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CONTENTS

2025/1-2.

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2025/1-2.

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PETR BENDL

Use of 3D scanning and modelling in forensic practice

Introduction

The development of computing and software has created a new field - 3D modelling. This is a three-dimensional display of a specific space or object using a computer. In particular, the development of computer games revolutionised both modelling and cinematography. It is interesting what the impact of a commercial field like the manufacture of computer games is. Consistent tools and products (computer programmes) can help the practitioner create a virtual space with realistic visualisation of the documented space.

A three-dimensional view, can also be called 3D modelling, has been widely used in many fields for several years. Spatial models of sites, in particular criminal events and objects created using a computer, provide diverse and comprehensive information of a visually informative type. In recent years, renowned European forensic laboratories have been intensively developing and applying technologies to help investigate and present the crime scene and related evidence in a 3D display.[1]

History

In general, one milestone in using 3D technology is developing imaging technology - whether different glasses or other visualisation devices, and

[1] Dolanský, T.: Lidar and airborne laser scanning. J. E. Purkyně University in Ústí nad Labem. 2004.
Source: http://wvc.pf.jcu.cz/ki/data/files/160lidaryweb.pdf.
Accessed: 13.05.2024 Acta Universitatis Purkynianae 99. University of J. E. Purkyně in Ústí nad Labem

not just for virtual reality. Another crucial factor influencing the development of this method is the development of imaging devices which, in different modes (automatically or manually) can capture the necessary scene or object for further display or analysis.

Morton Heilig (22.12.1928 - 14.5.1997) is considered to be the father of virtual reality. Around 1958, he started to create its first virtual reality machine, the so-called Senzorama (Figure 1). The instrument included various technical elements which gave the viewer a complete atmosphere of the projected event. The Senzorama used 3D stereoscopic displays. The first movie that could be seen was a recording of a motorcycle ride on Brooklyn Road. The viewer also blew the wind from the fan, giving him a sense of riding on the motorcycle. Of course, the use of technology and technical means appropriate to the time of the 1950's was obvious.

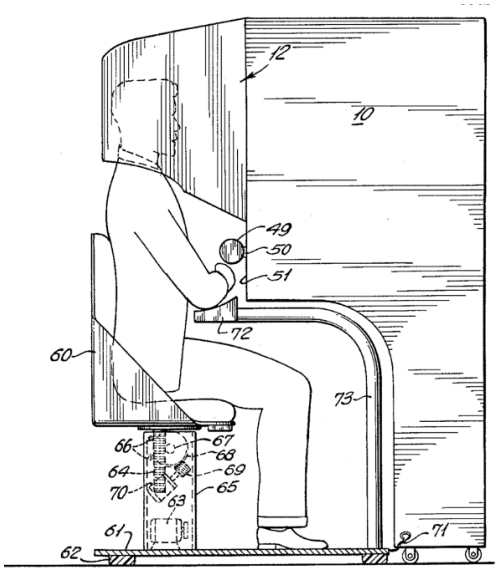

Figure 1
Sensorama (source: Internet)

Thomas Furness and his team continued to develop other visualisation devices. In the 1980's, they developed VR spectacles for the US military

and launched the redeployment of US military training to a world of virtual reality (Figure 3).

At the same time, Atari started offering various virtual computer games on the market, which began to fundamentally change the situation on the commercial market, increasing the possibility of using virtual reality for various non-commercial sectors.

In describing historical developments, the origins of developing 3D imaging technologies cannot be ignored. Around 1960, the first attempts were made to capture the plasticity of space using a combination of light, camera, and projector. It is only in the 1980s that some companies are starting to test their laser applications. Around 1985, structured light technologies known as LiDAR were developed. It is an acronym from the English term *„Light Detection and Ranging"*, which is freely translated to mean a light-measuring and detection device.

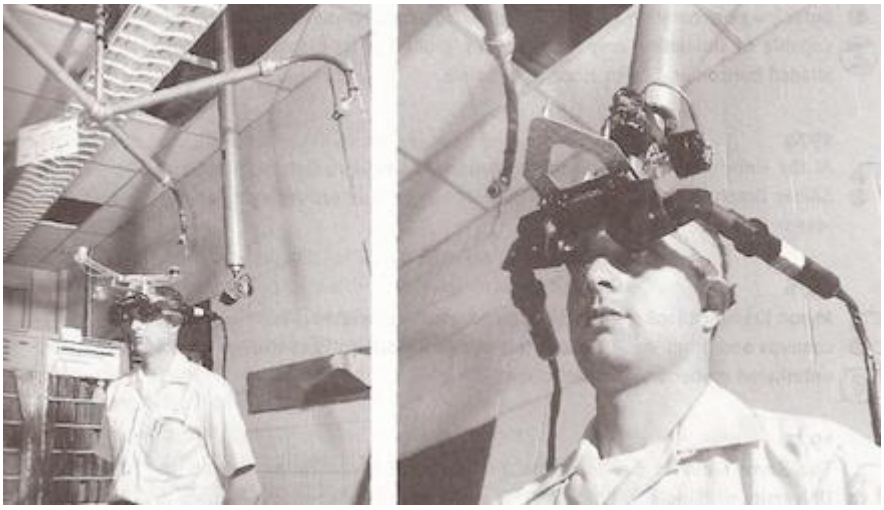

Figure 2
The first VR spectacles of Ivan Sutherland and Bob Sproulla

Figure 3
Furness's virtual reality glasses (source: Internet)

Basic concepts and description of the method

By understanding basic concepts, you can also understand the basics and description of the 3D modelling and sensing method. Basic terms and nomenclature:

- Model area - interest place or part of it (crime scene, scene of event, etc.) to be documented using 3D technologies.
- 3D scanner - a device that allows the user to create a 3D model of a model space or other object using different technology depending on their properties. It should be emphasized that scanners produce so-called dot clouds, which is a cluster of points of the known coordinate (XYZ) and its colour. In addition to the technologies used, scanners can be divided by types. The following scanners appear to

be most appropriate for documenting the location of the event and for scanning different objects (e.g., for expert examination):

- Touch scanners - the probe „grabs" the object and transmits its properties over the mechanical arm to the sensor. This type of scanner is useful for scanning small objects. The advantage of this is that a good scan of the subjects can be created while laser scanners have a problem (glossy surfaces, translucent objects - glass, etc.). Sometimes these types are referred to as CMM scanners (Coordinate Measuring Machine).
- Optical scanners - they operate on the principle of photogrammetry. Any camera can also be used for scanning. The 'Light Pattern Projection'[2] method uses a stereo camera model for 3D scanning, which is firmly installed (either in a compact device or freely, but in a known relative position). The object is projected with light patterns (typically in an invisible radiation spectrum) that provide their own structure on the object's surface. Cameras record pattern distortions on objects. The points of the model are then recalculated based on the known location of the cameras and the information from the light pattern falling on the object. Structured light scanning is used e.g., in facial recognition technologies.[3]

[2] Structured Light Scanning

[3] Jena Karl Zeiss: 3D Scanning with Blue LED Fringe Projection. ZEISS COMET. Dostupné z. 2020.
Source: https://www.zeiss.com/metrology/products/systems/optical-systems/3d-scanning/zeiss-comet.html#technicaldata
Accessed: 04.08.2023

- Laser scanners - this type of scanner works on a similar principle to optical scanners, but with the difference that no structure needs to be projected on the object. This is actively illuminating a scanned object (space) with a laser beam, and the light reflected from the object is taken by the camera. Subsequently, the instrumentation shall calculate the flight path of the beam, which shall be reflected on the surface of the object. These devices are not dependent on the illumination of the scene or object. However, they are affected by the surface material of the object. Some reflect a beam very poorly (e.g., glass, mirror). This type includes a camera that collects colour information about areas in its field of view. First, the captured information describes the distance to the surface at each point of the image, which allows identification of the three-dimensional position of each point in the image but also includes information about the object's property (colour).

– 3D scanning— scanning a space or object using a 3D scanner, where the real image is converted to a raster format (e.g., „Point-Cloud"). The captured points (so-called point cloud) carry certain properties (XYZ coordinates and point colour). In general, multiple scans from many different directions are needed to display the scene in an effective way. These scans need to be transferred to the common reference system, a process commonly called registration. It is then merged to form a complete 3D model.

Use of the method in forensic practice

The use of 3D technologies, especially 3D scanners, and the subsequent modelling of the focus space is broad. All available procedures and methods can be applied in forensic practice as in other fields (e.g., reverse engineering, geodesic, forensic archaeology). These can be used to simply

document the model space (of varying size) or further analysis and comparison with other available information will be carried out.

Figure 4
Artec Leo scanner (photo: Artec)

Figure 5
FARO Focus S150

Two kinds of usage are applied in the Czech Republic. The permanent group of the Regional Police Directorate of the Zlín Region conducts a scan at all visits to crime scenes which are requested by the police authority. The result is a simple export to html format in a FARO scene environment or a defined-pass video. In contrast to this, the Institute of Criminalistics is developing comprehensive documentation in case of special requests from the police, the Military Police or other state authorities. As in Zlín, the Institute's department is processing basic documentation. Further analysis is conducted based on further requests from the police authorities.

Practical examples of the use of the method in forensic practice

Some possibilities for using 3D technologies for criminal proceedings can be presented using several cases worked out.

Shooting at a bar in western Bohemia: one of the guests began to threaten visitors and the bar with a firearm, from which he fired. The police requested, on the one hand, an expert opinion from the ballistics field and an analysis of three security cameras were presented for the comparison, which was combined with the model of the bar. Using universal models of the character of the human body, every person on the record, including the shooter, was positioned within space. The basis for the ballistic expert's opinion was distances measured between individuals and the range of projectiles. Essential information not only for ballistics was the renewed position of the barkeeper and the track of the projectile that ended up in a mirror on the wall at an exceedingly small distance from the barkeeper's head, but video recordings of security cameras in the shooting area. Another requirement was to compare video records with a 3D scan of the bar space subsequently created. A complete scan of the area was made at the crime scene. It was about 15 x 15 meters in size, but very subtle, with many chairs and tables spaced unevenly. A total of nine scans were performed on site. A record of 3 security cameras were presented for the comparison, which was combined with the model of the bar. Using universal models of the character of the human body, every person on the record, including the

shooter, was placed in the space. The basis for the ballistic expert's opinion were distances measured between individuals and the range of projectiles. Essential information not only for ballistics was the renewed position of the barkeeper and the track of the projectile that ended up in a mirror on the wall at a very small distance from the barkeeper's head.

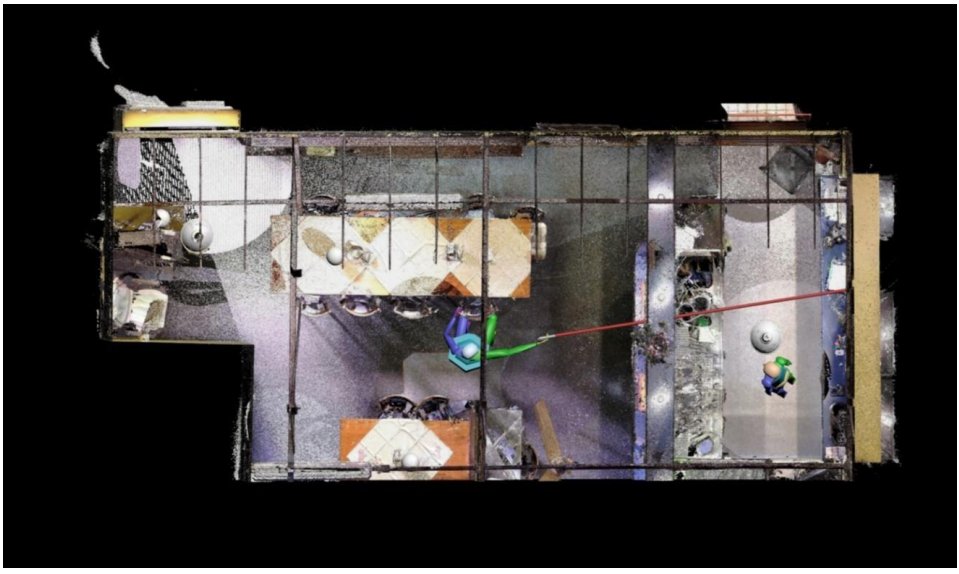

Figure 6
Plan of the model space showing the position of the shooter and the operator and the track of the projectile — without others

Some negative circumstances have been identified which may affect the processing of the 3D documentation and the subsequent comparison with the security camera records. The effect is primarily the security camera using its resolution, and the lens used. Cheaper cameras use both low resolutions, thereby degrading the stored footage, but they are equipped with lenses with short focal distance, the so-called fisheye. This type of lens is distorted by the lens' curvature. This has a negative impact on the final image and its application to the exact 3D model. The operator must either

edit the image in another digital image data processing programme (such as Adobe Photoshop) or count on it.

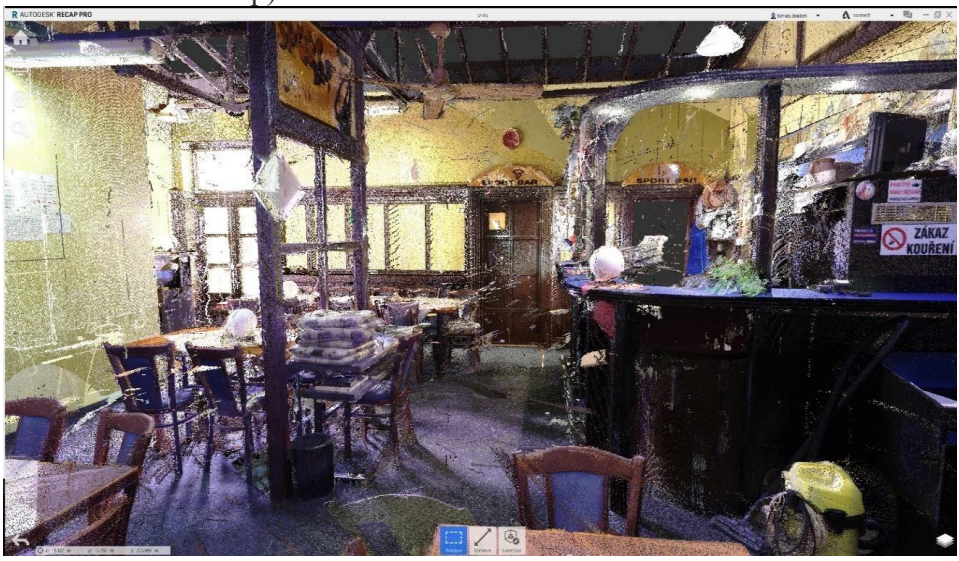

Figure 7
Crime scene view - Scanner exit - Combination of a cloud of points and photos in Recap (f. Autodesk)

Shooting into the window of the flat house: an unknown perpetrator fired into a window in an elevated floor of the flat house in a densely populated part of the city. The projectile passed through the window and stopped in the living room's ceiling. The task was again to prepare an expert opinion in the ballistics field to report all available findings and to determine the position of the shooter. The interest area had been taken by 3D scanner, the space in front of the house and, consequently, the area of the flat affected by the shooting.

