



CSM RESEARCH REPORT

THE IMPACT OF TECHNOLOGY ON THE FUTURE OF FOOTBALL – A GLOBAL DELPHI SURVEY

COMMISSIONED BY FIFA

INTRODUCTION

Dear readers,

Football and technology form a relationship that is sometimes unintuitive and is constantly the subject of debate – not only among industry experts, but also among the general public. While tech advocates see significant potential for teams, match officials and spectators to improve performance and experience, traditionalists are afraid of losing the relative simplicity and unifying nature of the game, which – like few others – can be played by almost anyone, anywhere, anytime. These opposing views represent two poles that have existed since time immemorial: art and science. It has always been a challenge for society, in general, to find the right balance between these two, and the same is increasingly true for football. Therefore, several organisations, including FIFA, have addressed the question of whether tech innovations should become an integral part of football. In line with its vision and role as football's world governing body and the tournament organiser for numerous men's and women's competitions, FIFA has an intrinsic motivation to investigate innovative features and new technologies that have the potential to improve the game at all levels and to empirically support

regulatory changes proposed to The International Football Association Board (The IFAB).¹

Over time, the number of potential amendments to the rules related to technology has inevitably increased. Recent examples such as goal-line technology (GLT), electronic performance and tracking systems (EPTS), or video assistant referee (VAR) technology show how innovative tools can improve the game. However, legitimate questions remain about the scope of technology in modern football and the desire for it.

To address these questions, we conducted a scientifically based Delphi study among 91 technical directors of FIFA member associations from all FIFA confederations.² The goal of our study was to determine their independent and comprehensive view of the impact of technology on the future of football. The insights from this exclusive expert panel help inform and guide relevant stakeholders. In this context, we put particular focus on performance and supporting technologies for the game while deliberately not addressing technologies for fan engagement or media exploitation at this stage. This is not to ignore the potential in the omitted domains, but rather to tailor our survey to the expertise of the participating technical directors. As such, this study represents the first and most comprehensive of its kind, considering representatives from FIFA member associations from all parts of the world and all development levels in a methodologically rigorous approach.

DELPHI STUDY

The desire to predict the future is part of human nature. In ancient Greece, the Oracle of Delphi foretold the future and became one of the most famous cult sites in history (Häder, 2009). For our prospective study, we did not consult the Oracle of Delphi, but rather collected the opinions of technical directors of FIFA member associations. We included representatives from all six confederations (UEFA, CONMEBOL, Concacaf, CAF, AFC, and OFC) and across all ranks of the FIFA/Coca-Cola World Ranking.

Using the Delphi method (von der Gracht et al., 2010), a total of 91 technical directors evaluated and commented on 11 projections of the impact of technology on the future of football. Each projection was assessed in terms of expected probability (EP), impact (I), and desirability (D) of its occurrence. In addition, the experts answered 25 survey questions.

This study was conducted in close cooperation with FIFA. We would like to thank Johannes Holzmüller and Nicolas Evans for their excellent collaboration. Finally, we sincerely thank the technical directors who participated in the study and provided their valuable input for this report.

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¹The official "Laws of the Game" are governed by The International Football Association Board (The IFAB), in which FIFA currently has 50% of the voting power with other votes being evenly distributed among the four British nations representing the founding members of association football (Dunmore, 2011). To adjust the laws, a supermajority vote of three-quarters is required, so that no single member alone can decide on passing a new rule (Statutes of The IFAB, 2019).

²For details see "Study design and methodology".

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A group of female athletes in white jerseys are celebrating, holding a large silver trophy. The scene is filled with confetti falling from the top. The image has a blue tint. The text 'KEY FINDINGS AND RESULTS' is overlaid in white, sans-serif font on the left side of the image.

KEY FINDINGS AND RESULTS

1 | *The vast majority of participants believes that technology will become increasingly relevant in football, as it presents more opportunities than risks for the game*

- *PARTICIPANTS ASSESSED THE EXPECTED PROBABILITY OF OCCURRENCE OF 11 PROJECTIONS WITH AVERAGES BETWEEN 69% AND 83%. THESE RESULTS INDICATE A HIGH PROBABILITY THAT TECHNOLOGY WILL PLAY AN INCREASINGLY IMPORTANT ROLE IN FOOTBALL.*
- *THE DESIRABILITY AND IMPACT OF ALL 11 PROJECTIONS WERE ASSESSED AS HIGH (I.E. GREATER THAN FIVE ON A SEVEN-POINT LIKERT SCALE WITH SEVEN = EXTREMELY HIGH). COMPARED TO SIMILAR STUDIES, THESE RESULTS INDICATE A VERY POSITIVE SENTIMENT TOWARDS TECHNOLOGY – WE DIFFERENTIATE NUANCES OF THIS SENTIMENT IN THIS REPORT.*

2 | *There is strong support for and belief in technology as a supporting mechanism and tool for various (game-related) processes*

3 | *There is some reservation with respect to technology's role as a potential substitute for specialist skills and competencies*

4 | *There is potential for technology to play a more integral role for players, but access around the globe remains a challenge*

The findings can be summarised by two participants' insights:

“SUCCESS WILL EVENTUALLY BOIL DOWN TO WHO IS ABLE TO MAKE USE OF THE AVAILABLE RESOURCES FOR A COMPETITIVE EDGE AND ADVANTAGE.”

