

2021

Landscape of Sports Tech

SportsTech Accelerator
Overview

Timeline
A look back at the milestones throughout the year

Trends & Stories
The stories that shaped the most remarkable year in sports



Thank you to our partners



Welcome

In January of 2020, we launched the Comcast NBCUniversal SportsTech accelerator with high hopes and aspirations of what the year would bring. Little did we know that the entire world — and the world of sports — would come screeching to a dramatic halt.

The obstacles of 2020 have presented incredible challenges while also proving that ingenuity, innovation, and creativity are key to coming back better and stronger than ever before. The solutions developed over this past year, along with those creative ideas still to come, will prove vital to the success of bringing sports and fans back together safely. These innovative ideas will serve as the catalyst to propel professional and Olympic athletes, and the future of all sports, forward into this year and beyond.

We are grateful to our SportsTech partner consortium, our accelerator applicants, and selected startups, for their patience and flexibility as we shifted the timing of our program to allow for the world to get its bearing in this new normal. Our partners, NBC Sports, Sky Sports, GOLF, NASCAR, USA Swimming, US Ski and Snowboard, USA Cycling, and Comcast Ventures, have enabled us to maintain strong momentum this past year through their commitment and dedication to the accelerator and broader innovation goals.

Sports exemplify the pinnacle of human courage, the pursuit of success, the grand moments when we triumph in victory and rise up from defeat. Thrilled by that spirit, we go forward into 2021 with strong aspirations, bold expectations, and a desire to compete and to win.



JENNA KURATH
Vice President, Startup Partner Development
Comcast

Contents

2021 Landscape of Sports Tech



We had to rewrite the script on all fronts, such as maintaining consumer engagement without live sports, adjusting our entire marketing plans for a postponed Olympics, rethinking the experiential discipline, and adapting to a work from home environment. Standard operating procedure was no longer standard.

— Jennifer Storms, Chief Marketing Officer,
Entertainment and Sports, NBCUniversal Media



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Startups get unprecedented
access to our industry partners.



8 INVESTMENT CATEGORIES



Media &
Entertainment



Fan/Player
Engagement



Athlete/Player
Performance



Team & Coach
Success



Venue & Event
Innovation



Fantasy Sports
& Betting



Esports



Business
of Sports

Over
1000+
GLOBAL
APPLICATIONS

FIRST COHORT

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2021

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The Accelerator

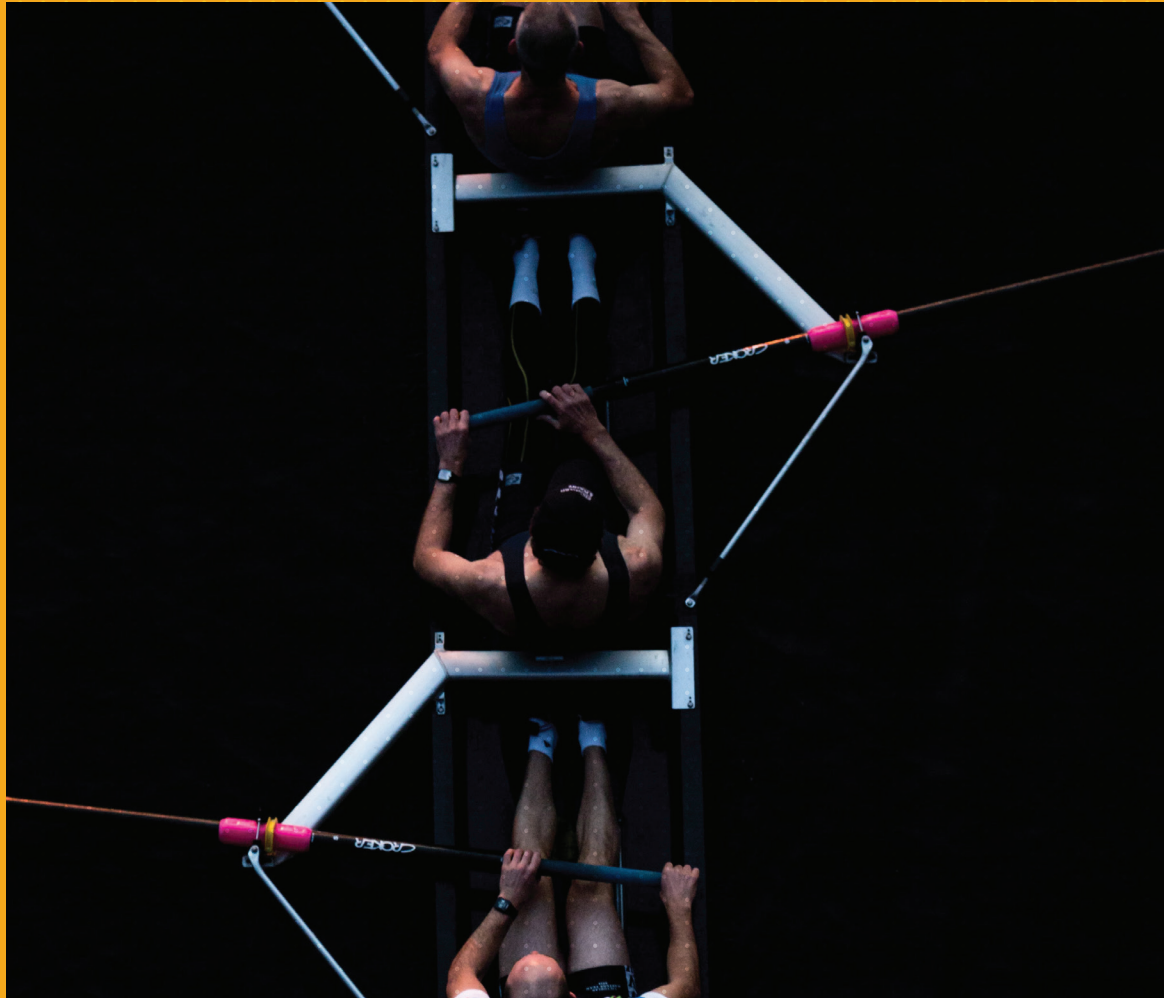


Comcast NBCUniversal SportsTech is not your ordinary accelerator. We are changing the way sports are played, both on and off the field. Powered by Boomtown Accelerators, and driven by Comcast NBCUniversal and a stable of well-known partners, brands, and professional sports organizations, our 12-week accelerator program brings the best sports tech ideas to life to provide players and teams with a competitive edge built on technology and innovation.

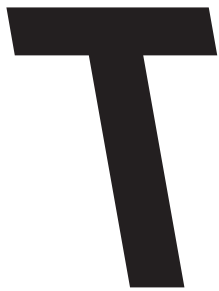
In the Comcast NBCUniversal SportsTech accelerator, we provide startups with unprecedented access to a global network of partners who serve as advisors, coaches, experts, and mentors. Through our program, the selected startups will bring their creative solutions to our partners and to market through the lens of our 8 investment categories.

In 2021, there is a powerful confluence of minds coming together to figure out the puzzling questions that impact how sports can safely return, and later, how fans can begin to return to cheer them on. This is the essence of our program: Gathering together forward-thinking entrepreneurs, inventors, and creative thinkers who can quickly assemble and turn an idea into reality. The innovations developed last year and into 2021 are going to change sports for the better for decades to come. We cannot wait to see which ones arise from our accelerator this year and into the future.

We would especially like to thank our executive leadership, Bill Connors of Comcast, and Will McIntosh and Jenny Storms of NBC Sports, for their key role in selecting a very special group of startups that will bring strategic benefits to Comcast as well as to our partners. These founders will have unprecedented access to a powerful set of advisors to grow and scale their businesses. We now look forward with great anticipation to our program kick off in February and our Demo Day in May.



The Purpose



his document provides an outlook to the Sports Tech Landscape for 2021 across Comcast NBCUniversal SportsTech's eight investment

categories. It gives insights into a future that builds upon one of the most difficult and impactful years in the history of sports. The most important takeaway is that 2020 and the coronavirus lockdowns attenuated longstanding challenges that pre-existed the virus, and as a result of the industry's response, accelerated solutions that were already in progress. These innovations will be key instruments of success for the sports business in 2021 and beyond. Similarly, 2020 saw the largest social justice demonstrations in U.S. history, advancing the sports industry's efforts to address historic and systemic inequities in a manner that will bring broad-based changes into the future.

In this 2021 Landscape Report, we tell the major sports stories of 2020 couched in the context of COVID-19, economic stress, and social justice issues, and provide a look at what's

coming for the sports industry in 2021. We cover significant 2020 milestones including partner events, leagues going offline and coming back on, venue health and safety protocols, Black Lives Matter and Rule 50 protests. The report also covers major tech developments that are playing a role in confronting the pandemic and its effects, telling the story of the sports industry's triumph over trial, grit through ordeal, and hope amid uncertainty. In 2021, the industry will re-emerge, resilient and stronger than ever.

We present a visual timeline of the year looking back and a summary for each of our eight investment categories. Each category includes research and our partners' take on the sector, based on personal interviews we conducted. We also incorporate some statistics from our analysis of applicants to the accelerator. We present a separate section on the Summer Olympics coming in July in Tokyo, an event that will bring the world together again to celebrate athletics, competition and the human spirit as the globe continues to emerge from the pandemic.

Executive Summary


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**Imagine a
world with**

no

no no no no

live sports.





If we had started our 2020 Landscape Report with that line, you rightfully would have questioned our sanity.

But that's exactly what March 2020 ushered in: A worldwide pandemic. A recession ignited by shutdowns and restrictions on public gatherings. Historic civil unrest over social justice inequities that reverberated throughout the sports world.

And yes, the massive and sudden cancellation of games, meets, tournaments, and other events, so globally pervasive, that at the low point, quarantine and sports-

starved fans were left with little else to watch but reruns, documentaries, and competitive darts broadcasts from taverns in New South Wales.

The deadly COVID-19 wreaked havoc throughout the public and private sector, racking up a tragic toll of lost lives and shattered livelihoods. It also exacted macroeconomic damage, broadly hammering the media and entertainment sectors and other industries linked to sports such as restaurants, retail, and travel.

