

**Nikolett Ágnes Tóth-Gábor Mátrai: Innovation, technological development,  
digitalization and the security of sport events**

*Abstract*

*Sport has become a fundamental socio-economic area, and it is no coincidence that it became a national strategic sector in 2010. Currently, technological progress plays one of the most important roles in the development of sport. In the twenty-first century, innovation, technology and technology are significantly shaping the world of sports, and huge changes are taking place, to which we must respond. The development, spread and completion of infocommunication, information technology, digital technologies, and digitalization itself at an ever faster pace than ever before are fundamentally changing all areas of the economy and society. There is no longer any question that digitalisation is the engine of the economy, affecting all sectors, including sport.*

*Keywords: sports, innovation, artificial intelligence, digitalization, law enforcement, sports policing*

## **1. Fundamentals**

**Sport became a fundamental socio-economic field at the end of the twentieth century and the beginning of the twenty-first century, and it is no coincidence that it became a national strategic sector in 2010.** Sport is an extremely complex phenomenon, it affects physical culture, education policy, health, and its economic and social policy significance is growing. Today we can justifiably speak of a "sports industry". Sport is gaining increasing importance in domestic and foreign policy and is an important tool for increasing the country's image. This is especially true of football, which, as the most popular spectator team sport in the world of sports law, also provides many illustrative examples<sup>1</sup>.

Today, sport is also considered one of the defining elements of the entertainment industry, which, on the one hand, represents an increasing share in the "active" and "passive" spending

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<sup>1</sup> Nikolett Ágnes Tóth: Sport, law enforcement, innovation. Edited by: Dobák -Zoltán Hautzinger. Professionalism, modesty, diligence : A festive volume in honor of 65-year-old József Boda. Budapest: Dialóg Campus Publishing House, Nordex Kft., 2018. 627-635.

of leisure time, on the other hand, it popularizes, arouses interest, shapes and shapes public thinking, sets an example for young people, so in addition to ensuring the next generation, it also plays a role in strengthening the physical and mental state of children.

Sport is considered an important industry worldwide, and it is also a key strategic sector of the Hungarian national economy. Its importance can be determined in many areas and interfaces, also in terms of business aspects: for example, elite sports, mass and leisure sports, recreation, entertainment (sports broadcasts), tourism, tourism (participation in sporting events, conferences).

Currently, technological development plays one of the most important roles in the development of sport as an industry: not only do data analysis tools help athletes' performance, but sports broadcasts are also completely transformed, and the technological possibilities of recreational athletes are expanding year by year.

The creation, maintenance and development of order, security, the sense of security of the population and athletes has also become increasingly important in recent years, primarily because top events in spectator team sports, spectacle and individual sports have become mass events, and crowds participate in recreational sports events. Numerous events of elite and grassroots sports mobilize tens of thousands of people not only inside and outside sports facilities, but before, after and after. Sporting events increasingly have show elements, all of which places new safety requirements<sup>2</sup>.

The safe conduct of sporting events is basically the responsibility of the organisers, but state involvement is also indispensable. In other words, all this can be considered a joint civilian and state law enforcement task.

In sports facilities, the primary duty of action lies with the organiser. According to the law, the police may only participate in supporting match insurance tasks in stadiums classified as public places in contractual form or, if justified by the security risk of the match, as a public task.

The internal protection function results in the obligation to perform law enforcement tasks aimed at ensuring order in the state. Law enforcement tasks aimed at maintaining public order

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<sup>2</sup> Nikolett Ágnes Tóth: Thoughts about the current issues of sports policing. BELÜGYI SZEMLE. SPECIAL ISSUE, 2020. 77-93.

and security in modern states are performed by public administrations. Sports administration is a specific legislative and judicial discipline that is a special part of administrative law, sport-related tasks are carried out by the state through sports administration, so it can be called a kind of policy.

Sports law is fundamentally based on public law, since typically one of the parties is the state itself, and there is a relationship of subordination and superiority between the participants, but of course there is also a civil law aspect of the field, in which legal entities in an autonomous structure are equal, equal and subordinate to each other<sup>3</sup>.

