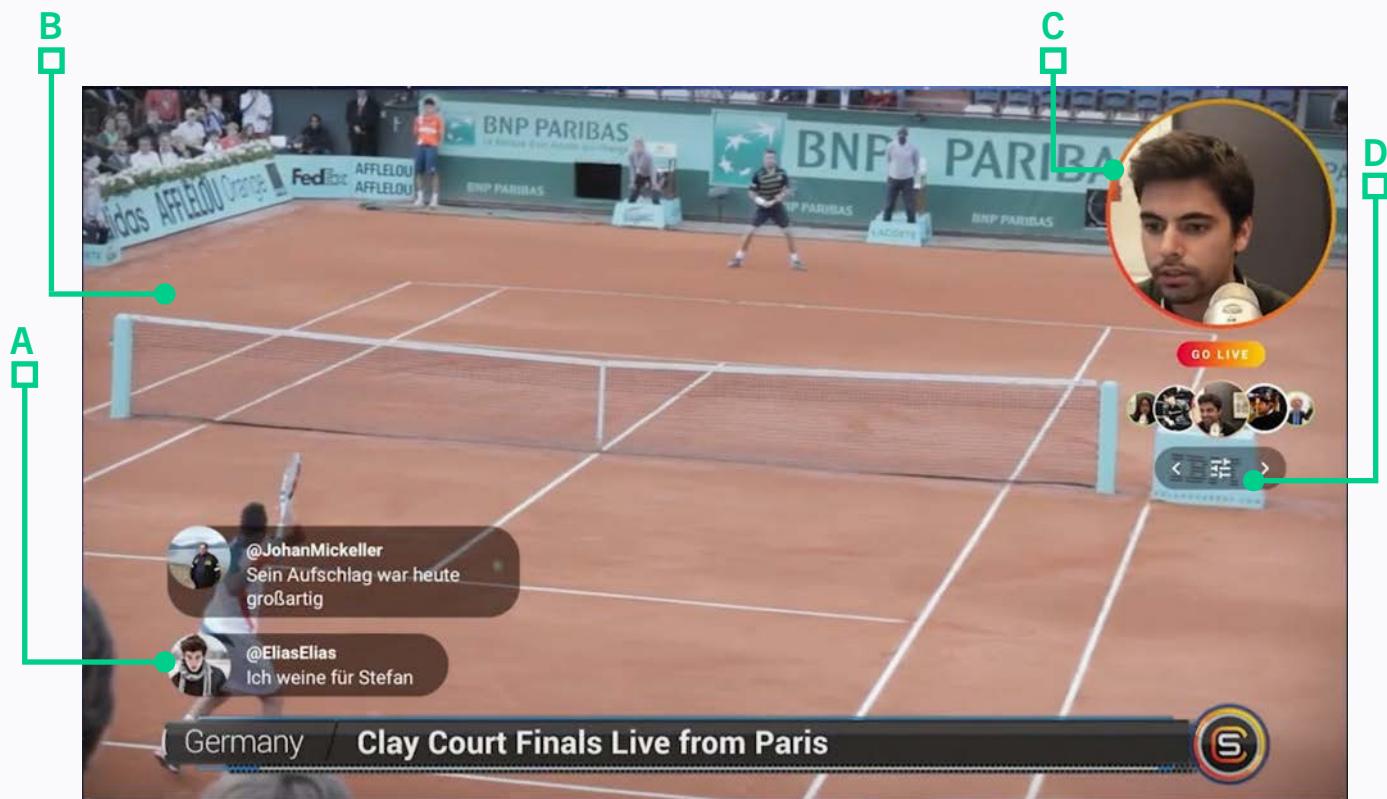
"Nearly half (44%) of U.S. millennials and Gen Z are interested in VR/AR to enhance the [sports] game experience."