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Some of the issues that we faced before were exacerbated by the virus, or by the isolation that came with it, and it accelerated two things: It accelerated the problems that came out of it, and it also accelerated the solutions.

— James Clement, Director of Operations, Sky Sports

sky sports



ne of the most noteworthy casualties was the 2020 Olympic Summer Games in Tokyo, which, after careful deliberation, were postponed to 2021. The cost of the Olympic delay was estimated to be just under 200 billion Japanese yen, or \$2 billion USD. But even more painful was the absence of the ecumenical spirit of the Games — just when the world could use it.

There's no question 2020 will be long remembered as the most turbulent and challenging year in recent history.

But there were moments of hope amid the hardships.

The NBA played games inside a bubble in Orlando. The MLB played a 60-game season and had expanded playoffs and a World Series. The NHL managed to finish its 2019-2020 season after a hiatus. And the NFL and NCAA football carried on, with empty or near-empty stadiums and amid COVID-19 positives that closed facilities and postponed games multiple times. Our partners put on virtual and in-person events, serving up competitions and entertainment to an audience that sorely missed sports.

As live sports slowly emerged from quarantine, masked fans returned to arenas, in small numbers and under strict social distancing conventions. Venue protocols including hand-sanitizing stations, contactless payment systems, testing and fever checks, and caveats for those with symptoms to remain at home.

Vaccines now set the stage for recovery, with the hope of some semblance of normalcy in 2021. And in mid-summer, all eyes will turn to Tokyo and the Games of the XXXII Olympiad.



African-Americans are trying to search for ourselves and ask where we stand in the world and where we stand in America. And we don't know. We shoulder a lot of the burdens of our community, but I think a lot of that responsibility should fall on the majority, and those who are the lawmakers and who are supposed to ensure that every man and woman is treated as an equal.

— Andre Iguodala, Miami Heat Forward,
First Vice President, National Basketball Players Association

While it was the biggest public health crisis in generations, COVID-19 was only one of the big stories of 2020. Generational social justice issues moved front-and-center after the death of George Floyd in Minneapolis. Floyd's death and other incidents sparked protests and civil unrest over law enforcement violence against people of color. What followed was the largest single demonstration movement in U.S. history, with effects felt throughout the sports world.



We're tired of the killings and the injustice.

— George Hill, Milwaukee Bucks Guard

Sports figures were at the center of the Black Lives Matter protests. NBA players began wearing t-shirts with the words, “I can’t breathe” while warming up before their games. On August 26, three days after 29-year-old Jacob Blake was shot in the back seven times by police, the Milwaukee Bucks opted not to take the court for Game 5 of their first-round playoff series against the Orlando Magic.

The NBA later postponed all three games scheduled for that day, and several other players in the WNBA, MLB and Major League Soccer declined to play. The following day, nine NFL teams cancelled planned practices.

The events of 2020 prompted NASCAR to ban the Confederate flag at its events. “That was an important move for our sport,” said Craig Neeb, the company’s Executive Vice President and Chief Innovation Officer. “We want all race fans, regardless of background, to feel welcome and included at our race events. More than anything, NASCAR is about great racing and the family-oriented community it creates. Everything we do needs to communicate that message to anyone interested in a great day at the racetrack.”

Women also took the spotlight in the focus on justice. In March, prominent female athletes — including tennis legend Billie Jean King, World Cup champion Megan Rapinoe and WNBA great Candace Parker — signed onto a legal challenge of Idaho’s law seeking to ban transgender women from participating in women’s sports in school. It’s a contentious issue with two sides. Athletes filed complaints with the U.S. Department of Education’s Office of Civil Rights in June 2019, arguing that their Title IX rights were being violated by a policy they say pits girls against athletes who are biologically male despite their female gender identity.



It was a wakeup call for us to take stock in where we were as an organization, and it didn’t take long for us to figure out we have some work to do to make sure our employee base is reflective of the audience and the fans we’re trying to serve.

— David Preschlack, President, NBC Sports Regional Networks & NBC Sports Group Platform and Content Strategy

In 2021 and beyond, the hope is that women will “collectively harness our positions and platforms to further the messages of equality and empowerment resonating in our culture and reframe long-held mindsets,” said Jenny Storms, Chief Marketing Officer, Entertainment and Sports at NBCUniversal Media. “I am optimistic our voices will be heard more clearly and we can build upon the prevailing messages of empowerment and equality in all aspects of sports and society at large.”

Given the widespread impact of the social equity movement on sports, prominent figures are raising questions about the application of Rule 50 of the Olympic Charter to future games. Rule 50 states, “No kind of demonstration or political, religious or racial propaganda is permitted in any Olympic sites, venues or other areas.” Casey Wasserman, Chair of Los Angeles 2028, has called for changes to the rule, saying it should be amended to allow “anti-racist advocacy on the Olympic stage.” Wasserman highlighted the “extraordinary voices” of athletes being heard across sport in support of Black Lives Matter.




As we move into 2021, there are some important observations for the sports world to keep at the forefront:

\$14b

U.S. professional sport losses from the pandemic could be as high as \$14 billion.

3.3%

The sports market is predicted to slow to an annual growth rate of 3.3% in the next 3 to 5 years, down from 8% compared to the past 3 to 5 years.



38%

38% of sports advertisers planned to pull funds because events were canceled or postponed due to the pandemic.

87%

The “return to normal,” the point when leagues are back to regular schedules and fans are attending games and events in bigger numbers, is thought to be early 2022, maybe late 2021. 87% of sports leaders say the industry won’t recover until 2022 or later.

Sports organizations will need to find new and innovative ways to promote two-way interaction with fans.

Investment Categories & Tech Trends

1

Media & Entertainment



BROADCASTING,
STREAMING,HIGHLIGHTS
NEWS AND CONTENT
SPONSORSHIPS
ADVERTISING

Remote
production



2

Fan/Player Engagement



FAN INTERACTION
ACCESS TO ATHLETES
FAN CONTENT
TEAM & ATHLETE CONTENT

Enhanced
mobile
interactivity



3

Athlete/Player Performance



ACTIVITY DATA/ANALYTICS
INJURY PREVENTION
TRAINING AIDS
ATHLETE WELLNESS

Use of AR on
mobile devices for
skills training



4

Team & Coach Success



GAME/TEAM PERFORMANCE
TEAM MANAGEMENT
COACHING/TRAINING
STATS TRACKING/ANALYSIS
RECRUITMENT

Remote coaching
apps while athletes
are still at home



Trends

5

Venue & Event Innovation



SMART STADIUMS
SCHEDULING
TICKETING, PAYMENT
SECURITY
MERCHANDISING

Arenas that are
digital twins



6

Fantasy Sports & Betting



TEAM FORMATION
INTERACTION
COMPETITION MANAGEMENT
BETTING
PAYMENT

In-game
wagering



7

Esports



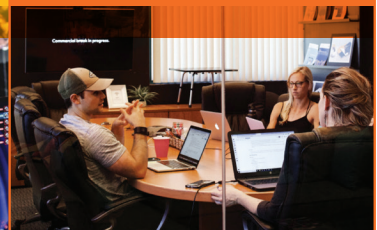
PERFORMANCE ANALYTICS
EVENT STREAMING/
MANAGEMENT
INTERACTION/CONTENT
BETTING
PLATFORMS

Convergence
with traditional
sports



8

Business of Sports



DATA VISUALIZATION
CYBERSECURITY
ECOMMERCE
MARKETING/
MANAGEMENT TOOLS
BOOKING

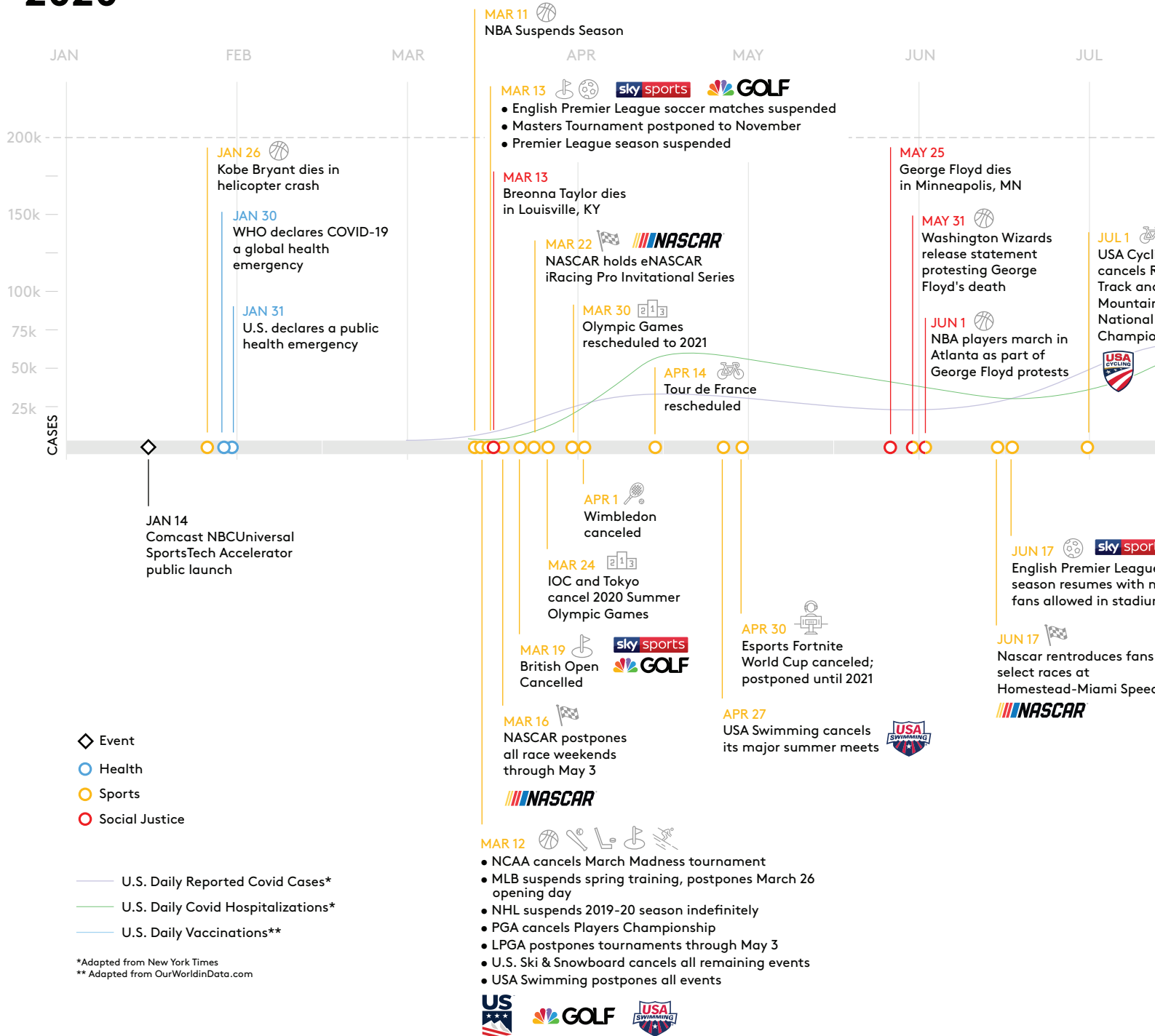
Security solutions
to give public
health assurance

