A whole new ball game

WHY SPORTS TECH IS A GAME-CHANGER

#GetTheFutureYouWant

Capgemini
RESEARCH INSTITUTE

Executive Summary

Technology and data analysis have transformed all aspects of the sports industry.

Fans increasingly use technology to enhance their viewing experience, both inside and outside the venue. The preference for consuming sports content over smart phones, streaming platforms, and via social media has increased significantly as the technology has become more sophisticated. There are several ways in which fans are using technology, including to access scores, news, and insights, and to watch highlights. They are also interested in wearable devices, such as, digital wristbands to enter the venue or pay for food, that will streamline the fan experience. Fans are also keen to try more advanced, immersive tech experiences, such as those offered by VR and the metaverse. Another area of interest is the purchasing of digital sports collectibles in the form of non-fungible tokens (NFTs).

The tech-enabled experience has improved so significantly that younger fans are willing to enjoy games, especially local leagues, from the comfort of their couches. Fans at home can enjoy high-quality broadcasts with better camera angles, analysis and replays, detailed game statistics, and immersive and multi-platform experiences, all of which increase the pressure on venues to deliver a differentiated experience.

Technology is also transforming the player experience by providing new tools and systems to improve training and performance and manage injuries. Technology for players ranges from developments of established technology, such as GPS tracking devices, to cutting-edge immersive, simulated environments and smart clothing. Injury-prevention technology not only accelerates recovery but can also anticipate risk of injury through AI-based insights into training methods and performance.

Technology is also the key to creating diverse, inclusive sports experiences. For example, fans can easily access all kinds of sport content, including parasports and women's sports, via streaming platforms and social media. Data analytics, wearables, and other technologies can further close the gap between men's and women's sports.

Executive Summary

The conversation around the environmental sustainability of sport has also intensified, with fans expecting players and other stakeholders to act on sustainability beyond the venue.

To further enhance the tech-enabled experience for fans, teams, and players, organizations should:

- digitize the end-to-end fan experience inside the venue, from pre-game to entry, game time, ordering food, and exiting, to provide an exciting and differentiated venue experience;
- increase fan engagement by using data to offer experiences and content tailored to individual fan preferences during the off-season;
- identify specific needs of players/teams in conjunction with coaches and the players themselves, before deploying technology;
- make objective, data-driven decisions, leading to more effective game strategies and an increased competitive edge.

From creating personalized fan experiences to shaping game strategy, improving training, and analyzing injury risk, technology is transforming the entire sports industry. The future of sports is digital.

Introduction

Our research on emerging technologies in sports (published January 2020), found that the available technology dictates the way in which fans consume sports. Our current research confirms that, over the past three years, technological advances have continued to shape the sports industry.

Fans use technology to enhance their viewing experience, both inside and outside the venue by:

- getting regular updates or watching highlights;
- ordering and paying for consumables at the venue;
- enjoying immersive augmented and virtual reality (AR/VR) experiences.

Technology also helps fans engage with their favorite teams and players, encouraging engagement and fan loyalty.

Advances in technology also assist teams and players with training, injury prevention and treatment, and performance management. Data generated by wearable technologies and digital cameras supports decision-making during the game, and also informs post-game reviews.

Technology is also improving accessibility to sports at all levels for women and differently abled players.

To understand more about the impact of technology on sports, we conducted a global survey of 12,000 sports fans over the age of 18, across 11 countries. We also conducted in-depth interviews with 15 professional sportspeople and industry experts to understand more about the transformative impact of technology on players and fans. For more details on the survey sample, please refer to the research methodology at the end of the report.

Introduction

The report explores four key themes:

01

How technology is enhancing the viewing experience for fans outside the venue

02

The types of advanced technologies fans are using/are keen to try to enhance their experience

03

The benefits to teams and organizations of offering an enhanced fan experience

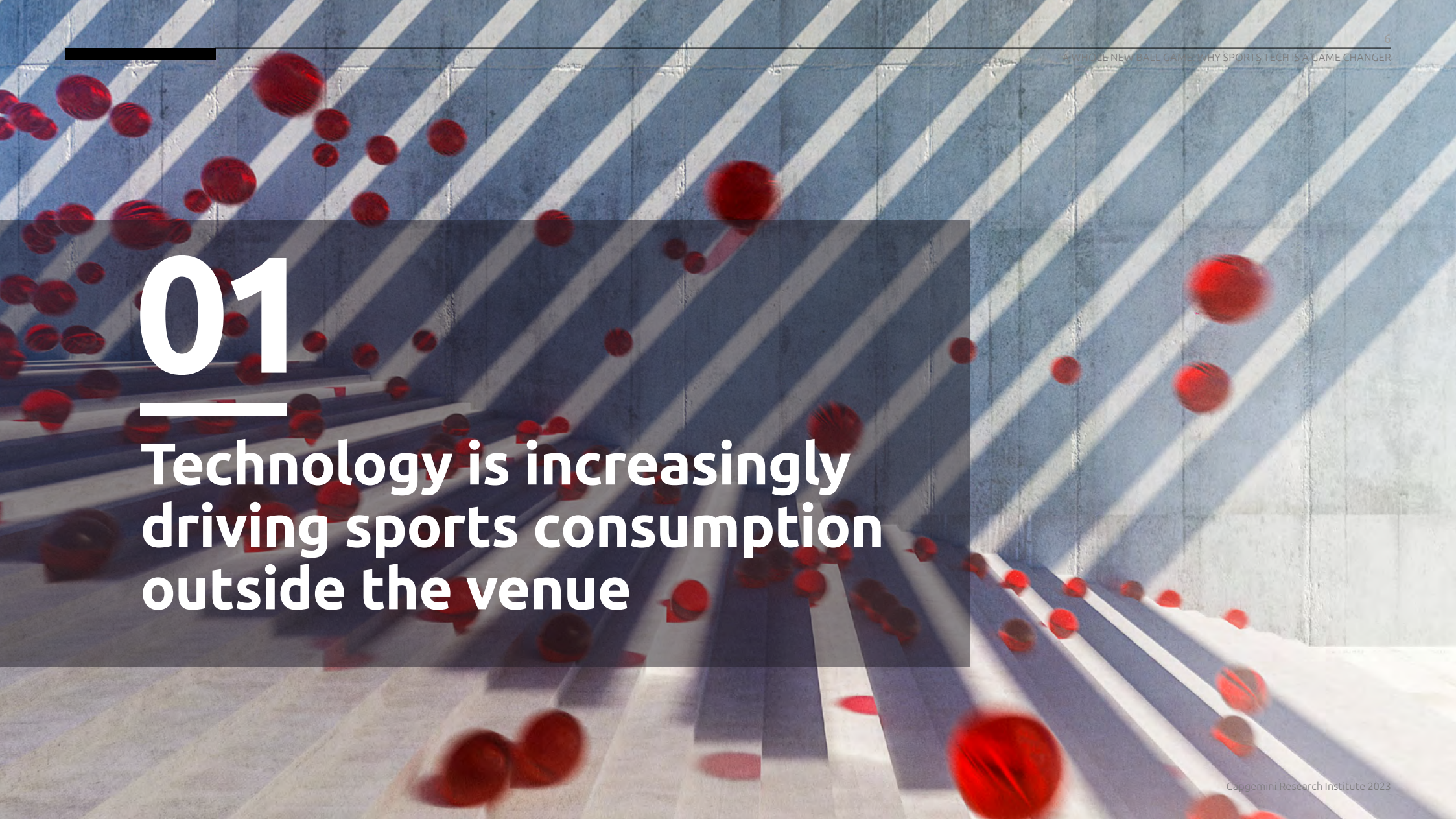
04

How technology has changed sports training and performance for players

We conclude the report with recommendations on how technology can be used to further support professional sportspeople and elevate the fan experience.

"The impact of technology on sports is massive. Sports will evolve and will continue to adapt to new technologies; otherwise, it won't survive."

Andy Etches
Co-Founder and Sports Director of VR sports-training-product company Rezzil



01

Technology is increasingly driving sports consumption outside the venue

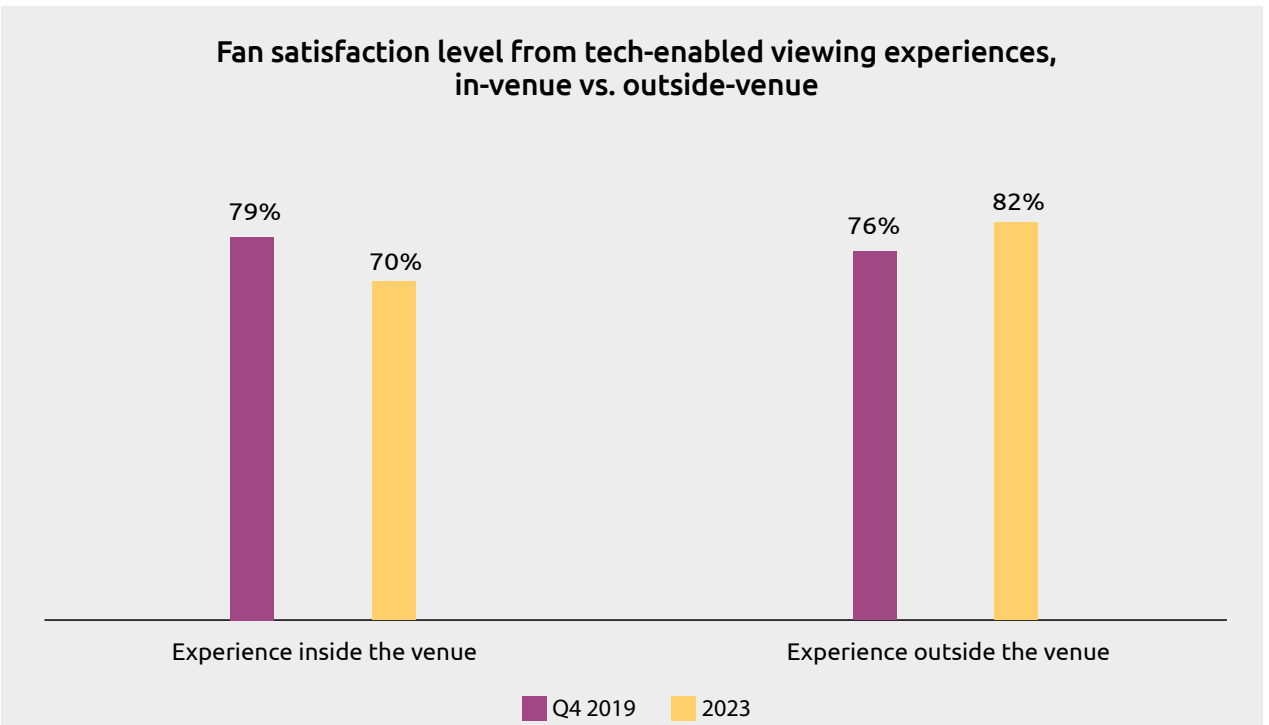
The digital viewing experience has improved

Technology dictates the way fans consume sports today. As many as 84 percent of fans agree that their overall viewing experience has been enhanced by technology. This figure climbs to almost 90 percent for Gen Z (aged 18–27) and millennial (aged 28–43) fans.

When we compare the in-venue and technology-enabled outside-venue viewing experiences, we find that, compared with Q4 2019, satisfaction levels have increased for outside-venue/at-home viewing but dropped for in-venue visits (see Figure 1). While the difference was minimal in 2019 (in fact, the in-venue experience was slightly preferred), by 2023 a gap of 12% had opened up in favor of outside-venue viewing.

Figure.1

Fan satisfaction from tech-enabled outside-venue viewing experiences is greater than that for the in-venue experience



Source: Capgemini Research Institute, tech in sports research, fan survey, March–April 2023; N = 7,081 fans. *Emerging technologies in sports, 2020.*
Note: The 2023 sample for this chart includes only those countries covered in the 2020 research.

"We are living in a society that enjoys sport from the comfort of the sofa, with good lighting, great graphics, and close-ups. At times, you are more disconnected when you are in the stand; you haven't got the referee's/commentator's mic; you don't see all the different stats or player/coach interviews that come up. We have to find a way to bring all these experiences to the people in the stands."

RACHAEL BURFORD

FORMER INTERNATIONAL
ENGLAND RUGBY PLAYER

Comparing current fan-satisfaction levels, by country, with those of Q4 2019, we found that:

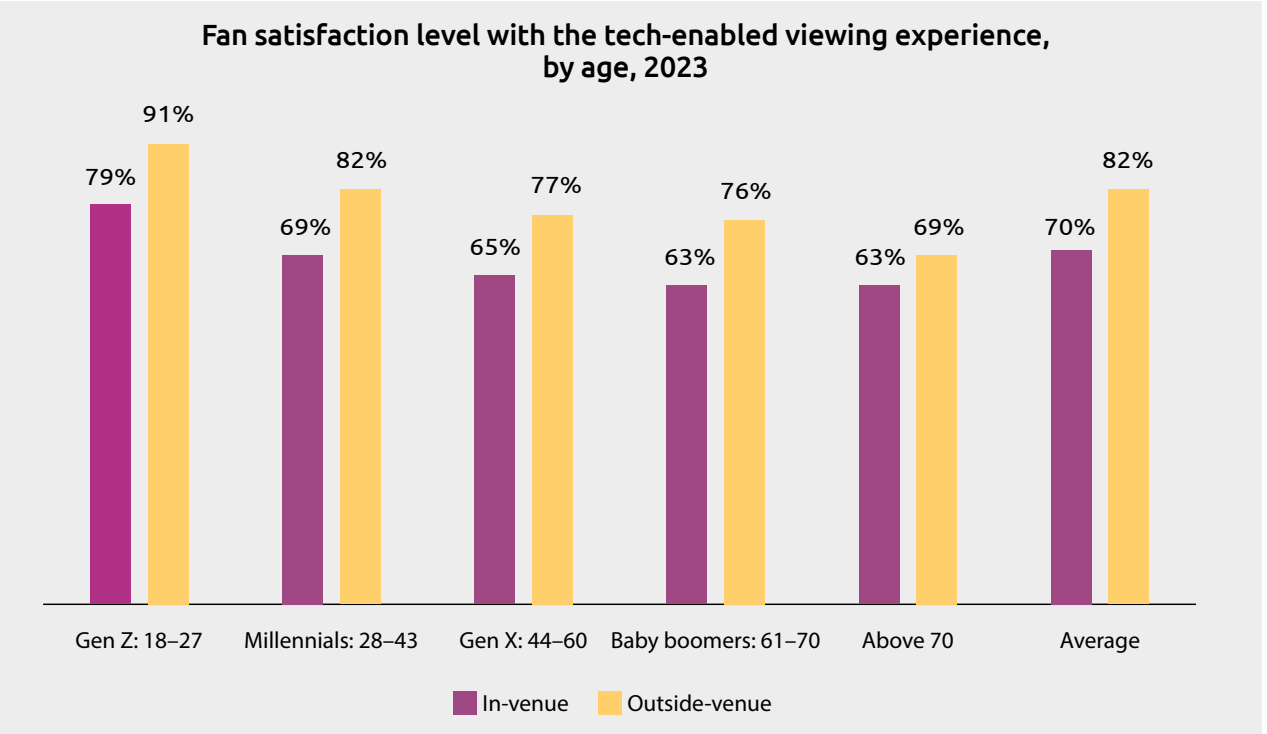
- fans from France, Canada, and the US reported a 15-, 11-, and 10-percentage-point reduction, respectively, in in-venue satisfaction;
- British and German fans reported an 11- and 9-percentage-point improvement, respectively, in outside-venue satisfaction.

We also found that younger fans are more satisfied with the tech-enabled experience. For instance, 91% of Gen Z fans (aged 18–27) are satisfied with outside-venue/at-home experiences compared to 69% of fans over 70 (see Figure 2).

