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–Media Package–

**Information on Video Assistant Referee (VAR) and
experiment results**



Summary by KU Leuven of the research results collected since the start of the VAR experiment in March 2016. Results relate to the 'live' use of VARs in competitive professional football matches

Facts	Explanation
20+ national associations and competitions	Competitions organised by: Australia, Belgium, Brazil, China, CONMEBOL, Czech Republic, England, FIFA, France, Germany, Italy, Poland, Portugal, Qatar, Saudi Arabia, South Korea, The Netherlands, Turkey and the USA.
972 competitive matches	In addition, 693 friendly/training/youth matches have used VARs. These results are not included in the analysis as they are not comparable with 'live' VAR use in competitive professional matches.
57.4% of checks were for penalty incidents and goals	Majority of match-changing situations relate to penalty/no penalty incidents and goals (57.4%). Red card incidents represent 42.1%. Mistaken identity is negligible.
Average of fewer than 5 checks per match	In the 972 matches, there were 4,720 checks for possible reviewable incidents. The vast majority were 'background' checks that did not interfere with the game.
Median check time is 20 seconds	Most checks take place quickly whilst play continues or during the 'normal time' of a stoppage e.g. during the goal celebration. Therefore, there is no impact on the flow of the game.
Initial accuracy for reviewable decision is 93.0%	Without VARs, the quality of decision-making in the match-changing reviewable categories is already very high.
69.1% of matches had no review	The flow of many games has not been interrupted by a review as 672 matches did not have a review. Only 53 matches (5.5%) had more than one review.
Average of 1 'clear and obvious error' every 3 matches	Before and during the experiment, statistics clearly show that only 1 decision in 3 matches is a 'clear and obvious error'.
On average a ' clear and obvious error ' was corrected in 18 out of 19 matches	This result is very encouraging considering the short testing period and inevitable human errors in perception, decision-making, unfamiliarity with technology, communication etc.; this should improve over time with more experience, training etc.
Accuracy of final decision with the VAR is 98.8%	The accuracy of reviewable decisions has increased by 5.8% to 98.8%. 100% accuracy is impossible due to human perception and subjectivity in decision-making.
The VAR has a decisive impact in 9% of matches	In 9% of all matches, the VAR had a decisive impact on the outcome of the game. In addition, 25% of matches were positively affected by the involvement of the VAR leading to an initially incorrect decision being corrected.
On-field reviews on average take 2x the time taken by a VAR only review	VAR only review - median time = 35 seconds. On-field review - median time = 68 seconds.
The average time 'lost' due to the VAR, is only 55 seconds of playing time	VARs have a very small impact on overall playing time 'lost' compared with other situations: free kicks (8min 51s), throw-ins (7min 2s), goal kicks (5min 46s) corner kicks (3min 57s), substitutions (2min 57s) etc).

Video Assistant Referee (VAR) Questions & Answers

Experiment philosophy and background Information

What is the philosophy of the VAR experiment?

The aim of the VAR experiment is to correct '**clear and obvious errors**' and deal with '**serious missed incidents**' in defined match-changing situations (goal, penalty/no penalty, direct red card and mistaken identity for disciplinary sanctions).

The aim is not to achieve 100% accuracy for all decisions as this would be impossible and there is no desire to destroy the essential flow and emotions of football which result from the game's almost non-stop action and the general absence of lengthy stoppages.

The philosophy is therefore: "**minimum interference – maximum benefit**".

Why did The IFAB decide to conduct an experiment with video assistance?

Following many requests from the global football community and in light of technological advances in the sports broadcast industry, The IFAB agreed in 2014 to investigate how video assistance for match officials could potentially be used in football. Based on discussions with its various bodies, as well as initial data collection, The IFAB, in close partnership with FIFA's Football Technology Innovation Department, drafted a detailed experiment protocol for live video assistance and presented it at the IFAB Annual General Meeting (AGM) on 5 March 2016. The IFAB AGM agreed in principle that an experiment with video assistance, based on the draft protocol, would be the best way to understand the pros and cons of video assistance. In simple terms, it was agreed that the time had come to test whether video assistance for referees could work to the benefit of football.