CABLE SERVICES GROUP - THE DIGITAL FUTURE REPORT: SPORTS STREAMING EDITION

FEATURE SPOTLIGHT: SPORTSCASTR & USER-GENERATED CONTENT

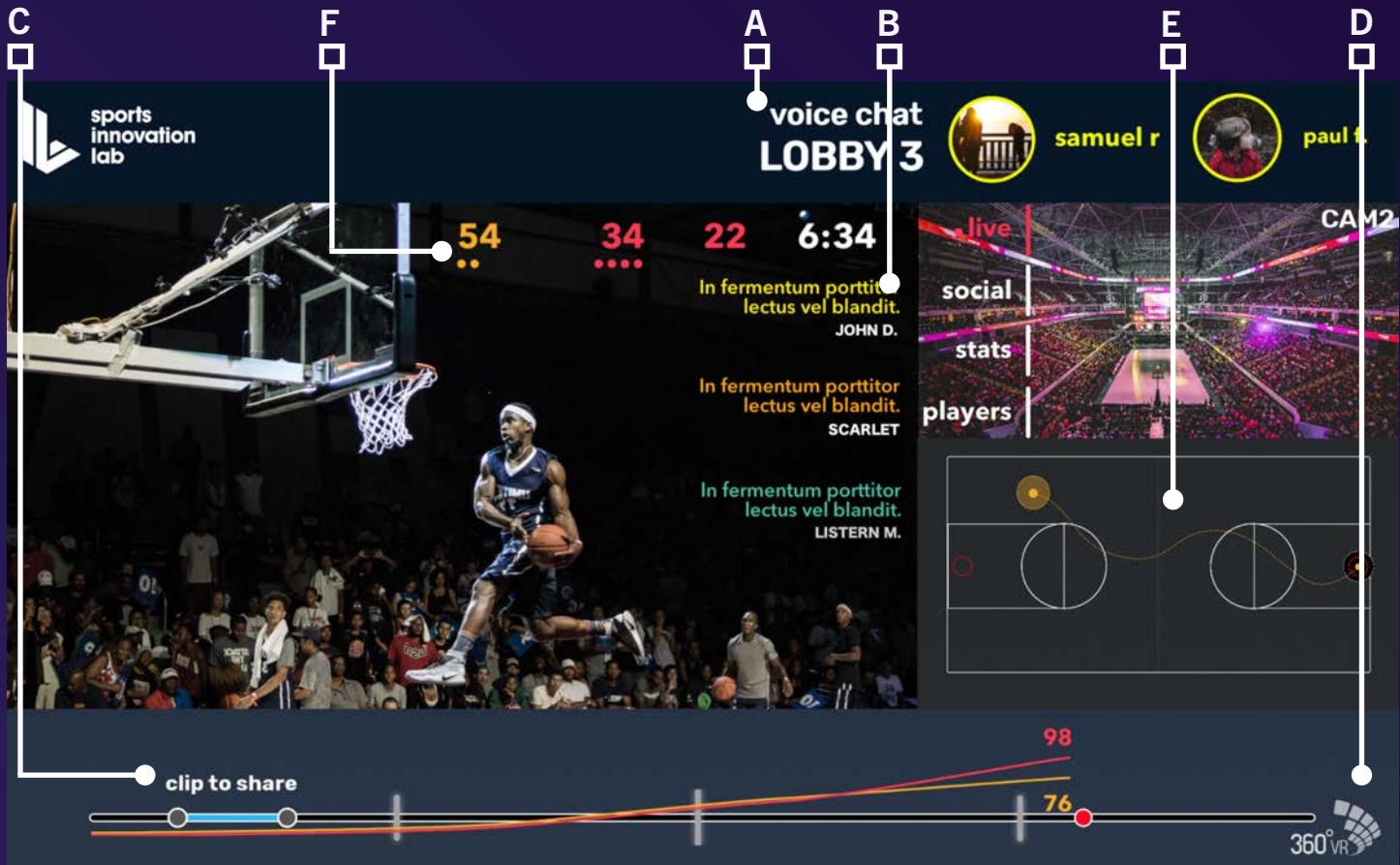
LEVERAGE USER GENERATED CONTENT TO EXPAND GLOBAL AUDIENCES

Sportscastr started as a second screen experience that allowed anyone to watch, or contribute, fan color commentary alongside the main broadcast. Rights holders can easily integrate Sportscastr into any OTT platform. This is critical for global distribution as rightsholders can outsource dozens of languages to user-commentators, creating a more personalized experience .