Rachael Burford, former international England rugby player: *"We are living in a society that enjoys sport from the comfort of the sofa, with good lighting, great graphics, and close-ups. The question is, how to create some of those experiences live in the venue and bring fans closer to the action, so that they don't just want to watch it on a screen? Because, at times, you are more disconnected when you are*

Figure.2

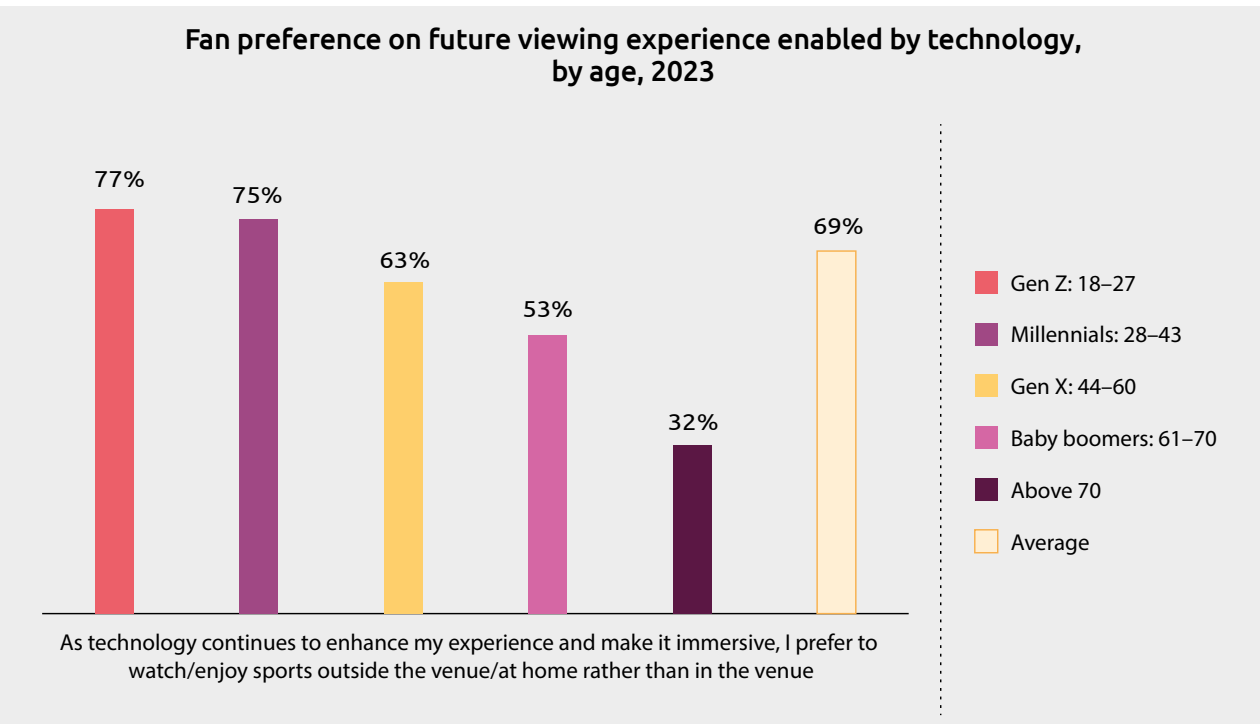
Younger fans are more satisfied with the tech-enabled sports viewing experience



Source: Capgemini Research Institute, tech in sports research, fan survey, March–April 2023; N = 12,004 fans.

Figure.3

Fans will prefer to consume sports outside the venue/at-home as technology continues to enhance the viewing experience



Source: Capgemini Research Institute, tech in sports research, fan survey, March– April 2023; N = 12,004 fans.

in the stand; you haven't got the referee's/commentator's mic; you don't see all the different graphics/stats that come up; you don't really see the player/coach interviews. We have to find a way to bring all these experiences to the people in the stands."

Fans will prefer to consume sports outside the venue/ at-home as technology continues to enhance their viewing experience

Almost 7 in 10 fans (69%) state that, should technology continue to enhance their viewing experience, they will favor the outside-venue/at-home experience. Younger fans are most heavily impacted by technology and feel most strongly about this (see Figure 3). Continued technological advancement means that fans are now able to enjoy high-quality coverage on multiple devices, with low latency (delay between live action and transmission) and without stream interruption.

In fact, we found that the proportion of fans who regularly watch sports events in the venue has fallen in the past three years. Our previous research found that 86% of fans preferred watching games in venues, of whom nearly half reported doing so regularly. Fast forward to 2023 and the share of fans visiting the venues often has shrunk to 34% (see Figure 4).

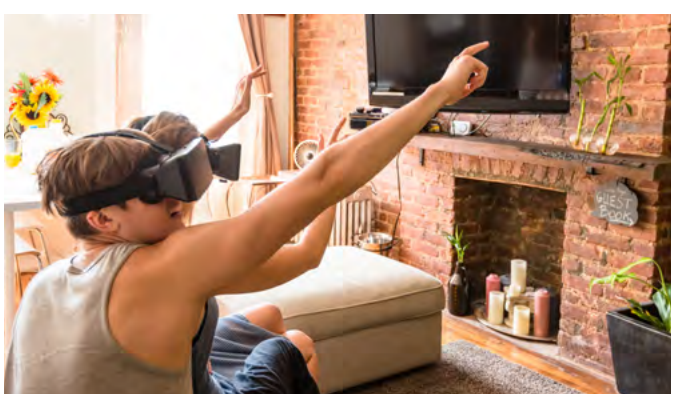
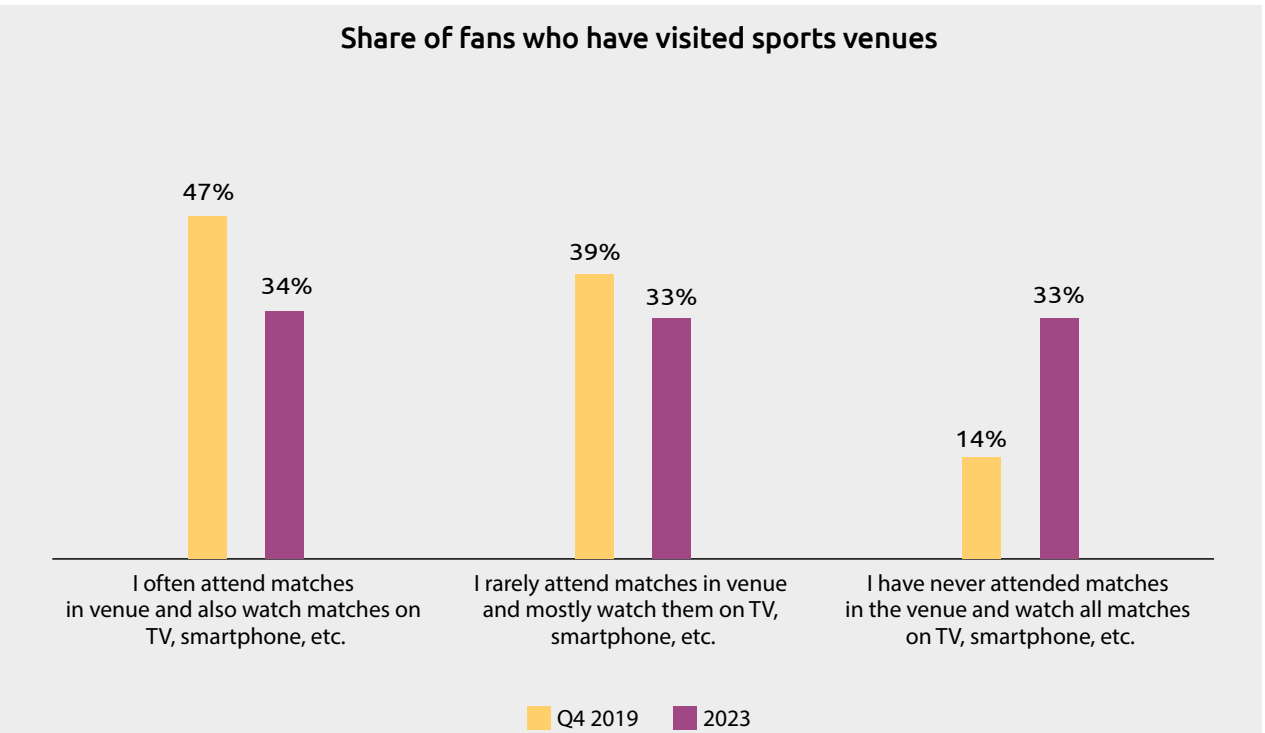


Figure.4

Satisfaction with the outside-venue tech-enabled experience has led to a fall in visits to sports venues



Sources: Capgemini Research Institute, tech in sports research, fan survey, March–April 2023; N = 7,081 fans. *Emerging technologies in sports, 2020. Note: The 2023 sample for this chart includes only those countries covered in the 2020 research.*

34%

of fans globally visited sporting venues often in 2023, compared to 47% in 2019

This would suggest that, for many fans, the comfort, convenience, and lower cost of watching sports at home is more attractive than the excitement of live viewing at venues.

- Major League Baseball (MLB) saw attendances drop by 5.7% on average for the 2022 season compared with 2019, marking the largest single-season drop since 2009. The league has also seen attendance drop for nine straight seasons (discounting the pandemic-affected season of 2020). Since the last year-on-year increase (from 2011 to 2012), league attendance has fallen by 14%.[1]
- In rugby union's English premiership, competition match attendances are, on average, down by around 1,000 from 12,636 in the 2018–19 season, the last full season before the pandemic, to 11,632 in the most recently concluded campaign.[2]

However, the excitement of attending live global events such as the World Cup endures:

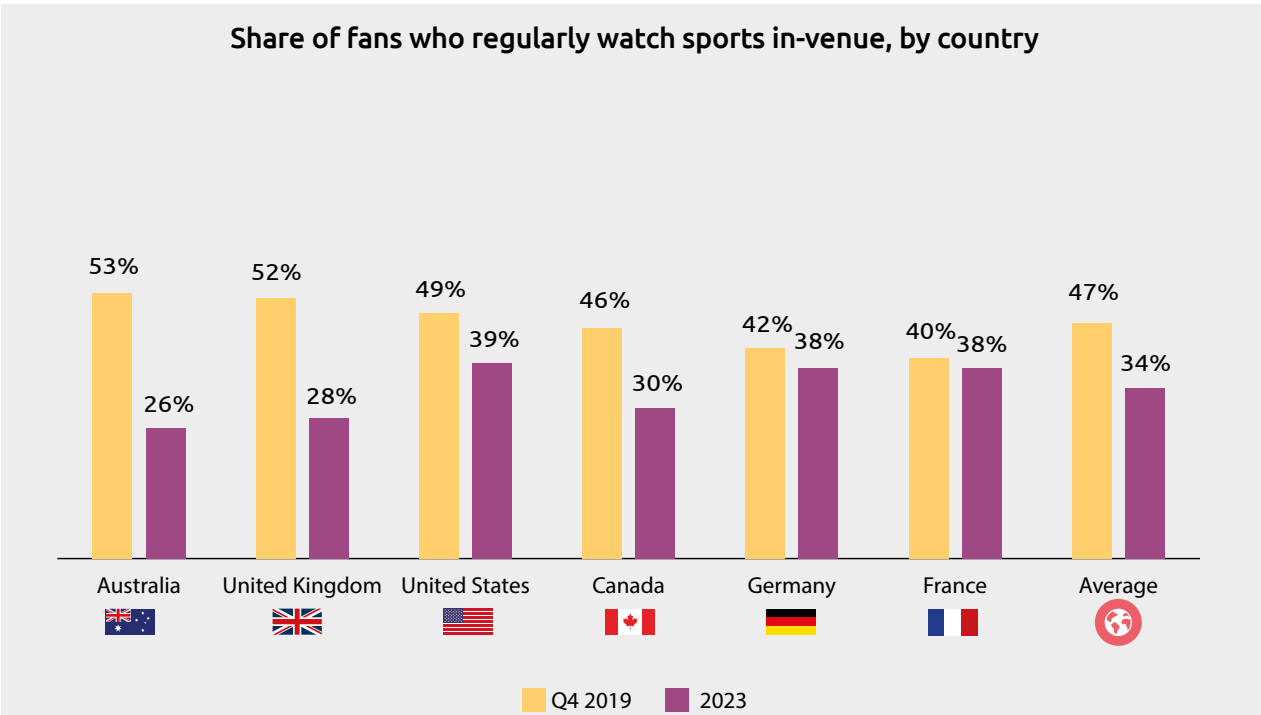
- The FIFA World Cup Qatar 2022 was enjoyed inside the venues by 3.4 million spectators – up from 3 million in 2018. Certain games, including the final, saw the highest attendances registered at the World Cup since 1994.[3]
- The 2022 US Open tennis tournament set a new all-time attendance record: a total of 776,120 fans attended the main draw to surpass the previous record of 737,872 set in 2019.[4]

Rebecca Hopkins, CEO at The STA Group, a global insights, communications, and events platform for technology in sports: *"For certain sports, fans would rather watch the game at home because they get a better viewing experience, since the broadcast is of such high quality that could never be replicated by being in the venue. But, for some games, of course fans actually want to go to the venue. So, the at-home experience has not completely replaced the in-venue one. What has transpired is that it must become more than 'just' going to a sports game – it's got to be an occasion."*

Over the past three years, we find that fans across geographies are watching sports in venues with less frequency. Australia and the UK witnessed the largest falls in this respect (see Figure 5).

Figure.5

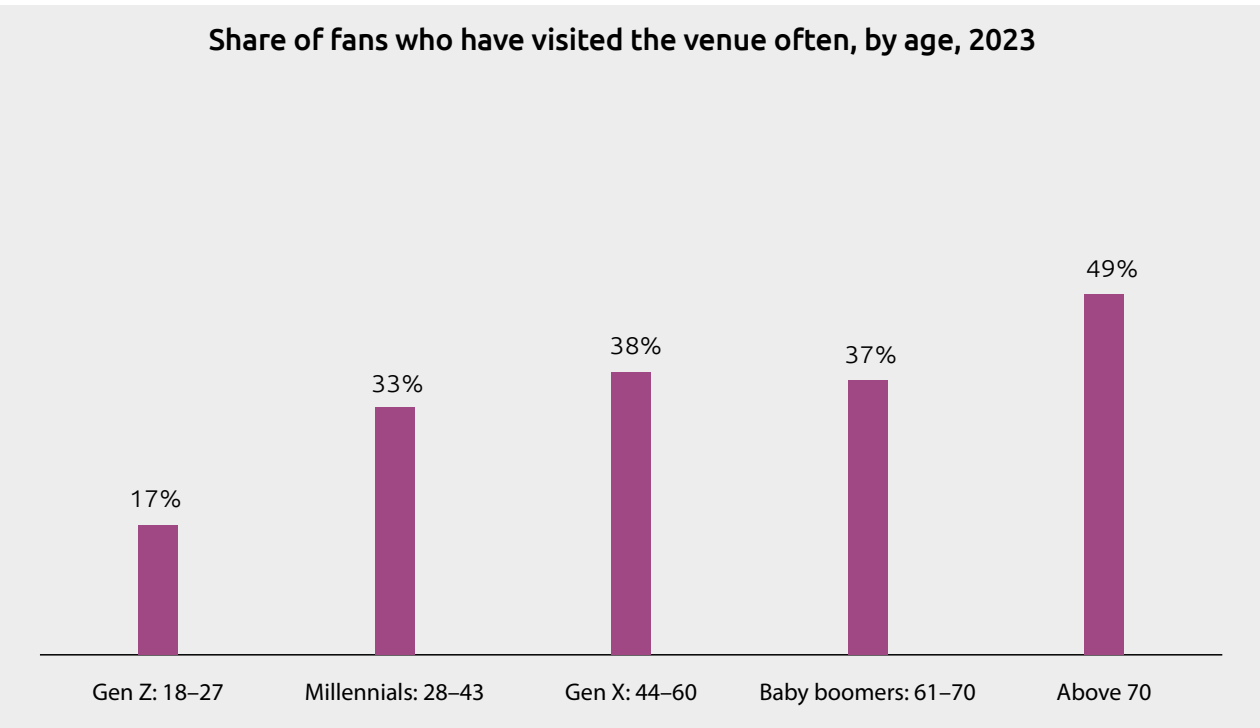
The number of fans who have frequently watched sports in-venue has fallen across regions over the past three years



Source: Capgemini Research Institute, tech in sports research, fan survey, March–April 2023; N = 7,081 fans; *Emerging technologies in sports, 2020.*
Note: The 2023 sample for this chart includes only those countries covered in the 2020 research.

Figure.6

Older fans visit venues more often than younger ones



Source: Capgemini Research Institute, tech in sports research, fan survey, March– April 23; N = 12,004 fans.

17%

of Gen Z fans (aged 18–27) often watch sports in the venue

We also find that the share of fans who visit venues generally increases with age. For instance, only 17% of Gen Z fans (aged 18–27) often watch sports in-venue, whereas nearly 40% of Gen X and baby boomer fans (aged 44–70) do so (see Figure 6).

Finally, we asked fans if they had visited a venue in the past 12 months. The answer was "yes" for only 37%, compared to 80% in Q4 2019.

The satisfying tech-enabled out-of-venue viewing experience, coupled with high-quality broadcasts, the aftermath of the pandemic, and the high cost associated with tickets and travel to venues are likely to be persuading fans, especially younger ones, to stay home.

