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**Selected examples of software used in France in the field of sport**

**Anotácia:** Automatizácia mnohých činností v športe pomocou informačných technológií (IT) je v súčasnosti už bežnou skutočnosťou. Rôzne hardvérové komponenty a softvérové aplikácie slúžia ako podporné nástroje pre hráčov, trénerov, rozhodcov, organizátorov, športové kluby, fanúšikov, médiá a širokú verejnosť pri športových podujatiach, tréningoch, administratívnych činnostiach, ako aj pri zabezpečovaní bezpečnosti všetkých účastníkov športových podujatí. Cieľom tejto štúdie je predstaviť niektoré vybrané softvéry používané v tenise, futbale a bezpečnosť pre veľké športové podujatia vo Francúzsku, ktoré môžu byť inšpiráciou pre športové zväzy, kluby a organizácie na Slovensku a v Českej republike, ktoré v budúcnosti plánujú implementáciu softvérových aplikácií do svojho súčasného IT portfólia.

**Kľúčové slová:** šport, digitalizácia, softvér, tenis, futbal, bezpečnosť

**Key words:** sport, digitalisation, software, tennis, football, security

**Introduction**

Sport, as one of the main areas of human interest, like other areas of life, is becoming an object of computerization and uses not only hardware, but especially software products to support conceptions, plans, programs, analyses and decision-making, as well as in the administration and management of real and movable assets of sports associations, clubs and organizations. Digitalisation, artificial intelligence and the implementation of expert systems in sports practice allow for more efficient management, but also better protection of athletes and sports facilities. In addition, databases of recorded images, videos and 3D views of different game situations are a very beneficial stimulus for the development of training, game tactics and for the analysis and modelling of future possible activities and the prospect of achieving a better sporting result.

To illustrate the use of informatics tools in sports practice, we will now take a few examples from the field of tennis, football and security for major sporting events which are used in France.

**Methods**

The research set was selected by a selection method of software used in France as a support tool for players, coaches, referees and sport event organizers, both in individual and team sports.

The following research methods and techniques were used in the research.

Exploratory and observational methods were used in the selection of the researched software, forming the research database. These empirical methods were used in synergy with the logical methods of qualitative and quantitative analysis, with the supporting criterion of selection being the analysis of tools, techniques, stimuli and automated bases for making more competent decisions by referees, as well as coaches and players in determining training and playing programs and tactics.

The methods of inference and deduction used in the selection of the objects of the research set was used to determine the level of software outputs offered and their potential implementation in the respective sports, specifically in tennis and football and in the areas of security for major sporting events. The method of comparison with software products addressing similar issues also played a role in the selection process.

The research was carried out on a database of selected objects, based on the selection criteria described above, and the method of induction of the shortcomings found in the individual objects under study was used to deduce at least a partial design of the recommended software products, that could improve the situation in Slovakia in the implementation of sport activities and through the use of information and communication tools to increase the performance of athletes, their tactics and technique, to contribute to making more unambiguous decisions and to stimulate all actors in sporting events to better and more engaging activities.

**Overview of selected software**

1. **Tennis**

***1.1 SportFinder - Online booking software for sports centre, which aims to automate 100% of booking management.***

SportFinder software is developed by the eponymous Belgian software company, which presents itself under the motto: "Our mission is to shine a light on the sporting activities around you." Using this management software, it is possible to manage online sports bookings, not only for tennis, padel and squash court bookings, but also for football, handball and volleyball court bookings. Each sports association or club can enter the entire set of its infrastructure that it manages in the catalogue under the management of SportFinder.

The main SportFinder modules for tennis include:

1. Reservation Scheduling - A visual reservation calendar allows you to see all reservations on a day-by-day basis within each week, week-by-week, showing all available elements of the club's infrastructure, such as all tennis courts, each day.
2. User Management - This module allows both infrastructure administrators and club officials to view, search and manage all club or sports centre contacts. Any person who works with a centre or club is automatically added to the directory that is accessible through this module, provided however that the person agrees that they can be contacted.
3. Subscriptions and Memberships - Subscriptions, membership fees and club member dues can be managed using this module. Subscriptions may be valid for a full calendar year, for a season, for one or more months, or for any other period of time. Subscriptions can also be issued exclusively for a specific tennis court or be given preferential rates.

* *Rental of tennis courts and/or services exclusively to members.*

The Administrator may restrict access to services or facilities exclusively to Members, including depending on the amount of the Membership Fee. Members may enjoy services that are reserved exclusively for them, such as court rentals, facilities exclusively for club members, participation in tournaments, practices and social events.

* *Preferential rates for members.*

Members may benefit from certain complimentary court reservations or preferential rates for tennis court rentals. The Club may set rates for members, invitees and external users of the courts.

Possible scenarios:

* Club members can reserve a court two weeks in advance, others only one week.
* Club members can book a court twice a week for 60 or 90 minutes free of charge. Other bookings are at full price.
* Club members may invite one guest per month, free of charge, for an unlimited time, other invitees pay full price.
* *Free tennis court reservations for members.*

Generally, if one member reserves a court with other members, they do not pay for the reservation if each player's quota allows. If the quota is exceeded, the court manager may cancel the reservation or apply the standard or preferential price.

***1.2 ExtraClub - Tennis and Padel[[1]](#footnote-1) management software for clubs of all sizes.***

The Stadline[[2]](#footnote-2) Group made several specific applications for the biggest French tennis clubs, Tennis Club de Paris, Tennis Club de Lyon, Lagardère Paris Racing, ISP Tennis Académie, Monte Carlo Country Club, Ligue de Paris de Tennis, at the beginning of its presence in the sports sector. This experience allowed it to identify a wide range of tennis club needs and, after subsequent collaboration with smaller tennis clubs, it developed software for tennis and padel sports club management.

The ExtraClub software is based on the premise that most clubs have a common core of management activities that can be automated using the software, but the software can also be enriched with bespoke developments for the tennis clubs that need it.