“I DO NOT BELIEVE THAT TECHNOLOGY CAN CHANGE A PLAYER'S PLAYING STYLE, BUT IT CAN HELP HIM/HER UNDERSTAND THEIR PERFORMANCE AND ADAPT TO OPPONENTS.”

The discussion around football and technology is often emotionally charged and can be politically sensitive. We therefore attached particular importance to the anonymity of all participating experts in our study design in order to encourage all technical directors to openly share their opinions. Thus, neither quantitative assessments nor qualitative comments can be linked to individual participants. However, we selectively compare sub samples of panellists to gain

greater insights from our study data. Therefore, experts identified themselves with one of three groups based on the FIFA/Coca-Cola World Ranking: top-ranked associations (i.e. ranks 1 to 50), middle-ranked associations (i.e. ranks 51 to 100), and lower-ranked associations (i.e. ranks 101 to 211). In presenting our results, we hope to enrich the debate on the role of technology in association football, for example, by stimulating thought and shifting perspectives.³

³ By nature, all prospective studies ultimately remain speculative to some degree. The Delphi technique, however, has proven to reveal accurate and robust insights (McKenna, 1994). While it is not possible to predict the future, the following results are rather to be taken as an informed judgement illustrating the collective view of our experts.



TECHNOLOGY
YES, BUT WITHIN
REASON

GAZPROM VISA VISA VISA adidas adidas FIFA WORLD CUP FINAL 2018 Coca-Cola Coca-Cola Coca-Cola HYUNDAI HYUNDAI QATAR AIRWAYS 万达WAN



JUDGING THE OVERALL EFFECT OF TECHNOLOGY ON FOOTBALL, THE PANEL AGREED THAT “TECHNOLOGY MAKES THE GAME FAIRER”, WHICH IS FIRST AND FOREMOST A POSITIVE ACKNOWLEDGEMENT OF THE REGULATORY AMENDMENTS MADE IN THE PAST (FIGURE).⁴

The majority of technical directors agreed that “the laws of the game should leverage technology to improve the game”, thus mandating decision-makers to further explore and evaluate the potential of technological innovation in the future (figure). However, technology should not be deployed at any price. This notion is underpinned by a response that, while still in agreement, is more mixed regarding the hypothesis that “technology will not decide on winners and losers” (figure). It is noteworthy that representatives from top-ranked associations agreed signifi-

cantly less on this topic than those from middle-ranked associations, who in turn agreed slightly less than those from lower-ranked associations. This result might be explained by the use of technology providing more of a potential competitive advantage when it comes to higher-level competitions; regardless, it emphasises the responsibility of governing bodies to carefully assess technology in order to maintain a competitive balance.

Despite all the subtleties and nuanced challenges that are to be considered, the expert panel agreed that “technology and data science are the fastest-growing areas in football clubs and associations today” (figure). This conviction reinforces the relevance of our Delphi study, in which we tested 11 future-oriented statements in terms of their expected probability (EP; 0-100%), desirability (D; 1-7), and impact (I; 1-7) of occurrence by 2026.⁵

The experts’ evaluation can be categorised into three clusters. The first is focussed on “technology and game-related processes” – a subset of projections dealing with technology that has a direct impact as a tool and enabler, and on which there was the most agreement among all participating experts. The second looks at “technology and game-related capacities”, or the impact technology and innovations have on skills or personal traits, which obtained less support from the technical directors. The last is a reflection on “technology and the players” – a pair of projections that captures the role of football players with regard to technical innovation.

⁴ The questions were presented as seven-point Likert scales anchored at 1 = “strongly disagree” and 7 = “strongly agree”. For details see study design and methodology.

⁵ For expected probability (EP) we used a scale from 0% (= excluded from becoming a reality by 2026) to 100% (= sure to become reality by 2026); for desirability (D) and impact (I) we used a seven-point Likert scale from 1 (= extremely low) to 7 (= extremely high).