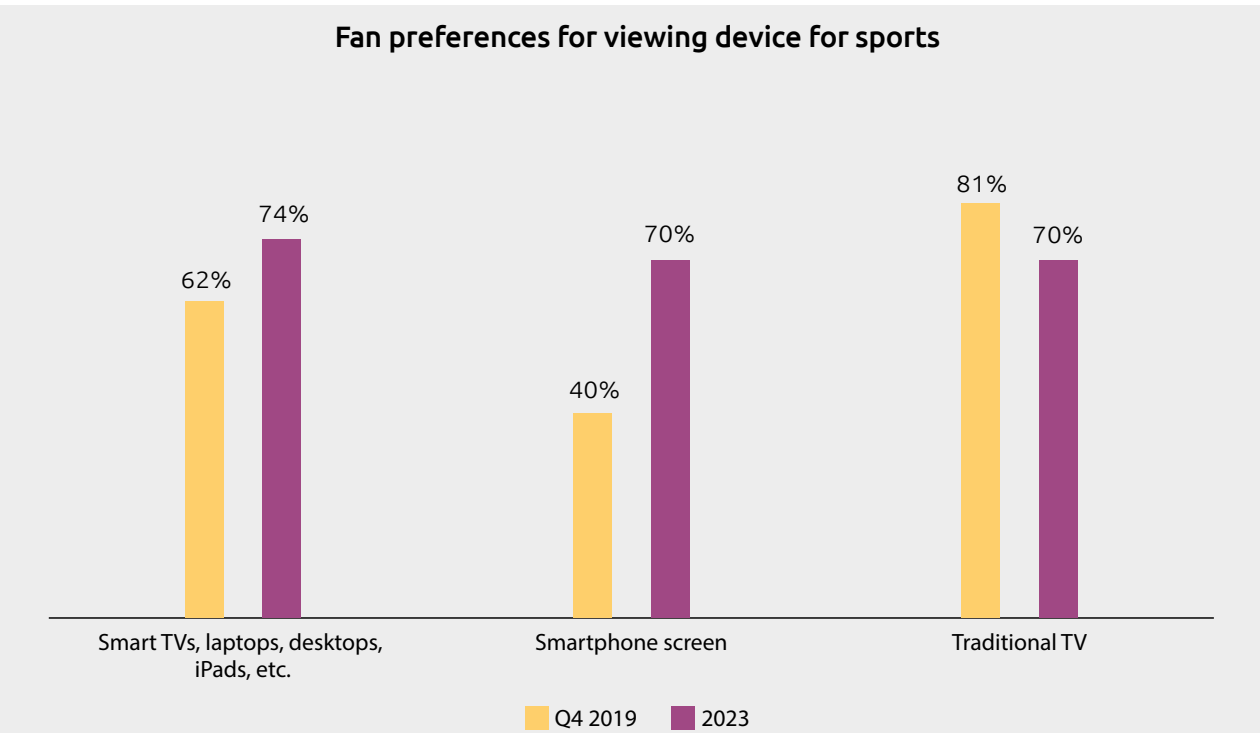
"For certain sports, fans would rather watch the game at home since the high broadcast quality could never be replicated by being in the venue. But, for some games, fans actually want to go to the venue. So, the at-home experience has not completely replaced the in-venue one. But now it must become more than 'just' going to a sports game – it's got to be an occasion."

REBECCA HOPKINS

CEO AT THE STA GROUP, A GLOBAL INSIGHTS, COMMUNICATIONS, AND EVENTS PLATFORM FOR TECHNOLOGY IN SPORTS

Figure.7

Fans increasingly prefer to consume sports content on smart devices



Source: Capgemini Research Institute, tech in sports research, fan survey, March– April 2023; N = 7,081 fans. *Emerging technologies in sports, 2020.*
Note: The 2023 sample for this chart includes only those countries covered in the 2020 research.
Respondents were allowed to choose multiple options as their preference.

John Quinn, high-performance coach and sports and exercise physiologist from Australia: *"People have become accustomed to watching sports on television and it has almost become the norm. As countries move through a financial crisis, it's much cheaper and easier for fans to watch sports at home. People have been trained to do this effectively through the pandemic, and the quality of the broadcasts, including all the data and statistics on scores and player performances, have made it more engaging. It will take a bit more for venues to get fans to return to going live."*

Demand for smart devices and services for sports consumption has increased substantially

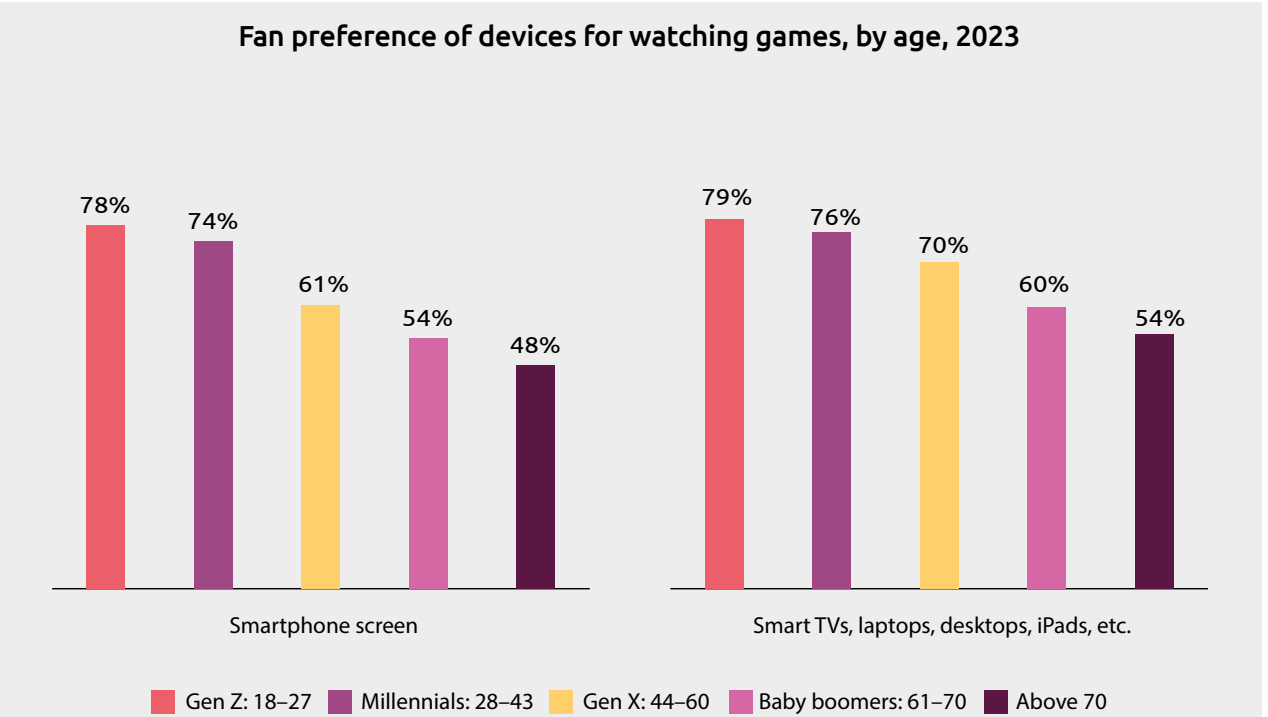
Fewer venue visits and greater at-home/outside-venue viewing has inevitably led to a change in sports consumption. Compared with Q4 2019, more fans expressed a preference for consuming sports over digital devices (such as smartphones, smart TVs, and laptops). As shown in Figure 7, the preference for smartphone viewing has increased significantly over the past three years.

Overall, fans still prefer TV for watching games, suggesting that smart devices such as smartphones provide a supplementary on-the-go option for consuming sport ("multi-screening"), rather than replacing the big-screen viewing experience. However, the ongoing shift towards smart devices could have a long-term impact on these preferences.

Fan preference for consuming sports on smart devices, and particularly smartphone screens, differs significantly by age. For instance, on average, we found that 77% of fans aged 18–43 prefer to watch sports on a smartphone compared to just 50% of fans over the age of 60 (see Figure 8).

Figure.8

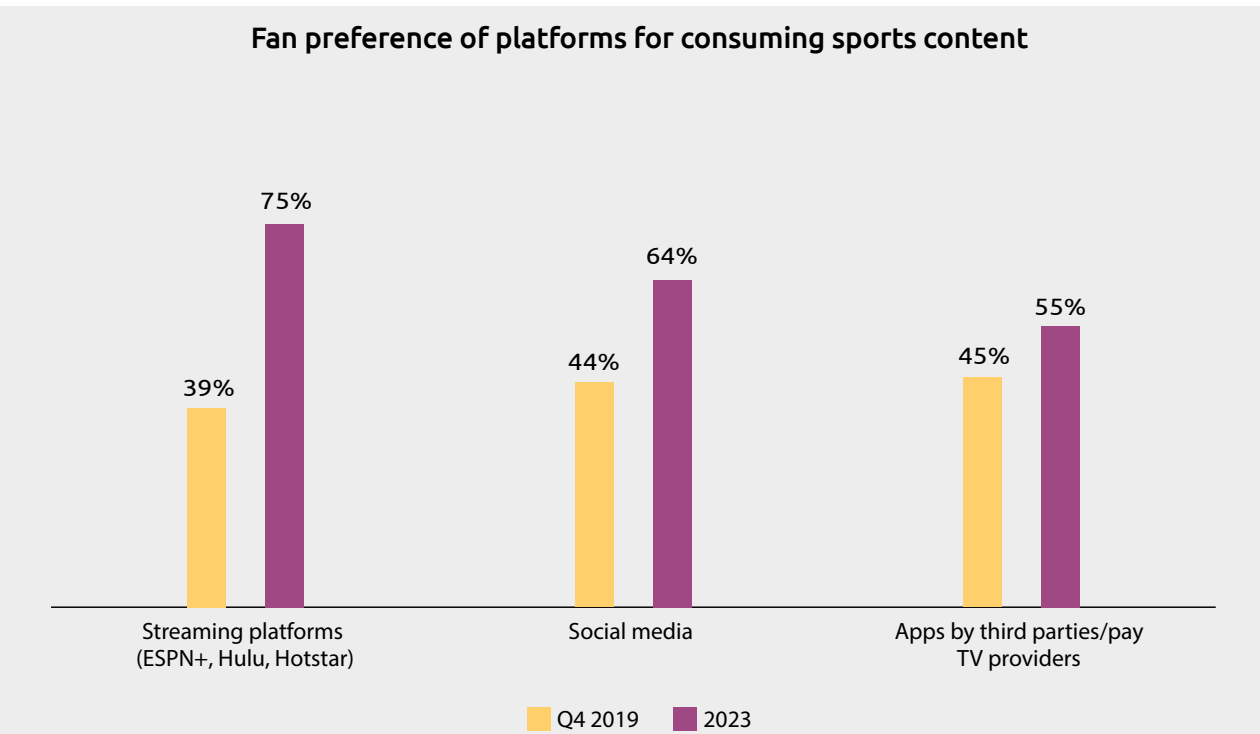
Preference for consuming sports on smart devices decreases with age



Source: Capgemini Research Institute, tech in sports research, fan survey, March–April 2023; N = 12,004 fans.

Figure.9

In the past three years, preference for consuming sports on streaming platforms and social media has increased significantly



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Note: The 2023 sample for this chart includes only those countries covered in the 2020 research.
Respondents were allowed to choose multiple options as their preference.

We also found that the preference for streaming platforms (e.g., ESPN+, Hulu, Hotstar) and social media for consuming sports content has increased significantly over the past three years (see Figure 9).

In addition, nearly half (49%) of the fans in our survey prefer to consume content on apps developed by sports bodies/associations.

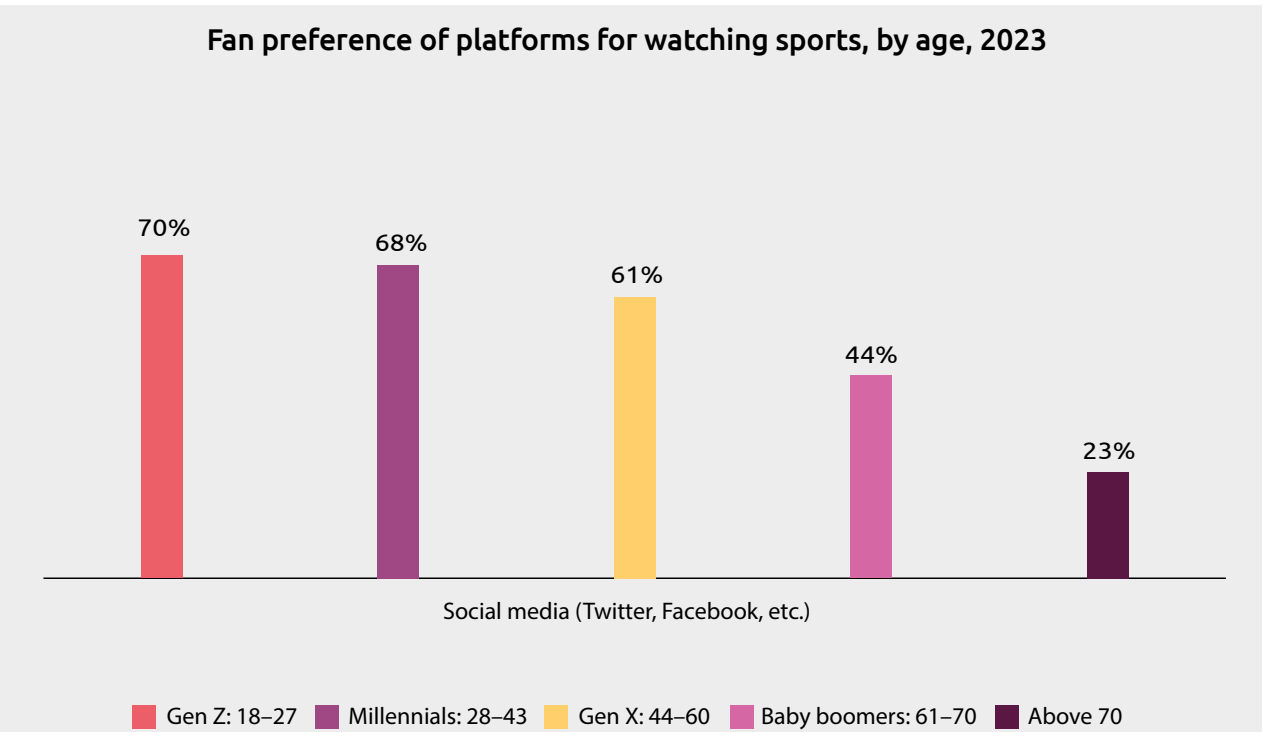
70%

of fans prefer to consume sports content on smartphones

Across age groups, we see a similar preference for consuming sports content on streaming platforms and third-party apps. However, we find that, while younger fans are extremely comfortable consuming content via social media, this tendency decreases with age (see Figure 10).

Figure.10

Younger fans are significantly more likely to consume sports via social media



Source: Capgemini Research Institute, tech in sports research, fan survey, March–April 2023; N = 12,004 fans.

64%

of fans prefer to consume sports content on social media

Points of interest regarding the consumption of sport content on social media include the following:

- The US National Football League (NFL) has partnered with YouTube to broadcast games on YouTube TV or YouTube Primetime channels. YouTube also has proprietary channels for MLB, the National Basketball Association (NBA), tennis, and golf.[5]
- Fans spent over 214 million minutes viewing NFL social content during the Super Bowl LVI week in 2022, including during- and post-game engagement. The content also amassed 1.8 billion impressions across all its social platforms, up 42% from the previous year.[6]
- During the 2021/22 season, views of Women's National Basketball Association (WNBA) videos on Twitter increased by 98% compared with the previous year.[7]
- Compared to the previous World Cup in 2018, social engagement on International Federation of Association Football (FIFA) channels rose by 448%, and 811 million accounts engaged with official FIFA social channels.[8]

Rachael Burford: *"I think technology plays a massive role in getting the game out there, and social media is one of the biggest drivers for engagement and bringing in new followers. It is so easy to follow a player journey, podcast, interview, or clips from a game. A lot of people will see something and then start following a women's game or buy tickets because they have seen something that is drawing them in."*

"People have become accustomed to watching sports on television; it has almost become the norm. It is much cheaper and easier to watch sports at home. People have been trained to do this effectively through the pandemic, and the quality of the broadcasts and detailed statistics, have made it more engaging. It will take a bit more for venues to get fans to return to going live."

JOHN QUINN

HIGH-PERFORMANCE COACH AND SPORTS AND EXERCISE PHYSIOLOGIST FROM AUSTRALIA

Fans expect the sports industry to do more on sustainability

Sports connect with fans by creating players who are role models; fans expect these individuals and their teams to act accordingly (see Figure 11). Across countries and age groups, 67% of fans feel disappointed that the teams/players they follow are insufficiently prioritizing environmental sustainability.