The civil rights nature of the right to sport also presupposes state tasks, which also means that state bodies and local governments must be given tasks to determine what is mandatory and optional sporting tasks for them, and what they must do to ensure that the human and civil right in sports is effectively enforced. The promotion and provision of sporting activities is therefore – among others – a state task, and thus also a public task, and consequently requires financing from public finance subsystems, primarily from the central budget. In view of all this, the Sports Act has implemented uniform regulations, which defines transparent and clear tasks for state institutions as well. <sup>4</sup>

One of the most important tasks of the state is to ensure order in the world of sports as well. Using the definitions of law enforcement practitioners, it is possible to arrive at the definition of sports policing, which is a specific part of sports administration. This narrower area can be clearly defined as professional policing, a series of laws regulate everything related to sports policing, supplemented by regulations of sports federations, which, for example, serve as guidelines for keeping sports police records and securing sports events.<sup>5</sup>

Issues related to the provision of sporting events raise social, legal, law enforcement and moral problems.

18 laws, 14 decrees and, mentioning football, the consistent application of the five internal regulations of the Sports Federation, MLSZ guarantee the safe conduct of sporting events and

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<sup>3</sup> Nikolett Ágnes Tóth: The Application of Innovative Sports Policing Tools. CASOPIS POLICAJNA THEORIA A PRAX, 2/2/2021 103.

<sup>4</sup> Act I of 2004 About sport

<sup>5</sup> Nikolett Ágnes Tóth: Sport policing in the system of sport administration. National University of Public Service, Faculty of Political Sciences and Public Administration, Budapest. 2019. 13.

foot-kicking matches. A significant change took place in this area during the amendment of the Sports Act, which entered into force on the first of January 2019. I also analyze these changes in my article by explaining the reasons.

## **2. The impact of innovation on sport**

In the twenty-first century, innovation, technology and technology are significantly shaping the world of sports, and huge changes are taking place, to which we must respond. The word innovation means professional development and innovation, but the concept of innovation itself is constantly evolving and undergoing change, and it also includes organizational innovation. Innovation is the ability to change, which requires courage and the need to be at the forefront of rethinking and redesigning<sup>6</sup>.

So many new innovative solutions are transforming our world and permeating every part of our lives. So why avoid the world of sport with innovation and one of its most dominant manifestations, digital transformation, which means that we redefine and recreate a lot of things in our environment, also in the field of sports?

Without innovative developments, solutions, infocommunication tools and digitalization, development is unimaginable in all areas and sectors, and all this is now an integral part of the development of the sports industry. The industry is still expecting a huge explosion, the number of companies active in the field is expected to increase significantly in the coming years, and competition between them will intensify. A few decades ago, sports and business were rarely mentioned on the same page, but today we are talking about an industry worth nearly \$90 billion worldwide. Today, data analysis tools help not only competitors but also recreational athletes, while the fan experience is completely transformed – both in front of the TV and in the stadium.

In connection with the comparison of the concepts of sport and innovation, the Digital Prosperity Programme states that digital technologies and information technology solutions have fundamentally transformed the field of sport, sport-related activities and operating models in the past few years.

But what is innovation in law? Law preserves, legal traditionalism is always important, but at the same time law responds to the changed economic environment and social life relations.

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<sup>6</sup> Nikolett Ágnes Tóth: Excerpts from the history of domestic affairs sports, football and the provision of sporting events at the beginning of the 20th century. *BELÜGYI SZEMLE*. 2021, 69 : 3 SPECIAL ISSUE 64.

Speed, a new and innovative approach and, of course, efficiency are increasingly important in legislation, as law adapts to changes in life, and many innovations arise as a result of technical and technological developments.

Order is a fundamental value in every society, those involved in securing sporting events guarantee the safety of all participants (athlete, sports leader, sports professional, spectator). Nowadays, innovation has been able to "create" such special situations that nowadays, for example, E-sports events also need to be provided.

Of course, a number of legal instruments have been available for years. One of the most important existing legal innovations was Act CIV of 2011 on the amendment of certain laws necessary to combat the phenomenon of sports hooliganism, the so-called "Hooligans Act", which simultaneously amended the Police Act, the Criminal Code, the Act on Misdemeanours, the Personal and Property Protection Act and the Sports Act. One of the great novelties of the legislation was the extension of the application of an access control system capable of uniquely identifying participants and the establishment of a sports police register<sup>7</sup>.