The main modules of the ExtraClub software include:

1. Scheduling and Reservation Management - this module allows online management and reservation of sports infrastructures. It offers all booking options through a graphical presentation, namely booking by days, hours, individual courts, pricing rates, availability and other possible restrictions. It also offers the possibility to search for and select playing partners, as well as invite non-club members.
2. Treasury management - the module allows to register the sales of promotional products of the club, income from restaurant and bar sales in the various infrastructure centres of the club and to track the inventory in these centres.
3. Club Membership Management - allows to track the progress of club members and tailor pricing and service offers to individual members in order to increase their satisfaction and loyalty.
4. Control of access to the club premises - club members will receive an electronic access card from the administrators, on which they can determine the accessibility of each member to individual areas of the club, including the parking lot. Members' passes are recorded in the client management database via this module.
5. Activity Statistics - this module allows the use of all recorded data. It is possible to obtain quantified statistics on sports club members, create sorted lists, or export all or part of the members to Excel. It allows to have various reports on members' activities.
6. Loyalty Module - allows to categorize club members according to their behaviour and tailor the club's marketing programs to their expectations. It also allows to simplify communication with club members and to be more operational in targeted campaigns. Through this module, it is possible to easily prepare and segment communications using emails or SMS.

***1.3 ProTournoi - software for tennis and other sports tournament management***

The ProTournoi software was developed by the company of the same name, which is one of the successful French start-ups. It is a software that can be fully used online to organize and manage sports tournaments. Tennis competitions and tournaments take place everywhere around the world, and therefore it is necessary to be able to sign up to participate in them online. This software is designed for both organizers and participants of tournaments and competitions. It is available via the website for all types of computer and communication devices, without the need for any installation on the device used. Each participant can register online for the tournament itself in the relevant tournament category and can then communicate with the tournament organisers via email.

Using the software, tables and groups of participants are automatically created according to the tennis rules. These can then be displayed to all tournament participants as well as to the tournament organisers and referees with a single click. ProTournoi supports all possible competition formats (championships, group tournaments where each player plays against each other, direct elimination tournaments, qualifying rounds).

Tournament organizers can enter match scores into the online system so that each participant can see in real time the progress of the competition and the schedule of the next matches. Based on the availability of courts and the match schedule of each category, ProTournoi calculates the possible duration of matches and generates probable schedules for each court, for each category, for each player. These schedules are available to everyone on the Internet. So, every participant knows where and when they need to play.

The ProTournoi software can be also used as a management software for organizing tournaments and sports competitions for other sports disciplines, among which we can include badminton, basketball, football, handball, judo, petanque, rugby, squash, teakwondo, table tennis, volleyball, as well as e-sports in the form of video game organization.

This efficient and innovative software, which allows sports clubs and associations to modernise and improve the organisation of competitive events, is made available to these clubs and associations free of charge.

***1.4 HawkEye - software to support line judges' decision making in ambiguous ball impacts in tennis***

HawkEye software was developed by Hawk-Eye Innovations Ltd. Its name is derived not only from the English expression "Hawk - eyed", but also refers to the name of its creator Paul Hawkins.[[3]](#footnote-3) Interestingly, in France, the term “oeil de lynx” (eye of lynx) is also used. Both of these representatives of the animal kingdom present themselves with excellent eyesight, which can reveal even the smallest detail. This software is used on the professional tennis circuit and in WTA and ATP[[4]](#footnote-4) tournaments. Its origins date back to the 1990s when Paul Hawkins, who was working on artificial intelligence, had the idea during a cricket match to create a video system that would be more efficient than a human umpire. The impetus for this idea was his discomfort at being the victim of an umpire's wrong decision during a match. He translated his frustration into a technological innovation.

As can be seen in the picture, there are ten cameras arranged in a triangular system around the tennis court, which capture the balls at different angles. Within seconds, the images from each camera are converted by artificial intelligence into three-dimensional graphics. The resulting image footage can then be viewed on a screen.

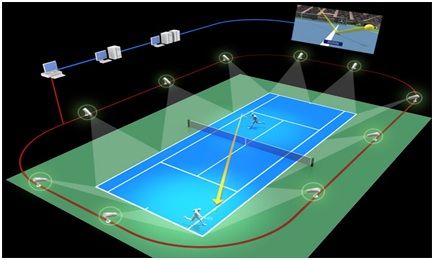
Hawk-eye's software expertise in providing the most reliable and innovative operational solutions in sport is leading to the development of a number of services that are changing the face of sports competition execution, controversy management, referee engagement and sporting event coaching.

***Interesting fact about software used in tennis.***

In addition to the software presented above, a large amount of software with similar focus and services are used in practice. The software companies that are the creators of such products are therefore ahead of each other not only in the content and range of digitised services, but also in their promotion. For example, Assoconnect markets its software using the following interesting comparisons:

* The database is as complete as Roger Federer's game.
* Managing club members is as effective as averting Rafael Nadal's submissions.[[5]](#footnote-5)

System Hawk-Eye



Source: <https://www.upsti.fr/espace-etudiants/annales-de-concours/topics/informatique-systeme-d-aide-a-l-arbitrage-hawkeye>

1. **Football**

***2.1 Easy2coach - software to support the training process with a wide range of professional exercises and a more advanced web application for tactical illustrations and animations.***

Easy2coach software is a software designed for graphical display of football training sessions. The software was developed under the auspices of The European Association of Cities, Institutions and Second Chance Schools[[6]](#footnote-6). Easy2coach offers computer tools that are designed to optimize the play of football teams and, through training applications, helps them organize themselves into game combinations as quickly and efficiently as possible. It is designed for all ages and all performance levels of football clubs. Each training session can be planned in this software with just a few clicks, choosing from a wide range of professional training activities and using the cutting-edge web application to present tactical illustrations and animations, allowing each coach to organize individual training sessions more efficiently. Easy2coach is software that can be used for the whole team, but also individually. It is available for coaches, players and football analysts to use the following modules:

1. e2c TEAM MANAGER

With this module it is possible to get optimal player evaluation, to plan training sessions in a professional way, where players will be offered different game actions and tactical instructions. In the database used by this module more than 3000 football training sessions are available, which can be used as inspiration for conducting a specific training session. If these offered training actions are not sufficient, it is possible to log into the web application and create your own schemes and animations using the *e2c Tactics* module or plan a training session using the data stored in the *e2c Training* module.