Who did The IFAB consult before taking this decision?

The IFAB consulted many stakeholders, as well as FAs and competition organisers, particularly those that had already made efforts to analyse the potential use of video assistance, namely the Dutch Football Association (KNVB) and the USA's Major League Soccer (MLS). The results were presented and discussed by The IFAB and its bodies, including the Technical Advisory Panel (TAP), Football Advisory Panel (FAP), Technical Subcommittee (TSC) and the Board of Directors (BoD). The IFAB also had discussions with various other sports already using video assistance, including rugby, American football (NFL), and basketball (NBA). In addition, technology providers working with those sports with state-of-the-art technology were consulted.

What is the overall objective of the experiment?

The overall objective is to try to establish whether using video assistant referees (VARs) could improve the game, particularly in terms of fairness. As part of the assessment, The IFAB wants to understand the impact on the game for all stakeholders including referees, players, coaches, officials and fans/spectators.

In which competitions is the experiment being conducted?

Throughout 2016 a number of information meetings and workshops were held by The IFAB and FIFA involving over a dozen interested competition organisers from FAs and leagues. Following approval for the VAR experiment at the 2016 AGM, competitions in Australia, Brazil, Germany, Portugal, the Netherlands and the United States became the first to agree to participate in the experiment using the protocol and implementation requirements drawn up by The IFAB and FIFA.

A number of 'trial' matches were held in the USA in summer 2016 to test and refine the protocols and procedures. These were followed by further offline and online practical testing and in December 2016 the FIFA Club World Cup in Japan served as a key trial before The IFAB authorised 'live' tests in 2017. By the end of 2017 the initial participants in the experiment had been joined by: Belgium, CONMEBOL, China, Czech Republic, England, FIFA, France, Italy, Korea Republic, Poland, Saudi Arabia, Spain and Turkey.

What does the experiment involve?

Although there were a number of different possible approaches, The IFAB has kept the experiment as simple as possible with all competitions using the same protocol. Each match has a video assistant referee (VAR) who works with an assistant VAR (AVAR) and replay operator (RO) in a video operation room (VOR). The VAR watches the live action on TV and 'checks' every incident, using replays where necessary, which relates to a goal, penalty/no penalty, direct red card or if the referee issues a red or yellow card to the wrong player of the offending team.

If the VAR believes that the referee has made a 'clear and obvious error' or there has been a 'serious missed incident' the VAR informs the referee who will then decide whether or not the incident should be reviewed using replay footage. The referee can also initiate a review without any initial VAR input.

If the referee decides to have a review the referee's final decision may be based solely on information from the VAR ('VAR only' review) or it may also involve the referee going to the side of the field to look at the replay(s) ('on-field review'). The referee will make a final decision and the original decision will only change if it was clearly wrong.

In organisation terms, the experiment has involved competitions 'testing' the protocol, principles and procedures in practice/simulated situations and in a variety of different

types of matches; information from each match in the experiment is uploaded onto a platform so that data can be collected, specific incidents analysed and feedback given.

As the experiment has proceeded, some practical procedures have been modified and refined but the original fundamentals of the protocol have remained unchanged.

Who drew up the experiment protocol?

The protocol's development was overseen by the Technical Subcommittee (TSC) of The IFAB together with FIFA's Football Technology Innovation Department. It was initially based on the early key findings of the Dutch Football Association (KNVB) during their offline experiments. Input came from The IFAB's various bodies, including the Football Advisory Panel (FAP), Technical Advisory Panel (TAP), Technical Subcommittee (TSC) and the Board of Directors (BoD). In addition, feedback from other leagues, associations, and football experts, as well as other sports which use video replays, was taken into account.

Once the experiment started, some of protocol's procedures and practical applications were refined based on feedback from participants and technical analysis of how the use of VARs was working.