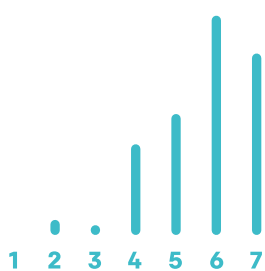
THE LAWS OF THE GAME SHOULD LEVERAGE TECHNOLOGY TO IMPROVE THE GAME

MEAN 5.7



TECHNOLOGY WILL NOT DECIDE ON WINNERS AND LOSERS

MEAN 5.1

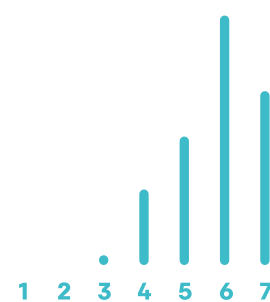


MEAN 5.7

TECHNOLOGY MAKES THE GAME FAIRER



1 Strongly disagree ▶ 7 Strongly agree



MEAN 5.8

TECHNOLOGY AND DATA SCIENCE ARE THE FASTEST GROWING AREA IN FOOTBALL CLUBS AND FEDERATIONS TODAY



TECHNOLOGY AND GAME-RELATED PROCESSES

A partnership with significant potential

WHILE FOOTBALL HAS REMAINED LARGELY UNCHANGED IN ESSENCE FOR MORE THAN ONE AND A HALF CENTURIES, IT IS CONSTANTLY BECOMING FASTER AND TACTICALLY MORE SOPHISTICATED.

In this development, as in other sports, technologies certainly played a vital role (Beiderbeck et al., 2020), be it the increased sets of data collected to track player information; GLT, EPTS, and VAR technology, as mentioned earlier on; or even enhanced video availability and quality as a basis for analyses. All of these technologies have improved game-related processes before, during, or after the match. Hence, we wanted to understand whether and how further technological developments could play a role in the next five years.

Figure/Table shows the collective assessments of all technical directors on projections in the context of game-related processes. Notably, three projections of this subset stand out with the highest overall impact rating (I = 6.0), which underpins the important role of technology as an enabler of the game. The highest overall expected probability (EP = 83%) was assigned to the statement: "in 2026, due to real-time analysis, the quality of communication from coaching staff to players and tactical changes on the pitch [will] have increased significantly". This projection becoming reality by 2026 was assessed with an average probability of 83% among all participants and reached consensus.⁶ There was an even stronger agreement among the experts on the projection that, in five years, "coaches [would] frequently use intelligent equip-

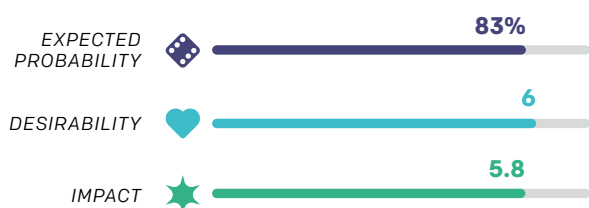
"INVESTING IN ARTIFICIAL INTELLIGENCE IS NOT A COST BUT AN INVESTMENT THAT CAN ALSO BE FINANCED BY SPONSORS IN SPECIFIC WAYS"

ment and hardware within their training routines" and that "the number of members of coaching staff with digital capabilities in a team [would have] increased" by 2026. Both projections were assessed with an expected probability of 82%, thus emphasising the trend that technology will support game-related processes (in this case, training) and that there will be a need for more staff with specific technological or digital know-how in the future. On average, technical directors expressed very high desirability for the

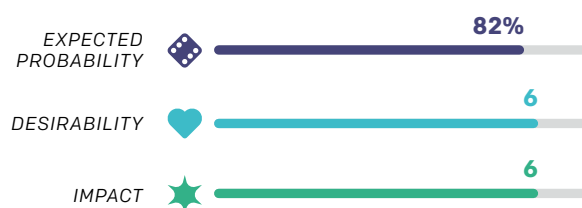
"ANNUAL INVESTMENT IN TECHNOLOGY SHOULD BE A KEY BUDGETARY ITEM FOR MEMBER ASSOCIATIONS AT THE BOARD LEVEL"

⁶ We assume that consensus is reached, if the interquartile range is smaller than one quarter of the scale, which is in line with leading literature in the field (Belton et al., 2019; von der Gracht, 2012). For the EP dimension (0-100%) this threshold is 25%.