After scanning the entire model space, the trajectory points of the projectile track were marked. The ballistics expert, based on this information, created several possible versions of the scenario for how the shooting could have occurred. After a thorough analysis, it was concluded that there were only two options. The first option was that the gunman standing in front of the house fired an unnamed shot toward the affected window. The second

option, less likely, was that the shooter was sitting in an unidentified motor vehicle, shooting from him toward the window. The 3D model's practitioner made a focus and identified possible trajectories of the projectile. Everything was done on the 3DsMax programme. As a result, it was very unlikely that the shooter was sitting in a motor vehicle, given the height of his arm where he would hold the gun.

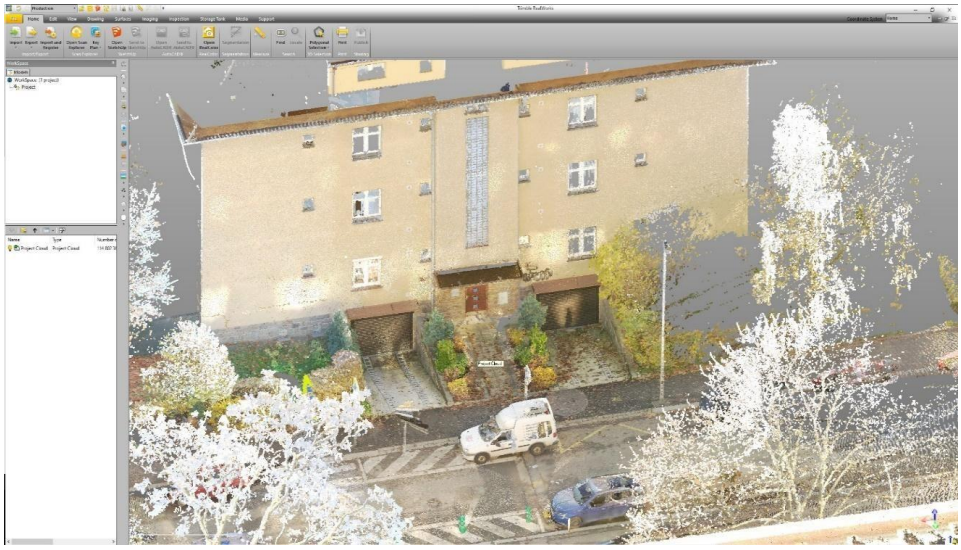

Figure 8
A cloud of points from the scene of the shooting - a general view of the crime scene after exporting the data from the scanner and its basic processing

The first option was confirmed after the figure had been incorporated into the front of the house. Based on general information on the attitude of the shooters, ballistics experts determined the height of the figure to be about 170 cm. As a result, an exceedingly small space was demarcated and shot. The area was limited by the width of the sidewalk, where one edge was embossed by the curb of the road and the other end by the garage in the basement of the house. From the shots in the window and in the roof of the flat, the trajectory was defined precisely, which together gave a specific definition of the shooter's space. The mere variability of the height of the

shooter, which was exceedingly small in size, with a maximum of 5 cm in standard shooting skills (height of gun possession, etc.), remained.

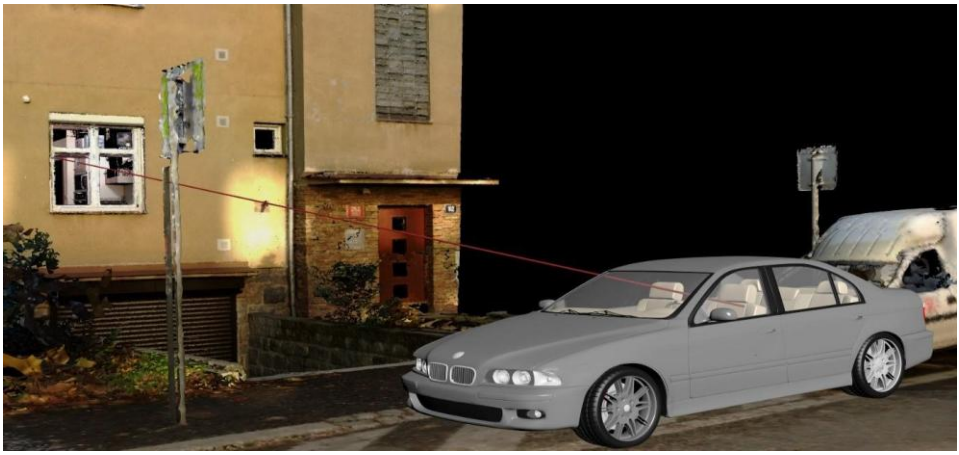

Figure 9
Shooting trajectory — provided the shooter was in a motor vehicle

Another option that allows 3D documentation technologies is to determine the height of the person, dimensions, or position of different objects. The essence is to analyze image (dynamic or static) records on which the object being examined is well captured. Good visibility is essential, if possible, without any cover. Abroad, analysis of image records and subsequent evaluation using 3D applications are commonly used.

Figure 10
Trajectory of the projectile track and position of the shooter — provided that the shooter was standing on the sidewalk in front of the house and he was 170 cm high

Figure 11
Trajectory of the projectile track and position of the shooter — provided that the shooter was standing on the sidewalk in front of the house and was about 170 cm high

The death of Jan Masaryk: in 2020, the investigative bodies demanded that the body position of Czechoslovak politicians should be determined after its fall out of the window using 3D technologies. Photos of the crime scene were available. 3D scanning was done at the scene of the disaster's fall. Then a comparison of the wireframe of the crime scene with the scan of photographs from the crime scene was made. A large number of environmental reference points that had not been changed significantly since the event, have been used for comparison, A human body model has been placed in the formed wireframe of the site of the finding and has been modified and directed to the compressed photographs of the body lying on the pavement. A follow-up examination and comparison with the autopsy protocol found that the measured height of the person in the 3D Studio Max and the information obtained from the autopsy report varied by only 1 cm, which is less than 1%. For example, the Dutch NFI (Netherland Forensic Institute) Imaging Analyses Site is working with an error of around 3%, provided that images or other image records of the person or other object are in an ideal state[4], which means that:

- the person is clearly visible and is not bent or in any other unnatural position,
- the person is large enough in the pictures (video),
- the resolution of the recording is of sufficient quality to produce a person's detail without the impact of the image noise or resolution (individual pixels),
- the shot is taken by a camera with a lens without distortion,
- without any other significant effects on the quality of processing.

[4] Edelman, G., Hoogeboom, B. Albering, I.: Comparison of the Performance of Two Methods for Height Estimation. Journal of Forensic Sciences, 55(2), 2010. p. 358-365 DOI: 1556-4029.2009.01296

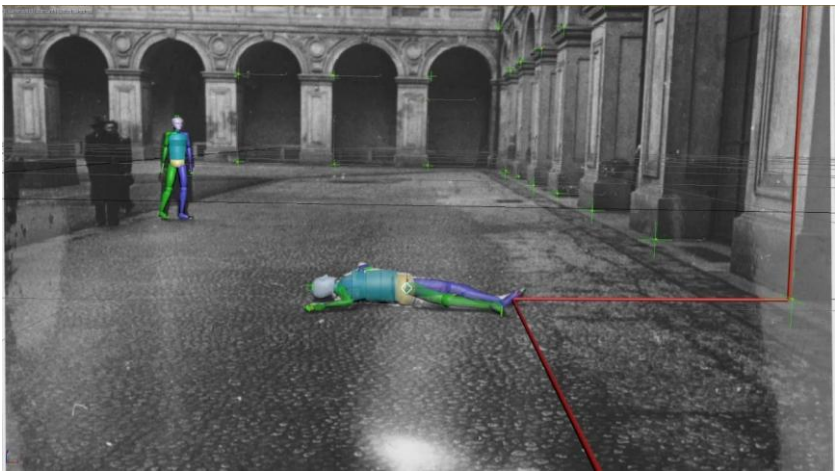

Figure 12
Photo comparisons from the crime scene scan (10.3.1948) and crime scene scan (10.3.2020)

Figure 13
Resultant model produced by photo-composting and crime scene scan

Figure 14
Resultant model produced by photo-comparisons and crime scene scan

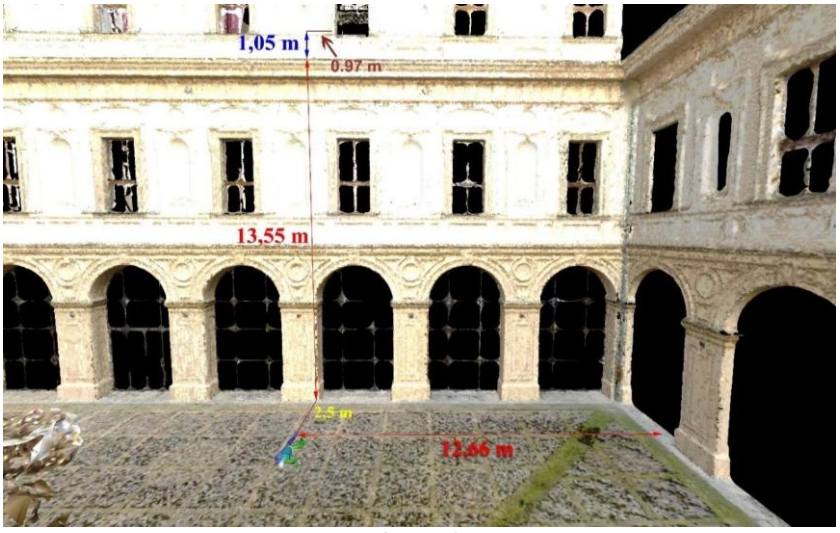

Figure 15
Resulting model created by the combination of photographs and scan of the crime scene, including the fundamental dimensions of Jan Masaryk's position

Analysis using 3D technologies is one of the applicable methods. It is widely used abroad. At the beginning of this century, the method of photogrammetry was used to create a 3D model of the site. In practice, analogue methods may be encountered to determine the physical characteristics of persons or objects.

Further application of 3D scanning and modelling can be found in anthropology or forensic archaeology. Foreign institutions (Switzerland, the Netherlands, etc.) routinely analyze the emergence of various injuries for forensic biomechanics. The cooperation of the forensic doctors of the Zurich Institute of Medical Medicine at the Zurich University Hospital and 3D Zentrum Zurich uses each other's knowledge and uses the possibilities of 3D modelling and scanning. The workplace routinely scans damaged parts of the human body for forensic medicine or collaborates closely on a project called virtual autopsy (virtual autopsy).

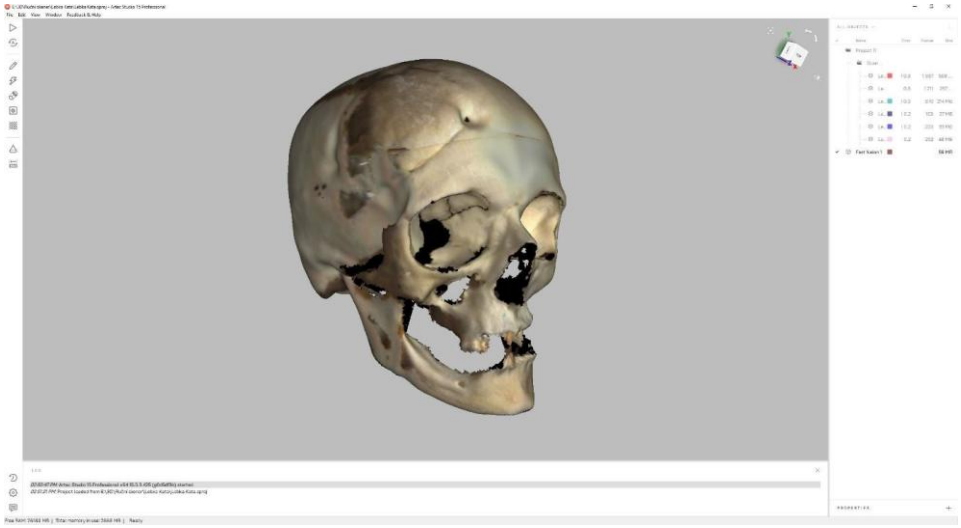

Figure 16
Human skull scanned at the Institute of Criminalistics using the Artec Leo hand scanner

Benefits of using the method in forensic practice

As with previous methods described, the 3D documentation is characterized by the objectivity of the data presented in the location, applying the recommended procedure. Objectivity is reviewable for the method described, which ensures that the results of the police authorities' activities are protected against any doubts when using this method forensic documentation.

The operator of the sensing apparatus shall not be able to intervene in the process of sensing and subsequently basic processing of the data If an operator wants to intervene in a process in some way, it can do it, but with the result of unprocessed final data. This will be reflected in the impossibility of presenting the results of the scan. Therefore, in this method, the rule is that either everything is processed correctly, and the result can be published, or the result is incorrect and unpublishable. The operator may be able to influence the accuracy of the processing (e.g., poor configuration of the scanner) by its approach, but this can simply be detected either in the final visual output or in the report produced by the processing programme. It can therefore be concluded that this method of forensic documentation is objective and safe.

Another great advantage is the high accuracy of the scan. The principle of the method and the technical parameters of the scanners can derive high processing accuracy. If the correct procedure is followed, the adjustment is correct and, above all, without negative interference, the accuracy of the scan can be achieved below 1 mm for stationary scanners. As with photometry, forensic documentation can be created with high precision. Very precise results and outcomes are essential for analysis or outcomes for further expert examination (e.g., ballistics, anthropology).

Stationary scanners can be seen as having a major advantage in the scope of scanning. These are fixed to the tripod, and can scan within a 50 m radius to achieve high accuracy depending on the type of instrument.

The three-dimensional documentation brings spatial sensation to classical documentation, which increases understanding of the scene and possibilities for the presentation of the scanned space, objects, and forensic evidence. The 3D documentation allows the observer to move around the virtual location - the scene taken, when using means for display (e.g., VR spectacles). A person who had never been to the scene of a scan can thus see the area as if it were real. In a virtual scene created in this way, it can move freely, viewing all the objects you have captured. Unlike spherical frames, the 3D view is enriched with additional added value.

Disadvantages of using the method in forensic practice

The deployment of 3D technologies in forensic practice, for crime scene documentation, events or as a means of documenting an expert's investigation, does not involve any significant negative aspects in case it is conducted in accordance with good practice and with objective documentation processing. The operator shall avoid modifying the acquired data, in particular, at higher stages of processing, and shall be appropriately trained to use all available technologies and processes.

A negative factor may be the high cost of purchase of the necessary technology and, where appropriate, additional mandatory costs for maintaining the serviceable equipment (in particular, the SW licensing policy is currently set to rent out the SW for a limited period). Here is the need to acquire 3D technologies and then use them. After reading the previous text, it should be clear to readers that these methods cannot be used to document scenes of volume crime. In some cases, only documenting using a 3D scanner can be done without further processing, if necessary.

Conclusion

The use of 3D technologies in modern forensics has its position and is only a matter of time to what extent, and how long it will take to use all its available functions and strengths.

Development in Europe makes the case for using 3D imaging and imaging technologies clear. As well as the demands of the various Czech Police stations, which are interested in good quality and, above all, precise documentation of the location of the event (whether it is a crime or a traffic accident or other events).

In this article authors provide information that can be further used by readers. Especially for those seeking information on the possibilities of 3D systems, not only those used for documentation (3D scanners), but on the way forward in processing (so-called postprocessing). When acquiring the necessary technology, it is important to consider the timescale, and particularly the minimum technical facilities. You cannot expect immediate results with a simple 3D scanner. In the case of 3D modelling, and in particular visualisation with the possibility of good quality telling output, you should be aware of everything described in the previous text. Without being aware of both the technical and the time-consuming nature of the results required, the results cannot be achieved.