"Sustainability in sports is not just a goal, it's a responsibility. It's about making conscious choices to reduce our impact on the planet, and athletes and fans have the power to influence positive change and must use that power with authenticity and intention."

Rebecca Hopkins

"It's important for everyone involved in rugby, including players, supporters, and management, to be sustainable and be seen as such."

Ronan Donagher
Head of Game Systems,
World Rugby

Figure.11

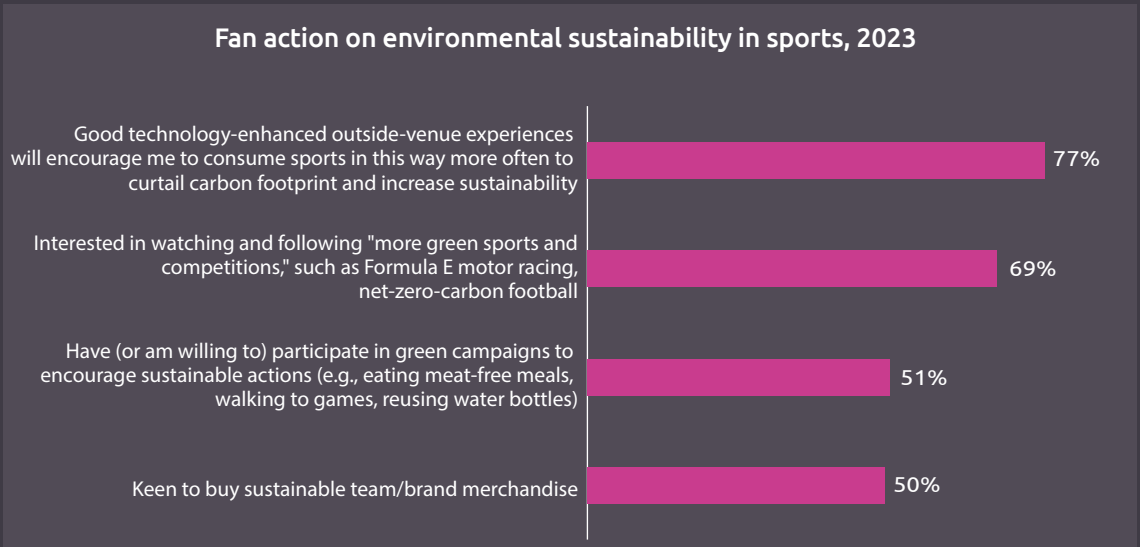
Fans expect teams and players to prioritize sustainability

Source: Capgemini Research Institute, tech in sports research, fan survey, March–April 2023; N = 12,004 fans.

A satisfying tech-enabled experience outside the venue encourages fans to consume sports in that way more often, thereby reducing carbon footprints. Fans we surveyed expressed willingness to encourage sustainability in sports, for example by watching green sports and competitions such as Formula E (motorsport for electric cars), participating in green campaigns organized by their teams, etc. Fans also increasingly attach importance to merchandise being produced in an environmentally friendly manner (see Figure 12).

Figure.12

A satisfying outside-venue viewing experience will encourage fans to reduce venue visits



Source: Capgemini Research Institute, Tech in sports research, Fan survey, March–April 2023; N = 12,004 fans.

Some sports bodies have taken steps to accelerate their sustainability efforts, even involving fans in the process. For example:

- Super Bowl LVII in 2023 used innovative reverse-vending machines for waste disposal at the venue. Every beverage container recycled using the gamified machine gave fans an instant prize, as well as qualifying them to enter a draw to win NFL season tickets.[9]
- Online platforms such as Planet League and Pledgeball are giving sports fans the opportunity to come together virtually to compete in low-carbon or sustainable-action competitions in exchange for points for their teams.[10]
- Many players and teams have used recyclable clothing and shoes to encourage fans to purchase sustainable team merchandise.[11,12]
- Professional leagues such as the MLB try to reduce team travel by scheduling more back-to-back games in the same city.[13]
- Formula E has developed a sustainable logistics roadmap to reduce air freight and increase biofuel use in sea and road freight, with a commitment to reducing its logistics-related carbon footprint by 30% by 2030.[14]
- For the past year, one of the world's biggest cricket stadiums, the Melbourne Cricket Ground (MCG), has used only renewable energy sources, including wind and solar. It has also set up its own water-treatment facility.[15]
- In 2021, the UK's soccer premiership's team Tottenham Hotspur hosted a match versus London rivals Chelsea with net-zero-carbon emissions with the aim of educating and inspiring fans to reduce their own carbon footprints.[16]

02

Fans are keen to try advanced-technology experiences

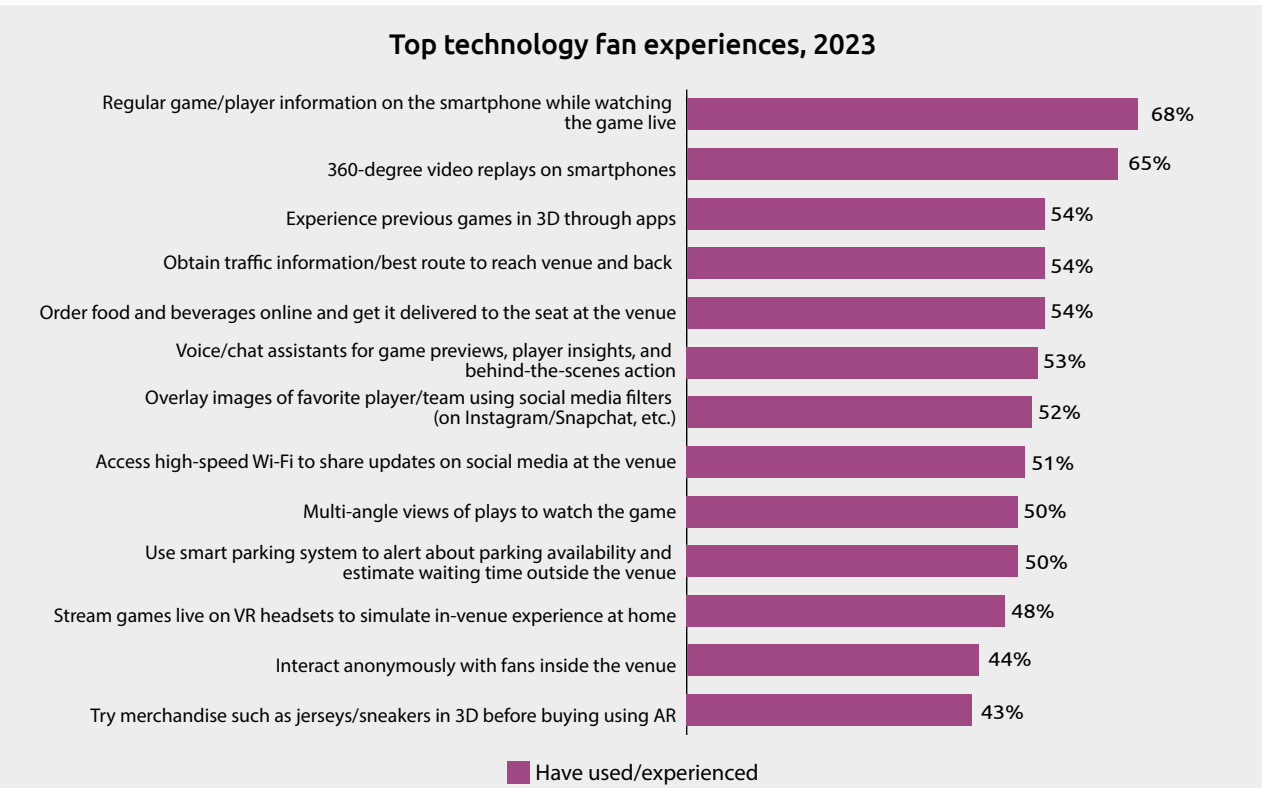
Fans often use technology to get regular game updates and to catch up

Whether fans are watching games in venues or at home, our research shows that they are increasingly using technology (see Figure 13) to, for example:

- get regular updates while watching the game live
- watch 360-degree video replays or past games
- get traffic information/the best route to the venue
- order food and beverages online to be delivered to their seats

Figure.13

Top experiences with technology while watching sports



Source: Capgemini Research Institute, tech in sports research, fan survey, March–April 2023; N = 12,004 fans.

SPORT	EXAMPLE
CRICKET	Indian Premier League (IPL) cricket broadcasts allow fans to view the match from multiple camera angles and use a chat feature to engage with other fans throughout matches. Fans also receive access to various game-related stats while the match is live.[17]
MOTORSPORTS	From the 2023 season, Formula 1 allows all drivers to fit cameras to their helmets to generate a live feed during the race.[18]
OLYMPICS	To celebrate the commencement of the Tokyo Olympics 2020, the official Olympics account launched an augmented reality (AR) filter that used Snapchat's body-tracking lens technology called "Train like a champion". Fans had to complete three different exercises against the clock. If successful, they won a virtual firework show on their phone.[19]

"At the BMW PGA Championship 2022, QR codes were deployed to replace physical food menus. In addition, digital noticeboards were used to provide spectators with key information, including course map, leaderboard, tee times, etc. Counter-top displays were used as the new data wall – bringing key moments and highlights of the tournament to those in the queue for food."

Michael Cole
Executive and CTO, European Tour Group and Ryder Cup Europe

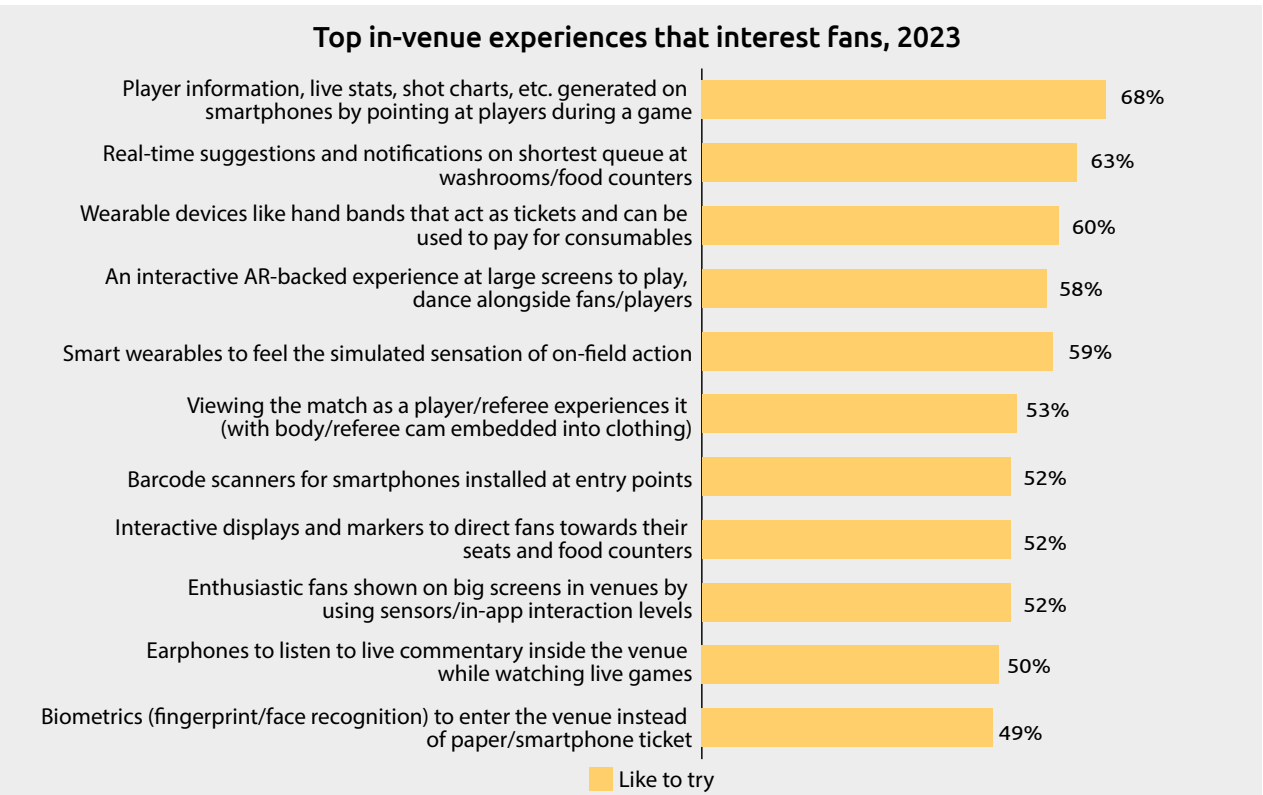
Michael Cole, Executive and CTO, European Tour Group and Ryder Cup Europe: *"At the BMW PGA Championship 2022, QR codes were deployed to replace physical food menus. In addition, digital noticeboards were used to provide spectators with key information, including course map, leaderboard, tee times, etc. Counter-top displays were used as the new data wall – bringing key moments and highlights of the tournament to those in the queue for food."*

Further, sports fans are open to trying a variety of technologies that will allow them to experience the game as it happens. There are a number of immersive and wearable technologies that interest fans, including:

- using AR to check player stats either in-venue during games or on large screens in fan zones;
- using wearable devices to enter the venue and pay for food, or using haptics to simulate the sensation of on-field action (e.g., a mild impact when a ball is hit) (see Figure 14).

Figure.14

Top technology experiences that fans would like to try in the venue



Source: Capgemini Research Institute, tech in sports research, fan survey, March–April 2023; N = 7,999 fans who have visited the venue.

SPORT	EXAMPLE
SOCCER	During a friendly international soccer encounter between AC Milan and Cologne, players were fitted with cameras and microphones to give the fans a unique chance to experience the game from the player's perspective.[20]
GOLF	Golf fans can use the PGA Tour app to get real-time updates on scores, hole-by-hole stats, player statistics, and access to interactive course maps. AR can be used to track the ball's trajectory, check a player's position on the course, and obtain detailed information on each hole.[21]
OLYMPICS	Tokyo 2020 saw over 1,800 drones illuminate the sky in a light display to entertain fans.[22]
MOTORSPORTS	Formula 1's VR channel uses 360-degree imagery to provide fans with immersive views of various on-site locations during live races. Fans can also experience behind-the-scenes footage.[23]
TABLE TENNIS	The North American Teams Championships competition was live-streamed in mixed reality (MR), delivering broadcast-quality video, commentary, analytics, and immersive animations.[24]

"Technologies such as AI and IOT are being leveraged to create an 'intelligent golf course' to keep fans engaged and excited. Wherever they are on the course, fans feel a sense of immersive connectiveness, not to technology but to content and sport itself."

Michael Cole (PGA)

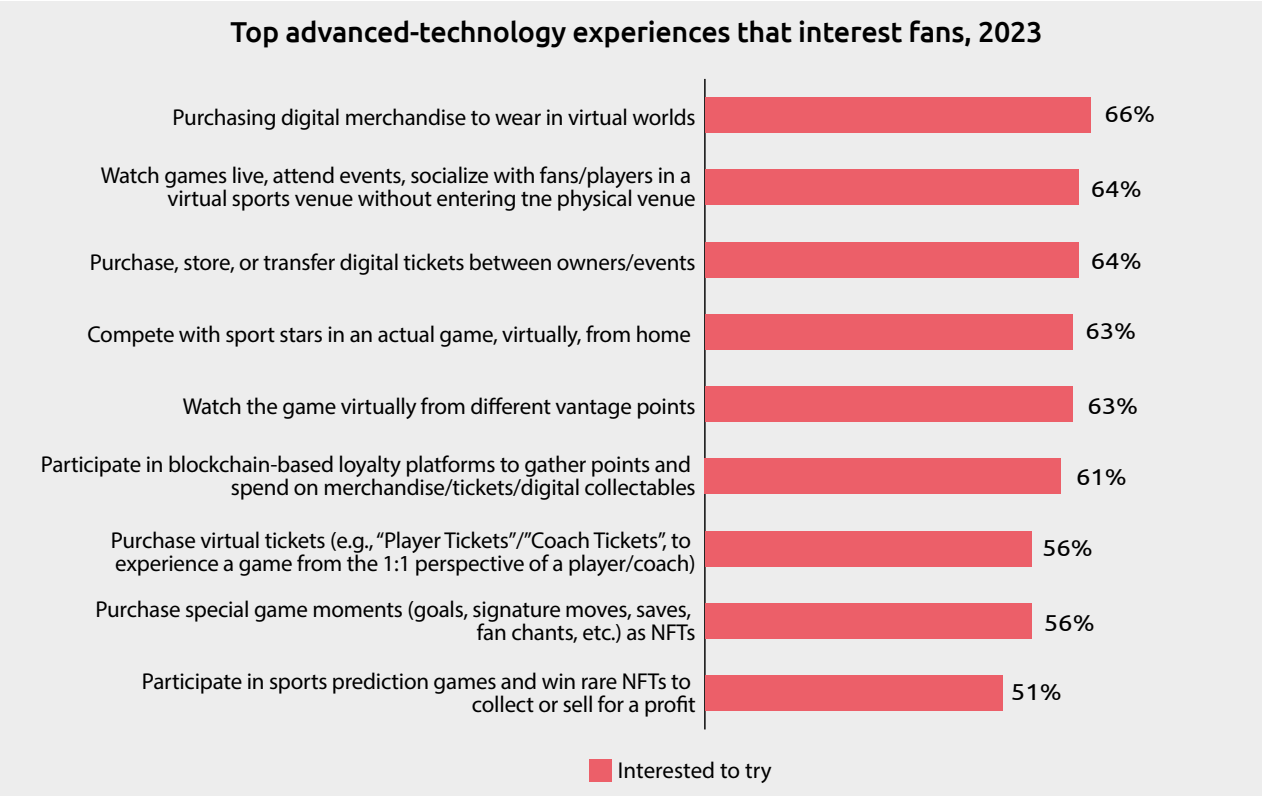
Fans are interested in advanced technologies such as the metaverse

Our survey sample does not necessarily include fans who are extremely tech-savvy or in touch with the latest advanced technologies. Nonetheless, fans are fascinated by how tech phenomena such as the blockchain system and the metaverse can enhance their sports-viewing experience. As we see in Figure 15, more than 60% of fans are interested in attending games, events, and socializing virtually using the metaverse; purchasing digital collectibles via blockchain; and much more.