IN 2026, DUE TO REAL-TIME ANALYSIS THE QUALITY OF COMMUNICATION FROM COACHING STAFF TO PLAYERS AND TACTICAL CHANGES ON THE PITCH HAS INCREASED SIGNIFICANTLY



IN 2026, COACHES FREQUENTLY USE INTELLIGENT EQUIPMENT/HARDWARE* WITHIN THEIR TRAINING ROUTINES



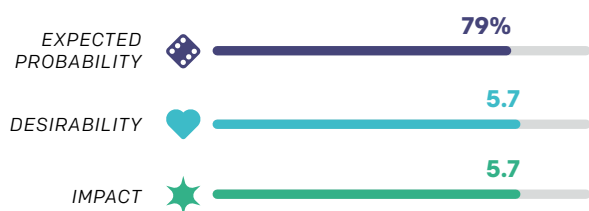
IN 2026, THE NUMBER OF MEMBERS OF COACHING STAFF WITH DIGITAL CAPABILITIES IN A TEAM HAS INCREASED SIGNIFICANTLY



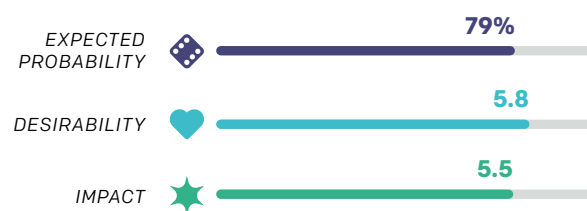
IN 2026, FACTUAL IN-GAME DECISIONS ARE INSTANTLY CONFIRMED TO THE REFEREE BY ARTIFICIAL INTELLIGENCE



IN 2026, INCREASINGLY STANDARDISED DATA SETS AND ANALYSIS TOOLS ALLOW FOR MORE OBJECTIVE AND EFFECTIVE DATA-DRIVEN REMOTE-SCOUTING SYSTEMS



IN 2026, TECHNOLOGICAL EQUIPMENT FOR THE IMPROVEMENT OF PLAYING PERFORMANCE HAS BECOME A KEY COST DRIVER FOR FOOTBALL ASSOCIATIONS



three above-mentioned projections, with middle-ranked and lower-ranked associations showing an even higher level of desire for coaching staff to have expanded digital capabilities (figure).

Turning to talent identification in 2026, the hypothesis was that “increasingly standardised data sets and analysis tools

An obvious challenge is that the above-mentioned technological developments are not free. Hence, we sought input on whether “technological equipment for the improvement of playing performance [would] become a key cost driver for football associations” by 2026. Interestingly, technical directors from middle-ranked associations rated this projection with

associations already count technology as a major cost today. It is, however, noteworthy in general that the average desirability for technology to become a key cost driver was rated as high (D = 5.5). This may be related to the fact that we surveyed technical directors, who tend to view technology as a core component of the game and all game-related processes, and they are keen to expand the offers to their coaches and teams.

The last game-related projection referred to officiating and queried whether “in 2026, factual in-game decisions [would be] instantly confirmed to the referee by artificial intelligence”. While this did not immediately address the sphere of influence of technical directors, it still revealed a general optimism that there would be further reliable technical solutions for factual in-game decisions in the future (EP = 79%). Again, the desirability dimension presented interesting results, as technical directors from top-ranked associations expressed a lower desire (D = 5.3) compared to lower-ranked (D = 5.6) and especially middle-ranked (D = 5.9) associations.

“I THINK WE NEED BOTH, THESE DATA-DRIVEN REMOTE-SCOUTING SYSTEMS, BUT ALSO HUMANS WHO ARE ABLE TO SEE TALENT DIFFERENTLY”

[would] allow for more objective and effective data-driven remote-scouting systems”. Experts unanimously agreed that there is a relatively high probability of occurrence (EP = 79%), while technical directors from top-ranked associations again expressed lower desirability for this development (D = 5.3); this may be because the visibility of football talent in these countries is higher than in other nations.

an expected probability of 84% and thus significantly higher than those from top-ranked (EP = 78%) and lower-ranked (EP = 76%) associations. One reason might be the anticipated opportunity to close the gap with the elite level, which would be underscored by the fact that technical directors from middle-ranked associations also showed the highest desirability for this projection (D = 5.8). This may also be explained by the fact that top-ranked

A close-up, angled shot of a tablet computer with a dark, textured case. The screen displays a game map with various terrain features and a timestamp '18:54:06:19'. The tablet is resting on a light-colored, textured surface, possibly a piece of fabric or paper. The entire image has a blue color cast.

TECHNOLOGY AND GAME-RELATED CAPACITIES

Quite conceivable, but less desired

WHILE THE TECHNICAL DIRECTORS WERE VERY POSITIVE REGARDING TECHNOLOGY ASSISTING AND SUPPORTING IN-GAME PROCESSES, THE SAMPLE WAS MORE RESTRAINED WHEN IT CAME TO THE POTENTIAL IMPACT OF TECHNOLOGY ON INDIVIDUALS' AND TEAMS' GAME-RELATED CAPACITIES.

Therefore, the panel rated the projection that "in 2026, artificial intelligence [would be] an important tool that supports all game-related coaching decisions" with the lowest expected probability (EP = 68%) of all projections. Similarly, the sample evaluated the scenario that "in 2026, the availability of technology and insight models [would have] had an impact on the playing style of players" with a lower expected probability (EP = 72%) compared to most other projections. However, both average assessments are still well above 50%, meaning that the panel sees a reasonable chance that technology will have an impact on game-related capacities in five years' time.