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Criminalistical and criminal procedure law lessons of a knife homicide

Introduction

After the noon bell, László Cs. said goodbye to his mother and left their apartment in Mohács (town). On March 19, 2004, at 12.30 p.m. on this seemingly ordinary Friday, it did not even cross his mind that this would be his final farewell. He returned at 2.45 p.m. He found the door closed but not locked. Sensing something was wrong, he cautiously entered their home. He first looked around in his own room. His wallet was missing. However, a more serious problem awaited him in his mother's room. Lying on the bed, lifeless, having bled out.

The initial data

The immediate responders, including paramedics, police, and forensic experts, determined that Józsefné Cs.'s death was caused by 17 stab wounds. The multiple attacks targeted the right and left lungs, the heart, chest, abdominal cavities, and liver. Almost all the wounds were fatal or at least life-threatening. The perpetrator showed no mercy, exerting great force and causing suffering beyond the usual, giving no chance of survival.

The inspection committee started working at 5.30 p.m. and found blood-like stains on the hallway floor. Initially only a drop was noticeable but as they proceeded towards the living room, more spots appeared. In the victim's room blood-like stains were discovered on the wall behind the desk, on the large and small pillows decorating the bed, on the bedsheet, and on the white curtain that was hanging on the door.

The 64-year-old woman was wearing a blood-soaked blueish-green bathrobe. According to the attending police doctor, the suspected murder weapon was a 10-20 mm wide stabbing instrument, with an approximately 15-20 cm long blade, which the perpetrator most likely used with their right hand.

The inspection committee noted that the room, and the apartment in general, appeared relatively tidy, with no signs of it having been rummaged through. In addition to the blood-like stains, partial fingerprints and palm prints were also recorded.

Investigation process

Data collection, witness interviews

Simultaneously with the inspection, the investigative authority initiated a data collection and the search for witnesses.

Cs. László's testimony also contained valuable information. He mentioned an acquaintance who had previously asked him for a loan, and he had heard that this person had done the same with others. For example, he tried it with H. György as well, with whom he was sitting in a car when they spoke on the phone that day. Additionally, he provided details about the denominations of the stolen banknotes, which amounted to nearly one million forints and were hidden in a wallet in the drawer of his nightstand.

K. Kálmán, the victim's neighbour, testified that around 12.50, he was heading down from his second-floor apartment when he saw an unfamiliar man in front of the ground-floor apartment of an elderly woman in the building. The young man was just leaving at that moment. He also clearly saw that the victim was still standing in the doorway of her apartment, unharmed. In the basement, the witness also noticed that the unfamiliar man had arrived by bicycle. He was pushing his bike out when his phone rang. The witness, who inadvertently overheard the conversation, recalled hearing the word *„mother”* from the discussion.

He gave a detailed description of the cyclist. The description was so accurate that it closely resembled Viktor B., who lived about 150 metres from the victim's home and was quickly identified.

György H. had thoroughly questioned his friend, László Cs., with whom he had been to Baja (town) on March 19, about what could have happened to his mother, who might have done it, and who could have taken the money. During their afternoon conversation, two names came to mind. One of them was Viktor B., who had asked both of them for a loan and had called László earlier that day, while they were near Bátaszék (town) in his car. György H. immediately reported this to the police.

They detained Viktor B., just before midnight on March 19. He was 29 at the time, 187 cm tall, right-handed with no criminal record, single, childless, a high school graduate, trained as a painter-decorator, had recently quit his caretaker job and financially broke. During his questioning, he stated that he had spent that day playing at the local casino. He left in the afternoon and spent the rest of the day with his girlfriend and one of his friends.

Seizure, (house) search

On the day of the incident, the police seized all video files from the riverside Casino that featured Viktor B. Based on these, it was established that he arrived at the Casino on March 19, 2004, at 8.46 a.m. At the time, he was wearing black sweatpants, a light-colored Nike t-shirt, and a dark blue hoodie. He left the gaming area at around 12.39 p.m. Before leaving, he placed his chair over the slot machine, which, according to casino rules, indicates that the player intends to return.

At 1:49 p.m., he returned, set up his chair, sat down, and resumed gambling after taking banknotes out of his pants pocket. By this time, he was wearing different pants, a light-colored t-shirt, and a hoodie with two stripes (unlike the previous hoodie, which had no such design).

At 2:25 p.m., he left the building, leaving the chair in its original position and not placing it over the machine.

On March 20, in the early hours following the first witness interview, the investigative authority conducted a (house) search at Viktor B.'s residence. During the search, they found HUF 808,400 in cash. They seized his footwear, sweaters, t-shirts, and tracksuits, including those that were freshly washed and drying.

No potential instruments of the crime or sharp objects were found during the search. However, it was determined that the denominations of the seized money matched those listed by László Cs.

Polygraph examination

Viktor B. agreed to undergo a polygraph examination ordered to verify the credibility of his testimony. During the examination, a set of general questions and three so-called *„peak of tension"* tests were applied. According to the expert advisor, during the general question test, Viktor B. provided deceptive answers to two questions based on observed physiological changes.

The questions were as follows:

1. Do you know who stabbed Cs.'s mother? Answer: „No."
2. Did you stab Cs.'s mother? Answer: „No."

In the *„peak of tension"* test, the subject was presented with multiple-choice answers while their physiological reactions were monitored using the device. In the first instance, the possible locations of the stolen money's original hiding place were listed.

In response to the „nightstand" option, his body exhibited a reaction that indicated recognition of the critical item in the test.

According to the expert advisor – despite his denial – Viktor B. knew that the perpetrator had taken the money from the nightstand.

The following series of questions concerned how many individuals were involved in the murder of Cs.'s mother. The number of individuals was listed in a mixed order, ranging from 1 to 7. The strongest reaction was recorded for the single perpetrator scenario, but the intensity of the reaction was not considered exceptionally high.

The following series of questions concerned whether the witness knew what the perpetrator did with the knife after committing the act. No strong indications were recorded for any of the options. However, a weak reaction was registered for the options *„9. threw it in a trash bin”* and *„11. discarded it along the road”*.

Forensic chemist's opinion

The appointed forensic chemist determined that the dark blue polyester fibers found on the bathrobe belonging to Józsefné Cs. originate from a fabric containing fibers of the same quality as those found in the dark blue polyester fibers of the Arena-brand sweater seized from Viktor B.

Additionally, the blue-green polyester fibers found on the Nike short-sleeve t-shirt, the Nike-branded black sweatpants, and the Arena-brand dark blue hoodie seized from Viktor B., as well as the left shoe with the VANS logo found during the house search, originated from the fabric of the bathrobe provided by Józsefné Cs., which contained fibers of the same quality.

The expert later supplemented their opinion, stating that the number of embedded fibers found on the surface of the examined clothing items was small, suggesting that the contact was either over a small surface area, for a short duration, or with weak force. Therefore, it is highly probable that the fiber embedding could have occurred simply by Viktor B. walking past the victim.

Fingerprint expert's opinion

The fingerprint experts primarily examined the banknotes found in Viktor B's possession, but no visible dactyloscopic traces were detected on them. After this during the crime scene inspection they compared three fingerprint fragments and five palm print fragments collected by the forensic technician, with the fingerprints and palm prints of Viktor B., Józsefné Cs., and László Cs. It was determined that the prints did not originate from any of them. A search among individuals in the criminal database also did not give any matches.

Investigators' conclusions

Based on the obtained electronic data, investigators concluded that Viktor B. first left the game room at 12.40 p.m. and returned at 1.47 p.m. During this nearly one-hour, – as Viktor B. himself stated – he spent about 15-20 minutes at his apartment, and the bike ride back from the apartment to the casino, timed at 15 minutes, was verifiable. Out of the 55 minutes within the time frame during which the crime likely occurred, Viktor B. could only account for 30-35 minutes, leaving approximately 20 minutes of unaccounted or questionable activities

(Potential) suspect interrogations

Viktor B. was questioned by the police several times, both as a suspect and as a witness. After his first witness testimony on March 19, a search of his apartment in the early hours of the 20th led to the discovery of 808,400 forints in cash. He claimed that it was part of his inheritance from his father, who passed away in August of 2003. On both occasions, Viktor B. maintained that he had not committed any crime.

Later, the investigators confronted him with the gathered information: On January 27, 2004, at the K&H branch in Mohács, Viktor B. received his

share of the inheritance from the sale of his father's house, which had been purchased by a local resident, János P. The buyer testified that on January 27, 2004, he paid 5,000,000 forints, which he handed over in denominations of 20,000 forints. 2,600,000 forints were immediately deposited in the bank to settle the mortgage on the house. Because of his two brothers, Viktor B. received one-third of the remaining 2,400,000 forints, meaning 800,000 forints. From this inheritance, he paid his 360,000-forint debt to György H. resident of Mohács, as well as other debts to Károly T. and László Cs. Therefore, it is unlikely that 800,000 forints from the inheritance remained.

Investigators also informed Viktor B. that by February 2004, his account balance had dropped to just 1,107 forints, and since early 2023, no deposits had been made.

They further revealed that, after spending the roughly 1 million forints from the inheritance, he had borrowed money from several individuals, for example György H. Based on phone records, Viktor B. called his previous lender, György H., at 12.41pm on the day of the crime, who informed him that he was not in Mohács and could not lend him any money.

At 12.52 p.m. Viktor B. got a call from his mother, who had divorced his father in 1982 but maintained contact with him. This conversation took place in front of the victim's home and was the one that Kálmán K. overheard.

Investigators also informed Viktor B. that, according to the testimony of T. Károly, Viktor B. had asked him for a loan of 100,000 forints on March 18, the day before the crime, but only received 50,000 forints, which had not yet been repaid. When asked why he needed to borrow 50,000 forints despite, according to his own testimony, having 800,000 forints from the inheritance (which had been seized from him), his response was, *„I cannot answer that."*

He was also unable to explain why, on the day of his interrogation, he had also attempted to borrow money from György H. and László Cs. if he still had a large amount of inheritance cash.

Confession

During his third interrogation – which was his first as a suspect – on March 29, 2004, Viktor B. made a confession. (From this point on, the defendant was also in detention.)

In his detailed, video-recorded confession, made in the presence of his appointed attorney, Viktor B. emphasized the following key points: On March 19, he stayed at the casino until about 12.00. After that, he called his friend, György H., who informed him that he was out of town. Viktor B. then biked to the home of László Cs., – who also dealt with lending money – and whose telephone number he did not know. However, he only found László Cs.'s mother at the ground-floor apartment, who informed him that her son was not at home. Viktor B. then walked out of the house, and as he was doing so, he even encountered a resident with a beard whom he did not know. He biked home and put his bike down. Then after a few minutes, he walked back to László Cs.'s home. Once again, Laci's mother opened the door. To his question she replied that Laci was still not home. Viktor B. then explained that he had come for a loan, to which the mother angrily replied something along the lines of, *„I'm fed up with young men asking for loans, they'd rather go and work."* At that point, Viktor B. took the wooden-handled knife from the plastic bag he had brought with him and stabbed the woman, first in the hallway and then multiple times in her room, after she collapsed onto her bed while trying to defend herself.

Then, in the bedroom, from the drawer next to the bed, he took the wallet containing several hundred thousand forints. He had previously seen László Cs. take money from there. He did not lock the apartment's front door, just closed it. He walked home, put his bloody clothes in the washing machine, and started the cycle. He hid most of the money in the sleeve of one of his shirts hanging in his wardrobe.

After this, wearing different clothes, he biked back to the casino.

In his detailed confession, he also mentioned that he took the knife from his kitchen after the first visit and went back to the victim's apartment with

it. During his second visit, he got into an argument with the mother because she was fed up with the money-related issues. Holding the knife straight the defendant stabbed the woman in the chest with his right hand, who began to back away. He stabbed her another four or five times. Then, he got so out of his mind that he couldn't recall any further details of the attack. Afterward, he went to Laci's room, where in a drawer he found a wallet that he took because he saw that it had lots of cash in it. In addition to the wallet, there was also 40,000 forints on the small cabinet, which he also took. As he was leaving the apartment, he realized that the door had remained open the entire time, as the attack had started in the hallway and continued in the living room, so he had not paid attention to the door behind him.

When he got home, he immediately put his clothes in the washing machine and then left to go to the casino again on his bike, taking a detour past the cemetery and the shore of Danube. On the way, he threw the wallet into a trashcan and the knife into a pile of garbage somewhere near the Mohács public cemetery.

At the casino, he adjusted his chair back to its normal position and resumed the game he had left earlier. By around 2.30 p.m., he had lost the few tens of thousands of forints he had with him. He headed home again, this time leaving his chair in its usual resting position.

With the remaining money, he ordered pizza to his apartment, which he ate with his girlfriend, and then later, he bought a cannabis cigarette from an acquaintance, which he smoked with a friend around 5 p.m.

He revealed that he occasionally smoked marijuana but was not an addict. He explained the traces of drugs in his urine with his consumption that day and two weeks prior.

He also talked about how he had spent his father's inheritance on his gambling addiction – which had been ongoing for about five or six years and for which he had voluntarily sought psychological and group therapy treatment, though he stopped attending and did not complete it – and used it to repay his previous loans. By March 2004, his inheritance was gone.

This is why he had to ask for loans to continue gambling. He had tried to borrow from György H., but he wasn't in Mohács, so he intended to turn to László Cs. When he wasn't home either, Viktor B. returned to his own apartment. There he took the weapon used in the crime, a large kitchen knife.

He gave a very detailed description of the moments of the crime, his departure, what he did at home, where he hid the money, the detour route he took on his bike to the casino, and how, where, and when he disposed of the evidence.

Following his confession, during the immediate crime scene interrogation (referred to as a „scene investigation" at the time), he voluntarily demonstrated his routes. He showed the way to the victim's apartment, then back to his own home, and his cycling route to the afternoon casino. He tried to show the locations where he discarded the wallet and the knife, but neither the person giving the testimony nor the authorities were able to find those items. (Meanwhile, there had been five waste collection rounds in that area.)

He maintained his confession during the court hearing on March 31, 2024, related to his detention, as well as during the consecutive suspect interrogations on April 15 and May 25, 2004. On May 24 and June 23, 2004, he refused to give a testimony.

Changing the confession

On July 14, 2004, however, Viktor B. changed his confession. He denied the homicide, admitting only to the theft. In his new defence story, he stated that although he was at the victim's apartment on March 19, but he only wanted to ask the victim's son for a loan. According to him, when the victim informed him that her son was not at home, he made up a „CD story", claiming that he just wanted to retrieve some CD's he had lent. Because of this excuse the woman let him into the apartment. He took the wallet from the partially open nightstand drawer in László Cs.'s room, without the

woman noticing (as she remained in the hallway). As he was leaving, he told the victim that he had found the CD and was taking it with him. He then said goodbye and left the apartment and the building.

The part of his testimony where he told how and how many times he stabbed was not retained because, *„I didn't do it. The police told me how it was, I just told it the way they told me how it was. I listened to what they said, and I took it back."*

After arriving home, he immediately changed his clothes, replacing the sweatshirt, pants and T-shirt he had worn during the day. He immediately put them in the washing machine to wash them.