What is the difference between using the VAR 'offline' and 'live'?

In an 'offline' match there is no contact between the VAR and the referee so there is no impact on the game. 'Offline' matches are used for VARs, AVARs and ROs to practise using the VAR setup, assessing whether an incident is a 'clear and obvious error' or 'serious missed incident', and gaining experience of using different angles and replay speeds.

In a 'live' match the VAR and referee are in contact and replays can be used for any 'clear and obvious error' or 'serious missed incident' in the 4 reviewable categories of decision. Where appropriate and within protocol, the referee can change the original decision using replay footage directly ('on-field' review) or indirectly ('VAR only' review).

How long and how expensive is it for a competition to implement VARs?

Cost and implementation duration depend on a large number of criteria such as: the size of the competition/number of matches; training of VARs and referees; number, size and infrastructure of the stadia; technological, communication and broadcast systems and solutions etc. A key factor is whether the video operation room (VOR) – where the VAR is located – is to be sited in/close to each stadium or in a 'match centre' where all matches are viewed centrally. Each competition has to evaluate the how long implementation will take and how much it will cost.

Experiment – Participants and timeline

Who can participate in the VAR experiment?

National FAs and competitions are only permitted to take part in the experiment (or use VARs) with the permission of The IFAB. Permission is only granted where The IFAB protocols will be used in full and The IFAB's referee-VAR education and technical requirements have been fulfilled. Having been accepted into the experiment, each competition must gain (separate) permission from The IFAB when it is ready for 'live' use of VARs in senior matches.

Experiment – Test results and final decision

How is experiment monitored and how is feedback obtained?

Each participant is required to submit feedback data and video footage of VAR-related incidents using a dedicated platform overseen by The IFAB, with the support of FIFA's Football Technology Innovation Department.

The feedback and data are crucial for scientific analysis by KU Leuven (Belgium), a university with considerable referee/football experience, which was appointed by The IFAB to produce an independent assessment of the VAR experiment. The analysis focuses not only on the refereeing issues but also the effect of using VARs on the game itself including the impressions of the various stakeholders.

When will the final decision be taken whether to allow VARs in football?

The IFAB hopes to make a decision about VARs at its AGM in early March 2018, but a decision could be delayed until 2019 if there is a need for further testing/additional data.

Application – VAR Procedure

In which situations will the referee be able to request video assistance?

Information from the VAR can only be used by the referee if there is a '**clear and obvious error**' or '**serious missed incident**' in one of the following categories:

- Goal /no goal
- Penalty/no penalty
- Direct red-card
- Mistaken identity – i.e. the referee gives a YC or RC to the wrong player of the offending team

No other incidents can be reviewed

The VAR (helped by the AVAR and RO) automatically ‘checks’ every incident in these categories; if the VAR or referee believes there has been a ‘clear and obvious error’ or a ‘serious missed incident’ then the video replays can be used.

Most ‘checks’ take place ‘in the background’ and have no impact on the game (or the referee), but in some cases the referee has to delay the restart of the game for the VAR to complete a ‘check’. In most cases the VAR’s check does not reveal a ‘clear and obvious error’ or a ‘serious missed incident’ so there is no contact with the referee – this is known as a ‘silent’ check.

Once the VAR has informed the referee what the ‘check’ shows the referee will then decide whether there should be a review and whether that review will be based solely on information from the VARs or involve the referee going to look at the replay(s) in the referee review area (RRA) on the side of the field of play; this is an ‘on-field review’.

At the end of the review process, the referee makes a final decision.

What is the difference between a 'VAR only' review and an 'on-field' review?

When the referee decides to have a review the next decision is whether the review will be based solely on information from the VAR (‘VAR only’ review) or will involve the referee also looking at the replay footage in the referee review area (RRA) just outside the field of play (‘on-field’ review).

As a general guide, a ‘VAR only’ review is most suitable for factual decisions e.g. offside position; position of an offence (inside/outside the penalty area); point of contact (foul or handball), ball out of play etc.