Practice has shown that sports hooliganism is not exclusively centred inside the stadium, and therefore the legislator takes the view that disruptors travelling to or leaving sporting events should also be treated as sports hooligans. The relationship between private and misdemeanor sanctions is also unclear, which in extreme cases may result in the offender being punished more than once for the same act.

## **2.1. Sports police register - the result of innovation**

Persons subject to restraining orders are recorded in a register kept by the National Police Headquarters. From the data file, the police for the purposes of public order and security, the prevention of violence and disturbance, the fulfilment of international police cooperation obligations and the protection of the rights of others to the foreign police force, as well as for the purpose of protecting the security of events, the refusal to attend sports events and the sale of tickets to the organizer or, if an organizer is employed, ticket sales on behalf of the organizer transfer data to the person performing the data<sup>8</sup>.

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<sup>7</sup> Nikolett Ágnes Tóth: The professional nature of sports law. Economy and Law., 25.9.2015.

<sup>8</sup> Nikolett Ágnes Tóth: Innovative sports policing tools. BELÜGYI SZEMLE, 2020. 68 .4 SPECIAL ISSUE 125.

It can be said that parallel to the introduction of the use of the camera system, the use of the access control system and the consistent application of legal institutions such as exclusion, banning and disqualification also played a role in reducing the number of infringements committed in stadiums.

The European Football Championship was to be held in 2020, where the country and its new top facility (Puskás stadium) would have played a prominent role. Of course, next year we hope that the plan can be implemented<sup>9</sup>.

The European Commission will pose a serious security challenge to the countries organising and organising the sporting event. The cultured and safe organisation of matches and related events can only be achieved through the coordinated professional work of all actors and professional areas involved in the organisation and with wide-ranging international cooperation based on partnership. This is also based on mutual acceptance, mutual respect and willingness to cooperate. Based on the experience of previous world competitions, it can be safely stated that dialogue and information exchange are basic conditions for making good and balanced decisions, and the key to solving security issues. The use of new information technologies will be essential for the successful conduct of the event.

### **3. Technical and technological innovation**

Law enforcement agencies have a wide range of infocommunication tools and software available. Among others, radio technology, RoboCop program, Activity Management System, Mobile framework, body camera, surveillance systems, devices used in electronic surveillance, Veda Road Intelligent Camera Network. However, focusing on the safe conduct of sporting events, I would like to highlight the latest technical tools that are essential for the safe organization of an international sporting event.<sup>10</sup>

#### **3.1. Application of drones**

According to Act XCVII of 1995 on Air Transport, an unmanned aircraft is 'a civil aircraft designed and operated in such a way that it is not piloted by a person on board'.<sup>11</sup>

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<sup>9</sup> Nikolett Ágnes Tóth: The place and role of sports policing in the system of sports administration. BELÜGYI SZEMLE, 2018, 66 .5. 120.,

<sup>10</sup> The evolution and future of infocommunication tools in law enforcement. Faculty Scientific Students' Association Conference National University of Public Service RFaculty of Encyclology 6 November 2019

<sup>11</sup> Act XCVII of 1995 on Air Transport 71. § 35.

The illegal use of drones came into focus years ago when a drone pilot broke out a mass brawl with a provocative flag during a European Championship qualifier between Serbia and Albania. The biggest risk in drone development is when technology falls into the wrong hands. In extreme cases, it can even become an instrument of terrorism. There is a growing demand for procedures and solutions that can be used to detect drones.<sup>12</sup>

The risk is always real, that after all, a development or new invention will be used for good or harm. Therefore, if technology falls into unauthorized hands, there may be a significant risk that we have to reckon with. Drone technology makes it incredibly difficult to pinpoint their exact location, but there is already a device that alerts you if you're hovering nearby. The Drone Laboratory was originally set up to develop agricultural drones, but in the meantime they realized that there was a huge need to facilitate the detection of drones. They produce detectors that alert when a drone for advertising or even entertainment purposes is detected. This includes voice and radio wave drone identification.