Asked why he did this during the day and why he only put these three items of clothing in when the laundry basket was full at the time of the search, he said that he had sweat, had used it before and the smoky, unventilated play area made it smell unpleasant.

He explained the transformation of the fibers identified by the forensic chemist by stating that when he was heading to the small room and passed by the victim, who was standing in the hallway, a frictional, incidental transfer of material remnants could have occurred between the victim and his clothing.

He explained why he had confessed earlier by saying that both he and his family and relatives had been alarmed by serious threats to his life. He was afraid of threats and revenge from László Cs. and György H. that they would kill him if he committed the murder. He therefore felt protected in pre-trial detention.

Graphologist expert advisory opinion

In the case of Viktor B., the graphologist summarised his findings as follows:

„He may be considered a perpetrator in the case of homicide committed against Józsefné Cs."

Forensic psychological and neuropsychiatric expert opinion

Based on the psychological examination carried out, the expert concluded that he had observed significant defensive behavioural strategies in Viktor B. Both outwardly directed antisocial aggressive manifestations and auto-aggressive tendencies were evident in his behaviour. There were no spontaneous emotional or verbal manifestations of his responses to questions during the study. He gave strictly edited, short answers. A peculiar emotional colourlessness and a certain lack of emotional resonance were noted in his case, with a tendency to conceal several events that came to his knowledge during the interview with the criminal investigators.

It can also be stated that the examined individual has a low sense of morality and ethics, which is combined with heightened emotions and aggressive impulsive tendencies.

The forensic psychiatric expert concluded that Viktor B. does not currently suffer, and did not suffer at the time of the commission of the act charged, from a pathological state of mind which would render him incapable of, or limit, his ability to recognise the consequences of his act or to act in accordance with his recognition.

The evidence of drug addiction indicates that he is an occasional drug user. Based on the history of the offence and the expert's examination, the motivating factor for his offence was his addiction to gaming machines.

In addition, the expert noted that he is significantly influenced by the motivation of childish needs and desires, has a low tolerance for frustration and therefore tends to react to lower than average levels of frustration with violent emotions and impulsive reactions. These personality traits have also contributed to the development and course of his current behaviour. However, according to the available data, the presence of a state of impulsivity is not considered to be a pathological state of impaired consciousness and therefore does not constitute a limiting factor in the recognition of the consequences of his actions or in the action to be taken in response to that recognition.

The court phase – decisions, legal remedies

The indictment by the Chief Prosecutor's Office

The Baranya County Chief Prosecutor's Office charged Viktor B. with murder committed with malicious intent and extreme cruelty (Criminal Code Section 166, Paragraph 2, Points b) and d)).

The first-instance judgment of the Baranya County Court

After a five-day evaluation of the evidence both individually and collectively, on September 20, 2005, the Baranya County Court found the defendant guilty of the charges. Therefore, the court sentenced him to life imprisonment and 10 years of disqualification from public affairs. The court ruled that the defendant is eligible for parole after serving a minimum of 30 years. (During the investigation, László Cs. was reimbursed 808,400 forints by the authorities. His additional civil claim was directed by the court to be resolved by other legal means, and the defendant was ordered to pay the criminal costs in the amount of 1,361,874 forints.)

In its reasoning, the court explained that all the injuries of the 171 cm tall victim were direct and life-threatening, caused by a sharp-edged weapon. It was likely a large knife. The injuries to the limbs were considered defensive wounds, and no other injuries indicating further assault were found on the victim. All stab wounds occurred while the victim was still alive, and the death was caused by acute haemorrhage as a result of the victim's injuries.

The stab wounds on the back of Józsefné Cs. – which were more seeping than splashing – resulted from additional assaults on the victim, who was already weakened and leaning head forwards. Due to the vital organ injuries and internal bleeding, not even immediate medical assistance could have saved her life, she had no chance of survival due to the numerous and severe injuries sustained. Each stab wound to the thoracic and abdominal cavities would have caused fatal bleeding even on their own. The victim's

injuries caused extreme pain and suffering, and death occurred within five to ten minutes.

The indirect evidence formed a closed chain, and they were supported by the defendant's multiple, detailed and uninfluenced confessions. The later altered testimony – made nearly four months after the initial confession – was deemed unacceptable. The court did not accept the defendant's claim either that the confession was made under threat. (It was only proven that György H. made a statement: *„If Viktor B. really committed the murder, he would be better off hanging himself while in prison."*)

The main points of the defence's appeal

The defendant and his defence counsel assigned for the appeal, appealed for acquittal, and in consideration of the admitted theft, for mitigation. Among other objections, they argued that:

a) There were fingerprints at the crime scene from another person and none of the defendant's were found there;
b) Contrary to the court's reasoning, it was not the defendant's responsibility to prove that he did not return to the apartment, but rather the prosecution's to prove that he did return a second time;
c) The court's conclusion that the graphometric and polygraph examinations indicated the defendant *„committed the act of killing"* was incorrect. While the expert opinions confirmed that his answers were misleading, the methodology does not provide an explanation as to why, therefore no conclusion can be drawn that it was due to the killing;
d) The graphometric expert cannot claim that *„it has been proven beyond reasonable doubt"* that the person in question committed the murder. Firstly, this is outside the expert's competence, and secondly, forensic methodology does not allow for such a definitive statement;

e) Concerning the classification, they argue that the cash stolen by the defendant did not belong to the victim but to László Cs.;
f) Thus, the defendant committed the crime of theft of a significant amount, to the detriment of László Cs.;
g) Regarding the evaluation of mitigating and aggravating circumstances, it was incorrect to evaluate the fact that the defendant consumed drugs and led an improper lifestyle as aggravating factors, as at most, this cannot be considered a mitigating circumstance – meaning the proper lifestyle could have been a mitigating factor;
h) It was wrong to evaluate the premeditation as an aggravating factor, since the sentence judgement itself explained that the act was rather impulsive, therefore it was exactly the elements of premeditation that were missing;
i) The dual classification should not be *„highlighted with significant emphasis"* as an aggravating factor, since – given the large number of statutory qualifying circumstances – no further classifications could have been emphasized without the existence of additional qualifying circumstances.

Reasons of the Pécs Appellate Chief Prosecutor's Office

a) Among several minor inaccuracies in the documentation, the brief also mentioned that *„the defendant never confessed to the intention to kill"*;
b) The expert opinions from the graphometric and polygraph examinations, which spoke to the defendant's commission of the murder, exceeded the expert's competence;
c) The classification is only partially correct, as the aggravating circumstance of premeditation was not established, meaning that three aggravating circumstances should have been applied (Criminal Code Section 166, Paragraph 2, Point a));

d) Regarding the sentencing, the defendant's addiction should not be considered a mitigating circumstance, as it was the motivating factor, representing an increased risk of criminal behaviour.

The second-instance ruling of the Pécs Court of Appeal

In its public session on January 10, 2006, the Pécs Court of Appeal upheld the judgment of the first-instance court. [1]

In its nine-page reasoning, the court stated among other things, that:

a) It found neither the defence's appeals nor the prosecutor general's motion to modify the classification of the crime to be well-founded;
b) It clarified several aspects of the factual findings, including that the defendant did not admit, even during the initial suspect interrogation, that upon returning home from the victim's place, he had decided to kill her;
c) The court of first degree convincingly argued, based on lawful evidence, why it accepted the defendant's detailed, confessional statement made during the investigation in the presence of his lawyer, recorded on video, and given without any physical or psychological coercion, as the basis for establishing the facts;
d) The defendant mentioned details in his testimony, unknown to the investigators, such as the open apartment door, the wooden handle of the knife, and the 40.000 forints belonging to László Cs., which not even the victim mentioned;

[1] The case numbers of the authorities involved are as follows: 23/2004. Baranya Megyei Rendőr-főkapitányság (Baranya County Police Headquarters); M. I. B. 665/2004/19. Baranya Megyei Főügyészség (Baranya County Chief Prosecutor's Office); 7.B. 103/2005/23. Baranyai Megyei Bíróság (Baranya County Court); Bf. 187/2005/1/II. Pécsi Fellebbviteli Főügyészség (Pécs Appellate Chief Prosecutor's Office); Bf. I. 178/2005/3. Pécsi Ítélőtábla (Pécs Court of Appeal.)

e) The accused could not provide an adequate and acceptable explanation for the changed, denial-based statement, nor were the alleged threats substantiated;
f) It agreed with the defence's arguments regarding the handwriting analysis and polygraph tests, stating that neither could provide a categorical opinion regarding guilt. *„These tests can only support or weaken the defendant's statement at a probabilistic level"*;
g) The forensic medical expert exceeded their authority by stating, *„The attack on Józsefné Cs. was carried out with cruelty."* The expert can only comment on pain and suffering duration, while the court decides whether these establish the aggravating factor of particular cruelty;
h) Motive for gain can be established even if the killing is carried out to obtain someone else's property;
i) The defendant committed the act with direct intent and executed it with extreme inhumanity and brutality, making cruelty an appropriate aggravating circumstance;
j) However, premeditation cannot be established in this case because the Supreme Court's Guideline No. 15 requires a consideration of place, time, and method, as well as assessment of hindering and assisting factors and the circumstances of preparation and commission, none of which apply here, as the defendant didn't even really have time for these;
k) Addiction cannot serve as a mitigating factor in sentencing unless it affects the perpetrator's mental status to some degree;
l) A mitigating factor, however, is the defendant's confession testimony with an exploratory nature, even though he later altered it;
m) The life imprisonment sentence serves the effective protection of society and is proportionate to the severity of the act and other circumstances of culpability.

Criminalistical and criminal procedure law lessons

1. The data collection and witness investigation initiated in parallel with the crime scene investigation harmoniously align with the so-called *„first strike"* (Erste Angriff) forensic requirement.[2]
2. Hot pursuit measures, unexpected and rapid searches, almost always promise results. There is no chance for hesitation or delay.[3] It is no coincidence that the search at the potential defendant's residence was carried out as an urgent investigative action, as it has been in this case as well.
3. A thorough, methodical search can uncover relevant evidence related to the crime, such as the loot (or part of it), the instrument of the crime, the perpetrator's clothing, means of transportation, notes, etc. In this case, it was particularly important to seize the target person's (partially drying after washing) clothes, as well as to photograph and document the small detail.
4. In the planned investigation, traces of material from the victim's clothing were found in the drying clothes, and vice versa. The „*principe de l'échange"*, formulated by Edmond Locard at the beginning of the last century, states that *„every contact leaves a trace"* (theoretical exchange in English)[4], and the *„exchange effect"*, or the intersection of traces, is still valid today. According to this principle, nothing in the world can be changed without leaving some kind of trace in the material world – whether it is microscopic, invisible, or disappears over time. Even the perpetrator who attempts to conceal the crime, during a conscious, well-planned, and precise execution, will, despite their intention, leave behind material traces such as hair, scent traces, or tiny fragments of various digital data, which inevitably occur and are so resistant, stable, and

[2] Forker, A.–Bertram, M., Glaser, H., Leonhardt, R. (1972): 404-407, Fenyvesi, Cs. et al. (2022): 539-540
[3] Fenyvesi, Cs. (2023): 139-148
[4] Locard, E. 1920; 1923, 1931-1940

„cunning" that it becomes impossible to avoid their creation, prevent their survival, or „eradicate" them. This is especially true because, in today's digitally connected world, the perpetrator often doesn't even realize that they are leaving a „trace", such as a video recording or a mobile phone cell position that can determine their location, whether approaching the crime scene, being at the scene, or leaving from it. This is true not only in physical crime scenes but also in cyberspace. The task of the investigation is to locate, record, examine and assess all adequate, relevant „clues" in a non-distorted, unbiased, un-prioritised, lawful manner. Only incompetent detection fails to find the lesions born of encounter exchanges, „transfers". The investigator with a discerning eye and the necessary equipment must always seek out the otherwise often invisible contact traces, the novelties which enable him to deduce the sequence of events, to reconstruct the past, in which he can also identify the individual perpetrator.

5. Now, electronic data, which is specifically mentioned among the evidence in our criminal procedure code, must be searched for in every case, as it plays a significant role (as strong, „hard evidence") and can greatly assist in the investigation and final proof. The casino video recordings supported the investigation and the court proceedings here as well, just as the list of phone calls did.
6. The polygraph is a criminalistic tool aiding detection, especially useful in answering unresolved questions such as the location of the weapon, the hidden loot, or the existence and whereabouts of an accomplice.[5] But it is no more in terms of proof. The limited use and validity of honesty testing instruments is known from both international and national literature. [6] Which is not to disparage them, but it is only their precise legal status.

[5] Krispán (2004): 42-50
[6] Budaházi (2014)

7. In this case, the criticized methodology of graphology experts has been partially rejected as credible by the legislature, based on scholarly objections, and they are no longer listed as forensic experts.
8. The question of whether the defendant can „withdraw" his confession, as the court of first instance indicated, is also relevant to the criminal proceedings. In our view, the correct wording is „change". Since the Miranda warning-based fourth warning to the defendant also includes the principle that a properly made confession cannot be made to appear as if it never happened. It can be used as evidence in further proceedings. The defendant can change it, but he cannot revoke it, make it null and void, make it non-existent. Even more so, as these proceedings show, the multiple admissions of fact made by the defendant were very valid and valuable as evidence. Particularly since in his original statements he revealed details and minimal facts that only he could have known and of which the investigators had no knowledge. (The defendant and the defence counsel must be aware that, in the event of any future change, it will be for the person who changed the confession to prove that he or she had a strong basis for the falsehood or false statement).
   During an investigation, interrogators must always anticipate the possibility of a future turn of events. Thus, when confessing, they should be free to make loaded statements, to use their own vocabulary, to make spontaneous statements of fact. It is advisable to record all this on video and to ensure the presence of a defence counsel.
   In the case of a confession and the defendant's activity and cooperation, regardless of the time of day or weather conditions, an immediate crime scene interrogation is essential, and there should be no hesitation in carrying out its professional execution.

Final thought

We believe that every stage of the criminal proceedings conducted 20 years ago conveys messages to today's legal practitioners. The investigative authorities, the prosecuting offices overseeing and directing the investigations, are provided with criminal tactics and forensic techniques, the attorneys with defence tactics instructions, and the various levels of courts with the objective, professional, and thorough examination of the facts, as well as the offer of logical evidence assessment, while keeping the fundamental principles in mind.

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Service dogs and the regulation of their possible use by the police

Introduction

Many of you may have heard from the media about our service dogs, who assist the police in many areas. However, fewer people have more specific professional and legal information than this, and an untrained observer would not realise how serious a task and responsibility the keeping, training and use of service dogs are [1]. If only because the training and actual use of service dogs is a somewhat mystified 'blind spot' area of information for 'civil' society and often even for professional 'non-dog' colleagues [2].

As a result, many people either think and expect too much of their skills or associate too little return with their use. In fact, many people really do get their information from the media or from a service dog show, i.e. there is a real mystique surrounding the field.

My efforts to dispel this mystery also reinforce my belief that the use of service dogs should be discussed and presented in more forums to demonstrate this special capability of the law enforcement sector. The regulatory environment of this field, which is less known to 'civilians' and lawyers, presents a very interesting picture.