Virtual venues in the metaverse will potentially allow fans from all over the world to feel connected to their team and players. Fans can attend events as part of a virtual community, recreating the in-venue experience. They could also gain access to usually restricted areas, such as, training areas. Meta, through its XTADIUM app, delivers a 180-degree VR experience in up to 8K video quality, where fans can watch live games or on-demand replays from various camera angles, individually or as part of a private watch party with friends.[25]

Figure.15

Fans are excited to try advanced technologies to enrich their experience



Source: Capgemini Research Institute, tech in sports research, fan survey, March–April 2023; N = 9,351 fans who know how to use any smart device for either basic or advanced functions.

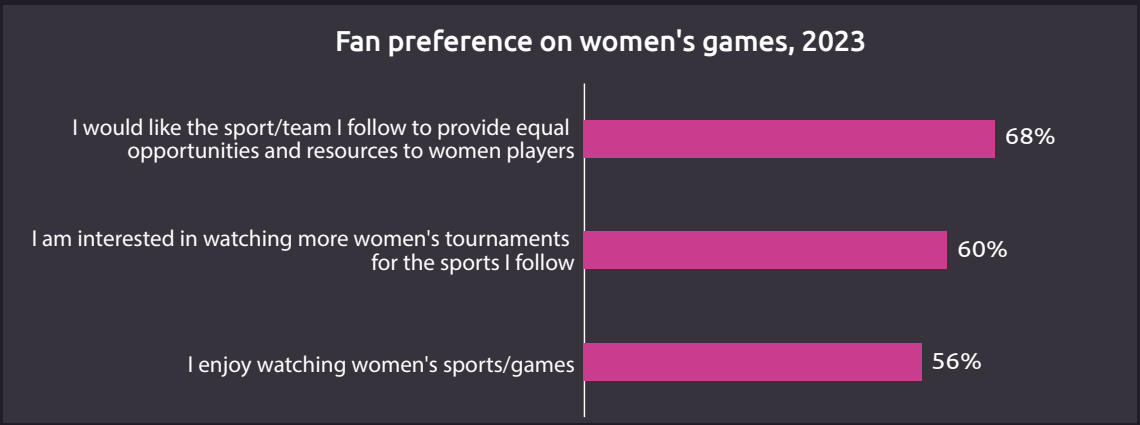
SPORT	EXAMPLE
FOOTBALL	The NFL launched an interactive game in the metaverse that lets fans act as NFL team owners and compete in activities including building teams and customizing venues.[26]
SOCCER	In the UK, Manchester City is recreating its stadium in the metaverse – a virtual universe where the fans watch games as if they are in the stadium and are able to virtually interact with other fans.[27]
BASKETBALL	The US NBA app allows fans to enter a 3D basketball arena through their smartphones to experience the daily life of an NBA player. With a virtual player representing each user, they can customize players' uniforms and accessories and move them around the arena and locker rooms.[28] The NBA has also launched NBA Top Shot, an NFT marketplace where sports fans can buy, sell, and trade basketball video clips.[29]
MOTORSPORTS	Formula 1 hosted a virtual speed race aboard an F1 car in a metaverse environment on a virtual track inspired by the Monte Carlo circuit.[30]
CRICKET	The International Cricket Council (ICC) has offered exclusive digital collectibles of the greatest moments from global ICC cricket events.[31]
GOLF	The BMW PGA Championship 2022 hosted a virtual clubhouse event offering fans the opportunity to go behind the scenes and interact with well-known players, participating in polls, and taking virtual range walks with players.[32]

Interest in women's games on the rise

Our research finds that there is a growing interest in watching women's games. As shown in Figure 16, 6 in 10 fans are interested in watching more women's games for the sports they follow. They would also like to see equal opportunities and resources offered to women players.

Figure.16

Fans are interested in watching women's sports



Source: Capgemini Research Institute, tech in sports research, fan survey, March–April 2023; N = 12,004 fans.

"Visibility of women's sports is crucial for building engagement and recognition. The recent Rugby League World Cup and Olympics showcased men's, women's, and wheelchair games simultaneously, a platform traditionally only afforded to men's sports. This sends a powerful message to young and aspiring athletes that their version of the sport is just as important, leading to increased engagement and bringing women's sports closer to the same level of recognition as men's sports."

Jonny Murray
Wheelchair Strength and Conditioning Coach, Scotland Rugby League Limited

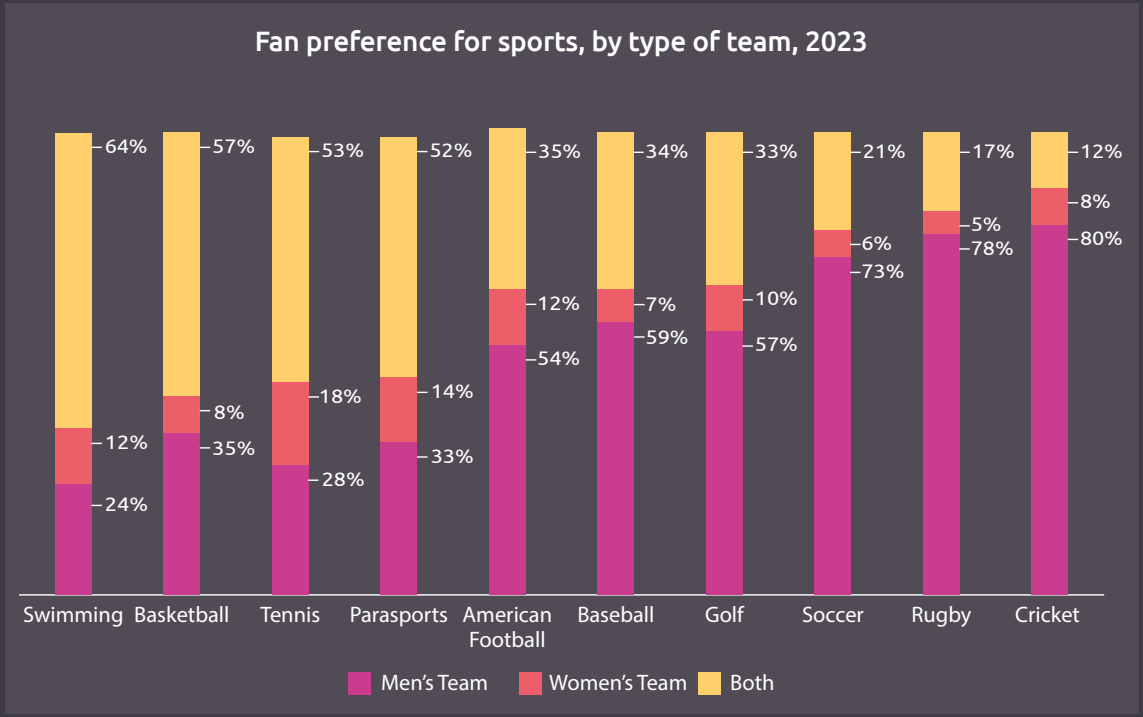
A few sports have now started to provide equal resources and funding to support women players and tournaments. Notably:

- WNBA (Women's National Basketball Association) raised $75 million to provide higher salaries and improved benefits for players in 2022.[33] WNBA Commissioner Cathy Engelbert stated: "*We're going to take a huge step forward in transforming the league and getting us an economic model that is worthy of players on the court.*"
- The International Tennis Federation (ITF) offered prize money of $5 million across 164 women's events in Q2 2023, up from $3.3 million in Q1.[34]
- In golf, the US Women's Open nearly doubled overall prize money to $10 million in 2022, from $5.5 million in 2021.[35]
- In soccer, FIFA has increased the number of Women's World Cup teams for 2023 from 24 to 32, while doubling investment in women's soccer to $1 billion.[36]

Our research also finds that, for certain sports, such as swimming, basketball, tennis, and parasports, the viewing figures for men's and women's games are similar, with many viewers choosing to watch both (see Figure 17). In particular, compared to Q4 2019, we found a significant rise in the number of viewers choosing to watch both men's and women's games for sports such as basketball (rise of 34%), baseball (rise of 20%), and American football (rise of 28%). In tennis, we found a 10% rise in viewership for women-only games.

Figure.17

There is a healthy preference for watching both men's and women's sport



Source: Capgemini Research Institute, tech in sports research, fan survey, March 23–April 23; N = 12,004 fans.

"Women's soccer is experiencing a breakthrough, since there are platforms that offer affordable subscriptions to watch live games. With women's teams now appearing alongside men's on established gaming products, technology is playing a crucial role in promoting equality and changing mindsets."

Andy Etches

"Technology advancements can help the women's game by advancing understanding of their bodies, and how that may impact performance, and consequently producing technology more geared towards women players."

Rachael Burford

There has been a recent surge in interest in watching women's sports. For example:

- The Union of European Football Associations (UEFA) Women's Champions' League 2022 final had a record-breaking cumulative global viewership of 3.6 million, a 56% rise from 2021.[37]
- The WNBA 2022 season became the most-viewed in 14 years, with 16% higher viewership than in 2021.[38]
- The 2022 women's Cricket World Cup generated 1.64 billion total views across ICC channels, making it the most engaged-with women's event on record.[39]
- TV viewership of the US Open Tennis 2022 women's final peaked at 6.9 million. The third-round of the game averaged 4.6 million viewers, breaking the previous record of 3.9 million for the 2012 UK Wimbledon men's final.[40]
- The 2021 US Women's Open golf championship averaged 600,000 viewers in 2021 across the Golf Channel and NBC Sports, 62% higher than in the previous year.[41]
- Average viewing time per person for women's sport on TV in the UK increased year-on-year by 131 percent in 2022.[42]

To encourage women's participation in motorsports, Formula E now hosts a FIA Girls on Track campaign. Female leaders in the sport provide mentoring for girls aged 12–18, to discuss various roles in the field and provide a vision for growth. The campaign gives girls exclusive behind-the-scenes access to drivers and women in technical support roles. They are also invited to come on race day to spectate, to encourage their knowledge and understanding of the sport.[43]

"Although there is still a long way to go, efforts to promote women's sports are gaining traction. With increasing interest in women players, there is hope for more sponsorship for women's sports. However, media coverage remains a crucial factor in showcasing female role models and their accomplishments. The more coverage, the more opportunities there will be for young girls to see themselves represented and inspired to pursue their dreams."

Abbie Wolf
Professional basketball player from Caledonia Gladiators Basketball Club (Scotland), and founder of Wild Works Basketball, a non-profit for basketball training for youth

03

Fans favor teams and organizations that offer a good tech-enabled experience

Fans are more likely to recommend sports that use technology to enhance their experience

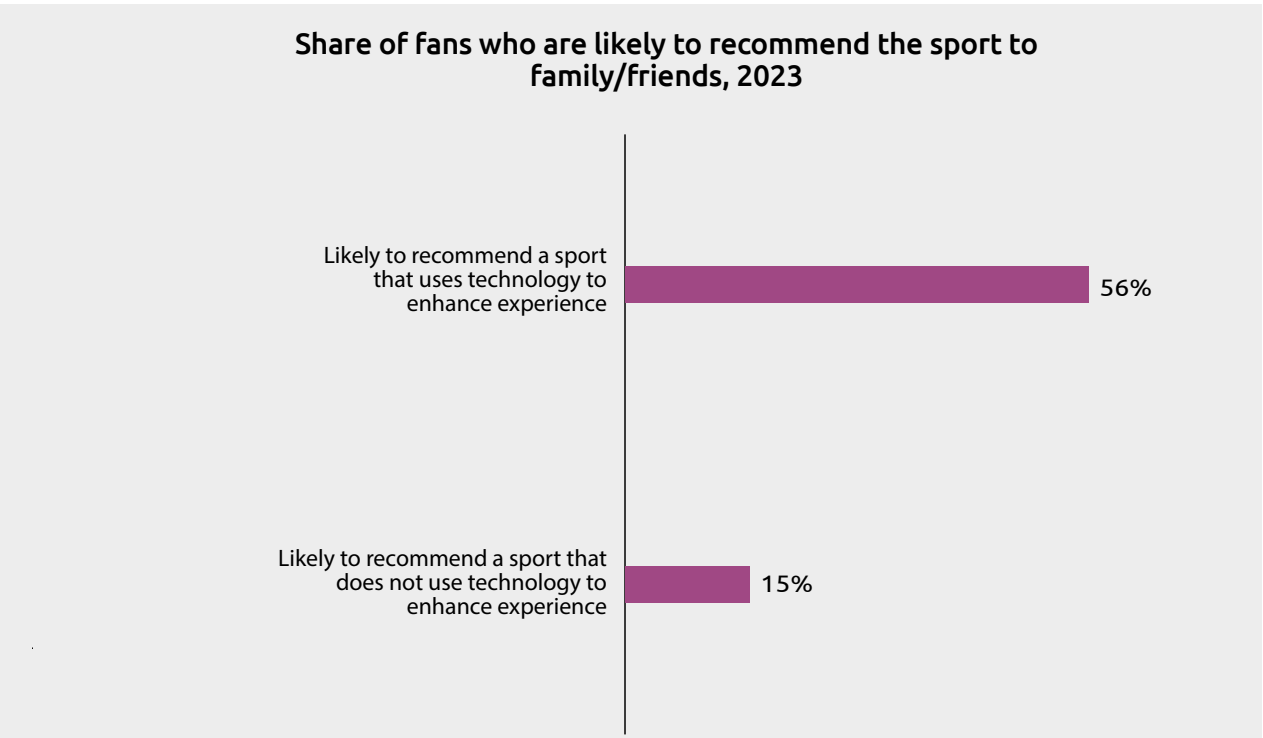
We investigated whether fans would recommend a sport based on their experience with technology. We found that more than half (56%) are likely to recommend a sport that uses technology to enhance their experience (see Figure 18).

Good viewing experiences lead to increased spend on technology

There are several other ways in which fans react positively to a good tech-enabled experience. For example, almost 8 in 10 fans have increased their spend on tech-enabled merchandise, such as immersive and wearable tech. Technology has also led fans to consume more online sports content, including streaming, social media, and apps (see Figure 19).