In Hungary, an infocommunication solution will be able to find and identify the signal source of the drone user in Puskás Arena. There will be an airspace closure during matches, so according to current plans, media representatives will not be able to use drones. Protection against drones is prescribed by UEFA, and the organization has formulated a detailed set of requirements in connection with this within the framework of its tasks of organising the European Championship, of which this area is a pivotal point.

### **3.2. Facial recognition system**

Security threats are a growing concern both internationally and nationally, as well as in commercial organisations and activities. As threats to international borders intensify, governments are introducing new measures at airports, seaports and public transport hubs. One of the main tasks of law enforcement agencies is to identify persons wanted by the public and to filter and highlight them as quickly as possible. In addition, security companies and facility managers must fear unauthorized access to or stay in their premises and offices by known

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<sup>12</sup> Internet source: <https://www.origo.hu/sport/futball/20150716-foci-eb-selejtezo-szerbia-albania-elokerult-a-provokator.html> Retrieved 22/01/2020.

unwanted or unknown persons, and they must also identify highlighted, possibly VIPs, who return to a facility legally and authorized.<sup>13</sup>

The human face plays an important role in our social interaction, conveying people's identities. Using the human face as the "key to security", biometric facial recognition technology has received significant and particular attention in identification in recent years, as it has many applications both in law enforcement and in other areas of civilian life.

Compared to other biometric systems using fingerprints/palmprints and iris diagnostics, facial recognition has particular advantages as it is a 'physical' contactless process. Facial images can be captured remotely without knowing the person to be identified, and identification does not require interaction with a person. In addition, facial recognition serves the purpose of 'detering' crimes, as a recorded and archived facial image can later help identify a person with high accuracy.

Facial recognition technologies can generally be implemented as functionally independent applications, but can be seamlessly integrated into new or existing biometric security solutions through system integrators and solution providers.

In Hungary, the operation of the Mobile Facial Recognition System and the Portrait Facial Recognition System also belong to the bodies of the Ministry of Interior. Obviously, at a sporting event, mobile facial image analysis can be used to screen out various suspicious persons, while the stationary facial image analysis system helps in subsequent detection in case of a criminal offence. The photographs in the register with which the requested person can be compared are laid down in the law, as are the bodies entitled to use them, indicating the purpose.

As an innovative legal measure, the Sports Act allows the registration of images in the sports police system from the first of January 2019. This provides the legal basis for the inclusion of facial images in the sports police register in the database with which the facial recognition system will work.

In 2015, the creation of two pieces of legislation could be considered as legal innovations: Act CLXXXVIII of 2015 on the Facial Image Analysis Register and the Facial Image Analysis

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<sup>13</sup> Tóth Nikolett Ágnes: Innovative sports policing tools. Manuscript. Before publication, Belügyi Szemle. 2020.



System, and Act No. 78/2015 (XII.23.) BM Decree on the detailed rules for the operation of the facial image analysis system.

#### **4. Digitalisation in sport**

The development, spread and completion of infocommunication, information technology, digital technologies and digitalization itself at an ever faster pace than ever before fundamentally change all areas of the economy and society, and beyond their direct value-creating role, catalyze the transformation of other industries through their multiplier effect, and fundamentally determine the adaptability and competitiveness of enterprises, the state is simpler, more transparent, cheaper, more efficient operation. Digital transformation driven by information technology and the infocommunication sector is a decisive driver and engine of economic growth, innovation and social development, and a decisive element of increasing digital wealth.

There is no longer any question that digitalisation is the engine of the economy, affecting all sectors. Previously immature technologies are becoming widespread, 5G, IoT, Big Data, artificial intelligence (AI) are fundamentally transforming entire sectors, from agriculture, health industry, sport and education, to transport and tourism. Thanks to digitalization and digital transformation, efficiency improves, prosperity increases, productivity increases, competitiveness improves.