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[1] Horváth, O. (2015): Szolgálati kutyák a rendvédelemben: a múlt, a jelen és a jövő lehetőségei. [Service dogs in law enforcement: past, present and future possibilities.] Magyar Rendészet, Budapest. 2015/3., 69

[2] Frigyer, L. (2023): A szolgálati kutyák alkalmazásával okozott kár szabályozásának egyes aspektusai. [Some aspects of the regulation of damage caused by the use of service dogs]; In: Gaál, Gyula; Hautzinger, Zoltán (editor) (2023): A biztonság védelme a rendészetben : Jubileumi kötet Zámbó Péter ny. rendőr ezredes 70. születésnapjára [Protecting security in law enforcement: an anniversary volume for the 70th birthday of Péter Zámbó, retired police colone]; Pécs, Magyarország, Magyar Hadtudományi Társaság Határőr Szakosztály Pécsi szakcsoport, 406, 353-359, 7

The historical role of service dogs in relation to the police

The use of service dogs has been a long-standing part of police activity. The first dog kennel was established in 1930 in Csillaghegy, which provided trained dogs for the gendarmerie until the end of the Second World War. After the World War, dog training was resumed in 1945, but the breakthrough came only in 1948 with the Minister of the Interior's Decree No. 278542/1948/IV.1. /BM and then with BM Decree No. 16-1317/1963, which merged the BM Dog Training Schools in Dunakeszi and Kerepestarcsá with effect from 1 January 1964.[3].

This merger made it possible for the predecessor of the Department of Dog Leader Training and Animal Control of the Police Education and Training Centre (ROKK KKÁFO), based in Dunakeszi, to become the internationally renowned central dog handler training and dog training base of the Hungarian armed forces by the early 1970s,[4].

The importance of the area is perhaps best demonstrated by the number of service dogs. Currently, the ROKK KKÁFO, which is centrally responsible for this field, has hundreds of service dogs under its control. To be precise, in 2021, there were 649 service dogs. The number of dogs in each county varies, of course. It is adapted to the needs of each area and to the competence of the area in terms of its specialised tasks.

This shows you that there are still quite a lot of service dogs in the police system, performing various tasks, which involve constant contact with colleagues and the people involved in the actions and their environment. At the same time, there are many occasions when potential harm can occur.

[3] Boglyasovszky et al. (2007): Szolgálati kutya alkalmazása. [Use of a service dog] IRM. Budapest. 7

[4] Source: https://rokk.hu/bemutatkozas/szervezeti-felepites/gazdasagi-szervek/kutyavezeto-kepzo-es-allatfelugyeleti-foosztaly-dunakeszi/
Accessed: 30.05.2025

It would therefore be reasonable to think that, given its importance, the field is well regulated in detail, both in general and in specific fields [5].

Basic rules on the use of service dogs

The rules on the use of service dogs are laid down at different levels of the legislative hierarchy, depending on the body applying them.

At the legislative level of the legislative hierarchy, the only normative provisions on the use of service dogs are generally those on the use of dogs as a means of coercion, which are best known to the civilian sector and to „non-dog" professional staff [6],[7]. An example of this is the regulation of Act XXXIV of 1994 on the Police (hereinafter referred to as the „Rtv."), which also serves as a primary basis. The regulations are very similar for all bodies that may use service dogs as a means of coercion.

Rtv.: Use of service dogs

§ 50 (1) A police officer may use a muzzled service dog, whether on or off leash, as a means of coercion if the conditions for the use of physical coercion (§ 47) are met.

(2) A police officer may use an unleashed service dog on a leash if the unlawfully gathered crowd cannot be dispersed by a less coercive means (§§ 47-49) or if it is necessary to disperse a group of people seriously endangering public safety or to overcome active resistance to police action.

(3) A police officer may use a muzzled and unleashed service dog

(a) to prevent an attack threatening serious injury;

[5] Frigyer, L. (2022): Gondolatok a rendőrségi szolgálati kutyák alkalmazásával kapcsolatos károkozás szakterületi szabályozásáról; [Reflections on the sectoral regulation of the use of police service dogs] In: Kovács István (editor) (2022): Multidiszciplinaritas: A rendészettudomány sokszínűsége Tanulmánykötet. Magyar Rendészettudományi Társaság Hallgatói Tagozat. [Multidiszciplinaritas: the diversity of police science, Collection of Studies, Hungarian Society of Police Science, Student Section], Budapest. 35-36

[6] Kovács, I. (2021): Rendvédelmi ismeretek I. [Law enforcement knowledge I.], MRTT Hallgatói Tagozat Budapest. 86

[7] Law 1

(b) to apprehend a person suspected of having committed a serious criminal offence;

(c) to prevent an attack on their person or conduct directly threatening their life or physical integrity.

As a source of law with more specific provisions than this law, we can refer to the Act on the National Tax and Customs Administration, which, in connection with the search of clothing, luggage and vehicles, regulates the search activity with the service dog to the level of a law, as a basic example of the field of application of service dogs [8].

Further detailed rules on enforcement and other areas of application are also found in a mix of legislation and other public law instruments [9].

It is important to emphasise that knowledge of these lower standards is essential, as it is these detailed rules that give substance to the activities carried out with specially trained service dogs, which have been used successfully by the police for a very long time.

The importance of the area is perhaps reflected in the number of dogs. In recent years, the police have had a relatively large number of service dogs (650), with 649 service dogs in 2021 to be precise. However, the number of animals per county varies according to the needs of the time and the competence of the area in terms of its specialised tasks. Unfortunately, this number is currently lower and the actual number of animals in active stock (after deduction of those withdrawn from service for scrapping and other reasons) is currently below 400. This actual number is made up of the number of patrol dogs assigned to service duties, explosive detection dogs, public protection special (assistance) dogs, tracking dogs, drug detection dogs, search dogs, personal search dogs, personnel tracking dogs, scent detection dogs and cadaver and body search dogs.

[8] Law 2
[9] Law 3

The basic detailed rules of the activity are set out in ORFK Instruction 36/2020 (XII. 23.) on the Police Dog Service Regulations (hereinafter: Dog Regulations).

However, the significant presence of service dogs is not only evident in the Police, as they are also used by several organisations across the law enforcement spectrum. A 'good-looking', trained service dog with a determined handler is a tool - with impressive power - that precedes its own deployment by its mere appearance [10,11].

In addition to those already mentioned, several organisations employ or may employ - under a specific legal mandate - service dogs, for which this possibility is not well known. Examples include state nature conservation guards, mountain rangers, field guards, professional hunters, public land wardens, but also municipal assistant wardens and armed security guards. Moreover, it also includes fishery guards employed by the National Food Chain Safety Office (hereinafter referred to as NÉBIH) of the State Fishery Service. In this organisation, the General Inspection Directorate of the NÉBIH is responsible for the tasks related to the acquisition, registration, training and training of service dog handlers.

Trends for the future (ways to increase application and numbers)

Common language and activities

It is of particular importance that when keeping, training and using service animals, organisations and individuals use the same terms to describe and formulate the activity. In order to achieve a higher quality of work with

[10] Frigyer, L. (2009.) A szolgálati kutyák és vezetőik képzésének, továbbképzésének szabályozása, a fejlesztés szükséges irányxyai a büntetés-végrehajtásnál [Regulation of the training and further training of service dogs and their handlers, necessary directions of development in the penitentiary system] Börtönügyi Szemle 28. /1., 44

[11] Frigyer, L. (2020): Kriminalisztikai szösszenet avagy miért kellene a büntetés-végrehajtási szervezet személyi állománya részére kriminalisztikai ismereteket oktatni, [Criminalistics summary or why staff of the penitentiary organisation should be trained in criminalistics] In: Európai Jogi Közlemények I. évfolyam/1. szám (2020.) Budapest. 34

service animals, it is necessary to share experiences of selection, training and use between different organisations and individuals, but this is only possible if positive and negative experiences are regularly shared between professionals to improve work with service animals. In this context, joint training, competitions and enforcement activities are organised. All this should be done by relying on the same professional language for communication, which in turn should provide a common 'service' model for civilian animal keepers [12,13].

According to the Dog Regulations, the training institution, which provides basic, advanced and further training and supervision of dog handlers and their service dogs, is the Department of Dog Handler Training and Animal Supervision of the Police Education and Training Centre (hereinafter referred to as the „DTO"). The training institution is located in Dunakeszi. The long and illustrious history and present of the institution, both nationally and internationally, in the field of dogs is a guarantee for the provision of this activity.

According to the Dog Regulations, the CDF ensures, among other things, the uniform implementation of the Police's duties in relation to dog handlers and service dogs, and supervises the training, further training and certification of service dogs and dog handlers, the use, application and keeping of service dogs. It also monitors and gives opinions on the breeding and training of service dogs.

It performs the tasks of the preparatory department in relation to the internal standard-setting activity for the service dog population. It approves the equipment, clothing, housing, accommodation, transport vehicles and all technical documentation relating to the training, use, deployment and housing of service dogs and all other matters within its remit.

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[12] Source: https://www.police.hu/hu/hirek-es-informaciok/legfrissebb-hireink/szervezeti-hirek/veget-ert-a-nemzetkozi-szolgalati-kutyas
Accessed: 20.05.2025

[13] Boda, J. (2019): Rendészettudományi szaklexikon, [Law enforcement encyclopedia] Dialóg Campus, Budapest. 541

Joint officer and driver training

One of the foundations of the professional work of law enforcement agencies and organisations with service animals in this area is that the managers in charge of the activity are aware of the service animal skills - as well as responsible (service) animal husbandry - and the sensitisation of future (officer) managers in this area is one of the main missions of the Ludovika SE Law Enforcement Dog Section at the National University of Public Service. By organising activities and events, they aim to provide a professional background for the university teaching of the subject „The use of service dogs", taught at the Faculty of Law Enforcement. [14,15]

Synopsis

Overall, the existing legislation currently ensures the implementation of the tasks related to the use of service dogs. However, it would be more appropriate to set out the basic rules for the keeping of service animals in a higher level of legislation, even at the level of a government decree, rather than in a set of different levels of regulation and in order to clarify the regulatory practice that has emerged. On the one hand, to unify these specific activities and to implement them in a common police framework. On the other hand, to standardise the ability to act with service animals, thereby increasing their effectiveness. After all, public order protection or search dog (drugs, persons, etc.) activities and capabilities carried out with service dogs are strongest and most recognised when they are based on the same and uniform legal basis, which is equally accessible to all.

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[14] Source: https://sportosegyetem.uni-nke.hu/ludovika-sportegyesulet/szakosztalyok/rendeszeti-kutyas-szakosztaly
Accessed: 30.05.2025

[15] Source: https://opsz.hu/unnepelyes-keretek-kozott-elindult-a-rendor-polgaror-kutyas-jarorszolgalat/
Accessed: 30.05.2025

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HOTTÓ, ISTVÁN

Mosaics from the last decade of the former Border Guard

Introductory thoughts

„The interpretation of the term border protection has completely changed today, since while from the perspective of military science and police science this activity includes territorial defense and military tasks, in a broad sense border protection nowadays includes all legal and technical means, as well as military and Police methods, that are embodied in preventing the illegal crossing of the country's state border and that can be linked to the protection of state border order. At the same time, the task of the Police is not border protection, but border policing in nature and consists of subtasks such as guarding the state border, controlling border traffic, and maintaining border order. Border guarding is a historical category that can be continuously examined using research methods from both military science and police science. The method and quality of border guarding reflects the social priorities of the country that employs it."[1]

Border Guard Day has been celebrated every year since 1992 on June 27, St. Ladislaus Day, the patron saint of border guards. The tradition was not interrupted by the organization merging with the Police on January 1, 2008. Thanks to the dedication of the Chairman of the board of trustees of the Border Guard Culture Foundation, Lt. Col. László Vájlok, master instructor, and Dr. József Balla, deputy dean for general and development, the Border Guard Memorial (Memorial Room) was born at the Border Police Department of the Faculty of Law of the University of Public Service,

[1] Hautzinger, Z. (2020): A határvédelem arca. A hadtudománytól a rendészettudományig - társadalmi kihívások a nemzeti összetartozás évében [From military science to police science - societal challenges in the year of national cohesion]. Magyar Hadtudományi Társaság Határőr Szakosztály Pécsi Szakcsoportja. Pécs, 96

which was inaugurated on September 1, 2022, on the 30th anniversary of the Faculty, and has since been an integral part of the education of border police students and the preservation of tradition.[2] At the initiative of Lieutenant General József Béndek, the last national commander of the Border Guard, the Border Guard Memorial in Apátistvánfalva, located in the Őrség, is one of the most significant symbols that worthily preserves memories and traditions. The wreath-laying ceremony on Saint Ladislaus Day at the Apátistvánfalva Border Guard Memorial will be organized by the Körmendi Police Technical School from 2019; before that, the wreath-laying ceremonies were organized by the National Police Headquarters. The post, which was then destined to be closed down, was reborn sixteen years later and became a memorial site in 2007 thanks to the organizing work of the last national commander of the Border Guard, Lieutenant General József Béndek and his colleagues. The border guard monument was placed at the Apatistvánfalva guard post, where former border guards commemorate and lay wreaths every year on Saint Ladislaus Day.[3]

„Let the nation's grace be a reminder of loyalty and duty towards the freedom of the Hungarian Homeland…"[4]

The above thought can be read on the marble plaque placed on the wall of the Apátistvánfalva Border Guard Memorial. The quote from a letter by

[2] Határőr Kultúráért Alapítvány. (2022). Határőr emlékhely (Emlékszoba) avatása [Opening of the Border Guard Memorial (Memorial Room)].
Source: https://hokalapitvany.hu/hataror-emlekhely-emlekszoba-avatasa/
Accessed: 16.03.2025

[3] Hottó, I. (2023): Gondolatok a határőrség letűnt korának üzeneteiről, értékeiről és fennmaradt szimbólumairól [Reflections on the messages, values and surviving symbols of a bygone era of the Border Guard]. Rendőrségi Tanulmányok, 6(4), Budapest. 104-106

[4] Magyar Idők. Kossuth levele, Emlékeztető hűségre, kötelességre [Kossuth's letter, Reminder of loyalty, duty].
Source: https://www.magyaridok.hu/lugas/kossuth-levele-3530249/
Accessed: 16.03.2025

Lajos Kossuth faithfully reflects the spirit and message of the border guard for visitors to the memorial.[5]

At the turn of the millennium, a border guard specialist group was established in Pécs in the spirit of King Saint Ladislaus with the aim of initially dealing with specific knowledge related to policing within military science and later as a separate discipline within the framework of an independent police science society. The Pécs Specialist Group of the Border Police Department of the Hungarian Military Science Society was founded on May 17, 2000, at the Pécs Border Guard Directorate, whose president was border guard lieutenant colonel Zoltán Tubák and whose secretary was border guard major Gyula Gaál. The current president of the specialist group is retired police colonel Péter Zámbó. The periodical, established in 2002 at the initiative of Zoltán Hautzinger, was launched primarily with the aim of making study-like versions of lectures and comments related to conferences organized in Pécs available in a uniformly edited manner to those who were unable to attend the events. On the other hand, they should provide an opportunity for all those who wish to express their thoughts in the fields of military science, police science, law, and other social or natural sciences.[6]

The Border Guard of the Ministry of Interior in 1989

The year 1989 marked a historic turning point in the life of the Border Guard. The technical locks and restrictions that facilitated total border surveillance were removed from the state border, the methods of border surveillance changed, and a radical transformation of the body began.