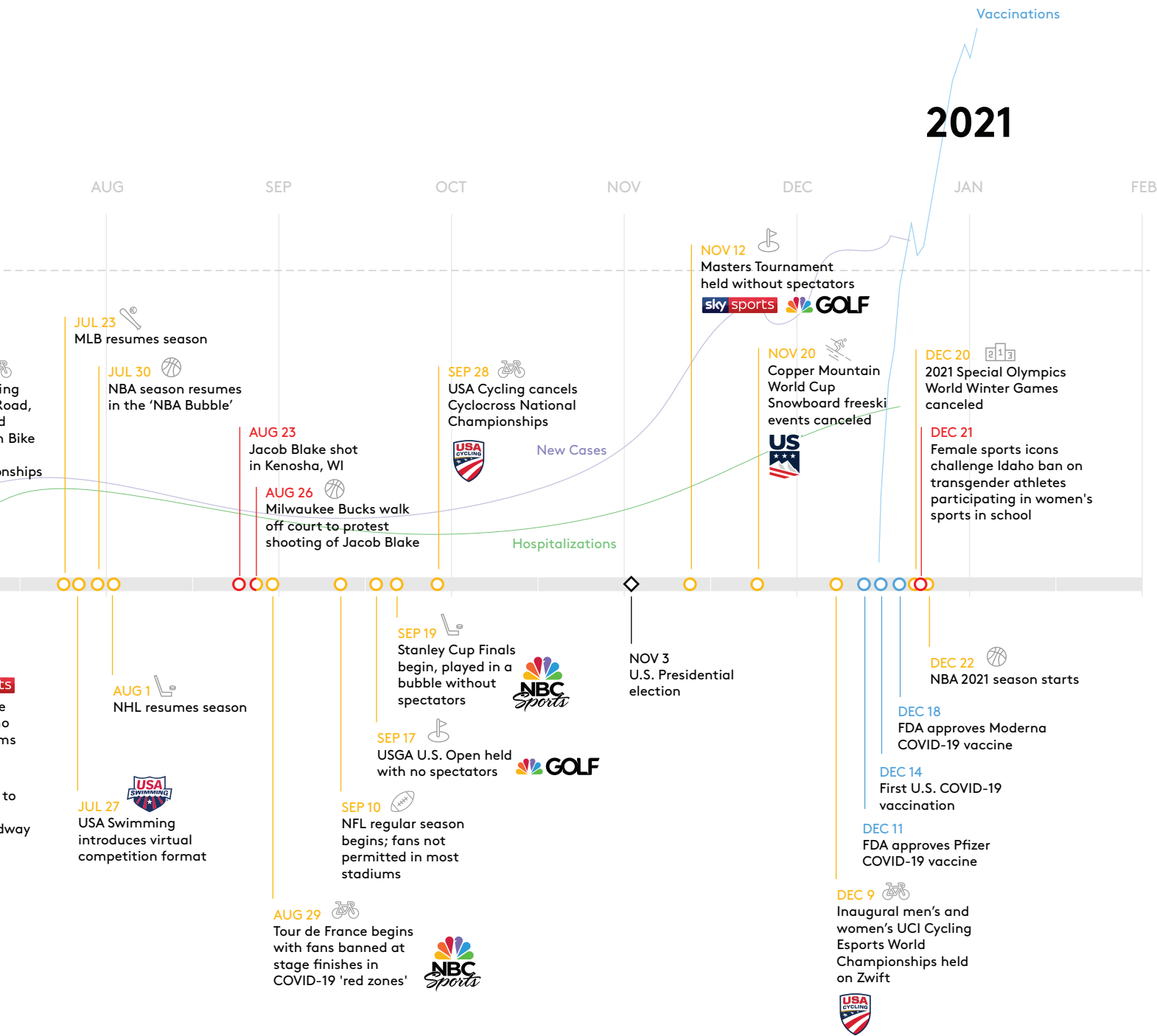


Timeline

A Look Back & A Look Ahead

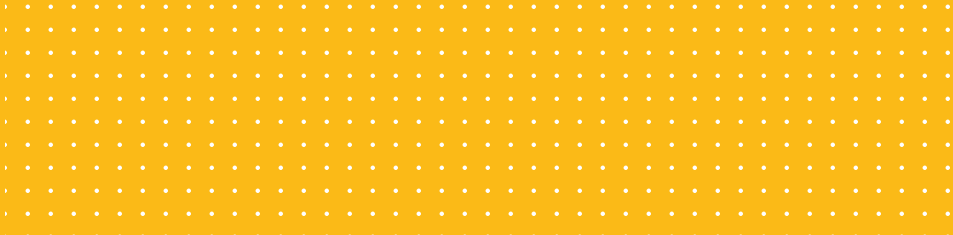
2020





C A T E G O R Y

1





Media & Entertainment



CATEGORY 1

Media & Entertainment



Sports fans have changed how they consume media greatly in the last several years, moving on from TV broadcasts to streaming live sports on their smartphones and tablets. Media and entertainment companies and sports organizations are adapting to this migration in viewing, with a majority developing their own over-the-top (OTT) services such as NFL's Game Pass, NBA's League Pass, and Amazon Prime's dip into the Premier League. There has been a great deal of interest in this area among startups — 39% of the applicants to the accelerator were in the media and entertainment category.

Streaming continues to be the engine of change in the ever-evolving sports media landscape. The global pandemic fueled this trend, convincing sports fans of the value of online streaming programs. About two-thirds of U.S. sports fans said they were willing to watch sports exclusively via streaming in 2020, and 69% said they would spend \$10/month for online streaming of sports and highlights, according to Grabyo.

In addition to broadcasting and streaming, this category includes news and content, sponsorships, and advertising. Major developments in this area in 2020 that will continue into 2021 include remote production, direct-to-consumer content, and niche broadcasting. Noteworthy technologies include OTT/on-demand streaming, augmented reality, 8K, 5G, immersive video, computer vision, VR 360, and optical player tracking (such as limb recognition).

For the foreseeable future, media companies which are bold enough to pivot away from paywalled bundles with flexible offerings, all while managing their base of fixed costs, are definitely here to stay.

— PwC



Further development and integration of remote production — with all the production suite equipment located away from the live event — was a major trend in 2020, likely

You have to get creative around how to produce live sports when you can't have 100 people at a golf course operating 30 cameras.

— James Clement, Director of Operations, Sky Sports 



69% said they would spend \$10/month for online streaming of sports and highlights

growing exponentially faster due to the pandemic than it would have under normal circumstances. NASCAR used REMote Integration (REMI) when it returned to racing in Darlington, S.C., with only camera operators, a technical director, and a single director on site. Meanwhile, producers and announcers were in a remote broadcast production hub.

"Remote production was gaining ground before the virus, but COVID-19 accelerated the trend," said Will McIntosh, Executive Vice President, NBC Sports Digital and Consumer Businesses at NBC Sports Group. "This pandemic has helped fuel a shift towards being much more efficient and thoughtful in how we're producing live sports," he said. "You've had this massive shift for a lot of traditional media companies to move more to a remote production model, so you've had technology move to the cloud."

5G networks provide vast opportunities for media and entertainment companies. Downloads that take hours on 4G LTE will take seconds on a 5G network. This will have major implications for VR, which consumes 1GB of data in one minute as well as the MIoT, which refers to the billions of devices and machines that require continuous connectivity.

Looking into 2021 and beyond, our research shows and many of our partners have told us the obvious potential for growth in remote production capability is so vast it's unlikely to lose ground against the more expensive traditional broadcast model.

Traditional broadcasters are best positioned to serve sports consumers as long as they can escape the stigma of declining relevance, PwC said in a 2020 survey of the industry. They have long-term expertise in storytelling, managing audiences, and marketing relationships. They can play in omnichannel formats (cable, digital, OTT), which gives them certain competitive

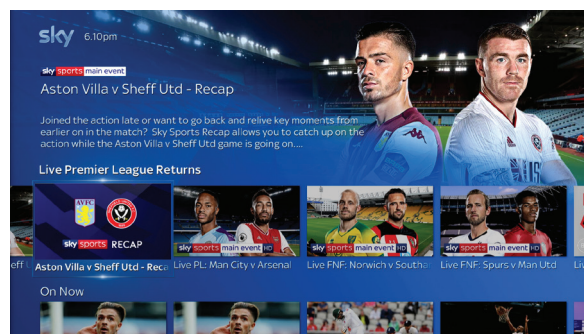
advantages. The proof

peacock

of this is taken from the headlines: NBC launched Peacock in 2020, migrating

premium sports content to the OTT platform. Disney+, with Hulu and ESPN — offered for free to Verizon customers and at a discount to Sprint/T-Mobile, hitting 90 million customers in late November.