In terms of desirability, the experts reached consensus regarding technologically supported coaching decisions but showed a large variance with regard to the impact of technology and insight models on playing style. While the technical directors from middle-ranked (D = 5.8) and lower-ranked (D = 5.6) associations expressed quite positive anticipation for this projection, technical directors from top-ranked associations were far less enthusiastic about it (D = 4.8). One reason for this discrepancy might be that the most successful nations have already adapted their playing style using technology and therefore do not see significant additional potential in the future. This would also explain why they rated this projection with the lowest impact (I = 5) among all subsets of experts.

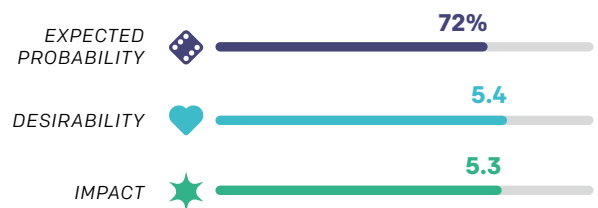
There was a similar spread in desirability for the statement: "in 2026, the public accountability of coaches and technical directors towards fans and stakeholders [will have] increased significantly". Again, technical directors from top-ranked as-

"WE ALSO NEED PLAYERS WHO ARE UNCONTROLLABLE AND WHO HAVE THESE GENIUS MOMENTS"

sociations showed the lowest desirability (D = 4.5), while representatives from middle-ranked associations were clearly more positive on this topic (D = 5.6). Although this was the projection with the lowest overall desirability (D = 5), it shows that technical directors have a different perception as to whether increased public accountability would be a burden or a chance to communicate (objective) reasoning behind decisions.

"ARTIFICIAL INTELLIGENCE IS A USEFUL TOOL WHICH CAN BE USED TO REINFORCE AND HELP MAKE DECISIONS. MY PERSONAL RESERVATION WITH AI IS THAT FOOTBALL ISN'T AN EXACT SCIENCE AND HAS MANY DIFFERENT VARIABLES"

IN 2026, THE AVAILABILITY OF TECHNOLOGY AND INSIGHT MODELS HAS HAD AN IMPACT ON THE PLAYING STYLE OF PLAYERS



IN 2026, THE PUBLIC ACCOUNTABILITY OF COACHES AND TECHNICAL DIRECTORS TOWARDS FANS AND STAKEHOLDERS HAS INCREASED SIGNIFICANTLY



IN 2026, ARTIFICIAL INTELLIGENCE IS AN IMPORTANT TOOL THAT SUPPORTS ALL GAME-RELATED COACHING DECISIONS



A full-page photograph of a soccer match, overlaid with a teal color filter. In the foreground, a goalkeeper in a white kit is diving horizontally to the left, reaching for a soccer ball. The ball is on the grass, just in front of the goal line. In the background, several other players in white and dark kits are visible on the field. The stadium stands are filled with spectators. The goal net is visible at the top of the frame.

TECHNOLOGY AND THE PLAYERS

A synergy to be facilitated
around the globe

IN THE LAST GROUP OF PROJECTIONS, WE TESTED THE EXTENT TO WHICH TECHNOLOGY COULD BECOME RELEVANT FOR THE FOOTBALL PLAYERS THEMSELVES.

Therefore, we presented the projection that “in 2026, players [would be] more involved and interested in data-driven decisions around their physical and tactical performances” and that, by the same

“MY REASONING IS THAT THE MORE DEMANDING WE ARE OF PLAYERS’ INTELLIGENCE IN THE FUTURE, THE MORE THEY WILL REQUEST TO BETTER UNDERSTAND THE ‘WHYS’ AND ‘HOWS’ OF THESE DEMANDS. WE SHOULD THEREFORE BE CAREFUL ABOUT WHAT DEMANDS WE MAKE ON THE PERFORMANCE OF OUR PLAYERS AND BE ABLE TO BACK THEM UP”

year, “players [would] have access to and control over all of their individual performance and player data and own a proprietary digital avatar”. In both cases, the technical directors expressed a fairly high desirability (D = 5.5), showing that a stronger engagement of players with game-related technologies would be endorsed. However, the probability of both more player involvement (EP = 72%) and control over individual performance data (EP = 75%) was rated lower compared to other topics. Based on the qualitative feedback, experts did not see limited interest or openness from the players; rather, they anticipated that the associated cost would be prohibitive for players and associations in some parts of the world.