The number of illegal border crossings on the Hungarian-Romanian border has increased significantly since 1987. At the beginning of 1989, there

[5] Hottó, I. (2023): Gondolatok a határőrség letűnt korának üzeneteiről, értékeiről és fennmaradt szimbólumairól [Reflections on the messages, values and surviving symbols of a bygone era of the Border Guard]. Rendőrségi Tanulmányok, 6(4), Budapest.105

[6] Gaál, Gy. (2024): A rendészettudomány huszonöt kötete [Twenty-five volumes of police science]. Magyar rendészet, 2024/1. Budapest. 167

were thirteen thousand Romanian refugees in the country who arrived illegally, with a few exceptions, and their number had increased to thirty thousand by November. Border violations also occurred; for example, on May 29, 1987, a Romanian mounted patrol officer in the Hungarian-Romanian-Yugoslavian triple border area, while pursuing a border violator, strayed into Hungarian territory and used his weapon against the Romanian citizen, who died. In August 1989, a Romanian border violator was captured on Hungarian territory by patrols from the neighboring state in the Gyulavári area. The refugees were first taken to border guard posts, where they were given food and possibly clothing until they could be transported onward, and where they were provided with baby food and diapers, if necessary, for small children. All of this placed a severe financial burden on the Orosháza and Nyírbátor border guard districts.

The Political Committee of the MSZMP assessed the circumstances in February as such that the previous border guard system must be transformed in line with the expectations of the new times, which implies that the tasks of passport management should be taken over by professional border guards instead of regular border guards. The body officially began the dismantling of the signaling system on May 2, and - although the rehabilitation of the area took until 1990 - it was completed by August. Prior to this, in May, the entry restrictions to the southern border strip were lifted, and by August 1, the tracking strip and the border strip were also removed from the western border. Our country joined the Geneva Convention on October 15, and new refugee camps were established in Békéscsaba and Hajdúszoboszló.

The lifting of border restrictions and the internal situation in Romania significantly increased the number of border violators. By July 1989, border guards had arrested five thousand border violators, mostly Romanians and East Germans. In the second half of the year, attempts by the latter to violate the border became widespread, and the number of violent incidents also increased. During the Pan-European Picnic held in the Fertőrákos area

in August, several hundred GDR citizens crossed into Austria. On one occasion, border violators heading west attacked the patrol. On August 21, the patrol's gun accidentally went off, fatally shooting the attacking border violator.[7] A joint Hungarian-Austrian investigation found the border guard innocent, and the residents of the neighboring towns of Sankt Martin and Deutschkreutz collected 10,000 shillings for him. In an increasingly tense situation, the government decided to open the western border crossings to GDR citizens, which the Border Guard implemented on September 11.

Border traffic increased significantly, with 34 million people crossing the border in the first half of the year, and by the end of the year, the traffic had reached a record. Act XVIII of 1989 granted Hungarian citizens a universal passport as a matter of citizenship. The number of people arriving from the Federal Republic of Germany, Austria, Poland, and Yugoslavia increased significantly.

The Council of Ministers discussed the situation of the Border Guard in December and decided on organizational changes. According to its Resolution No. 2046/1989 [8]: *„...the Border Guard shall begin from January 1, 1990, and shall complete by 1995 the performance of tasks at the posts and traffic control points with professional and civilian personnel."*

The increasing growth of border traffic, its control, the change in the legal assessment of prohibited border violations, and the decrease in the previous significance of Western border relations also justified changes within the organization. The emphasis had to be placed increasingly on the development of a law enforcement-type organization. Researchers already recognized at that time that, despite the military-technical level of the time, the weapons available to the border guard would be ineffective against a

[7] Nagy, Gy. (2010): Határőrség 1957-2007. Rendvédelmi - Történeti -Füzetek, Acta Historiae Preasidii Ordinis, 18(21), Budapest. 57-65

[8] A Magyar Köztársaság államhatáráról, annak rendjéről, őrizetéről és átlépések szabályairól szóló törvényjavaslat alapelveiről szóló 2046/1989. Minisztertanácsi Határozat, Határozatok Tára 17. [Decision 2046/1989 of the Council of Ministers on the Basic Principles of the Bill on the State Border of the Republic of Hungary, its Order, Guarding and Rules of Crossing, Decree No 17.]

regular military attack, so there was no justification for operating as an armed force and military weapons, and instead, it had to move towards becoming an armed body. Accordingly, instead of a large number of conscripts, border guard tasks had to be gradually solved with professional personnel.[9]

The gradual withdrawal of the conscripts and the measures related to it were well-founded in the information available at the time, taking into account the expected social and migration changes at that time, thus providing an adequate basis for further legislative efforts. On the other hand, they did not take into account the deepening crisis of the political system and the subsequent conflicts, such as the Yugoslav Civil War and the actual migration crisis that followed.[10] The line began with the Danube section of the Győr district, followed by the rest of the Czechoslovak section, and then the Austrian, Yugoslav, Soviet and Romanian border sections. According to calculations, by the end of the process, the number of Border Guard personnel would have decreased by 60% and its operating costs by one-third. The Border Guard officers took the oath to the Constitution of the Republic of Hungary on December 18.

The Border Guard of the Ministry of Interior between 1990-1998 - War situation and radical transformation

The period between 1990 and 1998 in the history of the Border Guard was defined by the transition to an organization consisting of professional bor-

[9] Fórizs. S., Gáspár, L., Paku J. (1990): Határőrizet és határőrség a kilencvenes években [Border surveillance and border guards in the nineties]. Határőrségi Tanulmányok, (1). 39-72

[10] Ritecz Gy. (2023): Az európai (schengeni) határőrizeti követelményekre való felkészülés helyzete és további feladatok Magyarországon. [The state of preparation for European (Schengen) border control requirements and further tasks in Hungary]. Európai Tükör (the bi-monthly journal of the Integration Strategy Task Force), Budapest. 8

der guards following the withdrawal of conscripted soldiers, the management of fundamental changes in the field of border order, border surveillance, and border traffic, and the new tasks due to the Yugoslav civil war. New states were created around our country, and Hungary now borders seven countries instead of the previous five. This also required the renewal of agreements and partnerships regulating cooperation related to state borders.

Border traffic increased significantly; in the first half of 1990, the number of Hungarians visiting abroad increased by 86% to nearly six million, and the number of people arriving from Austria by 112%, Czechoslovakia by 138%, Yugoslavia by 246%, the Soviet Union by 151% and Romania by 362%. More people also came from England by 158%, France by 222% and the USA by 153% than in 1989. Border traffic exceeded 100 million by the end of the year and remained around this level in the following years. In April 1990, authorities replaced total control with selective control to manage high traffic. They categorized passengers into three groups: Hungarians, foreigners requiring a visa, and foreigners exempt from a visa. At the same time, they eliminated passport stamping for Hungarian citizens.

It appeared mainly among those arriving from Romania, Poland, the Soviet Union, and Yugoslavia – smuggling of goods, currency exchange, and selling on black markets. By 1991, illegal barter trade had reached enormous proportions; tumultuous scenes were the order of the day on trains heading to Poland and Romania, border guards or police officers were attacked several times, and border crossings were closed. International crime also increased. The use of false documents increased, and increasingly better-quality forgeries appeared. Drug smuggling became more common in the second half of the decade. Unilateral controls were abolished on the Hungarian-Czechoslovak border on September 12, 1991. New crossings were opened one after another towards Austria, and joint border controls were introduced. Since 1995, new crossings have been opened on the Slovak and Slovenian borders as well. The EU Phare program was involved in

the modernization of border posts, which began in 1995 at the border posts of Nagylaki, Gyula, Ártánd, Záhony, Rajka, and Rédic.

At the beginning of the Yugoslav Civil War, from June 27, 1991, the Yugoslav People's Army primarily wanted to take control of the border crossings, and on October 14, it began to mine the main routes leading across the border in the Ivándárda-Ilocska-Sárok area. From August 17, refugees appeared at the border posts and on the green border. The national commander of the Border Guard ordered reinforced service at the affected border section and reinforced the local border guard forces by five hundred people. The government ordered the establishment of law enforcement action battalions, and by the end of 1992, there were already nineteen action battalions reinforced with armored personnel carriers. Due to the prolonged fighting, a liaison command was established in the Baranya Triangle, and this area was reinforced with one action battalion. The EU assisted in monitoring the goods embargo imposed by the EU against Yugoslavia in 1994 with two German guard posts at Mohács. For years, the Border Guard crossed the IFOR/SFOR lines - primarily at the Barcs and Drávaszabolcs crossings. As a result of the war, traffic at the Hungarian-Austrian border crossings increased enormously.

Illegal migration grew rapidly. The Orosháza district was reinforced with four hundred border guards in 1992 due to the high number of border violations - eight thousand in 1991. Human smuggling also began to increase in 1990, and in that year, the border guards caught forty-six human smugglers and one hundred and sixteen helpers, and in 1991, two hundred and twenty-one human smugglers and two hundred and fifty-four helpers. Criminals helped with 60% of the thirty thousand illegal border crossings. The export of stolen cars began on the Hungarian-Yugoslav border section in 1995, and there were several firefights on the green border with the increasingly violent organized car smuggling gangs, who were, in many cases, supported with machine guns from the other side of the border. Alcohol smuggling also took on significant proportions in this area.

In April 1992, the Border Guard's Aliens and Violations Department was established, and the police departments of the body began their work. Eight community hostels were established at the directorates. The new Aliens Act[11]adopted in 1994 gave the Border Guard more powers. The Minister of the Interior established a border police department at the Police Officers' College on September 1, 1992. In 1995, the Zalaegerszeg and Sopron directorates were abolished, the two Budapest directorates were merged, the Siklós training base was liquidated, and the Sopron training and further training institute was established, with a branch in Csorna. In April 1998, the last conscripts were discharged from the Border Guard. The Act on Border Guard and Border Patrol[12]completed the legal framework regulating the activities of the Border Guard. To join the European Union, the Border Guard began in 1994 and successfully continued its preparations to meet the border guard requirements of the Schengen Agreement even after accession. The Act on Criminal Procedure[13] defined the range of crimes in the event of which the Border Guard may act.

The Border Guard between 1998-2004 - On the way to the European Union

In the period between 1998 and 2004, the Border Guard was defined by the preparation for Hungary's accession to the Schengen area, the emergence of additional laws regulating its tasks, and the management of the aftermath of the Southern Civil War. Act XIX of 1998 on Criminal Procedure, adopted in 1998, defined the scope of crimes in the event of which the Border Guard of the Ministry of Justice may act. The Act on the Entry and Residence of Foreigners regulated the Border Guard's powers and tasks in the field of immigration control.

[11] Act LXXXVI of 1993 on the entry, residence and immigration of foreigners in Hungary. https://net.jogtar.hu/jogszabaly?docid=99300086.TV&txtreferer=99400034.TV
[12] Act XXXII of 1997 on Border Guard and Border Guard
[13] Act XIX of 1998 on Criminal Procedure

To suppress the Yugoslav civil war, NATO began bombing Serbian territories in early 1999. To ensure border order and to receive those fleeing the bombings, the national commander set up a liaison command at the Kiskunhalas border guard directorate, which he reinforced with a border patrol battalion. The border guards working in the endangered area successfully fulfilled their tasks.

The number of illegal border crossings, with minor fluctuations, has been consistently high. While 12,446 people attempted to cross the border illegally in 1997, the number increased to 15,196 in 1999 and 9,781 in 2002. Initially, more than two-thirds of these were directed towards the green border: inwardly, mainly towards the Ukrainian and Romanian, and later the Yugoslav border sections, while outwardly, mainly towards Austria, Slovenia, and then Slovakia. The main methods of committing the crime were hiding in vehicles and using forged travel documents, and the number of cases related to forged public documents at border crossings increased.

„The use of increasingly high-quality counterfeit travel documents, the use of the most modern technical devices, and the use of stolen original stamps can be observed. A frequently used method of committing human smuggling is to hide migrants in vehicles involved in international traffic. In several cases, large numbers of illegal border crossers have been caught, who were tried to be transported across the state border in the cargo holds of trucks or in hiding places in trucks designed for this purpose."[14]

Many people arrived in Hungary legally who wanted to continue westward illegally. At the border crossings, they tried to filter out those who did not have all the conditions for entry. In 2001, the Border Guard turned back 30,115 people, mainly at the Romanian and Ukrainian border crossings. Human smuggling activity was also linked to illegal migration. In 1998, the Border Guard's investigative bodies acted against 558 human

[14] Gaál, Gy. (2017): Az embercsempészet elleni fellépés a Határőrség erőivel, eszközeivel [Combating human smuggling with the forces and means of the Border Guard]. Pécsi Határőr Tudományos Közlemények. Special No 18. Pécs. 78

smugglers, and in 2002, 573. The proportion of Hungarians among human smugglers has been steadily increasing, reaching 40% by 2002. The Border Guard's investigative bodies have acted effectively in the fight against well-organized and highly equipped human smuggling organizations. International cooperation in law enforcement has strengthened. In 2001, a border policing operation called *„High Impact Operation"*[15] was carried out at the future external borders under the supervision of the EU Presidency, in which the Border Guard successfully participated; furthermore, during joint airport operations such as High Impact OperationTP 12PT and RIO I-IITP 13PT.[16] It became apparent that continuous contact between international airports and comprehensive information exchanges are essential.[17]

During the international operation conducted in 2002 with German-Austrian-Slovenian-Romanian-Hungarian cooperation, 23 people smugglers were arrested. Effective border control increasingly required the use of modern technical equipment. Intensive technical development, supported by the Phare program and the COOP programs, began in 1998. During this period, border crossing points were equipped with modern computer equipment by 2004, which facilitated the checking of travel documents and the detection of forgeries, and systems were established to support rapid data transmission. Industrial endoscopes and CO measuring devices were installed at the crossing points to search for people hiding in vehicles. High-performance mobile thermal cameras, handheld night vision devices, and devices suitable for closing migration routes were installed on the green border to aid detection. Patrol boats equipped with modern infrastructure arrived to control the border waters. The replacement of Niva off-

[15] High Impact Operation
[16] Risk Immigration Operation I-II.
[17] Bendes, Gy., Dankowski A. (2004): A Budapesti Határőr Igazgatóság csatlakozása az Európai Határ Információs hálózathoz és a Légi Határok Központjának munkájához. [The Budapest Border Guard Directorate joins the European Border Information Network and the Air Border Centre]. Határrendészeti Tanulmányok, Határőrség Tudományos Tanácsa, Budapest. 34-66

road vehicles received from the Russian state debt also began. The border guards were effectively trained to use the new equipment in parallel with the developments, but the effectiveness was negatively affected by the significant deductions made in the Border Guard budget in 2002. Despite this, the EU Commission, which monitored the level of preparation in 2002, although it objected to the budgetary deductions, ultimately gave an upbeat assessment.