The ‘on-field’ review (OFR) is most suitable for subjective decisions such as severity of a foul challenge, whether the hand/arm was in a ‘natural’ position for handball, interference by a player in an offside position etc.

Feedback from participating competitions shows a greater preference for the OFR because the referee is seen to be taking the major decisions, rather than someone who is ‘unseen and unknown’. An OFR also means the referee has all the information necessary to explain the final decision to the players; this is especially helpful if the OFR changes the original decision.

Inevitably, however, an OFR usually takes longer than a VAR only review; the length of time depends mainly on the complexity of the incident and whether there are several ‘reviewable’ aspects e.g. a potential foul in the attack which results in a penalty incident.

How does the referee signal a ‘check’ and a ‘review’?

‘Check’ – if the referee needs to delay the restart of the game because the VAR is undertaking a ‘check’, the referee will hold a finger to one ear and extend the other hand/arm. There is usually no signal if the restart of the game does not have to be

delayed, unless the referee wishes to make it clear that a 'check' by the VAR is taking place.

'Review' – the referee indicates that an incident will be reviewed by making the sign of a TV screen with both hands. At the end of the review process, the referee will make the TV signal again before the 'final' decision is indicated.

Who can initiate a review?

Only the referee can initiate a review. The VAR or one of the other match officials can recommend a review but it is up to the referee whether to accept that recommendation.

When can a review take place?

Whilst a 'check' can take place during play, a review can only take place when play is stopped. For many incidents play has already stopped but, if necessary, the referee can stop play when it is in a neutral area i.e. neither team has a very good attacking position.

A review can not occur for an incident if play has restarted after that incident (with the exception of some serious red card offences).

Is there a time limit for a final decision to be taken if there is a VAR review?

There is no time limit as accuracy is more important than speed and some situations are complicated e.g. a review reveals a missed penalty kick but then a possible offside/foul in the attacking move before the penalty incident has to be reviewed.

How much of the play before an incident can the referee review?

For reviews relating to a goal, penalty/no penalty or DOGSO red card, the referee can only review the actual attacking move that led to the incident; this may include how the team gained possession of the ball in open play at the start of the attacking move.

For red card offences (except DOGSO) and mistaken identity the referee only reviews the incident itself.

How long after an incident the referee can change a decision?

The Laws of the Game do not allow a referee to change a decision if play has restarted and this applies to the use of VARs. The only exception is for direct red cards offences involving violent conduct, spitting, biting and extremely offensive, insulting or abusive gestures which can be dealt with at any time as they are so serious.

Who takes the decision after a video review?

The final decision will always be taken by the referee.

Where is the VAR located?

The VAR (with the AVAR and RO(s)) work in a specially equipped Video Operation Room (VOR) into which footage is transmitted. The VOR may be located in/close to the stadium or in a match centre.

How do referee and VAR communicate with each other?

The VAR is included in the referee team's communication system so the VAR can hear immediately if the referee asks for a review or if the match officials are discussing a potential reviewable incident. The VAR can talk to the referee by using an 'on-off' button.

What kind of video footage is provided to the VAR?

The VAR protocol currently requires the VAR to have independent access to (and replay control of) all TV camera feeds showing action on/close to the field of play. If the use of VARs is approved, it is possible that the requirement for the VAR to have access to every camera may change as a means of reducing costs and making the use of VARs more widely available.

Will the competitions use camera feeds that are televised?

Yes. The key requirement for the use of VARs is a television setup in the stadium. Feeds from multiple broadcast cameras (giving different angles) are required, and only those feeds may be used for VARs. No additional cameras beyond those that are part of the standard broadcast plan are required. However, additional cameras could be added for the VARs, provided the broadcasters have access to them and the footage is also used/shown if the referee uses these specific camera feeds/angles for the final decision.

Will the video reviews be shown in the stadia on screen?