Sky Sports' new Recap feature was an example of an innovation that was accelerated by the virus. James Clement,



Director of Operations at the company, said the project would have taken a lot longer to roll out, but given that viewers were at home, Sky pushed it out much more rapidly. The feature allowed customers on Sky Q, the subscription-based television

CATEGORY 1

Media & Entertainment

and entertainment service that Sky operates, to catch up on key moments at the Masters and access the best shots at Augusta National.

Sky Sports is running the Premier League this season on a permanent version of what it pioneered in March. "So if there's a COVID-20, we can go back to the model that we're doing," he said.

Clement also said the company is planning its coverage of the Masters in April. He said it envisions three scenarios: "One where we can completely go, one where we can't go at all, and one where we look for as many U.S. contributors and workforce as we can so we fly the least number of people."

"If everyone's fully vaccinated, and travel restrictions are dropped and we can sit people within two meters of each other, then all we'll do is create some more space and bring some teams a little bit closer to each other instead of working in different rooms," he said.

For the media and entertainment audience, one of the biggest changes is going to be seeing fans back in stadiums, Clement said. "We're already talking about dropping

crowds that are augmented audio, because we have got 2,000 people in some of the venues here in the U.K. So we're starting to wind back some of the add-on extras that we've put in place to compensate for no crowds." His best prediction for a return to normal, with fans return to venues in bigger numbers? September.

Matt Barbini, National Team Director for USA Swimming, agreed that many of the changes will be permanent. "The NBA bubble was great — I loved some of the camera angles and VR options. I think those were things that got launched based on need and not so much on preparedness, but those are the things that are gonna stick and what I see leaping forward."



//

Nothing we've done has been temporary. Everything we've built, we've just scaled and what we've done with each sport, we've immediately flipped to be a permanent solution.

— James Clement, Director of Operations, Sky Sports





Fan/Player Engagement



CATEGORY 2

Fan/Player Engagement



First things first: 83% of Americans call themselves sports fans, and 50% say they are “super-fans” of at least one sport.

Now overlay COVID-19. According to a survey by MRI-Simmons, at the height of the shutdowns, between 83% to 92% said they missed live sports, depending on the game or league. Fans described themselves as feeling disconnected, sad, and frustrated, showing the emotional toll the virus exacted on the nation.



It's time to accelerate direct relationships with fans.

— Timo Lumme, CEO/Managing Director
at IOC Television & Marketing Services

And they clung to a key fact: Sports fans say technology enhances their enjoyment of the game. It's also clear that a good experience with sports tech increases a fan's spending. Many of the technologies are designed to reduce the barriers between fans and their favorite players, teams, and leagues. When those barriers are down, sports organizations receive value.

And despite the headwinds, this category represented 41% of applicants to the accelerator, the highest such percentage.

The actors in this sector provide game and match updates on mobile devices, make VR headsets to simulate in-stadium experiences, give fans the ability to select different camera angles to watch gameplay, allow fans to compete with an AI robot during an event, and give fans a platform to interact with other fans during a game or match. They also allow fans to interact with players and assess their skills using headsets and other sensor-driven equipment.

Here's the stark reality about the road back to live sports: Because of the virus, only 27% of fans say they're looking to attend a sporting event in the next six months, and



This investment category, which encompasses fan interaction, enhanced digital media fan content, access to athletes, and improved on-site fan experience, faced stiff winds in 2020, considering that for several months there were no matches or games to attend, let alone watch. It became more urgent for companies in this space to pivot than for many other of our investment categories.

only 58% said they would in 2021 — period. This means sports organizations, venues, and teams have to be focused on two priorities: (1) finding every means possible to pursue an accelerated, but assuredly safe, return process; and (2) take measures to keep fans engaged and loyal until they come back.

Stadium and arena protocols were covered earlier in this report, but teams and venues will need to invest in marketing to assure the returning audience that sites are safe, clean, and protective of their health. Security and hygiene measures are covered more extensively in the “Venue and Event Innovation” and “Business of Sports” sections of this report. Other important overlap areas include Fantasy games, sports betting, and esports, since all three categories serve to engage the attention of fans.

Fan engagement also faced some challenges that predated the virus, especially in capturing the Generation Z market. This demographic was especially sensitive to equity, diversity, and inclusion

Now the mandate for social distancing makes those priorities more attenuated. Some 58% of fans said they want to see sanitizing stations in arenas when they return, while 48% support temperature checks. Sports organizations will turn to mobile apps to notify fans about lines, in addition to technological solutions that provide transparency about safety and health measures. In a survey by Tappit, 56% of respondents said they would feel more comfortable if their team’s stadium implemented contactless payments, and the percentage rose to 74% for 18 to 24-year-olds.

Looking ahead to 2021, it’s clear that sports leaders recognize the digital fan experience is a top priority for teams and leagues, but few organizations are currently delivering it in a way that allows it to capture and retain fans for the long-term. Connections with fans not only deepen loyalties, but they help leagues and teams grow significant revenue-raising opportunities through incentives, sponsorships, and more engagement. But understanding the behaviors and habits of fans is essential.



The COVID-19 pandemic has significantly weakened physical entertainment, reinforcing the value of both immersive and interactive technologies to compensate for sports’ diminished visual and social experiences.

— PwC

issues that arose in 2020, as it is a market that makes economic decisions based on social and political viewpoints. Before the pandemic, leagues and teams already had a problem with fan dissatisfaction with lines at entry, concessions, and bathrooms.

Fans want omnichannel engagement: 93% watch games on TV, 68% follow them on social media, 45% purchase merchandise, 30% play fantasy sports and 26% participate in sports betting.

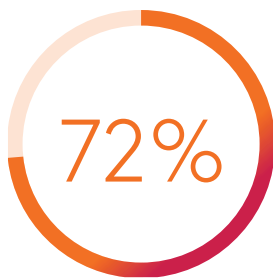
5G

AI

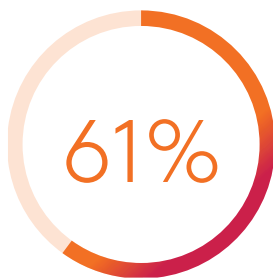
5G will enhance the ability of sport organizations to incorporate AR, VR, and AI into the fan experience; and, again, this can be supported with blockchain solutions that enable decentralization and cost-saving by cutting out the middleman. And, as with other blockchain solutions, it offers security and transparency allowing for cost savings for the fan and sport organization.

Social media consumption is increasing across all age groups, challenging assumptions about it being a user pathway primarily for younger demographics.

About 72% say they use social media for sports, with 61% reporting digital and social content helps them feel closer to their favorite team. As the world emerges and moves forward in 2021, with fans ultimately returning in full crowds to arenas beyond that, digital technologies will be critical to keeping fans engaged.



72% say they use social media for sports.



61% say digital and social content helps them feel closer to their favorite teams.

AR

VR

m



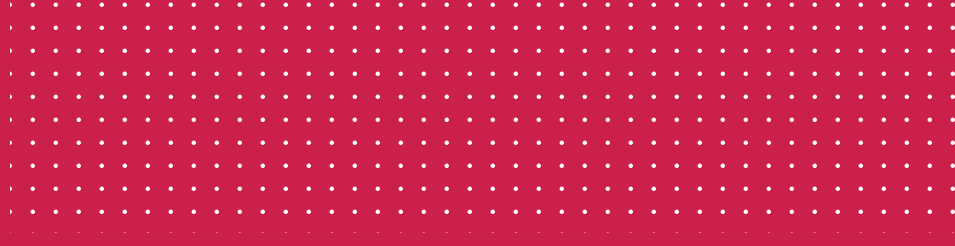
Partner Case Study



USA Cycling had to pivot in 2020 from being a required product — licensure for cyclists — to being a discretionary one. “We revamped our membership to make it less about the license and said, ‘Here's what we do. Here's where your money goes. Your money gets more kids on bikes. Your money supports more events and event directors, and we're gonna subsidize it with a million dollars. We're gonna subsidize insurance for events, so they can put on safe events. And your money goes to performances, goes to our lead athletics and helps these athletes be able to train and compete at the highest level,” said Bouker Pool of USA Cycling.

C A T E G O R Y

3



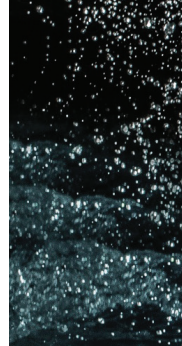


Athlete/Player Performance



CATEGORY 3

Athlete/Player Performance



For most athletes, the story of 2020 was cancelled and postponed events, shuttered training facilities, and an inability to go head-to-head against the competition, given quarantine and social distancing mandates. Health and safety took on different connotations in the sports world amid the raging pandemic, and many sports technology firms got involved in providing testing solutions and pursuing the warp speed quest for a vaccine.

But the athlete/player performance tech sector moved forward, as competitors trained and prepared for events in isolation

that two of the chief enemies of a training regimen are uncertainty and anxiety.

Technologies that help athletes become stronger, faster, and more adept at their game continue to drive this investment category, which includes miniaturization, player wellness, injury prevention, and activity data/analytics. They include products used during sports activity such as sensors and devices close to the body, wearables and performance tracking systems worn on the body, and smart pills and implants in the body. Accelerometers, magnetometers and gyroscopes can

gather vast quantities of information and, combined with GPS systems and video analysis, measure up to 1,000 data points per second. For example, the United States Olympic & Paralympic Committee's sports technology team offers cutting-edge technology to provide performance measurement, insights and feedback that help athletes and coaches make informed decisions about training and competition. These tools can be used to assess an athlete's performance by using data to track peak physical conditions, and by leveraging visual tools that show how athletes can continue to improve within the sport.

Anxiety and stress are just absolutely deadly for players, athletes and their coaches, and the whole team to have to deal with, especially when you talk about scheduling and planning.

— Matt Barbini, National Team Director,
USA Swimming



or at home. When word finally came of the postponement of the 2020 Olympic Summer Games, the would-be competitors felt equal measures of heartache and relief, given

Meanwhile, the global player tracking market, which delivers data using interconnected devices and sensors in the Internet of things, is expected to register a CAGR of 24.9% over the next five years.