A development that can be observed irrespective of geography is the exhaustion of players’ physical abilities. Other sports may be ahead of football when it comes to what could be called “mega-athletes”. Superior physical abilities may prove to provide competitive advantages for a certain period of time. However, when most athletes have reached a similar

level of professionalism, tactics and possibly technology may become more decisive in determining winners and losers, and the level of sophistication in the interpretation of data and information may become a stronger source of competitive advantage.

“MANY PLAYERS ARE YOUNG AND TECHNOLOGICALLY SAVVY. THEY ARE WELL ADVANCED IN THE NEW TRENDS AND INNOVATIONS IN TECHNOLOGY EVEN AS IT RELATES TO THE GAME. THEY WILL NO LONGER BE DEPENDENT ON A COACH OR OTHERS TO PROVIDE INFORMATION ON THEIR PERFORMANCE, RATHER THEY WOULD WANT TO BE ABLE TO ACCESS THAT INFORMATION WITH WHATEVER MEANS POSSIBLE AND AVAILABLE TO THEM AND MAKE DECISIONS CONCERNING THEIR DEVELOPMENT”

IN 2026, PLAYERS ARE MORE INVOLVED AND INTERESTED IN DATA-DRIVEN DECISIONS AROUND THEIR PHYSICAL AND TACTICAL PERFORMANCES



IN 2026, PLAYERS HAVE ACCESS TO AND CONTROL OVER ALL OF THEIR INDIVIDUAL PERFORMANCE AND PLAYER DATA AND OWN A PROPRIETARY DIGITAL AVATAR**



“THERE IS NO HIDING FROM SCIENTIFIC DATA AND BOTH PARTIES [COACHES AND PLAYERS] CAN REALLY BENEFIT FROM IT”

SCIENCE ON THE RISE, BUT ART WILL REMAIN

VAR

REVIEW
POSSIBLE
PENALTY

ANALYSE
POSSIBLE
PENALTY



OUR DELPHI SURVEY DEMONSTRATES THAT THERE IS A POSITIVE ATTITUDE TOWARDS TECHNOLOGY IN PROFESSIONAL FOOTBALL AMONG TECHNICAL DIRECTORS.

This is evident in terms of the general desirability for the technological progress we anticipated and is also reflected in the strong impact ratings given by our experts. Moreover, compared to other Delphi studies, we saw relatively high expected probability evaluations for all tested projections. Despite the overall expectation that the number of technological applications in football will grow, we also saw sympathy for the non-technical elements of the game, especially within the qualitative comments. This perception brings us to the tension, as mentioned earlier on, between art and science in football, which we also addressed as part of our survey.

On a seven-point Likert scale anchored at 1 (= pure art) and 7 (= pure science), experts answered four questions and revealed a slight ambivalence in terms of expected and desired developments. In response to the question of whether experts "deem the game of football today to be an art or a science", we received a mean value (M) of 3.9 out of 7, showing

that the panel currently considers there to be a balance between art and science. This corresponds to the desired scenario for the future, which we tested with the question, "What would be your personal preference for football in the future?" The collective assessment yielded a mean value of 3.8, with a slightly higher variance on the status quo than the first question. Interestingly, technical directors from middle-ranked associations (M = 4.1) and lower-ranked associations (M = 4.0) expressed a very balanced preference, while representatives from top-ranked associations, on average, leaned more towards the artistic side of the spectrum (M = 3.5). This pattern was repeated with regard to our third question, in which we asked if experts "believe[d] the game of football [would] be more of an art or a science in 2026". While the overall score (M = 4.7) clearly shows that the sample expects football to become more scientific, the technical directors from middle-ranked (M = 5.4) and lower-ranked (M = 4.9) associations expected a stronger shift towards science than those from top-ranked nations (M = 4.3). This might be explained by the fact that the top-ranked football countries already follow scientific principles in their current processes and routines. However, this result demonstrates that technical directors recognise the increas-

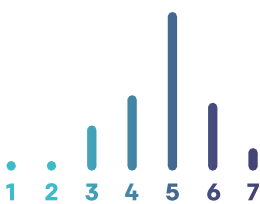
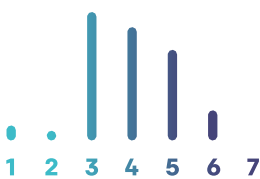
ingly significant role of science in football while being wary of its limitations or a possible level of saturation.

In the same spirit, we focused on the athletes and asked if "extraordinary players at the highest level [would] differentiate themselves due to outstanding artistic skills or particular scientific rigor". The responses centred around a mean value of 3.3 with an normal distribution, hence indicating a tendency towards the artistic skills that distinguish outstanding players from good ones. This result emphasises that, at an individual level, it is still about football talent in the end. However, even the best talent needs hard work and, in today's world, the support of technology to compete at the highest level.