This is a decision for each competition as showing replays can have an impact on the behaviour of players, team officials and spectators.

What happens when the VAR technology malfunctions during a game?

If the replay technology malfunction the referee is informed and the 4th official will inform the coaches. The match will continue but without any VAR involvement. If only the communication equipment fails, backup systems will be used if possible.

What happens if a player shows the TV Signal?

If a player aggressively makes the TV signal to the referee it is a yellow card offence; a team official doing the same will be officially and publically warned.

Why is there no possibility to have a challenge by a coach or player?

As every possible reviewable incident is automatically 'checked' by the VAR there is no need for challenges as a coach or player will not see something that has not been seen by one of the TV cameras.

In addition, a challenge system would have practical difficulties (e.g. how would a challenge be indicated? Would the referee have to stop play immediately?) and, more importantly, one of the reasons to introduce VARs is to increase fairness so it would be wrong to have a system where a team has used all its challenges and is then disadvantaged by a 'clear and obvious error' which can not be reviewed.

Application – VAR profile and education

Who is eligible to work as a VAR and an AVAR?

VARs must be (former or current) top level referees; former referees who are used as VARs must still be involved in top level refereeing. Individual competitions may have further requirements.

Assistant VARs (AVARs) must also be qualified match officials; they can be a former or current referee or assistant referee.

What kind of education do referees and VARs need?

The training for referees and VARs is lengthy and complex as it involves understanding and applying the protocols, principles and procedures as well as gaining skill and experience at quickly analysing video replays.

The education of referees and VARs is both theoretical and practical, and takes many months of intense training.

Application – VAR technology and Quality Programme

What is VAR technology?

The video replay technology is a tailor-made system for football, which is operated by a replay operator (RO), and provides the VAR with the best available camera angles and replay speeds in the fastest possible time.

Why is the virtual offside line a challenge for the VAR technology?

Checking offside positions of players has proven to be one of the more difficult tasks due to the number of variables and the very short time-span in which the decision needs to be made. The exact pitch dimensions, including any physical camber on the field as well as distortions of the camera lenses, make it very difficult for a virtual line to be drawn that accurately represents a true straight line as it would be physically drawn across the field. FIFA invited a number of providers to demonstrate their technology and assess the accuracy of such systems in October 2017 using a match day broadcast setup in a Bundesliga 2 stadium in Sandhausen (Germany). The tests showed that a number of VAR system providers are capable of calibrating offside lines from a number of different angles accurately or even very accurately whereby the additional challenge of instant provision will be tested at a later stage.

Will there be a certification process in place for VAR technology?

The provision of a VAR system carries a number of challenges including making all broadcast feeds available in real-time to the VAR and the replay operator (RO) in order to make decisions in line with the IFAB's directive: "minimum interference, maximum benefit". Therefore, only systems that have demonstrated the ability to meet these requirements are eligible to be used in competitive matches as per the Laws of the Game. The FIFA Quality Programme will focus on three core areas: VAR system setup, VAR system performance and the quality of VAR replay operators.

Will there be different quality levels for the certification process?

The VAR system must be able to meet a minimum number of infrastructure requirements to ensure a basic functionality as well as standardised setup for referees and operators. This setup is tested in two different configuration types which are indicative of the two intended levels of use: basic and elite. The aim of the two setups is for the system to demonstrate the principles of its technical capacity to process the number of camera feeds in a standardised way.

What is the qualification process for VAR replay operators?

Like the VARs, replay operators (ROs) play a crucial role in ensuring a functioning system. For the avoidance of doubt, the operator is the individual that is in direct communication with the main VAR during a match. As such, minimum requirements in terms of training of operators will be required in order for them to be eligible to operate a VAR system for a competitive match.

Operators may be employees of a technology provider, direct employees of a national association, competition, league or independent individuals that meet the criteria.

Information

More information can be found on

- <http://www.theifab.com/projects/video-assistant-referees-vars-experiment> and
- www.fifa.com/Football-Technology