This module is used by more than 40 000 football teams and is currently the market leader in the digital organisation of football team training.

1. e2c TRAINING

This module offers a huge selection of proven football training. Thousands of training sessions are available free of charge, so it is possible to create a varied, professional and personalised training programme in seconds. The data stored in the module's database has been compiled in cooperation with many Bundesliga football clubs, so that it represents the sum of the knowledge and know-how about the training content of these clubs, which is accessible within the *e2c Training* module to all coaches using Easy2coach software. To allow clear access, the data on the training offered is categorised according to techniques, tactics, conditions, coordination, standard situations and general training objectives. They are also divided by age categories, number of players in training, training venues and training objectives. So, it is possible to choose a specific option very quickly. It is also possible to create a list of favourite training forms in this module in an easy way.

Currently, more than 100,000 users have access to hundreds of football training sessions and various training plans within this module.

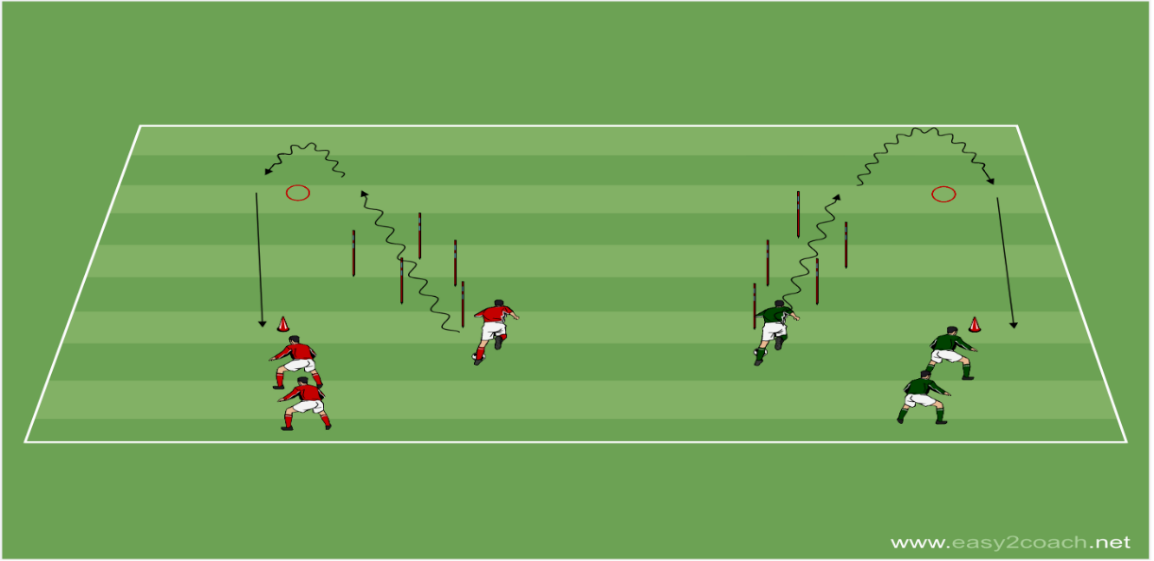
1. e2c TACTICS

Within this module you can create your own training schemes, tactics and animations in minutes using a virtual tactical table. The Virtual Tactical Table is a graphic and animation tool of the module, which allows you to create graphics or video of your own football training sessions based on a database of more than 250 graphic icons from the field of football and visualize them in this table. Subsequently, the training program can be displayed using the spreadsheet to selected training participants through various informatics tools and communication channels.

1. e2c FOOTBALL EXERCISES

This module contains 329 training scenarios, each of which is described in detail as shown in the following specific scenario, which is also accompanied by the figure below.

Competition in dribbling training

**-**

Source: <https://www.easy2coach.net/fr/>

*Organisational provision of the training situation:*

2 x 7 posts / cones

2 x 2-4 members coordination groups

*Training process:* The training equipment will be positioned as shown in the graphics. Two teams will compete against each other in the form of a running dribbling slalom. The first player of each team starts dribbling the ball along the marked track. The next player may start as soon as the player in front of him returns to the starting position.

*Tip for coaching goals:* The number of cones/posts and the distance between them depends on the skill level of the players. It is important that the players run the set course as quickly as possible. The incentive could be that the losing team has to undergo a special penalty (sprint training, strength and weight training, etc.).

*Technique:* Ball handling, dribbling

*Goal pursued:* Speed of movement with the ball

*Coordination:* Coordination jumping (Parkour)

*Goal of training activity:* Progression

*Age:* U14 - U19

*Duration:* 20 min

*Number of players:* 6 - 9 players

*Form of training:* Group training

*Participants:* Defenders, midfielders, forwards

*Intent:* Group cooperation

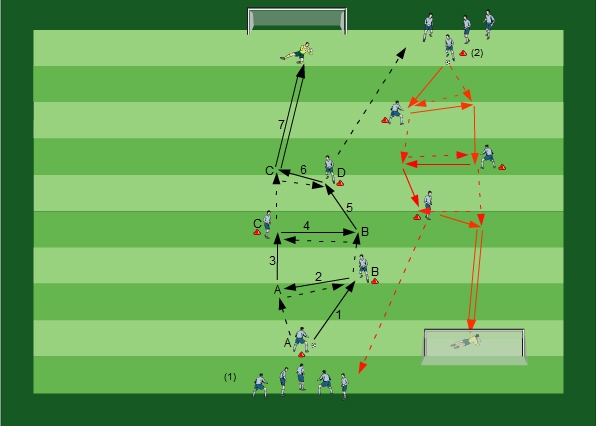
*Skill Level:* Beginner

*Spatial Behaviour:* Use of free space

*Training Location:* Grassy area, asphalt, soccer turf

A similar detailed description of this training scenario with all instructions and conditions of implementation is given in the *e2c FOOTBALL EXERCISES* module in the same structure as in the previous training scenario. It should be noted that this structure of detailed description is provided in the module for all 329 training scenarios.