In many sports, we are already at the limits of what is humanly possible. To get higher, faster, and further, athletes are like entrepreneurs who try, experiment, fail, start again, learn as they go, and eventually succeed.

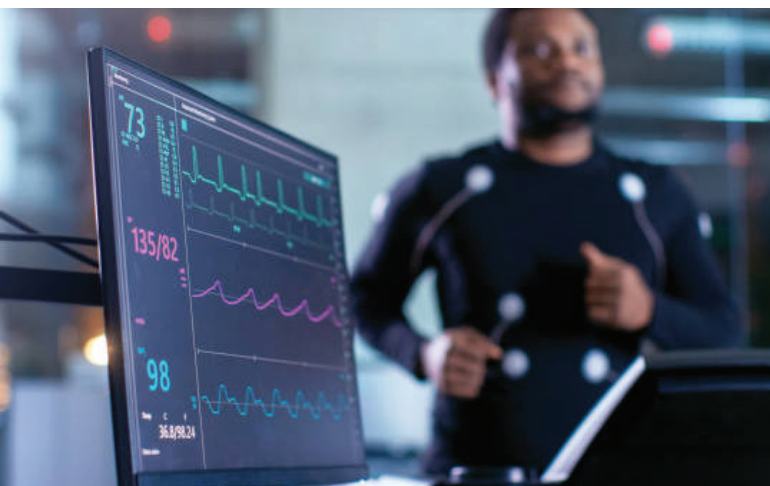
— Sascha L. Schmidt, Chair of the Center for Sports and Management, WHU - Otto Beisheim School of Management, Dusseldorf, Germany.

"In 2020, athlete training and tracking tools surged in importance for USA Swimming," said Barbini, who oversees a team of three performance managers who, before Covid, spent as many as 150 days a year on the

road at competitions or visiting clubs. "That's just gone now," he said. "And so communication, video, and being able to receive performance metrics has taken on a whole new meaning. We've always used hand held type stuff, GoPros and things like that, and all that is just sitting in a closet right now."

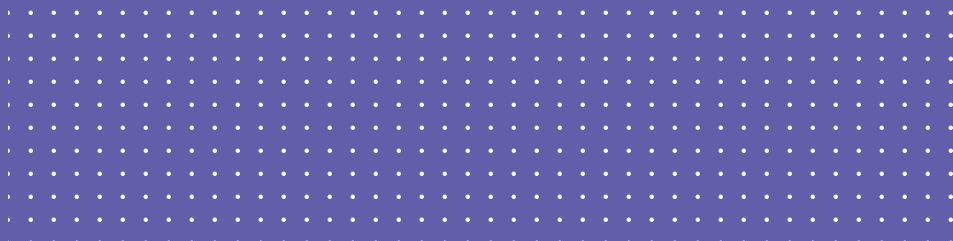
Barbini said USA Swimming has partnerships with FitRWoman and other providers of remote technology solutions for training and race analysis. "It gives us an ability to provide answers and solutions to them remotely, which we've never really had to do before. They send video for us to analyze and we get it back to them. Anticipate we'll do more of that." However, the organization is challenged by the limits of technology in the sports medium — water. "Water is undefeated against electricity," he said.

It's hard to imagine a year that reinforced the all-important issue of athlete health like 2020. Troy Taylor, high performance director for U.S. Ski and Snowboard, said one of the lessons learned this year was that "teams with the best practices have had a lot easier time adapting to the new normal." Winter sport competitors typically lose about 3-5 days per season to flu, and practicing best COVID-19 practices has reduced that to 1-2 days so far this winter, he said. "A lot of these are going to become habits" in the long-term.



C A T E G O R Y

4



Team & Coach Success



CATEGORY 4

Team & Coach Success



Coaches and teams faced unique challenges in 2020 that will extend into 2021. Like our other categories, the integration and use of technology will provide an invaluable boost as teams analyze statistics, fill rosters, and engage in recruitment and scouting.

A renewed emphasis on equality, diversity, and inclusion will be a mainline activity for teams going into the next year. As sports organizations experiment with content and storytelling to promote their athletes and teams, they should make social justice “an indispensable element of their culture and brand,” Pete Giorgio, U.S. Sports Practice Leader for Deloitte, urged in the firm’s 2021 industry outlook.

The global market for sports coaching platforms — web-based and offline tools to manage athletes’ data, plan and analyze training, and enhance communication between coaches and players — is expected to grow by \$17.07b from 2019 to 2023, advancing at a CAGR of nearly 33% during that period.

As noted in our 2020 report, this category has substantial overlap with our other investment categories. Companies in

this space are engaged in data analytics, training platforms, recruitment, and team performance. The top-funded team and coach success company, Hudl, with \$109 million in funding, is a software platform that provides video analysis and coaching tools for sports teams. Another fine example is one of our own alumni, Clutch, an affordable game film tool which provides free film for coaches.

Many startups in this sector adapted their products, services, and businesses to adjust for the virus. For example, BlueZone Systems — which has a team management and coaching solution — redesigned its platform to align with social distancing guidelines. When seasons were put on hold, Major League Baseball teams started using virtual training apps like TeamBuildr.

In 2021 we’ll see advances in technology that will continue to change the way sports coaching works. Powerful, accurate data collection systems give coaches state-of-the-art resources to help them build complex strategies and formulate tactics.

\$17.07b

The global market for sports coaching platforms is expected to grow by \$17.07b. from 2019 to 2023, advancing at a CAGR of nearly 33%.

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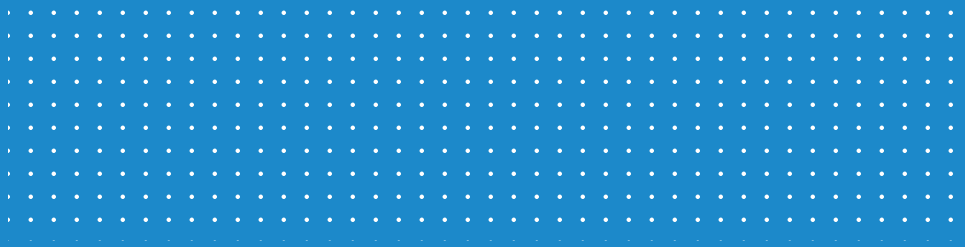
"As immunization occurs and we continue to see signs of recovery... if leagues can maintain continuity... then we will know we're headed in the right direction."

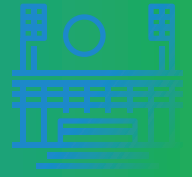
— Will McIntosh, Executive Vice President, NBC Sports
Digital and Consumer Businesses at NBC Sports Group



C A T E G O R Y

5



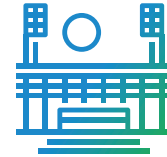


Venue & Event Innovation



CATEGORY 5

Venue & Event Innovation



After a year of cancelled events and empty or near-empty arenas, the impact on this investment category was profound — creating several new opportunities for innovative tech.

In the worst case scenario painted by the research firm Technavio, the global smart stadium market won't recover until the first quarter of 2022, leading to market deceleration at a CAGR of nearly 22%. The related subcategory of ticketing and hospitality is expected to be flat in 2021, according to PwC.

Our partners identified venues and event innovation as the category hit hardest in 2020, and the one that will emerge more slowly than others in 2021. The category includes smart stadiums, scheduling, ticketing and payment, security, and merchandising.

There were some bright spots. Despite the pandemic, two major sports stadiums opened in the NFL — Allegiant in Las Vegas and SoFi in Los Angeles, the latter a \$5 billion palace blending technology and sport. SoFi is a "stadium fit for Hollywood... It looks like the Dallas stadium and the Minnesota stadium had a baby," said NBC broadcaster Mike Tirico. SoFi is the first major venue in the U.S. to implement digital twin technology through an agreement with Willow. Willow, a global technology company that provides virtual representations of physical assets, will use big data gathered from every aspect of

the stadium to create a virtual copy of it, delivering analytical insight to enhance the fan experience. Such digital twin technology converts all aspects of a physical building into a living, learning, and evolving virtual replica. It will enable sports organizations to store, organize, and access data about



We now know what \$5 billion will get you.

— Al Michaels, NBC sportscaster, during the first NBC broadcast from SoFi Stadium, the new home of the NFL's L.A. Rams and Chargers.

their smart buildings and provide real-time insight to optimize venue operations.

Smart stadiums also come with innovations in ticketing, parking, point of sale (POS) terminals, merchandising, food sales, and digital signage. They provide opportunities for fans with loyalty and rewards programs, team and athlete interaction, and interoperability with mobile devices they bring to games.

In-person fan attendance is an essential component of the success of sports organizations, so teams and leagues are going to work hard to get venues reopened as soon as possible in 2021, taking all steps necessary to make fans feel safe about returning to arenas. They'll have to do this while continuing to invest in improved overall fan experience, especially with high-tech elements that Generation Z has come to expect and demand.

Businesses in the event and venue space are pivoting to offset the effects of the public health and safety crisis. Venues will use smart security cameras as IoT sensors, placing them at entrances and exits and outside bathrooms to monitor compliance with COVID-19 occupancy restrictions. When a maximum number of people is reached, venue staff will receive text alerts so they can take action.

For 2021, we are seeing innovations with in-arena software, physical hardware, and networking equipment to enhance the visitor experience. Verizon added 19 new stadiums and arenas in 2020 to the list of venues that use its 5G Ultra Wideband network. In 2021, we forecast more sport venues will capitalize on 5G given its benefits for the fan experience. Blockchain technology will be critical as companies will

require security and transparency at warp speed.

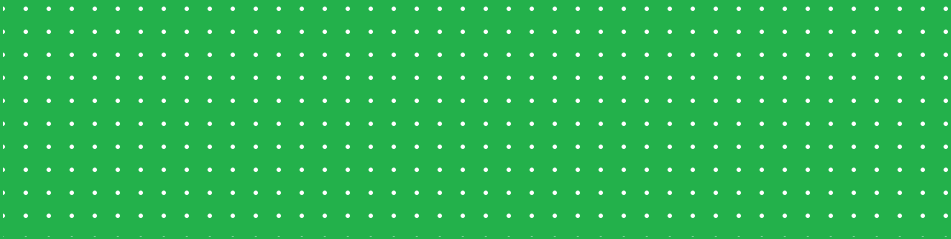
Other advancing technologies include regular game and match updates on a mobile app while watching the game live, access to high-speed WiFi to share updates on social media, and the ability to order food and beverages online and have them delivered to your seat.