In parallel with all this, the adoption and implementation of the Schengen acquis and the preparation of the staff for the new requirements continued. The reconstruction of border crossing points on the future external borders in accordance with Schengen standards continued. Local border traffic in the border area - following the termination of the relevant agreements - ceased for citizens of Ukraine, Serbia, and Montenegro, and then, in accordance with EU requirements, a visa requirement was introduced from November 1, 2003.[18]

The Border Guard of the Ministry of Interior after 2004 - on the way to the Schengen area

Hungary joined the European Union on May 1, 2004. This created an internal border of 1,139 km in the areas bordering Austria, Slovenia, and Slovakia. The external border of the EU was created on the 1,103 km long border section with Ukraine, Romania, Serbia-Montenegro, and Croatia, where the Hungarian border guards had to meet the EU's higher security requirements. Customs controls were abolished on the internal border, and Hungarian citizens can now travel with an identity card within the EU. The possibility of traveling to Croatia with an identity card remained after accession.

[18] Hottó, I. (2023): Gondolatok a határőrség letűnt korának üzeneteiről, értékeiről és fennmaradt szimbólumairól [Reflections on the messages, values and surviving symbols of a bygone era of the Border Guard]. Rendőrségi Tanulmányok, 6(4), Budapest. 107

After accession, the Border Guard of the Ministry of Interior continued its preparations for the period when Hungary will also become a member of the Schengen area. The Schengen Agreement imposes several conditions on travelers entering the EU's external borders and not belonging to the Union. The selective, differentiated control method applied in border traffic and the passenger categories used in the separation of border crossings already meet the Schengen requirements. The Border Guard received modern equipment worth 27 million Euros by 2004 within the framework of the COOP programs covering four development cycles.[19] The installation of the unified automatic travel document and license plate reading system was completed in December 2000, and the computer system equipped with mobile technical devices, which is used at the railway, water, and temporary crossing points, is still under development. Schengen requirements have already been taken into account in the developments at border crossing points carried out after 2000 and in the construction of new motorway crossing points. The EU continues to support the strengthening of external borders and the establishment of border crossing points in accordance with Schengen requirements.

Based on the Constitution amended on January 1, 2004, the dual task system of the Border Guard was abolished. It became an armed law enforcement agency with national jurisdiction, which operated under the Ministry of the Interior (since then the Ministry of Justice) until June 2006 and basically performed law enforcement tasks. During the modernization, 63 border police departments were established instead of the 125 border guard and border traffic branches, and the regional and central bodies were modified accordingly. Border traffic is controlled at 112 border crossing points belonging to the organization of border police branches.[20]

[19] Hegedűs, E. (2016): Motorizáció a XX. századi magyar határőrizetben [Motorisation in the Hungarian border police of the 20th century]. Rendvédelemi-történeti Füzetek, Acta Historiae Preasidii Ordinis, XXVI. (52), Budapest. 30

[20] Nagy, Gy. (2010): Border Police 1957-2007. Rendvédelmi - Történeti -Füzetek, Acta Historiae Preasidii Ordinis, 18(21), Budapest. 62-63

To combat crime, a complex control system was established between the Border Guard, the Police, the Customs and Financial Guard, the Immigration and Citizenship Office and the National Inspectorate for Occupational Safety and Health, and the Integrated Management Centre was established after May 1, 2004, to combat crime. Close cooperation with neighboring countries in the areas of service tasks and investigative actions serves to combat international crime more effectively.[21] Joint liaison offices were established for this purpose, for example, at Hegyeshalom-Nickelsdorf.

After joining the Schengen area, internal border controls were abolished entirely. In the interests of the security of the country and the Union, it became necessary to carry out immigration control of foreigners and to detect illegal arrivals in internal areas as well. The Border Guard deployment organizations were established for this task, which, in addition to continuous control, also constitute a reserve force for border police operations. The European Union Border Guard Agency is capable of reinforcing border police forces with reserves throughout the Union if necessary. The independent Border Guard ceased to exist at the end of 2008 and was integrated into the Police organization.

Closing thoughts

As the writer of these lines, a former regular border guard and platoon leader of the Apátistvánfalva Border Guard post, my job was to coordinate the liquidation of the post in November 1991. Finally, after my time there, I was among the last to leave the gate of the closed post with our patrol commander, Major Tibor Somogyi, who had always served as an example to us, platoon leader Miklós Guj, and platoon leader Géza Horváth.

Life is a great scriptwriter, thanks to which sixteen years later, in 2007, at the meetings of the National Defense and Law Enforcement Committee

[21] Nagy, Gy. (2010): Border Police 1957-2007. Rendvédelmi - Történeti -Füzetek, Acta Historiae Preasidii Ordinis, 18(21), Budapest. 62

of the Parliament, as a civil servant of the Office of the Parliament, I was able to personally witness what Lieutenant General József Béndek, the national commander of the Border Guard, said about the integration of the Border Guard and the challenges of the future, and then at the end of the committee meeting on December 13, the presentation of the committee resolution read out by Károly Kontrát, who chaired the meeting, which we can now look back on from a historical perspective.[22]

At the meeting of the National Defense and Law Enforcement Committee of the National Assembly in 2007, Border Guard Lieutenant General József Béndek, the national commander of the Border Guard, reported on the integration of the Border Guard and the challenges of the future, then at the end of the committee meeting on December 13, Károly Kontrát read out the committee resolution on the integration of the Border Guard, which also meant the cessation of the independent Border Guard. At that time, Lieutenant General József Béndek placed the commemorative ribbon on the border guard battalion, then Chairman Károly Kontrát and Zoltán Gál, former Chairman of the National Defense and Law Enforcement Committee, also placed the committee's commemorative ribbon. After that, the members of the committee and those present laid wreaths at the headstones of the border guard heroes in the courtyard.[23]

The Border Guard in Hungary ceased to be an independent law enforcement body with national jurisdiction, and on January 1, 2008, the organization was integrated into the Police of the Republic of Hungary. The Border Guard's assets, worth nearly eighty billion forints, which were primarily real estate, vehicles, and equipment, were managed by the Police in

[22] Hottó, I. (2023): Gondolatok a határőrség letűnt korának üzeneteiről, értékeiről és fennmaradt szimbólumairól [Reflections on the messages, values and surviving symbols of a bygone era of the Border Guard]. Rendőrségi Tanulmányok, 6(4), Budapest.139-140

[23] Minutes of the external meeting of the National Assembly's Committee on Defence and Law Enforcement held on Thursday, 13 December 2007, at 10 a.m. at the National Command Headquarters of the Border Guard
Source: https://www.parlament.hu/documents/static/biz38/bizjkv38/HOB/0712131.htm
Accessed:16.03.2025

the future. The National Police Headquarters, as the legal successor body of the Border Guard National Command, continues to pay special attention to the preservation and maintenance of the Border Guard's traditions and its corporate spirit.[24]

[24] Hottó, I. (2023): Gondolatok a határőrség letűnt korának üzeneteiről, értékeiről és fennmaradt szimbólumairól [Reflections on the messages, values and surviving symbols of a bygone era of the Border Guard]. Rendőrségi Tanulmányok, 6(4), Budapest. 141-142

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PETRÉTEI, DÁVID

Generative AI at the crime scene?

Introduction

The Nobel Prize in Physics 2024 was awarded jointly to John J. Hopfield and Geoffrey E. Hinton *„for foundational discoveries and inventions that enable machine learning with artificial neural networks"* – this was in the news on the 8th of October, 2024, just the next week after I held my presentation in front of the ENFSI Scene of Crime Expert Working Group annual meeting plenary, in Budapest. The ENFSI is the European Network of Forensic Science Institutes, which should always pursue the most up-to-date forensic solutions, at least theoretically.[1]

Forensic science has already started to utilize different types of artificial intelligence, mostly pattern recognition, and prediction functions.[2] In this study, a specific type of generative artificial intelligence, the large language model (LLM) is covered, and the possibility of its utilization for crime scene report writing is explored.

Direct observation or inspection is one of the oldest methods of evidence gathering, as everything that was not said by the parties in front of the authorities (confessions), but perceived by the authority or the court itself, can be considered an inspection. Crime scene investigation is an inspection, a direct observation. According to the oldest legal provisions, the weapon

[1] Source: https://www.nobelprize.org/prizes/physics/2024/summary/
Accessed: 15.11.2024

[2] Lontai, M. – Pamjav, H. – Petretei, D. (2024): Artificial Intelligence in Forensic Sciences Revolution or Invasion? Part I. Belugyi Szemle 2024/4. 701-715.
Source: https://doi.org/10.38146/bsz-ajia.2024.v72.i4.pp701-715
Lontai, M. – Pamjav, H. – Petretei, D. (2024): Artificial Intelligence in Forensic Sciences Revolution or Invasion? Part II. Belugyi Szemle 2024/8. 1513-1526.
Source: https://doi.org/10.38146/BSZ-AJIA.2024.v72.i8.pp1513-1526

causing the injury, the wounds, and the torn clothing must be shown to the authority or the court, conducting the proceedings so that it can be considered. Today, crime scene investigation is only one type of inspection; from a criminalistic point of view, what the experts do during the examination is also an inspection. Henceforth, I will refer to these inspections as crime scene investigations as well.

The three most important results of a crime scene investigation are proper documentation, pieces of evidence that are recorded in a way suitable for further investigation, and synthesis, which is a comprehensive evaluation of the state and changes present at the scene to form hypotheses.[3]

Crime scene documentation

In this paper, I focus on proper documentation. Nowadays, in addition to the traditional written materials, i.e., an official report, abundant photo documentation is almost always prepared, usually arranged in a photo attachment, and rarely inserted as a text figure in the report itself. The Hungarian police have been working exclusively with digital cameras for about twenty years now, and in recent years, it is no longer required to print digital images on paper, so there is no financial or logistical limit to the number of photos.

Video recordings (referred to as *„image and sound simultaneous recordings"* in our procedural regulations) are also regularly made in cases involving criminal offenses. It should be noted that continuous image and sound recording is not mandatory during a crime scene investigation, therefore it is possible to record relevant events with several short, few-minute-long shots (e.g., undressing a dead body, or any verbal statement of an expert consultant). The continuous recording of video with sound is primarily used for legal effects and functions (the written report does not have to be

[3] Petretei, D. (2018): The crime scene in the light of standardization trends and the new procedural law. Rendorsegi Tanulmanyok 2018/3. 4–48
Petretei, D. (2020): Offender profiling and crime scene analysis. Rendorsegi Tanulmanyok, 2020/1. 3-49

prepared concurrently with the scene investigation, the content of the report does not have to be read out, etc.). The continuous operation of a video camera mounted in a corner is not a legal requirement during a crime scene investigation, and it usually does not make much sense either.

Today, three-dimensional visualization of scenes is practically not only possible but also increasingly widespread, even in Hungary. This requires laser scanners, structured light scanners, or simple cameras used for the photogrammetry method. Perhaps the significance of spatial digital images does not need to be emphasized so strongly: scenes can be explored, and pieces of evidence can also be observed from all sides.[4] Some pieces of evidence recorded in 3D can even be printed and morphologically precise plastic copies can be handed to the judge or the accused.[5] In the future, scenes may even be navigable in virtual reality, although initially, it would probably undermine the dignity of the court trial, if the prosecutor and defender, wearing a VR helmet that covers their face, were to duel on the scene virtually, but physically present in the courtroom.

Some smartphones even come with lidar, i.e., laser scanners, and applications capable of displaying mixed reality. Examples of these are the Apple iPhone 12 and the models above. These are not primarily intended for criminal justice purposes, but for example, when buying furniture, we can scan the chair in the store with our phone and place it in the 3D image of our living room to see if it will fit and how it will look. These laser scanners have a range of only a few meters, even in the most expensive phones, and are not a match for tripod scanners or photogrammetric images made up of several hundred photos created by a professional, but that is not their purpose either. In the future, even patrol officers may be equipped

[4] Metzger, M. – Ujvari, Zs. – Gardonyi, G. (2020): Application of photogrammetry for forensic purposes: reconstruction of scenes, bodies, objects in three dimensions. Belugyi Szemle 68(11):57-70, source: https://doi.org/10.38146/BSZ.2020.11.4

[5] Fulop, P. – Ujvari, Zs. – Petretei, D. – Kiss, Is. – Dudas-Boda, E. – Metzger, M. – Fullar, A. (2023): Modern Tools and Possibilities for Illustrating Expert Witness Testimonies. Ugyeszek Lapja 30 (5-6) 91-102

with such devices to record the situation in three dimensions upon arriving at the scene, while arresting the offender or aiding and rescuing the victim.

Even today, a high-quality scene sketch that highlights the essentials can be of great service. The vast majority of these are no longer made on classic green millimeter paper but with various computer applications. Typically, it is an overhead view, but it can also be a three-dimensional figure.

The report

Despite the advanced technologies for scene documentation, written reports remain an essential tool in criminal investigations. Even if the photo documentation is comprehensive, it cannot replace the observation and analysis made by an experienced investigator. Therefore, the written report is an indispensable part of scene investigations, and remains a vital component of crime scene investigation, requiring careful attention and personalized human input to be effective.

However, writing a report takes time and requires energy. The use of technology, such as speech-to-text and other tools, can make reporting more efficient, but this is still only a partial solution since it's important to write in professionally coherent, grammatically correct, and elegantly structured sentences. Furthermore, the finished text will likely be unstructured, since if we say, *„new paragraph”*, most speech-to-text software will also write that down, rather than making a new paragraph.

However, advanced language models can take sentence and word characteristics and shape them into elegant, well-formed sentences. They can handle human expressions, such as *„the floor is covered by carpeting with white dots on a green background... dark green in the background... the dots are more yellow, each one is four... no, four and a half centimeters apart... let the carpet be malachite green”*. If artificial intelligence knows what the expected output is - a structured report using professional technical terms - it can turn these fragmented pieces of information into paragraphs and complete sentences.

To test this hypothesis playfully, I downloaded the American Open AI company's ChatGPT 4 application, which is available for free for anyone and is possibly the most well-known language model on the market, onto my tablet. The first time, I asked it to write a report for a crime scene investigation of a car break-in. The result was shockingly good, with the most frightening thing being that all I gave as instructions (the so-called *„prompt"*) was that, and yet a complete report was produced. This means that it made up the location, date, car type and model, breaking method, recorded evidence, and stolen items, purely for my entertainment. So, the second time, I gave it certain basic data: the car type, color, location, and which window was smashed. It incorporated all of these into the second report. For the third attempt, I tried to correct its *„movie/TV"* vocabulary to fit law enforcement jargon. I asked them to call glass *„glass fragments"* and evidence *„an exhibit"*. I asked it to only consider things that we pack up and take with us as evidence, and to number them, while not numbering other abnormalities but instead calling them *„other relevant remnants"*. The third set of minutes would have been perfectly acceptable at most police stations in Hungary.

This was obviously not scientifically rigorous testing, but rather a playful attempt. Additionally, car break-ins are perhaps one of the simplest types of crime scenes (compared to an arson or a suicide, for example). Despite all of this, the results were surprisingly promising. After two small (a few sentences) corrections, it produced a nearly flawless CSI report. When I asked ChatGPT how it learned to use the word „exhibit" instead of „evidence", it responded that it had learned from the context of other reports and that it would use that term from then on.

What would this high-quality (again: free, and accessible to anyone) technology be capable of, if we were to feed it all the police CSI reports created between 2019-2023 and all the autopsy reports from the four university medical expert institutes, and the Hungarian Institute for Forensic Sciences...? Of course, we can't do that, yet.

Concerns, or where does the ghost of the machine live?