Demonstration of a training procedure with the ball to score a goal (two possible variations of the attack)



Source: <https://www.easy2coach.net/fr/>

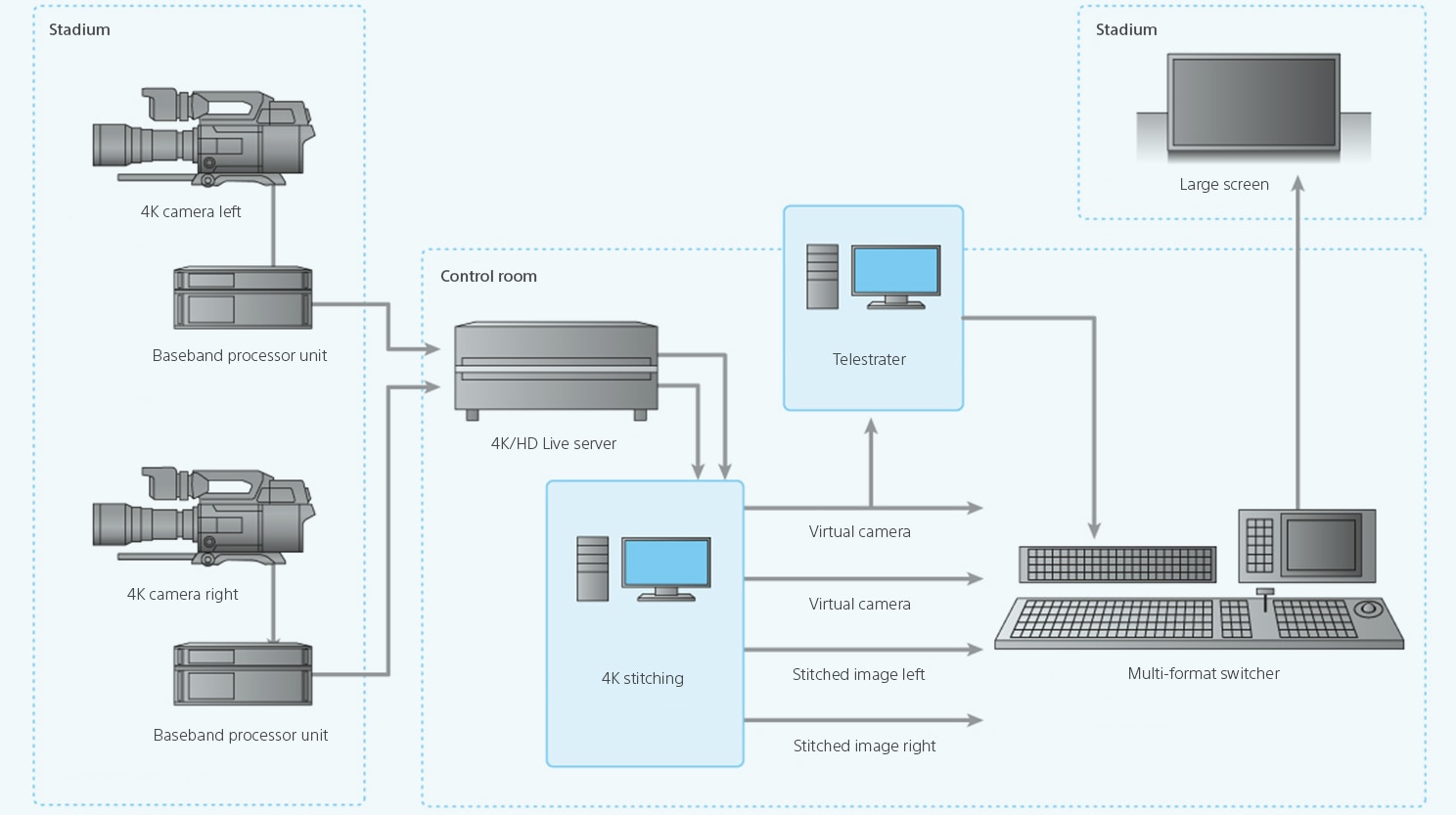
* 1. ***Sony Live - a range of software products and high-end hardware components designed to display high-quality video of sporting events and to protect football stadiums***

Big screens play an important role in creating the atmosphere in crowded stadiums around the world. Through its LIVE software products, Sony provides real-time streaming of breath-taking scenes on big stadium screens, sending images to stadium security teams monitoring the stadium, broadcasting the match and its footage on teams' mobile sites, and providing pay-per-view content to TV stations or other companies specialising in multimedia.

Through the Live software, in addition to the live webcast, video from the stadium control panels can be projected onto cinema screens or a big screen within the sporting event venue. For large sporting events, this software also allows visitors to use a Wi-Fi network to watch the event on their mobile phone displays.

The LIVE 4K production system, with roughly four times the resolution of Full HD[[7]](#footnote-7), delivers extremely detailed images and gives fans the feeling of being right on the scene of a sporting event. The migration from HD to 4K[[8]](#footnote-8) has already begun in many countries, including France. Sony cameras provide 4K access at up to 120 frames per second (fps), with the XAVC format developed by Sony providing reliable compression and decompression on both 4K and HD platforms. Live 4K software supports both 4K and HD broadcasts. The Live 4K camera and server system allows HD video to be captured, recorded and played back at four times (240 fps), six times (360 fps) or eight times slower (480 fps).

LIVE HDK Production System Configuration



Source: https://pro.sony/fr\_LU/sport/sport-solutions/sportsstadiums

The Live 4K Camera System software supports two different ways to achieve real-time HD cuts, depending on the shooting targets or system settings. It is possible to instantly switch any area captured by a single 4K Live Camera System to HD cropped views, so that image effects can be cropped as if two or three cameras were used. In addition, the combination of the Live 4K Camera System and Live 4K/HD Server System creates a dynamic image presentation by extracting HD views, clipped from recorded content, that can be used for replay. Sony PWA-4KS image splicing software can cut HD images from video captured in 4K format using multiple 4K cameras. In conjunction with the Sony Telestrator[[9]](#footnote-9) PWA-TS1 software, it allows original images to be added to these clipped HD views. This powerful combination makes for an interesting addition to sports content and can also be used to analyse games, practices and other activities.