Other apps will provide player information and insights, with live stats in-game. Fans will also have wearable devices such as wristbands or biometrics instead of paper or mobile tickets to gain access to an event. Mobile devices will also provide notifications of shortest lines at bathrooms and concessions.



C A T E G O R Y

6





Fantasy Sports & Betting



CATEGORY 6

Fantasy Sports & Betting



Sports betting & fantasy saw a brief dip in the middle of the year, then came roaring out of the storm with big numbers. COVID-19 and the shutdowns didn't overly hinder this sector, since participants could place bets and play in fantasy sports safely from home on smartphones, laptops, and other web-connected devices. As a result, it's poised to be even more resurgent in 2021.

Currently, 20 states + DC have live, legal sports betting. 5 states are legal, not yet operational. Bills were introduced in all but three states. Congress has taken up proposals, and ultimately, it's likely that only Utah – which has a prohibition in its constitution against gambling, won't ump in the game.

During the pandemic, states with sports betting industries – especially those with mobile sportsbooks – were able to generate revenues as gambling contributed to their budgets and eased financial stress. Other states that have not yet made gambling legal took notice, accelerating the potential for opportunities in new venues. States with in-person sports betting only are exploring other platforms, given that 80% of the revenues were placed on mobile devices.

In the 2020 landscape report we cited experts who predicted that legal sports betting would surge from \$4.9 billion in 2019 to \$287 billion in 2021. Despite Covid, the industry is now forecasting more optimistic numbers, saying that total wagers could be as high as \$400 billion, according to Legalsportsbetting.com. Sports betting rose 33% measured in

With the outbreak of COVID-19, mobile sports wagering revenue has skyrocketed even further making more states that are without it want that part of the industry to become legal as well.

— Legalsportsbetting.com

October 2020 on a year-over-year basis. That month – the strongest so far in U.S. sports betting history – marked the sixth consecutive month of recovery for the commercial gaming industry – following a historic low point in April – in part because of the much wider availability of major live sports to bet on, including the NBA, NHL, MLB, and the NFL.

The industry also found out what it's like when there aren't any sports to bet on. When the lull came in 2020, sportsbooks found small successes with some relatively esoteric niches, including eSports, table tennis, competitive darts, and far-flung soccer matches still being played somewhere on the globe.

In 2021, states are likely to broaden their betting opportunities, creating a more-inclusive betting market with even broader appeal. In August, NBC Sports inked a five-



of the revenues
were placed on
mobile devices.

year partnership with PointsBet worth nearly \$500 million, including a 4.9% equity stake in the gambling operator. PointsBet, an Australian company, will be the sports betting partner across NBCUniversal's assets, including NBCSN, the GOLF Channel, and its regional sports networks (RSNs). The deal presents NBC Sports with "the opportunity to drive billions of dollars in bottom line growth vis-à-vis the equity we've secured," said David Preschlack,

Fortunately Covid didn't have a long-term impact on the sports betting space. When we have rights holders who are in business with PointsBet that will allow the three of us to work better together, then that could take this notion of in-game betting to a whole different level.

— David Preschlack, President, NBC Sports Regional Networks & NBC Sports Group Platform and Content Strategy



President of NBC Sports Regional Sports Networks and NBC Sports Group Platform and Content Strategy.

POINTSBET

**SPORTS BETTING
IS HERE**



The outlook for sports betting in 2021 is bright as more states come online with legal regimes. For many of the states that have not yet legalized, it's a question of when, not if. And revenues will continue to rebound for the industry. More agreements will be reached between online sports betting companies and casinos, and next year sports betting revenue is expected to reach \$2.5 billion, rising to \$8 billion in 2025.

One trend to watch out for in 2021 is the continued development of iGaming, with Iowa, Maryland and Indiana likely to get into the activity. iGaming — betting on the outcome of a game or event online — looks like a niche made for our times, given COVID-19 shutdowns. It's hugely successful in New Jersey and Pennsylvania, despite concerns about the potential for it to exacerbate problem gaming issues, and the fact that the casino industry is still a bit wary of online alternatives.

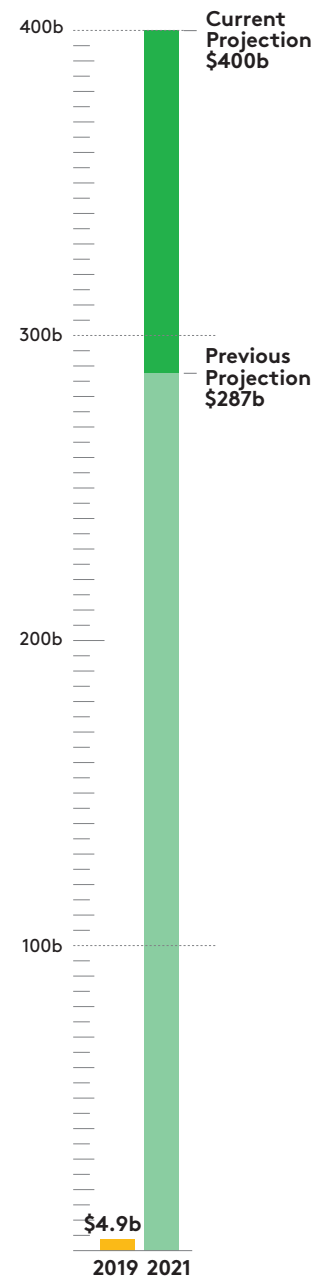
Fantasy sports also had a healthy 2020, especially as live sports came back following pandemic shutdowns. Market size was valued at \$18.6 billion in 2019, and is expected to reach \$48.6 billion by 2027, registering a CAGR of 13.9% from 2021

PROJECTED BETTING DOLLARS (USD)

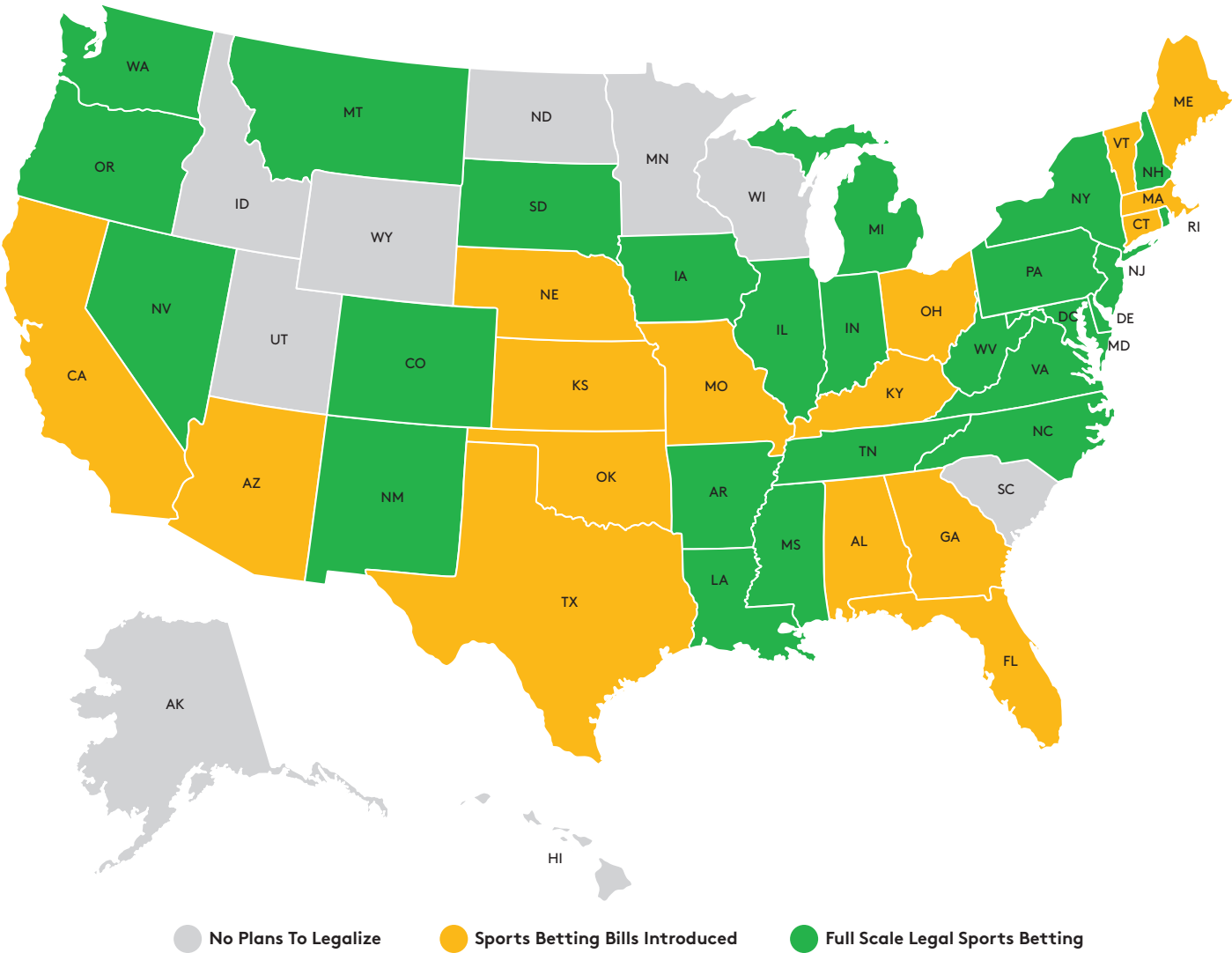
to 2027. The football segment led in terms of the fantasy sports market share in 2019 and is expected to retain its dominance throughout the forecast period.