Overall, the expressed perception of art and science fosters the debate about technology in professional football. The experts anticipate that there will be more science and therefore more use of technology in the future of professional football. While this is obviously a mandate to all "guardians of the rules" to leverage technology where it can make the game better, it is also an appeal to protect the essence of the game, allowing creative players on the pitch to maintain the beauty of the game.

DO YOU DEEM THE GAME OF FOOTBALL TODAY TO BE AN ART OR A SCIENCE?

MEAN 3.9



MEAN 4.7

DO YOU BELIEVE THE GAME OF FOOTBALL WILL BE MORE OF AN ART OR A SCIENCE IN 2026?

WHAT WOULD YOUR PERSONAL PREFERENCE FOR FOOTBALL IN THE FUTURE BE: MORE ART OR MORE SCIENCE?

MEAN 3.8



MEAN 3.3

DO EXTRAORDINARY PLAYERS AT THE HIGHEST LEVEL DIFFERENTIATE THEMSELVES DUE TO OUTSTANDING ARTISTIC SKILLS OR PARTICULAR SCIENTIFIC RIGOUR?



STUDY DESIGN AND METHODOLOGY

THIS EMPIRICAL STUDY WAS BASED ON THE DELPHI TECHNIQUE. IT IS A SCIENTIFICALLY ESTABLISHED RESEARCH METHOD THAT SOLICITS OPINIONS FROM A PANEL OF EXPERTS IN AN ITERATIVE SURVEY PROCESS (GRISHAM, 2009).

As part of the method, selected experts evaluate pre-formulated future theses ("projections"), according to their expected probability of "occurrence" (as a percent), as well as their "impact" and their "desirability" on a seven-point Likert scale from 1 (= extremely low) to 7 (= extremely high). The experts support their quantitative evaluations with comments and arguments. Upon completion of their own evaluation, experts gain access to the evaluations of the entire panel. Moreover, they are provided with summary statistics, such as the median or the level of consensus/agreement by projection. Experts may choose to maintain or modify their evaluations in subsequent iterations (von der Gracht, 2012). The methodology has been proven to enhance the validity, acceptance, plausibility, and consistency of future-oriented studies by allowing experts to effectively discuss complex matters in a structured and anonymous group communication process (Linstone & Turoff, 2011).

This Delphi study was conducted in three steps. In step one, the projections were formulated. In step two, the actual Delphi survey was conducted using a sequential approach. In step three, the survey results were aggregated and analysed by means of descriptive statistics and the coding of the qualitative arguments to derive scenarios. The results of our Delphi survey that go beyond the scope of this report will be presented separately in a scientific article. Non-Delphi survey questions were measured with Likert scales as ordinal or quasi-interval scales. Demographics were measured with the help of nominal scales.

OVERVIEW OF DELPHI PROJECTIONS

A / TECHNOLOGY AND GAME-RELATED PROCESSES		
<i>In 2026, due to real-time analysis the quality of communication from coaching staff to players and tactical changes on the pitch has increased significantly</i>	<i>In 2026, coaches frequently use intelligent equipment/hardware* within their training routines</i>	<i>In 2026, the number of members of coaching staff with digital capabilities in a team has increased significantly</i>
<i>In 2026, factual in-game decisions are instantly confirmed to the referee by artificial intelligence</i>	<i>In 2026, increasingly standardised data sets and analysis tools allow for more objective and effective data-driven remote-scouting systems</i>	<i>In 2026, technological equipment for the improvement of playing performance has become a key cost driver for football associations</i>
B / TECHNOLOGY AND GAME-RELATED CAPACITIES		
<i>In 2026, the public accountability of coaches and technical directors towards fans and stakeholders has increased significantly</i>	<i>In 2026, the availability of technology and insight models has had an impact on the playing style of players</i>	<i>In 2026, artificial intelligence is an important tool that supports all game-related coaching decisions</i>
C / TECHNOLOGY AND THE PLAYERS		
<i>In 2026, players are more involved and interested in data-driven decisions around their physical and tactical performances</i>	<i>In 2026, players have access to and control over all of their individual performance and player data and own a proprietary digital avatar**</i>	

* Intelligent equipment/hardware could include data capturing systems such as sensors, drones or active elements like moving obstacles or even functional robots.