* 1. ***SKIDATA Handshake Logic - a suite of software for control, management and protection of stadiums and visitors at football matches***

The Handshake Logic software for stadium management and administration is at the heart of the Event SKIDATA software package developed by the Austrian company SKIDATA GmbH. It brings together all the products and services used during sporting events in the stadium to ensure the maximum level of safety and stability in the execution of the various tasks related to the event. These services include:

1. *Entry to the stadium using access control software*

Sports fans can use the SKIDATA software to purchase tickets online, which come with accompanying instructions on the quickest way to access the purchased seat in the stadium, as well as information on how to access other services provided in the stadium.

SKIDATA's visitor management and access control software are currently used in more than 200 stadiums worldwide. These include, for example, the stadiums that hosted the European Football Championships in 2004 in Portugal and in 2008 in Switzerland and Austria, as well as the World Cup in 2006 in Germany and in 2010 in South Africa. UEFA has also equipped its stadiums with SKIDATA software products, which were also used during the 2012 European Football Championships in Poland and Ukraine and in 2016 in France. Since 2006, at least 50% of the stadiums hosting the European Championships and World Cups already rely on SKIDATA's access control systems.

1. *Stadium access counters, turnstiles and devices for individual passage of persons*

During access control and individualised entry of people into the stadium, the focus is on safety and speed. Turnstiles and access readers allow tens of thousands of visitors to enter the stadium territory in a very short time. Regardless of the stadium options offered by existing structures, any number of mobile turnstiles and access readers can be installed anytime and anywhere, especially in the event of a sudden influx of visitors. All these devices are controlled by Handshake Logic software and linked to a common SKIDATA system database.

# Picture of access reader with turnstile



# Source : <https://www.skidata.com/fr-ch/produits-services/produits-pour-stades-installations-de-loisirs/lecteurs-dacces-tourniquets/>

# *Cards and bracelets RFID[[10]](#footnote-10)*

# SKIDATA has made sure that global RFID tickets are connected to its RFID systems in its products. The concept of efficient and controlled visitor access to stadium areas through fast and secure access systems based on rewritable or disposable RFID cards and bracelets is a convenient entry point for fans, plus they can access the reading devices without the need to have anything in their hands. The reading device will read the content stored on the RFID card or wristband using radio waves automatically, regardless of where the fan has the RFID card or bracelet stored.

# The flexible integration of external ticketing solutions via SKIDATA's system interfaces already includes more than 70 different ticketing systems that are successfully used worldwide.

# *Measurement, analysis and control of visitor flows*

# With a few clicks, the Handshake.Logic software provides important data to manage visitor flows and perform analysis of these flows. During a sporting event, organisers can intervene and optimise visitor flows at any time using this software. For example, they can change the direction of turnstile rotation or redirect visitor access to other freer entry blocks.

# *AVIGILON – software learned for stadium safety and security, which has received the SAFETY Act award from the U.S. Office of Homeland Security*

# Ensuring the safety of 50,000 spectators is not easy. Avigilon software is a comprehensive stadium access control and venue monitoring solution with exceptional image quality and effective control through a camera management system that helps ensure the safety of fans and players and enables rapid response to unexpected and pathological events. The suite of modules, called Avigilon, was programmed by the Canadian corporation of the same name, whose products are used worldwide.

# Avigilon software, through its Avigilon Control Centre module[[11]](#footnote-11) and Avigilon Appearance Search technology, is a powerful search tool that quickly and easily sorts out relevant sequences from a large number of hours of footage in order to locate a specific person or vehicle within the entire stadium complex and its immediate surroundings.

# The Focus of Attention module introduces a new concept in the field of on-line video monitoring. In synergy with the Avigilon Artificial Intelligence & Video Analytics module, which helps operators to manage tens to hundreds of cameras at once, it enables critical events to be detected and verified and acted upon within the appropriate competencies.

# Avigilon's High-Definition Stream Management technology reduces bandwidth requirements to display views from all cameras on a single screen, even on just one laptop.

# The Avigilon Appearance Search module, which is a facial recognition technology based on artificial intelligence algorithms, helps to reduce the response time for searching and identifying persons of interest. The facial recognition software offers the context needed to make clearer and more unambiguous decisions, enabling organisers and security forces to respond proactively to unexpected or dangerous and pathological events. The aim of using facial recognition technology is to provide assistance to the above-mentioned forces, to the extent necessary, to support and help people to carry out the tasks that enable them to implement regulations and legislative orders.

# When applied correctly in software applications, artificial intelligence is an incredibly powerful tool that can be used to increase the effectiveness of physical security systems and enable increased protection for sports facilities and their visitors.

# The basis for the Avigilon Appearance Search[[12]](#footnote-12) software, which is used to search for persons of interest, are security watch lists. These persons are identified on the basis of one or more security watchlists, the content of which is managed by users authorised by the sports club management. These can populate and manage multiple watchlists by adding reference photographs of the faces of persons of interest or by searching for appearances from a person's performances based on recorded video sequences. Record retention also allows for the dating of events corresponding to the capture of the face and appearance of a wanted person of interest. Robust controls within Avigilon's facial recognition software technology govern the accessibility and retention of watchlist data. Security watchlists can be supplemented with alarm tags to provide stadium operators and the monitoring centre with more information about persons of interest entering the stadium. If a match is found between the identification of an entering person and the monitoring list, monitoring centre operations staff are alerted via Avigilon Control Centre software alarms, either by relevant images and recorded video sequences or by displaying a colour alarm on the screen, showing the operator the video that triggered the alarm and the monitoring list reference number, allowing the operator to verify the match and act quickly.

# Avigilon Unusual Activity Detection aims to detect unusual events that might go unnoticed. This module offers a new type of artificial intelligence based on Edge Computing[[13]](#footnote-13). It is designed to detect atypical activity, such as people being in unusual places and vehicles moving at higher speeds or in unusual locations, and then alert operations centre personnel.