*"Europe is building its future on its long history of technology, research, innovation and creativity, as well as on vigorously defending rights and fundamental values. New policies and frameworks will help Europe adopt cutting-edge digital technologies and strengthen its cybersecurity capacities. Europe will continue to maintain an open, democratic and sustainable society, and digital tools can be a powerful underpinning of these principles. Europe will find and pursue its own path to become a globally competitive, value-based and inclusive digital economy and society, preserving its open but rules-based market and continuing to work closely with its international partners."<sup>14</sup>*

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<sup>14</sup>Internet source: [https://ec.europa.eu/hungary/news/20200220\\_eu\\_digital\\_future\\_hu](https://ec.europa.eu/hungary/news/20200220_eu_digital_future_hu) Retrieved 2020.04.22.

Consequently, digitalisation, the virtual world and the information society must also be addressed in the field of sport.

*"Digital technologies have fundamentally transformed sport-related activities, operating models and the entire ecosystem of sport over the past few years. The availability of big data, sensors, digital services and digital channels and communities are completely transforming the sports system; The widespread use of virtual and augmented reality devices is also gaining momentum."<sup>15</sup>*

The aim is to build on the successes, traditions, intellectual resources and innovation activities of Hungarian sport to develop new digital applications, solutions and products in Hungary that can be globally competitive. Cloud-based systems and data analytics software have brought tremendous momentum to various sports, so it's no surprise that sports analytics and sports informatics have grown into independent industries within IT and the following applications play a major role in revolutionizing the sports industry:

- Sports analytics systems (real-time data analysis, statistics)
- Sensors, wearable technology
- Cloud-based solutions
- Mobile technology
- Virtual reality
- Drones

These technologies, individually or in different combinations, have now appeared in almost every sport. It would be important to equip youth education bases and sports academies with state-of-the-art digital equipment, along the lines of setting up a unified procurement concept and proposal in advance. The goal should be to integrate digital technologies widely in all areas of the sports sector, especially in youth education, spectator team sports, as well as priority sports and prominent associations.<sup>16</sup>

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<sup>15</sup> THE DIGITAL PROSPERITY PROGRAMME 2.0 Budapest, July 2017. p. 83.

<sup>16</sup> DIGITAL PROSPERITY PROGRAMME 2.0 Budapest, 2017. July. 86.

These technologies not only provide new training tools for professional and hobby athletes, but also lay the foundation for new sports and business models. The spread of digital solutions is particularly important in the field of youth education and talent management.

Currently, there are few digital solutions in the field of sport in Hungary, the systematic and extensive use of digital technologies, and there are few professionals who know sport well but also have adequate digital knowledge who could handle the most modern IT systems and apply digital analysis methods at a skill level and with sufficient efficiency.<sup>17</sup>

The spread and introduction of digital technologies, applications and solutions should be encouraged in the fields of elite sports, competitive sports, school sports, youth education and mass sports. The aim is to build on the successes, traditions, intellectual resources and innovation activities of Hungarian sport to develop new digital applications, solutions and products in Hungary that can be globally competitive. Cloud-based systems and data analytics software have brought tremendous momentum to various sports.<sup>18</sup>

Social media has given athletes a tool to build a fan base of millions and nurture them professionally. According to recent statistics, 2.2 billion people actively use Facebook, 1 billion use Instagram, 1.3 billion use Messenger. Online social media has become one of the main tools for athlete branding. Players often post live streams, photos, videos. The peculiarity of this is that the main characters themselves share the recordings, thus accompanying the followers behind the scenes, which gives a special experience to the viewer as well.<sup>19</sup>

Chatbots, that is, interlocutors who act and respond like robots, have also begun to work in sports. In a simplified application, fans only need to tick which club and player they like and the chatbot will automatically send them a message with the current video summary of their favorites' last match. Clubs can also use AI-based chatbots to replace customer services: they can provide immediate answers to simple questions, such as how fans can get to the stadium, where to buy tickets or how to sign up for the club's platforms. Thus, chatbots can also be of enormous importance in the field of sports policing, and in Hungary they can also help the work of contributors included in the Sports Act.<sup>20</sup>

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<sup>17</sup> DIGITAL PROSPERITY PROGRAMME 2.0 Budapest, 2017. July. 84.

<sup>18</sup> DIGITAL PROSPERITY PROGRAMME 2.0 Budapest, 2017. July. 85.