The top sportsbook app, DraftKings, saw its stock value rise by 11% after its projected revenues for 2020 were revised up to as much as \$560 million, thanks to a strong 3Q performance. The company attributed the surge to the return of the NBA, NHL, MLB, and NFL – all of which were active during the quarter – following coronavirus lockdowns. Legal sports betting also fueled the fantasy niche.

Craig Neeb, EVP and Chief Innovation Officer for NASCAR, said sports betting was an incredible success for the organization in 2020. Although the handle was small given that the organization runs only about 36 events in a typical year, compared with Major League Baseball with 162, “We saw some ridiculous growth numbers in sports betting,” he said. Fans placed wagers on NASCAR’s esports product and on real races once they returned. “And we scored some partnerships with BetMGM, Penn Gaming. We just announced a recent one with Winbet. We are fortunate to have these best-in-class partners working with us to figure out that whole in-game betting and what we can do to keep people engaged.”



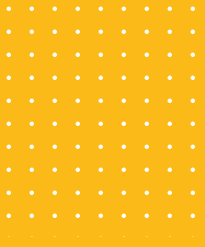
STATES WITH LEGALIZED SPORTS BETTING







Esports



CATEGORY 7

Esports



It would be hard to argue that any investment category benefited from 2020, but if there was one that thrived, it was the global booming phenomenon of esports. The sector kept fans and players engaged in sports and games while they stayed at home. Sports leaders ranked simulated sports as the #1 activity for growth potential and action/fantasy/shooter games as the #2 in a recent survey. Virtually all our partners said that if the lockdowns had a winner, it was esports.

And it's a broad sector: Companies in the space use technologies such as performance analytics, event streaming and management, betting platforms, mobile gaming, apps to support fan/player interaction and content management, AR/VR, AI/ML, computer vision, gaming software, 5G, and blockchain.

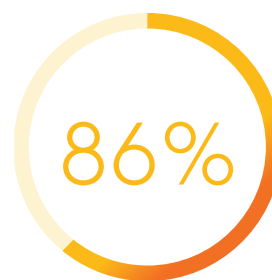
According to our research, 73% of sports tech executives expect COVID-19 to generate greater investment and deal activity within esports in 2021. While it is dwarfed by the \$159 billion video gaming industry within which it sits, the sector is expected to generate revenues of \$950.3 million globally in 2020, according to a report by the law firm of Foley & Lardner. That might come lower than the pre-pandemic forecast, but it represents only a 1% decline from 2019, meaning esports has remained strong even amid worldwide economic distress.

The sector set an industry record in 2020 when some 1.3 million viewers tuned in

to watch professional NASCAR drivers compete in a virtual race on FOX and FS1 during the first month of the shutdowns. With in-person racing suspended from mid-March to mid-May, NASCAR developed its first eNascar iRacing Pro Invitational Series so fans would spend their Sundays with the brand, as they would normally at the track or on TV. The series featured NASCAR's stars — including Dale Earnhardt Jr., William Byron and Chase Briscoe — virtually racing from home at digital versions of venues like Homestead-Miami Speedway and North Wilkesboro Speedway.

The popularity of esports keeps growing: Globally, 35% of sports fans have watched esports and 23% have played one. And why not? Tournaments paid out a total of \$92.6 million in prize money. At times it appeared that quarantine was actually fueling the industry's expansion — Verizon saw a 75% increase in video game traffic during peak hours in March, after shutdowns began. Twitch, the premier live video-streaming service, reported a 56% increase in viewership in the second quarter on a year-over-year basis.

Optimism is high for esports growth in 2021 — 86% of industry leaders say the sector is poised to post above-average to very high



86% of industry leaders say the sector is poised to post above average to very high growth.

With esports and sports betting, thousands of entrepreneurs are creating companies to find strategic partners.

— Wayne Kimmel, Managing Partner of SeventySix Capital, a sports tech venture capital firm

growth, according to our research. The esports ecosystem provided multiple revenue streams: media rights for broadcast content, including free-to-air and pay-TV; advertising, either placed at live events or during broadcasts of esports competitions; ticket sales and merchandising; and publisher fees paid by the publishers both to independent esports organizers for hosting events and to esports teams for marketing rights.

One of the big developments in esports in 2020 was its nearing convergence with traditional sports. The trend demonstrates that high-level sports experiences in the future will not only be watchable, but playable. The pandemic prompted the NBA's Phoenix Suns to simulate

In the next few years, we will see esports academies that will teach students gaming AI, leadership, game development, etc.

— Steve Garrow, Managing Partner of financial advisory firm Rushmore Associates and Founder of industry conference Esports Tech Invest

its remaining regular-season games on NBA 2K, streamed on Twitch. The first such contest, a mimicked game against the Dallas Mavericks, drew 221,000 views.

Esports gives traditional sports organizations several new ways to leverage technology and

engage with fans. About 64% report they are looking to use digital technologies to provide fans with more direct interaction and engagement, while 48% are now allowing fans to virtually experience the feeling of attending a live game.

There are a few concerns that blunt the rosy outlook for esports going forward. Legal risks abound with cybersecurity, intellectual property, licensing, and labor and employment matters. Additionally, 75% of esports executives say they're concerned about match-fixing and other forms of cheating that could undermine the legitimacy and future growth of esports. There are also

Ten years from now when we look back, we may very well see that the sport most kids in the world participate in is esports.

—Will McIntosh, Executive Vice President, NBC Sports Digital and Consumer Businesses at NBC Sports Group

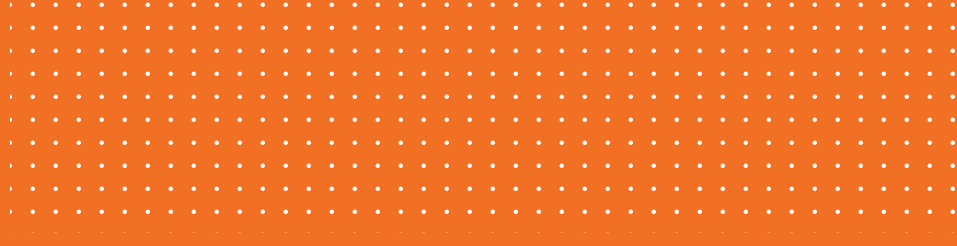


concerns about the control exerted by the small number of game developers in the space, and whether that could present a barrier to entry by others.

Esports organizations are now using NBC's software — used by 16 million parents and athletes in the traditional sports space — for managing youth teams and youth leagues, said McIntosh of NBC Sports. When youth sports were significantly disrupted by COVID-19, kids turned to video games. "Those young athletes are also the same kids that are playing Fortnite, that are using the Roblox platform, that are playing Minecraft, that are playing Rocket League — all these video games," he said. "We know that people that engage in those games or who engage in fantasy sports, they tend to consume more live sports, which creates an interesting halo effect for companies like NBC."

C A T E G O R Y

8





Business of Sports



CATEGORY 8

Business of Sports



Management of sports and media organizations in 2020 was a tough slog. Many companies faced harsh cutbacks in budgets and personnel while trying to pivot quickly to new sources of revenue amid the upheaval. This sports tech investment category — which includes marketing and management tools, data visualization, booking, ecommerce, and cybersecurity, faced turbulence this year, but will gather steam again in 2021, our research showed.



Major League Baseball payrolls plunged to \$1.75 billion during the pandemic-shortened season from \$4.22 billion.

— ESPN

The global sports management software market was valued at \$4.55b in 2019, and It is expected to reach \$10.67b by 2025, registering a CAGR of 14.82%, during 2020-2025. Driving the sports management

\$10.67b

The global sports management software market is expected to reach \$10.67b by 2025, registering a CAGR of 14.82%

software market is the need to run teams, clubs and associations as organized businesses. The global sports industry often grows faster than many country's national GDPs.

Few areas generate and venerate data to the extent found in sports. The sheer volume of data necessitates solutions for processing and analysis, driving the market for data visualization apps. In 2017 IBM introduced artificial intelligence highlights at the Masters, processing hundreds of hours of live video, analyzing player movement and facial expressions, and measuring the roar of the crowd to identify the most highlight-worthy moments right after they occur.

The company topped that in 2020 by adding sound analysis to its AI-powered sports highlights technology, allowing for more accurate edits of highlights not just at the Masters, but at Wimbledon and the US Open as well. It also put AI analytics in the hands of USTA coaches with its "Coach Adviser" tech.

In the sub-category of ecommerce and marketing, context is critical when it comes to sports and brands. For example, when it comes to selling outdoor gear, not every activity is suitable for every season, and not every customer even buys for every season — skiing in Montana, roller-blading in Florida. For example, RevZilla has a solution that personalizes email based on purchase history, like many such apps, but then incorporates it into the context of season and geographic cues to drive decisions about product promotion.

Cybersecurity continues to increase as a

priority for organizations, and sports teams and leagues are not immune from hacks and threats. Data about athletes, fans, and customers must be protected, and issues of player health raise ethical questions about privacy. Every aspect of an athlete's daily training regimen and diet is actively tracked. In January 2018, the hacking group "Fancy Bear" released stolen International Olympic Committee emails, possibly in retribution for the ban against Russia's participation in the 2018 Winter Games. For these and many other reasons, the digitization of sports must be stored and secured.

Several sports tech start-ups have management solutions as their primary focus. We continue to see a healthy future

// **The acceleration around digital transformation will be critical as organizations look to create new revenue streams to balance revenue loss, especially related to ticket sales.**

— Jennifer Storms, Chief Marketing Officer, Entertainment and Sports, NBCUniversal Media



for companies that help teams and leagues automate administrative tasks and streamline operations, giving them time to do what they do best — compete, win, and prevail.

Social justice issues will play a big role in this category moving forward, given that c-suites across sports tech — as in most other industries

// **Any time you can use data to enrich the experience or provide more context to the consumer, it's a win-win.**

—Will McIntosh, Executive Vice President, NBC Sports Digital and Consumer Businesses at NBC Sports Group



— are largely populated by white males. "The business of sports certainly has a diversity, equity, and inclusion issue," said Bouker Pool of USA Cycling. "And I think that as a business we're going to have to look at new ways to ensure we are reflective of the entire cycling community. For media, events, and venues to progress, they've got to change the way they do business. Same with us, we need to change the way we do business."