# The Notifications and Alarms module is based on artificial intelligence. It relies on the performance of Avigilon cameras and devices with next-generation self-learning and analytics features, while the interface with the Focus of Attention module uses artificial intelligence to detect and signal events that may require attention. Visually, the locations of these events are represented by color-coded nodes that indicate different levels of importance:

# Blue node - detected event.

# Turquoise node - unusual movement detected or event analysed.

# Yellow node – unusual activity detected, finding a match of a person's face with the monitoring list of persons of interest.

# Red node – alarm.

# The module provides easy navigation for operations centre staff and a clear and simple view to check for security event alerts. Simply hover the mouse cursor over the highlighted node to directly show the live video to the operator, and another click on the node will zoom in to view and review the event in more detail.

1. **Security by software for major sporting events.**

The security by software of major sporting events represents a major challenge for the host country, due to the organizational complexity, the numerous stakeholders involved, and the worldwide exposure. All of which increase the risk of cyber-attacks that could compromise the security of the entire territory, hamper the experience of millions of spectators and damage the reputation of the organizers.

In 2024, the Paris Olympic and Paralympic Games and the European Football Championship-UEFA required France and Germany to ensure both the digital and physical security of all stakeholders, in several cities and for several weeks, amidst a tense geopolitical climate. The main objective was to prevent any significant disruption of events or tournaments due to a cyber incident.

For both events, a series of preventive and reactive measures were put in place with all the relevant stakeholders in each host city, to guarantee a high level of security for the information systems that were particularly under pressure during the events. This involved forging collaborative relationships between partners, private companies, local communities, federations and associations.[[14]](#footnote-14)

***3.1. Timely - Event Management Software for Sports Events[[15]](#footnote-15)***

Timely - Sports Event Management Software is the ideal solution for announcing and managing all upcoming sporting events. From matches and tournaments to press conferences and award ceremonies. It is the ideal software for all sports event management needs. Timely supports the fact that events are the basis of experiences. It aims to create technologies that connect communities and turn events into lasting memories. Count on the fact that it will help you achieve your event management goals. Timely is the safe, secure and reliable software. It is a comprehensive platform that is constantly growing and evolving to meet the needs of its users - event organisers. The event management system is flexible and scalable and works seamlessly with all types of events, whether in-person, virtual or hybrid, large or small, paid or free. It contains the following modules:

1. Calendars and event lists
2. Design and customisation
3. Publication of events and scope
4. Promotion and distribution of events
5. Event registration and ticketing
6. Event operations and analysis
7. Security, confidentiality and accessibility

***3.2. Evolv Express - threat detection system[[16]](#footnote-16)***

Evolv Express combines powerful sensor technology with artificial intelligence (AI), integration with the security ecosystem and detailed location analytics to deliver safer and more accurate threat detection at unprecedented speed and volume. Evolv Express is designed to enhance security, create situational awareness by alerting on potential threats and support threat response with targeted "Red Box"[[17]](#footnote-17) searches.

It ensures the following functionalities:

3.2.1. Consistent Threat Detection

Envolv Express is designed to address a wide range of potential threats and continues to improve performance through new and updated algorithms, which customers can get through software updates.

3.2.2. Efficient Entry Experience

Evolv Express is designed to screen visitors effectively while helping minimize congestion and disruptions to traffic flow at ingress points. Evolv Express can screen up to 4000 people per hour for a dual-lane system.

3.2.3. “Red Box” Threat Identification

The connected Evolv Express tablet seeks to provide a fast, non-invasive threat resolution by providing security operators with visibility into who to search, helping eliminate potential bias in decision making, and where to search via a “Red Box” for efficient secondary screening.

3.2.4. Fast & Flexible Deployment

Evolv systems are designed for easy deployment indoors and outdoors. The mat takes the guesswork out of setup—no need to estimate or measure the distance between posts. Deployment options include single- or dual-lane, ADA-compliant configurations[[18]](#footnote-18), and a narrower footprint for venues with space constraints.



Outdoor deployment of Evolv system

Source : <https://evolv.com/concealed-weapons-detection/express/>

3.2.5. Performance Analytics

Evolv Insights analytics aims to provide security teams with powerful web and mobile control over their systems along with visual dashboards, analytics, and regular automated reports intended to drive operational efficiency.



Evolv eXpedite™ is a purpose-built X-ray scanner designed from the ground up to work autonomously to detect many concealed threats in bags.

Source : https://evolv.com/concealed-weapons-detection/express/

3.2.6. AI-Based Threat Analysis

Evolv Express consistently detects many concealed threats and distinguishes them from many common everyday items, such as phones and keys.

Evolv Technology, a leading security technology company pioneering AI-based screening designed to create safer experiences, was honored to serve as a security screening provider for one of the world’s largest global sporting competitions that took place in Europe this summer alongside a multitude of other significant events. Evolv Express® systems were used as a layer of security to screen over five million people, including 10,000 competing athletes, fans and media who attended various events in venues across Europe from April to August.

***3.3 Sportest - Playing surface and sports equipment inspection specialist software[[19]](#footnote-19)***

The safety of playing surface and sports equipment cannot be improvised. SPORTEST, with its software, a specialist in its field since 2000, puts all its expertise into the inspection of public playgrounds and sports facilities.

Safety and security control areas:

3.3.1. Control of fitness trail

The fitness trail offers everyone the opportunity to take part in sporting activities that promote physical and mental well-being. It is freely accessible but involves risks that require regular checks and maintenance to ensure it is used safely. Fitness trails, also known as sports trails, are sports circuits made up of a series of modules that are generally found in parks, on the outskirts of forests and in sports complexes.

1. Post-installation control before commissioning

MANDATORY

To be carried out by a safety expert to determine the general level of safety of the equipment.

1. Annual main inspection

MANDATORY

To be carried out by a safety expert to ensure compliance.