Figure.18

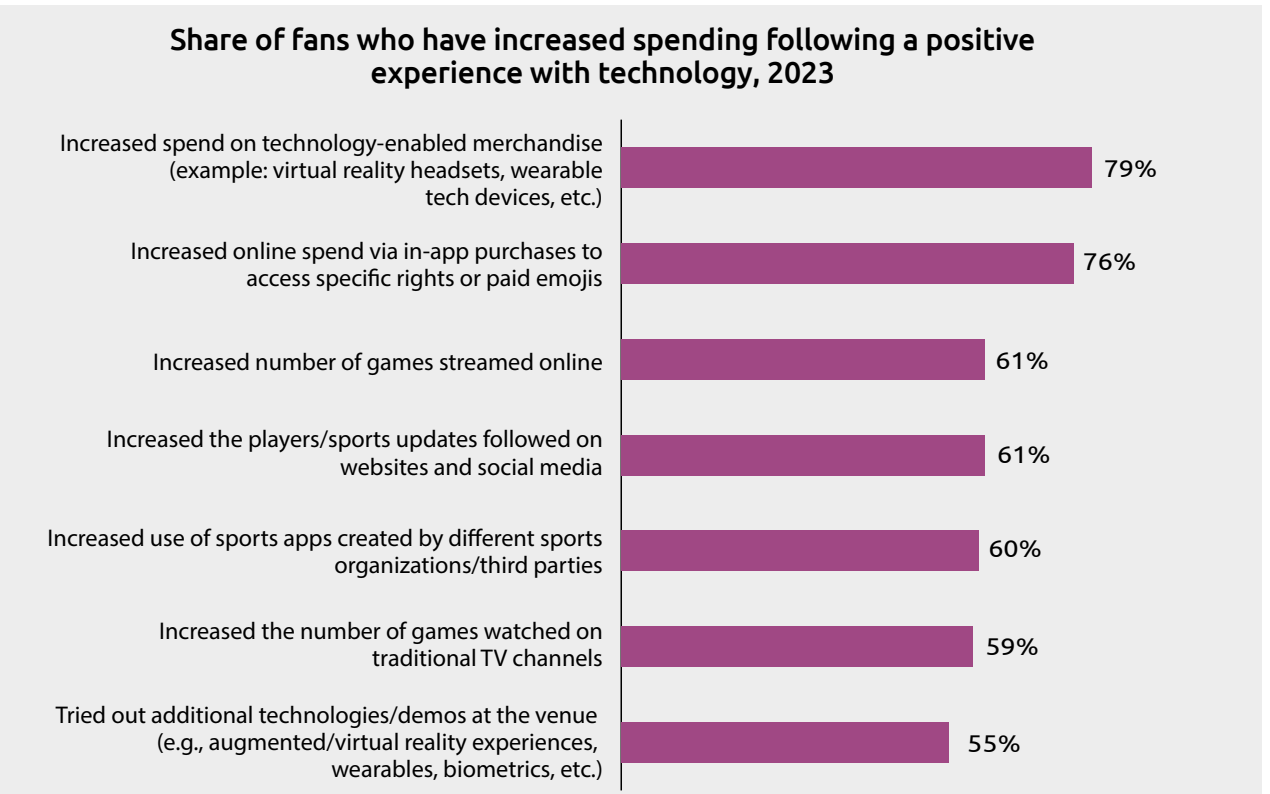
A good tech-enabled experience encourages fans to recommend the sport



Source: Capgemini Research Institute, tech in sports research, fan survey, March–April 2023; N = 12,004 fans.
The percentages in the chart above represents the sum of 8, 9, and 10 on a rating scale of 0 to 10.

Figure.19

A good experience with technology leads to increased fan spend and engagement



Source: Capgemini Research Institute, tech in sports research, fan survey, March– April 2023; N = 12,004 fans.

"The management of fans is crucial for the success of a club, as fans are an integral part of the game. With technology, it has become easier to reach out to fans and keep them engaged. Technology is necessary to attract new followers and fans, which can ultimately lead to increased revenue for the club."

PAOLO RONGONI

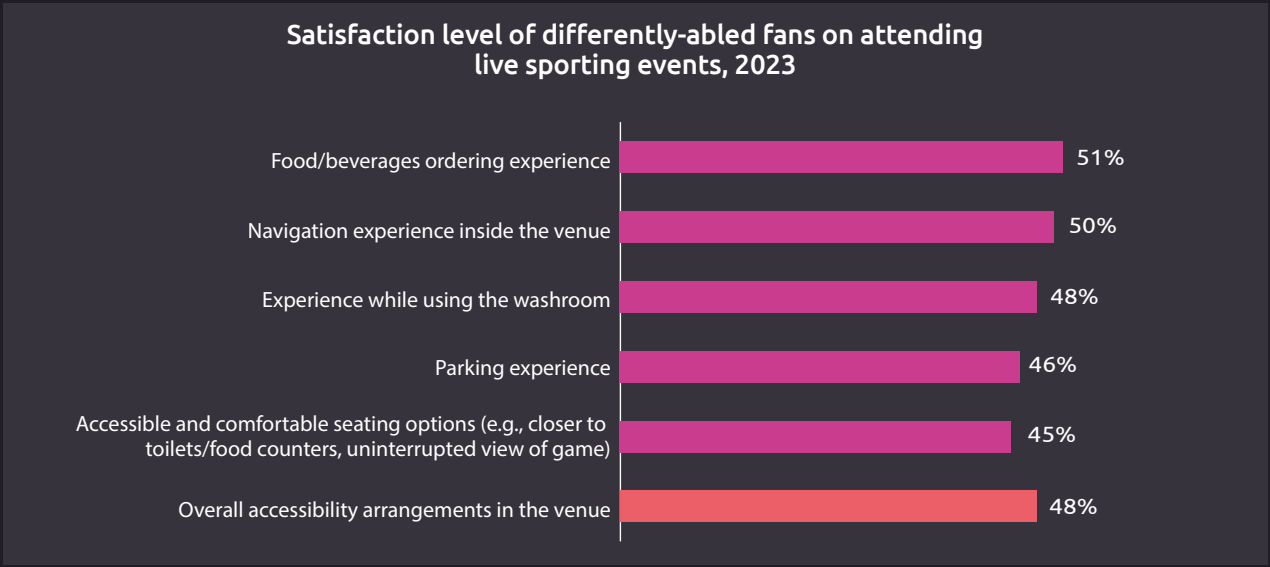
PERFORMANCE COACH FOR AL NASSR SAUDI CLUB AND CHIEF FITNESS COACH FOR THE FIFA WORLD CUP 2022

Technology is paramount in enhancing the experiences of differently abled fans and players

Ten percent of our sample of surveyed fans had a physical, mental, or cognitive disability. We found that, currently, many differently abled fans find at least one aspect of venue accessibility to be unsatisfactory (see Figure 20).

Figure.20

Differently abled fans are unsatisfied with their accessibility experience inside venues



Source: Capgemini Research Institute, tech in sports research, fan survey, March– April 2023; N = 1,185 fans with a disability (physical, mental, or cognitive).

"The technology ecosystem is understanding the barriers and creating solutions to help differently abled players compete in sports. It is also enhancing the live game experience of differently abled fans. The future of sports tech is exciting because it offers the potential to create more inclusive and diverse sporting experiences both for differently abled fans and players."

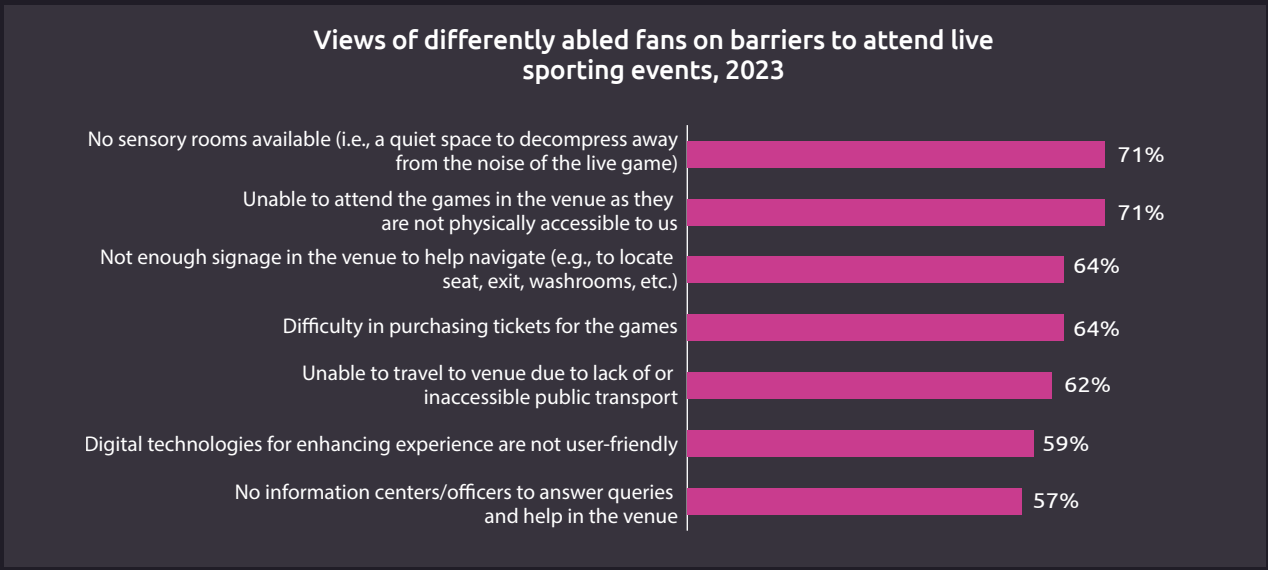
Alistair Brownlee
Double Olympic gold medalist in triathlon and tech entrepreneur

Differently abled fans also revealed that there are various barriers to attending live sporting events that reduce their satisfaction, such as the unavailability of "sensory rooms" (designated quiet spaces), the inaccessible venue design, and difficulty in purchasing tickets (see Figure 21).

These fans believe that technology is important to enhance their experience and remove these barriers (see Figure 22).

Figure.21

There are several barriers that differently abled fans face in attending live sporting events



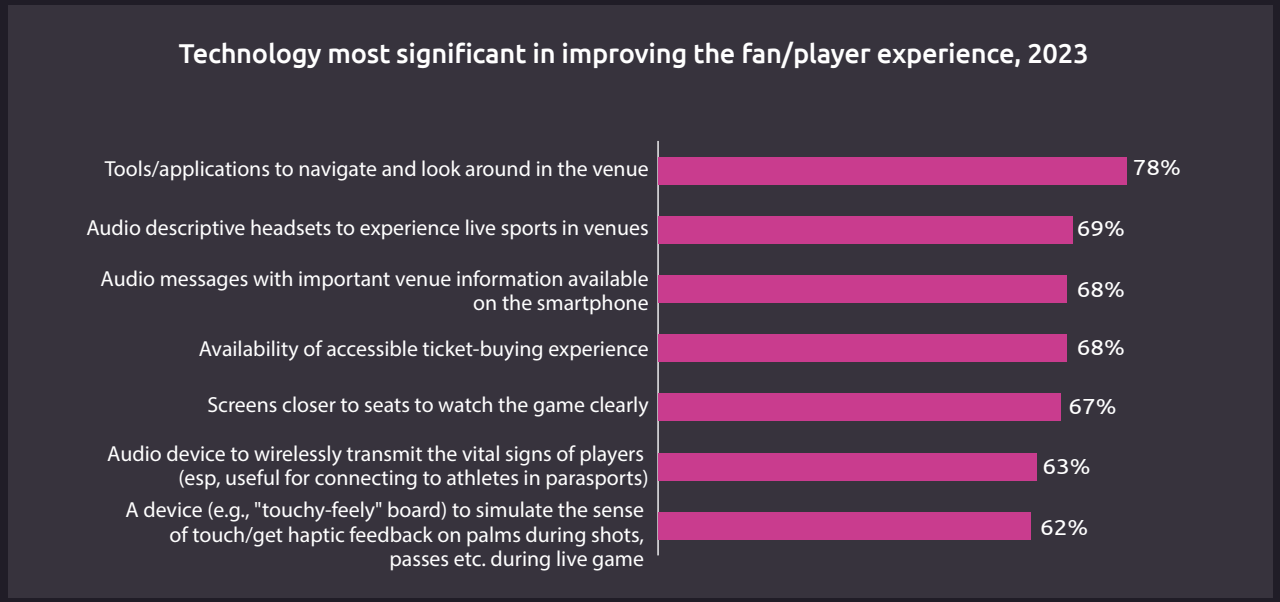
Source: Capgemini Research Institute, tech in sports research, fan survey, March–April 2023; N = 1,185 fans with a disability (physical, mental, or cognitive).

"More work needs to be done to enhance the experience for differently abled fans. Physical disabilities are not limited to wheelchairs and there is a pressing need for more accessible venues and enhanced technology that provides tailored experiences for such fans, such as audio descriptions for the blind. There needs to be more funding allocated to enhancing the overall experience for differently abled spectators."

Jonny Murray

Figure.22

Differently abled fans believe various technologies can enhance their experience



Source: Capgemini Research Institute, tech in sports research, fan survey, March– April 2023; N = 1,185 fans with a disability (physical, mental, or cognitive).

”Parity in sports is about providing relevant data to help players with disabilities achieve individual excellence. It's not about comparing them to able-bodied athletes, but rather collecting data that is specific to their needs and abilities."

John Quinn

Recent innovations to cater for differently abled fans include the following:

- The Australian Open tennis tournament recently introduced descriptive audio for the visually challenged, combining live ball-position data with spatial sound effects to give fans an immersive audio experience.
- At the FIFA World Cup 2022 in Qatar, appropriate arrangements were made for differently abled fans. These included accessible infrastructure, routes into and around the venue, seating, toilets, and parking areas. There were also dedicated priority lanes at entrances and food and beverage counters, priority lift access, relevant signage, and sensory rooms. Accessible ticket-buying was also provided.[44]
- The NeoQuimica football arena in Brazil has a sensory room, designed to have a calming effect for disabled and especially autistic fans. It has noise-proof glass walls, special subdued lighting, crayons spread on multiple tables, toys, and food available during games.[45]

Many parasports incorporate technology into a wide range of physical aids, from motorized prosthetics to carbon-fiber wheelchairs. There have also been exciting breakthroughs in the types of assistive technology permitted during certain sports. For example:

- Personalized equipment can be produced using 3D printing. Several wheelchair athletes now use 3D printing to make customized gloves printed in different materials appropriate to different conditions. British para triathlete Joe Townsend uses stiff materials for maximum performance in competition and softer gloves for training that are comfortable and less likely to cause injury.[46]
- Wheelchairs used in sports such as basketball and rugby are customized to fulfil mobility needs.[47]
- Swimmers with visual disabilities can use a digital device that delivers a haptic signal to their goggles indicating when to turn or when they are approaching a wall.[48]
- Rodrigo Hűbner Mendes, who is quadriplegic, uses an intelligent bio-connected head cap, that enables him to drive a race car using brain activity.[49]

04

Technology has fundamentally changed sports training and performance

Advances in technology have undoubtedly helped improve sports performance and the experience of sporting events for many fans. Players, teams, and organizations are beginning to understand the potential of innovative technology and are using it to gain a competitive advantage in their respective sports.

Andy Etches adds: *"The difference between being a good player and a great player can often come down to very fine margins. By utilizing technology, aspirational players can identify improvement areas to reach their full potential, regardless of their current skill level."*

Technology has wide applications in training, injury prevention, and performance management

A variety of devices are used to measure performance and vital functions, including smart watches, smart clothes, heartrate monitors, smart glasses, and AR/VR headsets. These can be used for everything from tracking sleep patterns and biometrics to improving game technique and preventing injury (specifically by identifying danger zones and predicting high-risk movements or patterns).

"Technology makes players a little better educated and informed in certain situations, whether that's nutrition, strength and conditioning, or knowing the strengths and weaknesses of the opposition. It has helped me understand my personal KPIs (distance, speed, game techniques) and what I need to achieve to perform to the best of my ability in tournaments. This then helps me replicate this in my training and guides me on what physical shape I need to be in to perform at an elite level."

Daniel Norton
Double Olympian and Rio 2016 silver medalist in Rugby

”Launch monitors measure every parameter related to the golf swing, from ball and club speed to various angles and other factors. Having access to such data can provide valuable insights into areas that need improvement, helping in refining technique and enhancing performance. This is truly a game-changer and has the potential to make a huge impact on golf.”

CARLOS MIGUEL LÓPEZ SINDONY

SPAIN-BASED INTERNATIONAL GOLF INSTRUCTOR

Alistair Brownlee:

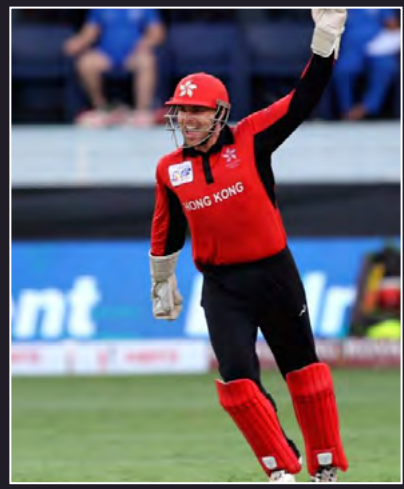
"The evolution of technology in sports has been remarkable. From basic heartrate monitors and stopwatches to advanced wearables and tracking technology, the options to measure and analyze player's performance are almost endless. By integrating all this information, players can optimize their training routines and improve performance."