2021 Olympics

If there is a single 2021 event that will demonstrate the resilience and creativity of sports tech, it's the 2021 Tokyo Summer Olympics, scheduled for July 23 through August 8. Sebastian Coe, the World Athletics president, believes the organizers of the Summer Games have "cast-iron will" to stage the event,



We feel like the Olympics is going to be just a massive igniter for this country, for the world.

— Bouker Pool, Chief Commercial Officer, USA Cycling


which will showcase classic competitions by the globe's athletes, as well as world-class technology.

NBCSports is aiming to strike a tone of "awe and inspiration" for the 2021 Games, positioning them as a unique celebration of trial and triumph that will inspire a world facing shared, historic challenges. That theme of inspiration and awe is demonstrated by the tech that will be featured at the Games, helping athletes elevate their competition. Tech and creative "hacks" have played a big role in training as the competitors make their journey to the Games, in the throes of the pandemic.

For example, with swim clubs shut down because of COVID-19, Sharon van Rouwendaal, an elite distance swimmer who took home a gold medal for the Netherlands at the London 2012 Summer Olympics, took a novel approach to get in her laps. With a belt around her wetsuit that's tied to a rope attached to a pole to keep her in place, van Rouwendaal swims laps in an inflatable pool.

Indeed various advances will make the Tokyo Games the most high-tech in history. Sports tech will be critical for the athletes given that they now have "truncated training seasons ahead of them" as the Olympics grow closer, said USA Swimming's Barbini. "We're working towards a single-site Olympic trials in June where our best athletes can race head-to-head for spots on our Olympic team. We're trying to offer opportunities to compete through this year, but we're taking it one at a time."

During the Games, broadcast rights holders will make use of Alibaba's OBS Cloud, a cloud-computing media solution, to deliver quick turnaround highlights. A 3D, AI-drive athlete tracking tool also will run on the Alibaba Cloud. The International Olympic Committee and Alibaba will provide the first-ever online store for the Olympics, housed on Alibaba's Tmall retail platform.



Japanese broadcast network NHK will be providing 8K coverage from select events at Tokyo for both the Olympics and the Paralympic Games.

OTHER TECH HIGHLIGHTS:

- Athletes, media, and officials will be transported in autonomous vehicles to smart stadiums.
- Arenas will include digital signage, online refreshment services, real-time match and athlete information, and access to real-time data on transport congestion.
- Human Support Robots and Delivery Support Robots will aid over 1,000 spectators using wheelchairs at the Olympic Stadium by carrying food and other goods, guiding people to their seats, and providing event information.
- Mascot robots will welcome athletes and guests at various Games-related locations with human-like movements such as shaking hands and waving, as well as using a variety of facial expressions.
- Security checks will be aided by facial recognition technology and other cyber security solutions.
- The Games will feature automatic multilingual translation.
- Panasonic's Power Assist Suits will assist in unloading and transporting heavy objects and waste disposal backstage. The suits transmit information almost instantly to synchronized motors, providing the wearers with mechanized power for performing strenuous tasks easily and safely.
- Hydrogen fuel cell busses will shuttle visitors while battery-powered accessible people movers will be used for last-mile transport.

The tech on display at the Summer Games has had an extra year to germinate, and the power it will unleash will be matched by the emotional feeling of bringing the world's athletes together to compete, our partners said. "We're all cautiously optimistic and we're all sort of desperately looking forward to them," Barbini said. "This season is going to be extremely emotional for athletes and coaches and when they're able to get to an Olympics trials, there will be a lot of appreciation for what it took to get there."

Everybody is overjoyed to make an Olympic team, he said, "but I think we need to be prepared that this is gonna feel a little different. A coach is gonna put an athlete on the team and after all of the pressure of the last 15 months, it's gonna just wash over them."

Beyond

Adaptive

Sports tech is a sector of innovation, experimentation, and promise -- exactly what is needed to pull the larger sports industry out of the trials of 2020. Our partners tell us they have optimism for what lies just around the corner.

Since the early days of human competition, sports tech has come a long way. Beyond 2021 we'll see increasing use of robotics, including robot-controlled drones providing a richer, 360-degree view of sports events for streaming. Semi- and fully-automated drone racing is on its way to becoming its own sports discipline, competing with traditional sports for the attention of global audiences.

In the next few years, the media and entertainment sector is going to make greater use of limb recognition to augment video automation. Clement of Sky Sports said he is hoping to identify a breakthrough partner in this area. Feeds for understanding a player's physical position by video only is expensive and data intensive, he said. "We get pitched a lot of stuff, and I think the people that get the limb recognition right are on a major route then, because then you can start doing cinema without the heavy bubbles attached to everything," he said. Not needing a green screen "should free people to be able to make television in different ways," he said.

Barbini said the challenge of water for wearable technology will drive solutions for swimming beyond 2021. "Automation of



For the foreseeable future, media companies which are bold enough to pivot away from paywalled bundles with flexible offerings, all while managing their base of fixed costs, are definitely here to stay.

— Price Waterhouse Cooper

analysis has almost been a pipe dream. It's been just over the horizon for so long, but we've never quite been able to get there and I do think in the next year or two, we are going to get there. We are closer to solutions now for that than we have been and we've made huge progress in 2020 partially because of the pandemic. We've been able to garner the attention of some folks that are experts in this field that we may not have had access to during normal times."

For the National Governing Boards, branding and message are going to continue to be critical in 2021 and beyond as sport audiences evolve and their needs and desires change. USA Cycling, for example, looked at the number of people

2021 eManufacturing

EXOSUITS.

who purchased new bikes or fixed up old ones during the pandemic. "Bike sales were through the roof," Pool said. "That was our challenge — we said, 'omigosh, this is a watershed moment for us. People are riding bikes. How do we become more relevant?' We were synonymous with racing a bike, but not riding a bike. We had to become synonymous with riding a bike." The focus of the coming year for the organization, he said, is "We Champion Cycling."

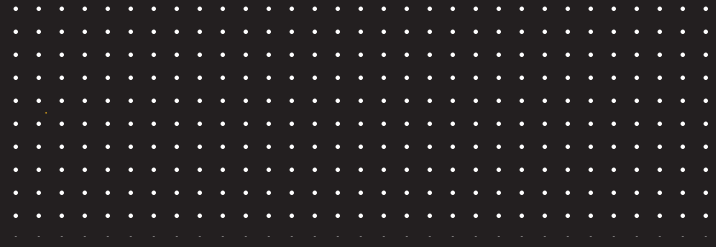
The organization pivoted in 2020 from being a compulsory product — license to race — to being a discretionary one, Pool said. "We revamped our membership to make it less about the license and started leading communications with, Here's what we do. Here's where your money goes. Your money gets more kids on bikes. Your money supports more events and event directors. We are going to do better with our insurance and support for events, so they can put on safe events. And your money goes to performances, goes to our lead athletics and helps these athletes be able to train and compete at the highest level."

Zoom

OTHER COMING TECH:


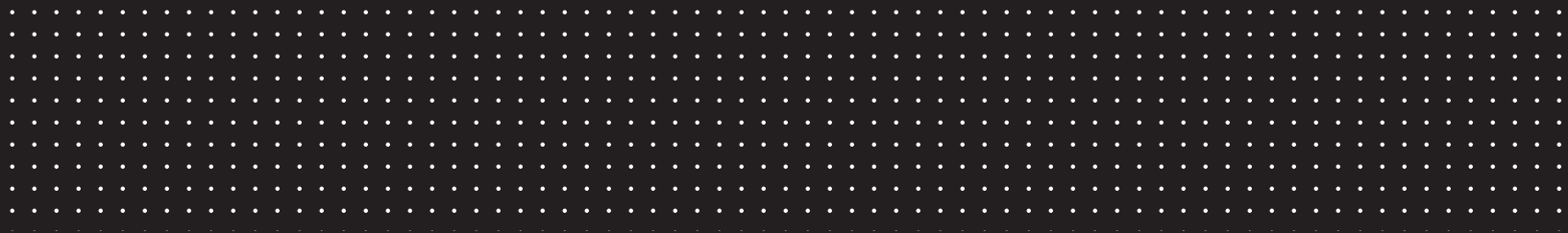
- **Projected for 2025: 4D printing will have emerged, adding the dimension of time to products; thereby allowing objects to alter their shape and structure over time or based on environmental factors.**
- **By 2030: Additively manufactured (AM) sports nutrition will have entered the mass market. Bioprinting has advanced quickly and helps us not only in terms of injury healing but also in terms of optimized and environmentally friendly nutrition.**
- **Also by 2030, exosuits will provide Paralympic competitors with additional strength, stamina, and stability.**
- **Digital twinning of athletes will be available by 2030 so athletes can train against their "competitor."**
- **Personalized consumption of sport will be more widely used by fans, enabling them to dive deeply into topics of interest during matches, create personalized highlight reels, and wear "Google-glasses" styled goggles to go virtually onto the field, court, or pitch for a rich in-game experience.**
- **In 2035, Nanoscale Additively Manufactured devices will have stepped out of their infancy. The ability to print literally anything on a small scale has allowed us to produce smarter devices and include more intelligence in all sorts of sports equipment.**

Final Thoughts




Teams and leagues, athletes and coaches, media and entertainment companies, sports betting and fantasy providers, esports platforms, and the businesspeople and national governing boards they work with — will never forget 2020. And after a year that nobody could have predicted, sports tech will continue playing an important role on and off the field. Many of the shifts made and innovations pioneered during 2020 will come to full fruition in 2021, adopted as permanent elements in the landscape. After what was one of the most eventful years in the history of the industry, everyone who touches sport — players, fans, coaches, teams, leagues, media organizations, sports tech, and other businesses — feel a sense of hope and resilience as we emerge and move forward. As the vaccine takes hold and sports return to normal, we know and believe as a global society that the games will go on. The spirit of competition endures. Sports exemplifies the pinnacle of human courage, the pursuit of success, the grand moments when we triumph in victory and rise up from defeat. Thrilled by that spirit, we go forward into 2021 with strong aspirations, bold expectations, and a desire to compete and to win.

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