1. Control functional

MANDATORY

Frequency defined by the manager in accordance with the manufacturer's instructions

To be carried out by a safety expert

3.3.2. Control of water slides

Whether indoor or outdoor, open or in tubes, the number of waterslides is increasing. To ensure your safety, waterslide operators must comply with the latest safety standards. Controls shall be carried out as described in 3.3.1. a) and c).

3.3.3. Control of skate parks

The safety standard applies to skateparks. It sets out the safety requirements and test methods for facilities for users of roller sports and BMX (bicycle bicross). Controls shall be carried out as described in 3.3.1. a) and c).



Source : <https://www.automatic-systems.com/ier-content/uploads/2020/07/safeflow-solution-picture_v2-e1599213945522.jpg>



Source : https://www.sportest.fr/aires-de-jeux

***3.4. Genetec – Physical Security system[[20]](#footnote-20)***

Genetec Security Center is a unified security platform that combines different IP security systems[[21]](#footnote-21) into one intuitive interface. Monitor access control, video surveillance, automatic number plate recognition, communications, intrusion detection and analytics, all in a single solution that gives operators a global view. In the event of an altercation, a broken door or an abandoned bag, the security platform will immediately inform security operatives. Security team can also easily share videos and information with the police or other municipal authorities.

Genetec includes the following modules:

3.4.1. Access control

Ageing physical security systems are not only expensive to maintain, but they also weaken your security. Lack of modern functionality or access to newer door control technology, as well as emerging cyber security vulnerabilities, clearly leave you in a difficult position. The Genetec/Synergis access control system offers a modern approach. As a truly open system, it connects to an ever-growing list of third-party access control devices. With options to link devices directly to the cloud, Gemetec/Synergis facilitates your transition to a cloud or hybrid deployment. Unified seamlessly with video and other security systems, it provides operational and security information about your secure areas.[[22]](#footnote-22)

3.4.2. Video surveillance

Working smarter with Genetec/Omnicast video management system. Genetec/Omnicast Video Management System (VMS) provides a complete overview of the surveillance environment using the latest cameras and analytics systems. The security team will be able to react faster to incidents, access new operational information and make more informed decisions. Flexible system architecture and efficient delivery of video streams means less storage space and less load on the network. And it's easy to upgrade. In addition, the system protects footage and personal information.[[23]](#footnote-23)

3.4.3. Automatic number plate recognition

When overseeing parking management, security of critical facilities or citizen safety, Genetec/AutoVu can help your security team achieve more. It captures multiple license plates to ensure you don't miss any vehicle of interest. And when action needs to be taken, it empowers operators with intuitive software so they can focus on the task at hand rather than checking a reading.[[24]](#footnote-24)

3.4.4. Communications

During a critical situation, communication is essential. Genetec/Sipelia is a communication management system that centralizes communication within the security environment. It improves security team awareness by unifying incoming calls with the rest of the security system. When emergencies require quick action, Genetec/Sipelia ensures that the entire communications infrastructure can be used to coordinate the response and keep sporting event organizers, athletes and visitors informed.[[25]](#footnote-25)

3.4.5. Incident management

With smart sensors, an increasing number of devices and a multitude of systems, it's hard not to be overwhelmed by data. All this noise makes it difficult to identify the real threats hiding among hundreds of events. Incidents risk being responded to by the security team only when they become serious. Genetec/Mission Control is a decision management system that helps the security team understand current events and quickly determine the best way to respond. It simplifies the coordination of responses between stakeholders and speeds up incident resolution.[[26]](#footnote-26)



Source : https://www.20minutes.fr/faits\_divers/3299871-20220531-incidents-stade-france-faisaient-marche-comment-delinquants-gache-finale



Source : https://www.midilibre.fr/2022/05/30/fiasco-au-stade-de-france-incidents-a-saint-etienne-notre-pays-a-un-probleme-avec-le-football-10327189.php

**Conclusion**

In conclusion, security plays a key role at sporting events by managing crowds, controlling access, identifying risks, responding to emergencies and ensuring the safety of spectators, athletes and VIPs, while ensuring the smooth running of sporting events.

Security measures at a sporting event have to cope with a wide range of threats. The first security measure of a sporting event must concern the facilities, namely the stadium, the changing rooms, the training ground, etc. All these areas, some of which are open to the public, must be the focus of attention of those responsible for the security of the sporting event. Players, managers and fans may also be at risk. Their protection is the second most important task in the security measures at a sporting event.[[27]](#footnote-27)

Security issues in the world of sport are not limited to the obvious situations such as violence in the stands or pitch invasions. They also include more complex risks such as cyber-attacks on ticketing systems, terrorist threats, medical emergencies and natural disasters. Added to this there are specific characteristics of each type of discipline: marathons, for example, require systems on open courses, while stadium competitions require the management of spectator flows in enclosed areas.

With the increasing digitisation of sporting events (online ticketing, spectator apps, streaming), cyber-attacks represent a new type of threat. A malfunction or hacker attack can not only lead to financial losses but can also expose sensitive data or disrupt the smooth running of an event.[[28]](#footnote-28)

The line between physical and information security is blurred, and there are a huge number of information systems and software applications. They are interconnected, so the dependence on digital technologies is absolute. Let us consider video surveillance of sports facilities, for example. A failure of access control and surveillance cameras can put spectators' physical safety at risk.

Given the ever-present cyber threats to IT security at sporting events, it is crucial to consider the use of software applications.

The above examples of IT tools in the form of hardware devices, but especially software applications, are only a very partial set of modern technologies used in the field of sport and sport security in France. However, even from these examples, it is clear that the implementation of information and communication technologies is applied in almost all activities that are carried out at all levels and by all actors in sporting events.

The highly topical issue of preventing growing corruption in sport, which is enabled by the high degree of application of subjective decision-making in sport, both in decision-making during sporting events and in managerial and administrative decision-making, needs to be addressed through the use of information and communication technologies (ICT) and audio-visual means. As can be seen from the above examples of the use of ICT in France, information technology itself makes it possible, thanks in particular to artificial intelligence tools, expert systems and decision-support applications based on algorithms based on practical experience, to reduce the rate of perpetration of these unfair activities and to increase objectivity in decision-making, not only in sport but also in other areas linked to human activities.