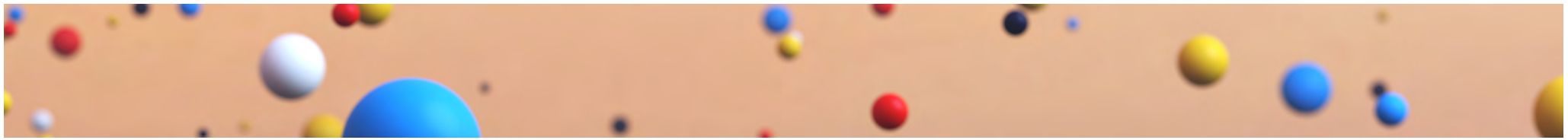
The data generated through such devices can be used to design and review individual player training programs. During games, data on player positioning, distance, speed, and technique can be analyzed to improve strategies, including for immediate performance feedback and analysis of opponents in live games.

Teams have also started using the data provided by these new technologies to scout high-potential players. Even organizations and sports associations are benefiting from improved operational efficiency by using applications that help in holistic management of players and teams.

"We use GPS vests that track our movement at training or during live games. This is probably the biggest shift I have seen in terms of how technology is used at the individual player level, tracking the whole player workload to identify risk of burnout, injury, and underperformance."

Scott McKechnie
professional cricket player and creator of PLAI Sport, a platform for sports team administration





Ronan Donagher:

"I've spent 20 years at World Rugby and, in the last eight, I've been delivering technology on the pitch. The most prominent product is video replay, which provides independent replays to medical professionals, match officials, judicial teams, and citing commissioners, presenting accurate and timely decisions to assist in the delivery of the game."

Jonny Murray:

"Technology has revolutionized talent identification by providing coaches with crucial data on raw physical capacity, helping them to identify potential talent for the team, regardless of their initial experience in wheelchair sports."

Rachael Burford:

"When I first started playing, I used to get an Excel sheet with my stats, where somebody just watched the game and then tagged the different game elements against my name. Now, I can analyze all that data and match it up to live video footage. It can transform the way you plan and prepare to train and play."

Scott McKechnie:

"When it comes to the building of a squad, particularly in short-form franchise cricket, teams look at the data to find value for money. Technology is critical here, so that individual players can be analyzed in terms of what their value add could be to the squad."

New and evolving technologies, such as the metaverse, nanotechnology, and drones, open a world of opportunities for player training and performance analysis.

John Quinn adds: *"The integration of nanotechnology into sports clothing holds immense potential in terms of measuring and communicating various biometric data, enabling players to achieve unprecedented levels of convenience and personalization. Drone footage is also revolutionizing the way we analyze patterns of play and individual movement. It's becoming increasingly important in creating personalized training schedules for athletes and improving performance."*

SPORT	EXAMPLE
SWIMMING	Swimmers worldwide use smart goggles to monitor various vitals and stats, such as heartrate, lap count, lap splits, stroke rate, etc., adjusting and improving their training in real time.[50]
CRICKET	Various teams use VR training systems to practice bowling and batting and simulate a match environment.[51]
BASKETBALL	The NBA uses pneumatic boots and sleeves to shorten warm-up times and as an aid to post-game recovery.[52]
MOTORSPORTS	NASCAR racers and staff use a "smart ring" to measure heartrate and body temperature, and overall health and recovery.[53] A VR simulator can be used to measure drivers' brainwaves and display them in real time to increase understanding of the risks of distractions and altered perception while driving.[54]
SOCCER	Several teams use a wearable tracker in their vest during a game, which helps to analyze and improve the performance of players while enabling them to view their speed, distance covered, power, sprint distance, load, intensity, and positioning.[55]
MARITAL ARTS	Brazilian mixed martial artist Amanda Nunes is building her personal gym in the metaverse, where she will appear in 3D and coach users on how to fight.[56]

Technology is increasingly embedded into sports equipment

Sports equipment is now being made with sensors incorporated to enable users and coaches to monitor, track, analyze, and improve performance, as well as providing enhanced health and safety data. In basketball, for example, sensors in the ball can track movement across the court, which could help players improve shooting accuracy or scoring strategy. Similarly, in cricket and baseball, sensors in bats can measure the speed and force of the swing, allowing players to adjust their batting technique.

Examples of such technology in use include the following:

- During the recent FIFA World Cup, a sensor was placed in the ball used in games, allowing it to send data 500 times per second, enabling very precise detection and tracking of the ball in real time.[57]
- Sensors in cricket bats allow for the measurement and analysis of impact time, angles, speed, rotation, etc., and have been used in several matches since the 2017 ICC Champions Trophy.[58]
- Formula 1 cars have numerous sensors embedded to deliver multiple datapoints, such as car "health," acceleration rate, braking capacity, etc. This data is used for pre-race car testing, monitoring during the race, driver handling and behavior assessment, and future-performance management.

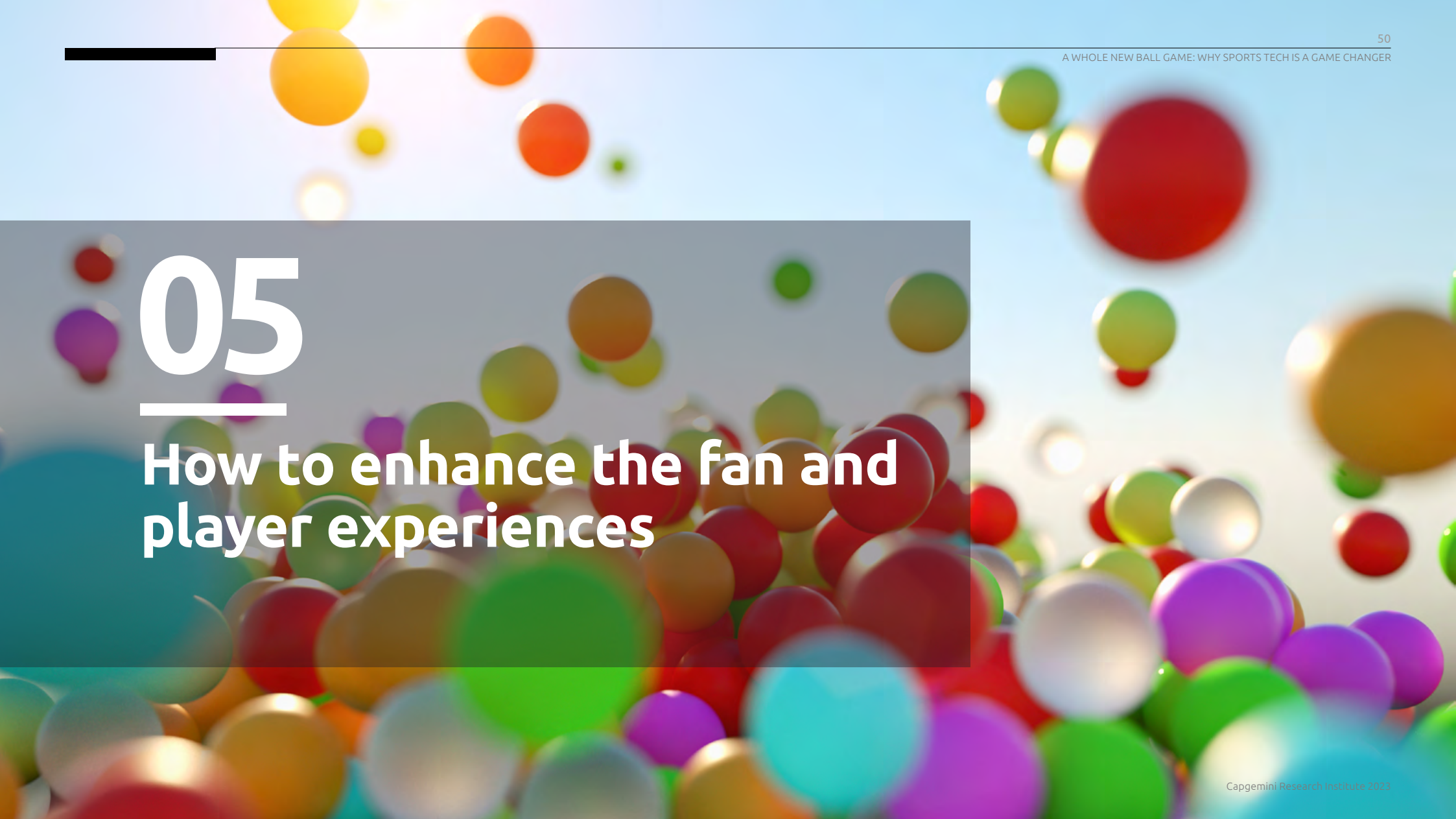
Nanotechnology is also incorporated into various pieces of sports equipment to improve durability and performance. For example:

- Footballs and tennis balls with a nano-clay lining act as a barrier material maintaining pressure for longer play
- Nano materials lighten golf clubs, increasing power and accuracy
- Formula 1 car manufacturers use lighter-weight and better-wearing nanocomposite products
- Quick-dry nanotechnology for swimwear fabric wicks away water extremely quickly, making the fabric lighter and swimmers more agile in the water[59]

Technologies improve decision-making in live games

Technology is even helping umpires and referees improve their decision-making. Examples include:

- **Video assistant referee (VAR) systems:** With the help of cameras positioned around the stadium's roof to track soccer players' movements, and using several data points to make a virtual model of the game, this technology assists referees in decision-making. The semi-automated offside technology used in the FIFA World Cup 2022 brought down the average time for a VAR offside check from 70 to 25 seconds.[60]
- **Automatic ball-strike systems (ABS):** This technology is used in baseball games to detect strikes and measure ball trajectory. The roof of the ballpark contains a tablet-like device that reads the pitch of the ball, and relays to the umpire, via an earpiece, whether the pitch is a strike. This technology is increasingly used in minor league games.[61]
- **Hawk-Eye:** Computer-vision technology, such as Hawk-Eye, is used in ball/racquet sports such as tennis, badminton, rugby, cricket, soccer, etc. It makes use of multiple cameras placed at various locations around the field or court to track the ball's movement from many angles, eliminating human error and improving accuracy. For example, in cricket, this technology can determine the path of the ball had it not hit the batter's legs or body.[62] Sensor tools in tennis use lasers to determine whether the tennis ball is in or out, based on the smallest of touches on the painted lines.[63] Other technologies, such as snickometers (which detect any contact between bat and ball) and smart bails and stumps that illuminate when disturbed, are used extensively in cricket to assist umpires' decision-making.



05

How to enhance the fan and player experiences

Digitize the in-venue fan experience

The fan's experience begins before they reach the venue and continues long after the event concludes. Technology can enhance the entire fan journey. For example:

Pre-game experience: Digital ticket purchasing via a website or smart phone app is a commonplace convenience. Information on various venue resources, such as facility maps and dining options, can be shared digitally in advance. Apps can share the latest news and stats about the players and teams with fans before the game. Finally, pre-event fan engagement can be encouraged on social media.

Parking and entering the venue: Our research indicates that 83% of fans are frustrated by long queues during parking, security checks, etc. To ease this, apps should allow fans to arrange transit and parking beforehand. Technologies could guide fans towards areas with good space availability.

Digital tickets/wearables (such as armbands) should replace physical tickets. Barcode scanners at the entry point allow entry via smartphone as easily as paying for a bus ride. In addition, smart sensors around the venue could continuously gather real-time information on bottlenecks and queues. Dynamic digital displays and signages, or notifications on smart phone apps could inform fans where to find the entry point with the shortest line and guide them to their seats.

Ordering food and beverages: Apps can allow fans to preorder refreshments from their smartphones for pickup or even delivery to their seats. Interactive displays can guide fans to the nearest restrooms or concession stands and provide an estimated wait time. Our survey revealed that over 7 in 10 (71%) fans find that current notifications related to food/beverages or washroom queues are not timely. In addition, a live feed of the game while fans wait their turn would mitigate one source of frustration (67% of fans say that queueing for food means missing live action).

67%

of fans say that queueing for food means missing live action

Watching the game: At present, 74% of fans say that they are unable to access the internet/social media while watching their sport due to a lack of strong network connectivity/venue wi-fi. Earphones to listen to live commentary in the venue could be made widely available, since 78% of fans find it challenging to follow the game properly without commentary. In addition, fans could be kept engaged by interactive quizzes and polls on an app during breaks or half time.

In-venue differentiators: The value of the in-venue experience is compromised by high ticket and travel prices, and the reduced comfort compared with watching from home. Venues should invest in differentiators if they are to attract new generations of fans. Providing digital display systems inside the venue, with advanced features such as instant replays and interactive messages, could keep fans engaged and connect them to the action on the field in a way unavailable to fans at home. VIP VR experiences such as virtual locker-room visits and player-view could be added.

Exiting the venue: Special dining options and dedicated fan zones can encourage fans to extend their in-venue experience. Digital displays and signage can streamline the fan exit process.

WHY IN-VENUE DIFFERENTIATORS ARE IMPORTANT

Johannes Dobretsberger, Head of Marketing & Sales at soccer club FK Austria Wien:

"It's not only about the game; you need to give the audience in the venue an entertainment factor. Fans in the venue want to have access to more data and statistics. So, venues need to use their screens and video walls to tell the story and give more insights."

Scott McKechnie:

"At the venue, special experiences can be offered that are impossible to replicate at home, such as being able to meet the players and have shirts or merchandise signed."

"Technology used during the game must bring the venue into the digital world, while content and insights must augment the experience before, after, and in between games."

Johannes Dobretsberger
Head of Marketing & Sales at soccer club FK Austria Wien

Personalize the fan experience to improve engagement

Fan data across all touch points, from ticketing, buying concessions/merchandise, to engagement on apps/ online platforms, etc., should be centralized to provide the perfect tailored experience. This means developing a comprehensive data strategy based on fan behavior. Delivering targeted content in the form of exclusive interviews, behind-the-scenes footage, fan discussions, contests, giveaways, and tech-based immersive experiences, on a dedicated app or via social media, are all valid approaches to fan engagement. Pushing personalized notifications related to the event could also be a big plus, as 66% of fans currently feel there is a lack of accessible information.

Finally, data gathered in this way could help clubs and teams develop marketing strategies and campaigns to target interested fans and thereby generate further opportunities for monetization.

Andy Etches:

"Data is the foundation of a deeper and more meaningful relationship with fans. It is only through data that we can truly understand our fans and provide them with the experiences they seek."

Identify player needs before deploying new technology

One thing that stood out in our conversations with experts is the importance of deploying tech in a targeted manner that considers both benefits to fans and players and ROI. There should be a fine balance between using technology and acknowledging the in-depth knowledge and skills of the sports person. Technology is extraordinarily important but should not eclipse the core skills of a sports person.

WHEN TO USE (AND WHEN NOT TO USE) TECHNOLOGY

Rebecca Hopkins:

"Technology works best when somebody has identified what it needs to solve – how technology can be applied to that challenge, whether that's improving the fan or player experience or creating a new revenue stream. It's about being open-minded enough to hear what the data has to say and then apply or layer human insights on top as needed."

Carlos Miguel López Sindony:

"Acquiring unnecessary technology could be a distraction from the purpose of trying to improve. This is where coaches are important – they know how to use technology and apply it in the right context to achieve the best results."

Daniel Norton:

"There needs to be a very focused approach: What do I need? What's my playing level? What do I want to do? And do I have the right device or the right technology to do that? And, while technology plays a critical role in a high-performance program, it's equally important to recognize the human touch. Building relationships, understanding individual needs and experiences, and the intuition and experience of coaches and players cannot be replicated by technology."

Our previous research found that this is equally applicable to fans. It is crucial to curate experiences that significantly enhance the overall fan experience.[64]

Data analysis can enhance decision-making in sports

Nearly everything that can currently be measured is being measured. The sheer quantity of data can easily become unmanageable.

Collecting and storing data is one thing; understanding and using it productively is another. Coaches and players are generally unable to offer more than simple surface analysis, so it is advisable to use data scientists with advanced skills to gain a statistical edge. They can contextualize and compare data, creating a tool that can influence team decision-making.

LISTEN TO WHAT THE DATA IS SAYING ...

Paolo Rongoni:

"The key is to understand what data is relevant and what is not. Technology is needed to help players save time. The peak performance of players depends on many aspects – mental, metabolic, muscle, injury, balance. So, it is crucial to know which data points are important for each player."

Jonny Murray:

"Collaborations between sports scientists and technology companies are filtering out irrelevant data and producing easily digestible information. Having a sports scientist who can make sense of the data and present it in a coach- and player-friendly format is highly beneficial, as technology has yet to fully replace the value of human expertise."