- A. **Live Chat** - Just like on Twitch, Sportscastr provides chat functionality so viewers can participate in the experience with the broadcaster.
- B. **Rights-controlled Sports Content** - Sportscastr works within rights-controlled content, as well as outside of it, providing maximum flexibility to rights holders, and a high degree of accessibility to fans.
- C. **User Broadcaster** – Just like on Twitch, they can be seen by the viewers, and they can read what is being typed in the chat and respond.
- D. **Other Broadcasters** – Sportscastr seamlessly integrates the ability to change between broadcasters without the user switching the match they're watching.

THE FUTURE WITHOUT LIMITS: A SIMULATION OF WHAT IS POSSIBLE



ONE PLATFORM TO RULE THEM ALL

- A. **Voice Chat Lobby** – Talk with a few friends, not everyone at once, with instant invites to get your friends into the mix quickly and effortlessly.
- B. **Text Chat** – Don't leave out people who don't have mics or don't feel like talking.
- C. **Video Clip and Data Scrubber** – This is something sorely missing from the modern sports experience: the simple ability to clip a play and share it with friends. Information is laid within the scrubber so you can scroll back to when the score was lower, rather than trying to remember when that was in the first place.
- D. **Instant VR Mode** – Virtual reality is here to stay, and while its market penetration remains shallow, providing the option out in the open encourages its uptake.
- E. **Interactive Data** – Providing rich data that viewers can manipulate enriches the experience and delivers information for betting and fantasy.
- F. **Flat Information** – Flashy animations and glossy stat bars inhibit immersion. Flat graphics that can be disabled allow the user to customize the experience.

Platforms like this are coming sooner than you might expect. Individually all these features are currently available, but a fully social, accessible and interactive experience remains elusive.

THE IMMERSIVE FUTURE IS HERE



The whirlwind of change hitting the sports broadcast industry can be overwhelming. Many companies, leagues, and organizations have to entirely rethink their strategies and shift their expectations, which is no simple task.

What we hope readers learn from this report is that the future is vibrant and full of opportunity. Immersive media isn't the end of sports media, it's a promising new frontier. It's a chance to tell the exciting stories that move sports in never before seen ways. New and wondrous experiences, and a fresh generation of fans indoctrinated into the great tradition of sports, will be the reward.



About the Sports Innovation Lab:

The Sports Innovation Lab is a technology-powered market research company focused on the convergence of sports and technology. We enable organizations around the globe to unlock the combined power of sports and technology. Whether you're a multinational corporation making a sponsorship choice or a sports league driving growth, you need an objective voice, trusted insights and insider access to make the most informed decisions. With our deep expertise in market research, technology, and the sports ecosystem, Sports Innovation Lab helps organizations of all stages understand and get in the game like never before.

Think of us as your research analysts, strategic consultants, SaaS providers, and sports industry insiders—all rolled into one. We are committed to being the first and most objective voice of the sports world, helping you discover industry trends so you can align them with your business objectives.

To learn more about our research, go to www.sportsilab.com, or email us at info@sportsilab.com.



About Consumer Technology Association:

Consumer Technology Association (CTA)TM is the trade association representing the \$377 billion U.S. consumer technology industry, which supports more than 15 million U.S. jobs. More than 2,200 companies – 80 percent are small businesses and startups; others are among the world's best-known brands – enjoy the benefits of CTA membership including policy advocacy, market research, technical education, industry promotion, standards development and the fostering of business and strategic relationships. CTA also owns and produces CES® – the world's gathering place for all who thrive on the business of consumer technologies. Profits from CES are reinvested into CTA's industry services.

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