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[https://www.sportest.fr](https://www.sportest.fr/) (online, cited on February 1, 2025).

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**Summary**

Nowadays, the automation of many activities in sport using information technology (IT) is commonplace. Various hardware components and software applications serve as support tools for players, coaches, referees, organizers, sports clubs, fans, media and the general public in sport events, training, administrative activities, as well as in ensuring the safety of all actors involved in sport events. The aim of this study is to present some selected software used in tennis, football and security for major sporting events in France, which can be an inspiration for sports federations, clubs and organizations in Slovakia and in the Czech Republic, which are aiming at the future implementation of software applications in their current IT portfolio.

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1. Padel - is a sport that combines the best elements of tennis, squash and racquetball. Sometimes this sport is also called tennis with walls or squash in the sun. It is usually played in pairs, with teams separated by a net on a court that is one-third the size of a tennis court. The playing area is partially lined with walls, which players can use to their advantage within the rules. (online, cited on February 1, 2025). Available online: https://cs.wikipedia.org/wiki/Padel [↑](#footnote-ref-1)
2. Stadline - is a development group that develops customized computer software for athletes, sports clubs, fitness clubs and sports federations. (online, cited on February 1, 2025). Available online: https://www.stadline.com/ [↑](#footnote-ref-2)
3. <https://fr.wikipedia.org/wiki/Hawk-Eye> (online, cited on February 1, 2025) [↑](#footnote-ref-3)
4. ATP (Association of Tennis Professionals) [↑](#footnote-ref-4)
5. <https://www.assoconnect.com/associations/logiciel-club-de-sport/tennis/> (online, cited on February 1, 2025) [↑](#footnote-ref-5)
6. The European Association of Cities, Institutions and Second Chance Schools is an international learning organisation for young people with skills or qualifications gaps to successfully access educational programmes or the labour market. [↑](#footnote-ref-6)
7. HD (High Definition) is a widescreen format that has an aspect ratio of 16:9. Its resolution is 1280 x 720 pixels. Monitors or televisions with this resolution are a prerequisite for watching broadcasts in HD quality. Full HD is a higher level. It is also a widescreen format with the same aspect ratio as HD. However, it differs in resolution, which is 1920 x 1080 pixels. (online, cited on February 1, 2025). Available online: https://www.banger.sk/rozdiel-medzi-hd-full-hd-a-4k-rozlisenim/ [↑](#footnote-ref-7)
8. The 4K or Ultra HD standard came as a response to rapid technological advances. It has four times more pixels than Full HD, hence its name. Its resolution is 3 840 x 2160, which is roughly 8.3 million pixels. (online, cited on February 1, 2025). Available online: https://www.banger.sk/rozdiel-medzi-hd-full-hd-a-4k-rozlisenim/ [↑](#footnote-ref-8)
9. A telestrator is a device that allows its user to manually draw any shape into a still image or projected video. It is also known by the name video marker. This device is often used in sports broadcasts to show specific sporting action and be able to analyse it using hand-recorded drawings. The user draws with a finger, stylus or pen on a touch screen or graphics tablet. From the touchscreen or tablet, the drawing signal is communicated to a telestrator, which overlays the video image with the drawing, and its output is a combined image or video. (online, cited on February 1, 2025). Available online: https://en.wikipedia.org/wiki/Telestrator [↑](#footnote-ref-9)
10. # **RFID (Radio Frequency IDentification) is an automatic identification technology that allows almost any object to be wirelessly identified using data transmitted via radio waves and stored in so-called RFID tags (chips), which can be subsequently re-read and rewritten. (online, cited on February 1, 2025). Available online: https://www.kodys.sk/rfid-radio-frekvencna-identifikacia?gclid=EAIaIQobChMI2uW716af9QIVAu7tCh1-0gI0EAAYASAAEgI8bvD\_BwE**

    [↑](#footnote-ref-10)
11. <https://www.avigilon.com/fs/documents/avigilon-acc-integration-guide-gallagher-command-centre-8-9-en.pdf> (online, cited on February 1, 2025) [↑](#footnote-ref-11)
12. <https://docs.avigilon.com/bundle/unity-video-client/page/using/appearance-search.htm> (online, cited on February 1, 2025). [↑](#footnote-ref-12)
13. Edge Computing (Computer in the periphery or computer network) is an optimization method used in cloud computing that consists of processing data in the periphery of the network, close to the source of the data. It is expected to improve response times and save bandwidth. All computations take place outside the cloud and take place at the edge of the network, more specifically in the application where real-time data processing is required. (online, cited on February 1, 2025). Available online: https://en-m-wikipedia-org.translate.goog/wiki/Edge\_computing?\_x\_tr\_sl=en&\_x\_tr\_tl=sk&\_x\_tr\_hl=sk&\_x\_tr\_pto=sc [↑](#footnote-ref-13)
14. <https://cyber.gouv.fr/actualites/lanssi-et-le-bsi-publient-un-rapport-sur-la-cybersecurite-des-grands-evenements-sportifs> (online, cited on February 1, 2025). [↑](#footnote-ref-14)
15. <https://time.ly/fr/marches/logiciel-de-gestion-devenements-pour-evenements-sportifs/> (online, cited on February 1, 2025). [↑](#footnote-ref-15)
16. <https://evolv.com/concealed-weapons-detection/express/> (online, cited on February 1, 2025). [↑](#footnote-ref-16)
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19. <https://www.sportest.fr/> (online, cited on February 1, 2025). [↑](#footnote-ref-19)
20. <https://www.genetec.com/fr/industries/lieux-de-divertissement/portefeuille> (online, cited on February 1, 2025). [↑](#footnote-ref-20)
21. IP-based access control system involves an electronic access controller that is specifically designed for controlling the entry and exit to and from a restricted area as well as for precisely identifying the visitors [↑](#footnote-ref-21)
22. <https://www.genetec.com/fr/produits/securite-unifiee/synergis> (online, cited on February 1, 2025). [↑](#footnote-ref-22)
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