<sup>19</sup> Internet source: <https://sportsmarketing.hu/2019/01/04/facebook-vezeto-a-sport-mar-joval-korabban-osszekototte-az-embereket-mint-a-zuckerberg-galaxis/> Retrieved 23.04.2020.

<sup>20</sup> Internet source: <https://sportsmarketing.hu/2019/01/04/facebook-vezeto-a-sport-mar-joval-korabban-osszekototte-az-embereket-mint-a-zuckerberg-galaxis/> Retrieved 23.04.2020.

Digitalisation can also bring about the latest revolution in enhancing sports performance.

Smartwatches measure activity, performance, health app is available. It can be used by amateur, professional and recreational athletes. These devices measure and record their activity, store health analyzes.

The demand for digital tools and services has also had an impact on online gaming, leading to a sharp increase in interest in e-sports. Our lives take place in an online space controlled by us. Innovation is present in all areas of life today, it is essential to use innovative tools without the use of development.

The form of e-sports as we know it today began to develop at the end of the 90s, with the spread of video games that can be played through the World Wide Web, in South Korea, where the state was the first in the world to recognize the importance of a purely entertaining activity that captured the interest of many young people. The Ministries of Culture, Sports and Tourism established the Korean E-sports Association, whose primary task has been to regulate and promote e-sports ever since. Esports are currently officially recognized in more than 60 countries, including China, the USA and South Korea.

Already in 2000, players were able to compete in ten tournaments, and the popularity of e-sports is evidenced by the fact that by 2010 the number of tournaments had grown to 260 per year, in South Korea alone. E-sports is an abbreviation for electronic sports, in fact it is a special combination of intellectual and technical sports, so this topic raises a number of technological legal questions.<sup>21</sup>

As Ákos Kőhidi put it in his publication on the topic, e-sports is a collective term for competitive (competition, racing) video games, where professional players and competitors compete with each other online or offline, at traditional events and organized competitions, usually for some kind of prize. Actually, the game is the competition. Video gaming at home as a hobby is by no means an e-sport.<sup>22</sup>

Artificial intelligence is already being used in esports. At the end of 2018, the world's first AI-based gaming coaching system was introduced. It aims to provide effective assistance to amateur e-athletes and help them improve their performance. The development is registered by a Hungarian startup. This system is nothing more than an artificial intelligence-based personal coach that develops the player by analyzing the videos recorded during gameplay. In addition

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<sup>21</sup> Nikolett Ágnes Tóth: Legal regulation of E-sports. Sports Law, 2020. I. Budapest, HVG-ORAC. 27.

<sup>22</sup> Kőhidi Ákos: Legal assessment of electronic sport (e-sports). In Medias Res, 2018, no. 2, p. 248.

to traditional statistics, the system provides tips and even practice exercises, thus contextualizing the player's performance and effectively helping to understand mistakes.<sup>23</sup>

For example, a sporting goods company has developed self-lacing shoes that automatically fit the shape of the foot and will be able to control the tension of the shoelaces with a smartphone. This is the latest futuristic shoe from the manufacturer. According to the company, this innovative solution will improve the performance of basketball players in particular, because it will no longer be necessary to loosen corsets to improve blood circulation in the feet. In addition, smart jerseys, smart vests, smart clothes, motion analysis systems, clothing with sensors and electronic sensors built into the material are constantly being developed, which record data.

Leicester City, one of only three Premier League teams, are working with futuristic technological innovation, artificial intelligence, among others, to process data about them and their opponents during the season. The three current podium finishers, Liverpool, Manchester City and Leicester City, are the most advanced in Europe, and perhaps the world, in integrating artificial intelligence into everyday processes.

*"The club uses IBM's artificial intelligence, Watson, which provides completely new ways to prepare a team. One of the most spectacular of these solutions is to place all the team's games in virtual reality, and with the help of a controller and glasses, any scene can be analyzed standing on the pitch between the players. This gives a new perspective to the coaching and analytical staff and, through them, to the players. From here, with a single click, they can get a new perspective: the track can be examined in 3D (with rudimentary graphics) in a top view, as if it were a giant terrain table. Behind him on the wall is the image of the original TV broadcast in sync so that they can analyse what happened on the track."*<sup>24</sup>

The program uses GPS data recorded about the players, is able to expand its own knowledge base about players and teams.