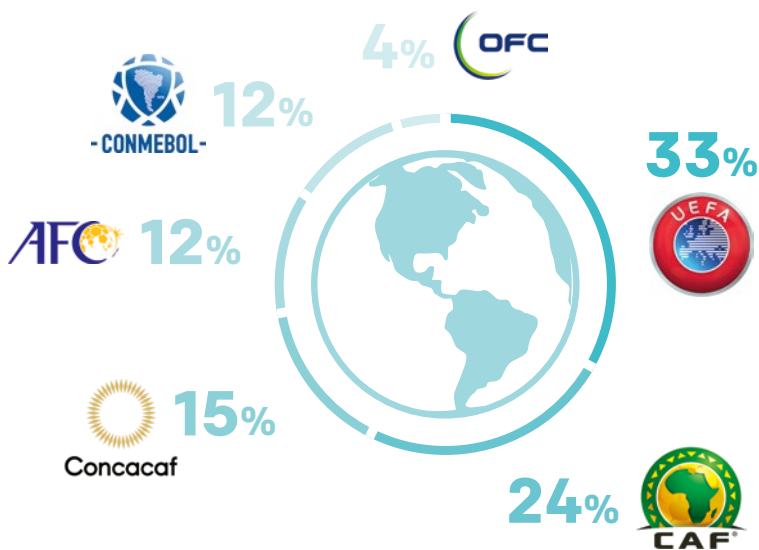
** Digital avatars could be understood as standardised data sets including all information related to a player's health, performance, contract and content history, owned by the player.

FORMULATION OF FUTURE PROJECTIONS

The relevant literature recommends the derivation of Delphi projections from several sources (e.g. Markmann et al., 2020). Our process for this study was as follows: future technological drivers for international football were identified through input from experts and via desk research of largely internet-based sources (Frevet et al., 2020; Schmidt, 2020). To struc-

ture the insights, all drivers were assigned to one of four overarching categories: (i) player, (ii) coach, (iii) technical-director, and (iv) referee. For each, a series of projections was formulated that best condensed the respective drivers, which were discussed in an expert workshop with two representative technical directors. This process ensured a broad spectrum of projections and concentration on key developments to minimise participant drop out rates (Nowack et al., 2011). The time horizon of the study, by 2026,

SAMPLE - BREAKDOWN BY CONFEDERATIONS



was based on relevant comparable Delphi studies that covered a foreseeable period and was closely linked to the FIFA World Cup 2026™ in Canada, Mexico, and the USA. Hence, it was not seen as “looking too far into the future”. As a result, expert discussion on changes that seem realistic in the near- to mid-term was fostered (Beiderbeck et al., 2021).

SELECTION OF EXPERTS

By definition, Delphi panels are not statistically representative. Therefore, improper expert selection is one of the most serious validity threats to Delphi studies

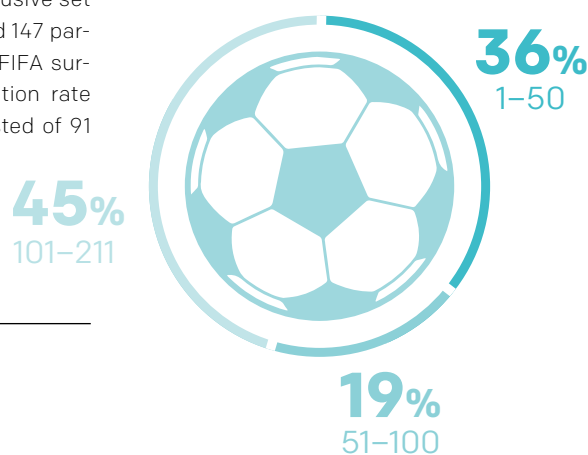
(Devaney & Henchion, 2018). In our study, we exclusively focused on technical directors from FIFA member associations including participants from all confederations. This panel constellation ensures a high level of expertise in terms of football operations and technology. It is, however, worth mentioning that there is only limited heterogeneity within the sample, which is typically a risk with regard to biases (Winkler & Moser, 2016). However, we explicitly informed participants about these potential effects and appreciate the access to such an exclusive set of experts. In total, we contacted 147 participants directly via an official FIFA survey invitation. With a participation rate of 62%, our final sample consisted of 91 technical directors (figure).

EXECUTION OF THE SURVEY AND ANALYSIS OF RESULTS

The Delphi survey was conducted over a four-week period and was administered via the internet using “Surveylet” by Calibrium (<http://calibrium.com/>), an on-line survey tool specifically designed to facilitate Delphi research studies. We analysed the 5,278 quantitative comments provided by our 91 experts for 11 Delphi projections on three dimensions and 25 non-Delphi questions. Additionally, more than 500 written arguments were analysed. Using both qualitative and quantitative survey data, we elaborated on different viewpoints and reasons for both consensus and dissent regarding the use of technology in football in order to better understand (diverging) views within the industry (Warth et al., 2013).

All projections were rated with an average impact value larger than 5 (on a seven-point Likert scale from 1 = extremely low to 7 = extremely high). This underscores their relevance and confirms the accuracy of the formulation process.

SAMPLE - BREAKDOWN BY FIFA/COCA-COLA WORLD RANKING



PROCESS OF THE DELPHI STUDY (BASED ON VON DER GRACHT & DARKOW, 2010)



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