Johannes Dobretsberger:

Data is the key to success, both on and off the field. From wearing metrics devices during training to analyzing video sessions, the ability to collect and interpret data is crucial for player development and tactical decisions during games. With more data come more powerful decisions, leading to greater success."

Carlos Miguel López Sindony:

"Acquiring technology is just half the battle. Equally important is having knowledgeable people to operate it and communicate the different measurements and the benefits of the data collected."

Conclusion

Technological advances are transforming the way fans consume sports, both within and outside the venue. Fans increasingly use technologies to enhance their experience and are keen to try experiences driven by advanced technologies such as VR, the metaverse, and collecting digital merchandise in the form of non-fungible tokens (NFTs). Sports technology has also greatly impacted the way in which players and teams approach their sports, helping them in training, managing injuries, improving performance, and creating match-winning strategies. Technology has made sports more accessible and inclusive for women and differently abled fans and players.

Moreover, good tech-enabled experiences outside the venue have made many fans, especially younger ones, happier to watch events at home. Today's venues face increasing competition from an enhanced home-viewing experience.

As technology permeates all aspects of sports, organizations need to go beyond foundational elements and focus on:

- digitizing the end-to-end fan journey and providing differentiated experiences in the venue;
- providing personalized content to better engage fans outside the venue;
- clearly identifying player needs before deploying new technology; and
- contextualizing and analyzing extensive player data to aid decision-making.

Research methodology

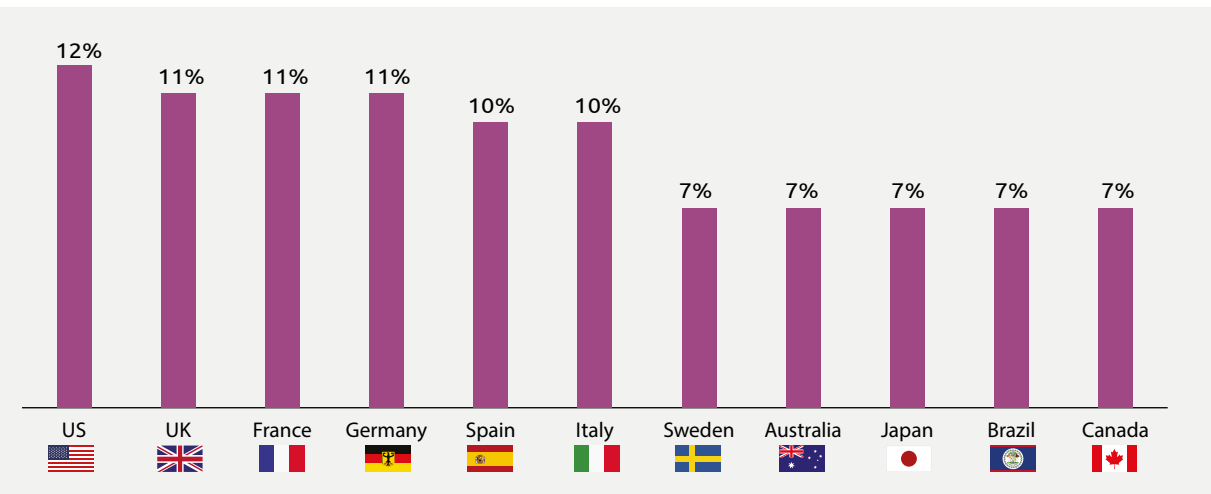
To understand the impact of technology on sports, we carried out extensive research with both quantitative and qualitative components.

Fan survey

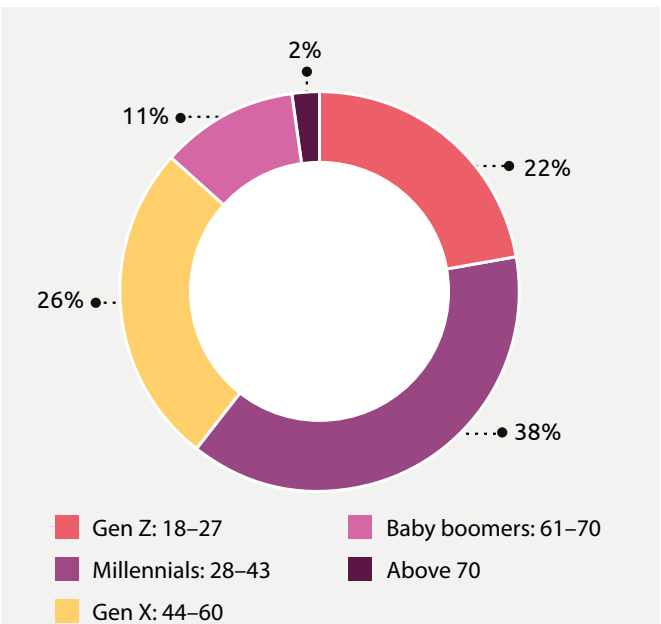
We surveyed 12,000 sports fans who regularly watch and follow sports globally. Of these, nearly 1,110 had a disability, either physical, mental, or cognitive.

Please note, for the purposes of comparison with the 2020 research, we have excluded respondents from Spain, Italy, Sweden, Japan, and Brazil in certain charts.

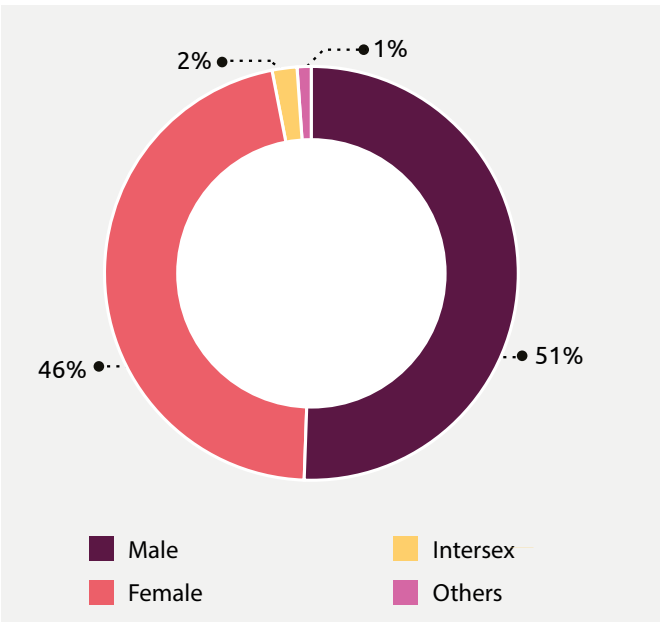
Fans by country



Fans by age

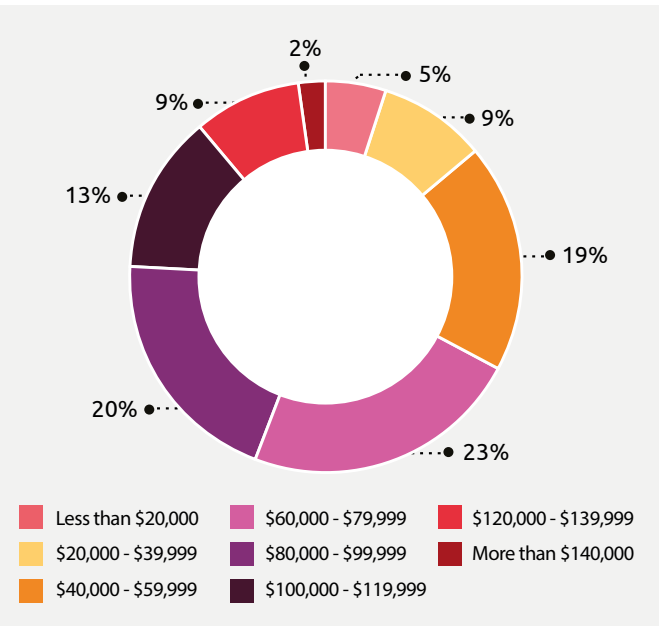


Fans by gender

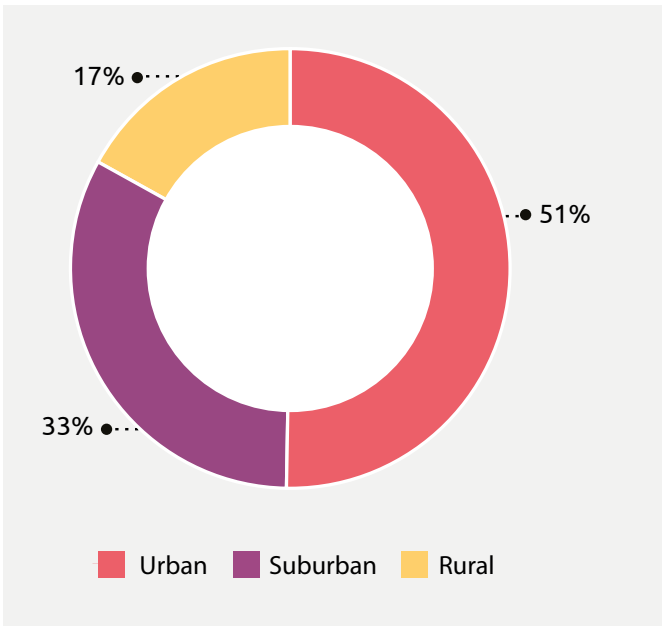


Research methodology

Fans by annual income



Fans by area of residence



Source: Capgemini Research Institute, tech in sports research, fan survey, March– April 2023; N = 12,004 fans.

Expert interviews

We also interviewed 15 international players, coaches, and sports tech experts.

Research methodology

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The key contributors would especially like to thank Mridul Agarwal and Manisha Dash for their contribution to this research.

The key contributors would also like to thank Thomas Hirsch, Laura Breslaw, Victoire Grux, Charlotte Sarran, Sam Connatty, Sebastian Schenkenbach, Lucas Lauret, Lorna Neville, Clare Rosalind Argent, Frederic Vander Sande, Paul Scales, Johan Lonn, Bob Schwartz, Paul Saunders, Vito Labate, Punam Chavan, Aparajita Paul, Suparna Banerjee and Ashwani Kumar for their contribution to this research.

About the Capgemini Research Institute

The Capgemini Research Institute is Capgemini's in-house think tank on all things digital. The Institute publishes research on the impact of digital technologies on large traditional businesses. The team draws on the worldwide network of Capgemini experts and works closely with academic and technology partners. The Institute has dedicated research centers in India, Singapore, the United Kingdom, and the United States. It was recently ranked number one in the world for the quality of its research by independent analysts.

Visit us at www.capgemini.com/researchinstitute/

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Capgemini and the focus on sports

We engage in sport not just because of our shared passion, but because we know it can make a difference. Sport provides a platform to demonstrate our expertise that uses the power of transformative technology and innovation to achieve true impact and value. We want to help sports communities get more value as fans and customers, as participants and global citizens who demand and deserve a better world.

Our founder Serge Kampf was passionate about the sport and all that it represented – and indeed, ever since the Group's creation, rugby has been in our DNA.

The sport has strongly influenced our culture and our values, with particular mention for team spirit and fun. And, with its diverse and continuously growing global fan base, rugby is fully aligned to Capgemini's belief in the role that diversity plays in developing innovative solutions and creating value.

- We are the first Worldwide Partner to sponsor both World Rugby (as Digital Transformation Partner and Global Partner of Women in Rugby) and most of its major men's (Rugby World Cup 2023) and women's international competitions (Rugby World Cup 2021 played in 2022 and Rugby World Cup 2025), as well as the HSBC World Rugby Sevens Series.
- A momentous first step in the Capgemini golf story, our partnership with the prestigious Ryder Cup reflects our focus on building and celebrating talent, team spirit, and high performance – all of which are at the heart of both Capgemini and the Ryder Cup. Golf is a game of strategy and preparation. Its endless appeal lies in its challenge: chasing perfection on every shot in order to better your personal best. Our partnership with Ryder Cup, one of the most tactically demanding events in golf, aligns perfectly with our expertise in using strategic insights to transform any business.
- Motorsport is the world's most transformative sport, navigating complex technologies, rule changes, and environmental innovation. It is a constant platform for progress and performance. Our partnership with Peugeot sport plays a key role at the heart of the FIA World Endurance Championship program, driving transformation with advanced digital tools and analytics to enhance the performance of the team and the Peugeot 9X8.

Meet our in-house Capgemini sports stars

Jonathan Laugel

1. Sport played: Professional rugby 7 player
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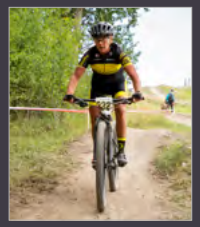

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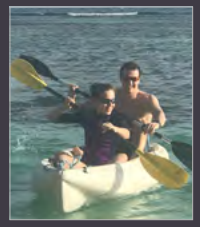

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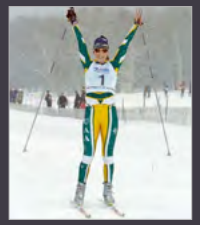

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2. Achievement:In the German National team for 5 years, German National Champion 1 time (Senior), Junior World Championships (16th place); USA (international university sports): Two-time NCAA Champion Division I; 6x All-American; Hall of Fame Inductee University of Alaska Anchorage; Sports Illustrated Faces in the Crowd; U.S. National Championships (Senior; while being a full-time student) – 3rd place; after being a student-athlete was a University Ski Coach (Assistant) for 4,5 years in which the university ski team placed a historic 4th place at the NCAA Championships; some student-athletes competed in U23-World Championships and the Olympics.
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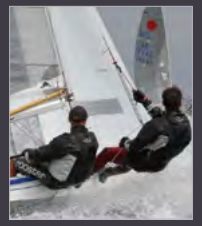

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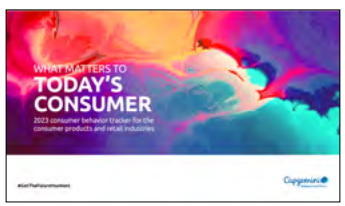
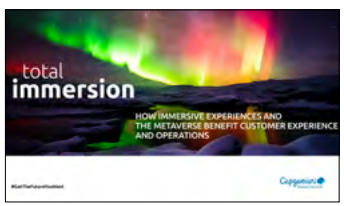


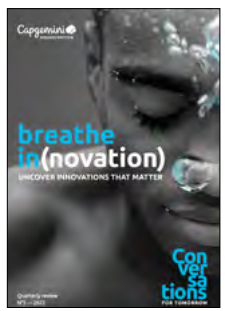
CPR Trends: What matters to today's consumer

Conversations for tomorrow #7: Climate tech – for a sustainable planet



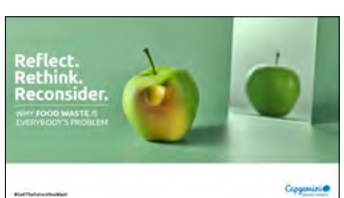
Total immersion: how immersive experiences and the metaverse benefit customer experience and operations

Sustainability in Automotive: from ambition to action

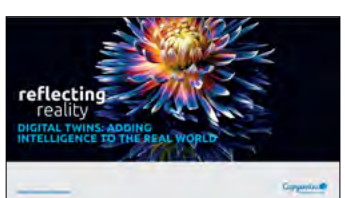


Conversations for tomorrow #5: Breathe (in)novation – uncover innovations that matter

Rethink: why sustainable product design is the need of the hour



Reflect, rethink, reconsider: why food waste is everybody's problem



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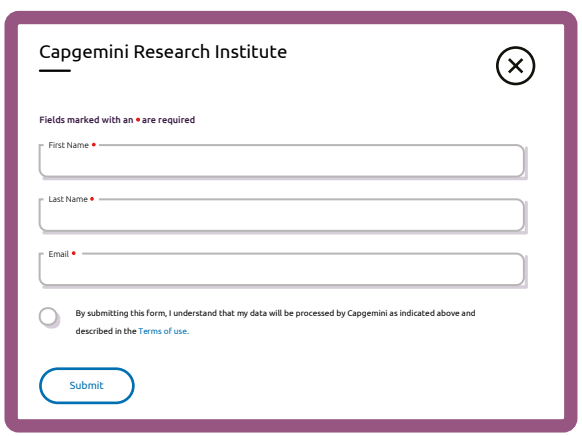

About Capgemini

Capgemini is a global leader in partnering with companies to transform and manage their business by harnessing the power of technology. The Group is guided everyday by its purpose of unleashing human energy through technology for an inclusive and sustainable future. It is a responsible and diverse organization of over 360,000 team members in more than 50 countries. With its strong 55-year heritage and deep industry expertise, Capgemini is trusted by its clients to address the entire breadth of their business needs, from strategy and design to operations, fueled by the fast evolving and innovative world of cloud, data, AI, connectivity, software, digital engineering and platforms. The Group reported in 2022 global revenues of €22 billion.

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