Interestingly, this platform also found the answer to exactly where the attacks come from, analysing data from the 2017-18 Premier League season, and found that 20% of shots on goal

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<sup>23</sup> Internet source: <https://startuponline.hu/mesterseges-intelligencia-mar-az-e-sport-edzeseken-is/> Retrieved 2020.04.22.

<sup>24</sup> Internet source: [https://index.hu/sport/futball/2020/02/21/futball\\_premier\\_league\\_leicester\\_city\\_watson\\_ibm\\_mesterseges\\_intelligencia\\_virtualis\\_valosag/](https://index.hu/sport/futball/2020/02/21/futball_premier_league_leicester_city_watson_ibm_mesterseges_intelligencia_virtualis_valosag/). Retrieved 2020.04.21.

started from throw-ins. As it turned out that throw-ins were a priority, Liverpool, which pays close attention to data analysis, signed a separate throw-in coach.

They are currently working on a virtual reality system in which players will be able to walk onto the pitch themselves with glasses on their heads and be able to position themselves anywhere.

An interesting fact is that there is already a team game developed by artificial intelligence called " speedgate", in which two teams of six play on a field with three gates, and players have to hit each other with a ball by bypassing the middle gate – the American soccer ball can be passed to each other with hands and feet.<sup>25</sup>

While there is no substitute for talent and expertise in football and other sports with IT, leading sports clubs around the world are also striving to modernize. Because what used to require many years of experience or special observation skills is now also known by technology. The use of certain technologies is also becoming more and more widespread in football: for example, goal-line technology to determine goals, camera systems and video applications to help refereeing decisions and check their regularity.<sup>26</sup>

## **5. Summation**

In the twenty-first century, innovation, technology and technology will completely transform and will significantly transform the world of sport.

The emergence and spread of new innovative solutions and digital technologies have fundamentally transformed sport-related activities, operating models and the entire ecosystem of sport in the last few years. The availability of large amounts of data, sensors, digital services and digital channels and communities are completely transforming the sports system; The widespread use of virtual and augmented reality devices is also gaining momentum<sup>27</sup>.

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<sup>25</sup> Internet source: <https://qubit.hu/2019/04/17/egy-mesterseges-intelligencia-feltalalt-egy-uj-sportagat-amit-mar-emberek-jatszanak> Retrieved 23.04.2020.

<sup>26</sup> Internet source: <https://www.portfolio.hu/gazdasag/20161230/robbanas-a-sportiparban-jon-a-hightech-tomegrendezvenyek-kora-241811> Retrieved 25.04.2020.

<sup>27</sup> Nikolett Ágnes Tóth: New information technologies and innovative solutions in the provision of sports events. JOURNAL OF JURISPRUDENCE, 76/2021 3,141.

Unfortunately, there are currently few digital solutions in the field of sport, the systematic and extensive use of digital technologies (both vertically and horizontally), and there are few professionals who know sport well but also have adequate digital knowledge, who can handle state-of-the-art IT systems and apply digital analysis methods at a skill level and with sufficient efficiency.

I consider it important to establish a digital education framework for sports professionals, to ensure the conditions for sports informatics training, and to establish many more university knowledge and research centres. The organisation of a sporting event on a digital platform also requires detailed regulations.

These technologies not only provide new training tools for professional and hobby athletes, but also lay the foundation for new sports and business models. The spread of digital solutions is particularly important in the field of youth education and talent management.

As a result of all this, the traditional concept of sport has loosened up very strongly, and today a large number of new sports are being formed, or old ones are differentiating on digital bases and electronic interfaces. The topic also raises a number of data protection questions, and the question may also arise as to whether chatbots, robots and systems operating on the basis of artificial intelligence will require less living human power, and whether all these can replace human labor. The next decade will provide the answer to this question, because what will define our lives ten years from now is unknown even to researchers today. Innovation and digitalization are transforming the world of sport to an unprecedented extent, providing lifelong research opportunities for those working on this topic.