Of course, the LLM operated by a foreign private company cannot be uploaded with real reports: we have no idea where the uploaded material goes, who can access it, and how - legally or in the event of a possible malfunction. Generative AI does not „fit" on a tablet or a phone. What we have on our device is just an endpoint; the substantive work takes place on powerful servers, somewhere in America, or perhaps in the Far East.

This is also the reason why the police do not use open source „speech-to-text" services to write reports: it is not known whether someone can copy the voice messages while they travel to the servers and back, or if someone can listen in, it can be subject to analysis, search, etc. In the case of criminal data and special personal data, such uncertainty is inadmissible.

What is the solution, or my innovation proposal?

Now, a few large companies dominate the generative artificial intelligence market, and their products can be used for free or at varying costs. However, open-source generative artificial intelligence is also being developed rapidly. For the time being, these do not match the products of large companies, but in the near future they are expected to reach the level of free platforms, e.g. represented by ChatGPT 4. And that is more than enough.

Once an open-source LLM reaches the level of current corporate LLMs, the Police or the Ministry of Home Affairs can get one immediately. It can be installed on a high-performance server purchased and set up just for this purpose only, which can immediately be isolated safely and securely protected against external interference. After that, tens of thousands of police reports or official records from the police's integrated administration system can be easily fed into it for training purposes. The same could be done with the autopsy reports of medical schools and the Hungarian Institute for Forensic Sciences, supplemented by legal and forensic handbooks and articles freely available in university repositories, as well as the legal

material of the National Database of Laws and Decrees, and the library of court decisions.

The next step would be for some volunteers, preferably trainees or former crime scene investigators or prosecutors, to start „teaching" the system. That is, they would generate reports with it, based on various imagined scenarios, specifically to correct possible errors, correct the use of words, identify confabulation, etc. In parallel, a small volunteer team of medical experts and residents would perform the same task concerning autopsy and autopsy reports. In practice, after switching on the server, the text corpus can be loaded literally in seconds, after which the „teaching" would take no more than a week.

After that, it is only a matter of a secure data connection so that the LLM-based inspection report can run on the tablets that are already regularized by the crime scene investigators. The „speech writing" function would be handled by the system via the same secure data connection; the device's microphone could even be disabled for other services. In this way, on the spot, the writer of the minutes could even have both hands free: what they said, his findings, descriptions, and measurement results would be transformed by the artificial intelligence into well-structured reports that use professional language and consist of complete sentences.

From there, it is only a step, which is science fiction for now, that the AI could ask for clarification if something is not clear to it, or if it detects an irresolvable contradiction in the communication. Also, the AI might suggest something if prompted *(„this is a rattan piece of furniture... what kind of powders are usually used to develop latent prints on it?"*) - science fiction is when the protocol proactively suggests actions or corrections without being asked. However, this will probably be just one or two steps away from putting the system into operation.

Closing

Everything I have outlined is the reality of the near future. As early as the first months of 2025, an open-source LLM may emerge that is comparable to the capabilities of the current large language models and could be used to create the text of protocols. A high-performance server on which the system can be run costs no more than the price of a mid-range passenger car. The endpoints could be tablets that are already available.

I would like to point out that, to the best of my knowledge, such development is not taking place anywhere in the world. So far, not a single police force or expert institute uses a large language model to write the text of reports, and I have not found such a thing among the exponentially growing number of publications related to artificial intelligence.

This kind of utilization of artificial intelligence is completely worry-free, it does not make or support human decisions, and it does not consider the dangerousness or suspiciousness of people. It just helps the work as an educated scribe would.

Finally, let's consider: the world changes even if we do not.

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FULLÁR, ALEXANDRA – FÜLÖP, PÉTER – UJVÁRI, ZSOLT – METZGER, MÁTÉ – SZÉCSI, ANDRÁS – VARGA, GYULA – VARSÁNYI BALOGH, MELINDA – PETRÉTEI, DÁVID

Empirical and virtual experiments: reconstruction of an extraordinary death

Introduction

In recent years, both nationally and internationally, there has been increasing emphasis on the role of cooperation between different specialized fields in proving crimes. This trend is well illustrated by the European Network of Forensic Science Institutes (ENFSI), which encourages experts to cooperate through proficiency tests and to study efficient organization of work processes in order to extract and utilize the maximum amount of information from evidence during examinations[1,2]. In Hungary, forensic experts working at the Hungarian Institute for Forensic Sciences (HIFS) continuously seek opportunities for cooperation between specialized fields, primarily in connection with major crimes, where joint work is essential to

[1] Zampa, F. – Bandey, H. – Bécue, A. – Bouzaid, E. – Branco, M. J. – Buegler, J. – Kambosos, M. – Kneppers, S. – Kriiska-Maiväli, K. – Mattei, A. – Zatkalikova, L. (2024): ENFSI 2022 multidisciplinary collaborative exercise: organisation and outcomes. Forensic Science International: Synergy 2024. 8 100465.

[2] Kiss, István: The system of opportunities for expert cooperation in international and national practice. Police Studies. 2024/1-2. 110-119.

address questions that span multiple areas of competence and overlap between individual areas of expertise[3,4,5].

According to legal provisions in Hungary, it is the expert's task and duty to become familiar with all data related to the case that is necessary for the fulfillment of their duties, and experts have the opportunity to present their findings in the form of joint or joint expert reports[6,7]. In investigating cases that raise case-specific problems, it is essential to fully utilize the possibilities provided by law, and to maintain close cooperation between the investigating authority and experts, as well as between experts from different specialized fields. The following case study clearly demonstrates that expert involvement is extremely important in cases where the investigating authority has doubts about an unusual death. One of the most difficult questions, both during on-site death examinations and in expert practice, is determining whether an injury or set of injuries caused by blunt force trauma is the result of an accidental event, an accidental fall (e.g., age-related gait instability, loss of balance, illness, dizziness, stroke, sudden cardiac death, etc.) or an intentional, third-party action or abuse (e.g., hitting, pushing). This is because injuries characteristic of blunt force trauma can occur both from being hit with a blunt object and from impact with a hard surface. Both processes can be understood physically as a type of collision, thus

[3] Lontai, M. – Kosztya, J.S (2023): The challenges of institutional expertise in the light of technological development. [Az intézményi szakértés kihívásai a technológiai fejlődés tükrében.] Ügyészek lapja 2023. 30(5-6) 75–90

[4] Fülöp, P. – Ujvári, Zs – Petrétei, D. – Kiss, I. - Dudás-Boda, E. – Metzger, M. – Fullár, A. (2023): Modern tools and possibilities of forensic expert illustration. [Az igazságügyi szakértői szemléltetés modern eszközei és lehetőségei.] Ügyészek lapja 2023. 30(5-6) 91–102

[5] Fullár, A. – Dudás-Boda, E. (2024): Examination methods at the intersection of forensic anthropoligist and forensic mark expert competences in Hungarian practice. Police Studies 2024.

[6] Act XC. of 2017 on büntetőeljárásról XXXI. fejezet A szakértői vizsgálat 192. § (1), [Act XC of 2017 on Criminal Procedure Chapter XXXI Expert Examination Section 192 (1)]

[7] Act XXIX. of 2016 on the Forensic Experts, 2. § (2).

showing many similarities. Differentiation is particularly difficult if the incident occurs in a home environment and potential perpetrators are family members, as DNA testing offers no meaningful assistance in these cases.

In these cases, determining the cause and manner of death is of paramount importance, which is informed by data from the death scene examination and subsequent autopsy. Examining bone fractures and soft tissue hemorrhaging alone, without knowledge of detailed circumstances and other scene alterations, can hinder the investigation of injury causes and, in extreme cases, lead the procedure to a dead end. For medical experts, extensive injuries and bone fractures easily raise the question of whether they occurred during an accidental fall or intentional abuse. If any doubt arises regarding the mechanism of injury formation, it is advisable to involve experts with different competencies in the procedure. The possible mechanism of injury formation and the most likely sequence of events should be examined in collaboration with experts skilled in physics and the analysis of marks and bloodstains, who can contribute their knowledge and experience to clarify questions involving overlapping areas. As a result, they can clarify circumstances based on classical mechanics laws, and by jointly analyzing other traces in a complex manner, they can support or refute the accidental or third-party nature of the incident. Additionally, medical experts – primarily in the courtroom – may face expectations to separately comment on the complex formation mechanisms of injuries occurring nearly simultaneously due to various loads (e.g., pulling, compression, bending, shearing, twisting) and the magnitude of the forces creating them. Therefore, in such complex cases, it is required that experts reliably – based on scientific methods and credibly – evaluate possible processes.

At the plenary session of the ENFSI SoC EWG conference held in Budapest in October 2024, we presented the expert aspects of the first case in Hungary where experts from multiple fields used empirical and virtual model experiments to reconstruct an unusual death.

Case study

According to initial reports, an elderly lady was found dead in her own home, where she was allegedly alone following her hospital treatment. The woman, who died under suspicious circumstances, was discovered by her daughter's boyfriend at the bottom of the stairs leading from the upper floor to the ground floor, with bleeding injuries. According to the discovering witness, he turned the woman's body, which was lying on its left side perpendicular to the stairs, onto her back for resuscitation. Given her health condition, he believed his girlfriend's mother had become ill on the stairs and consequently fallen.

In Hungary, according to health regulations, criminal police procedures are required in all cases of an extraordinary death. This can occur under criminal procedure rules if the extraordinary death results from a crime, including both intentional and negligent commission. These can be various crimes ranging from intentional homicide to negligent homicide and crimes causing death beyond intent, such as causing fatal traffic accidents, endangerment through violation of occupational rules, or forms of public endangerment resulting in death. If no crime is suspected, the criminal police still conduct procedural actions, but under administrative law rules, similar to regulatory inspections in other legal areas. Under administrative law procedures, it's also possible to conduct scene investigations, interview witnesses, and gather extensive data. Despite the differences in procedural rules, the police work according to the same professional standards and investigate every unusual death so that the resulting documents and evidence could later be used in a potential murder investigation. It's also important to note that murder cases are investigated by the territorial police, while unusual deaths are investigated by the local police. In the latter case, the territorial police may closely monitor and supervise the local police's work.

For this case, it's also important that Hungarian criminal law punishes death caused beyond intent, meaning when the perpetrator intentionally causes injury but the victim "accidentally" dies from it, with imprisonment

from 2 to 8 years. Completely negligent homicide, when the perpetrator sees the possible outcome but recklessly trusts it won't occur, or when they don't see the possible consequences because they failed to exercise due care (attention), is punishable by imprisonment from 1 to 5 years. Intentional homicide can be punished with imprisonment from 5 to 15 years. In cases with aggravating circumstances (such as: profit-seeking motive, minor victim, defenseless victim, particularly cruel commission, etc.), homicide is punishable by imprisonment from 10 to 20 years or life. In Hungary, actual life imprisonment without parole exists.

The medical expert performing the official autopsy detected injuries on the body (left frontal region hemorrhage, broken facial bones, broken ribs, hyperextension fracture of thoracic vertebrae) early in their examination that raised doubts about the accidental nature of the death. For this reason, they ordered a forensic autopsy and, together with another medical expert, conducted a complete exploratory examination. However, the medical experts' findings alone were not sufficient to modify the police procedure to a criminal case. The investigating authority examined the crime scene data and the discovering witness's testimony, and further peculiarities emerged regarding the case, such as the position of the body relative to the stairs or the bloodstains found in the vicinity of the body. To clarify these disturbing findings, additional experts needed to be involved. The investigating authority provided an opportunity for an additional scene examination, witness hearing at the scene, and a concurrent expert examination. This allowed the appointed medical expert, physicist, mark examiner, and bloodstain pattern analyst to examine the original scene, conduct model experiments, discuss their results together, and apply photogrammetry methods for precise scene documentation.

Following the on-site examinations, the experts provided a joint expert report within the framework of their official appointment, still within the administrative procedure. The data detailed in the "Examination Results and Professional Findings" chapter of the report clearly indicated that, alongside the examined accident mechanism, third-party involvement

might have played a role in connection with the fall from the stairs. Based on the expert report, criminal proceedings were initiated, in which the discovering witness was now a suspect. The statements made during his on-site interrogation were examined by the acting experts in a new joint expert report, and their accuracy was verified using virtual model experiments. The investigating authority concluded the case with an indictment for aggrevated murder, where the expert reports served as the sole evidence alongside the suspect's testimony. All experts involved in the case were heard together by the court during a separate trial day in the presence of the defendant and their defense counsel, where they presented their results and model experiments in digital presentation form. The court of first instance sentenced the defendant to 19 years in prison and 10 years of disqualification from public affairs for murder committed against a defenseless person, which sentence was upheld by the appeals court[8,9].

Bloodstain Pattern Analysis and On-site Empirical Model Experiments

Analyzing the crime scene photographs, the mark examiner and the bloodstain pattern analyst involved in the investigation found spatter stains and flow patterns on the victim's right arm that only partially corresponded with the discovering witness's account (area marked with red arrow in Fig. 1A). On the victim's face and chest, as well as in the blood pool on the floor beside the body, transfer stains were visible that suggested the body was turned from a prone position to a supine position (areas marked in white and black in Fig. 1A). Additionally, the location and direction of impact patterns on the stair-side of the blood pool, along with spatter stains on the

[8] Source: https://jogkodex.hu/doc/8727149
Accessed: 03.07.2025
[9] Source: https://kekvillogo.hu/egy-porzsak-miatt-oltotta-ki-anyosa-eletet-a-tatabanyai-ferfi-19-ev-fegyhazat-kapott/
Accessed: 03.07.2025

stairwell wall, indicated that the already-formed blood pool had been subjected to multiple forces (area marked in yellow in Fig. 1A and Fig. 1B).

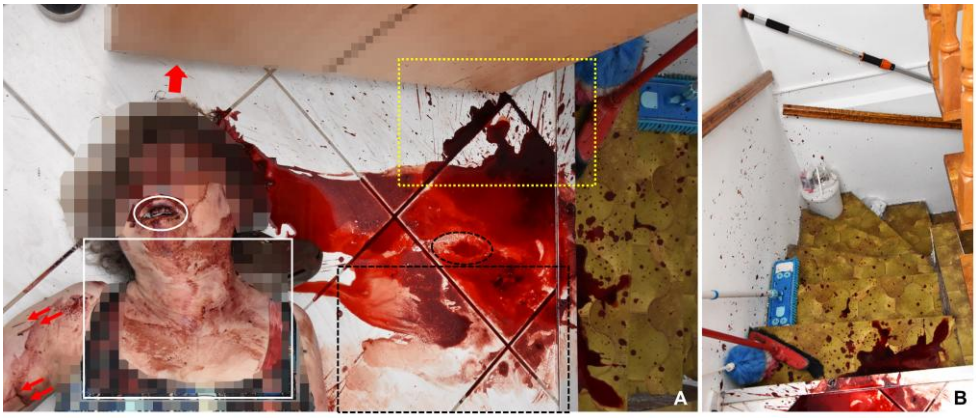

Figure 1.
A: Bloodstains on the body (marked in white and red) and in its surroundings (marked in black) indicate that the victim was moved from a prone position to a supine position. Evidence of blood impact pattern is visible on the edge of the blood pool on the floor (area framed in yellow). The victim's head is located at the edge of the dresser. B: Blood spatter on the wall and staircase near the body. (Original crime scene photographs)

During the scene examination conducted by the forensic experts, the discovering witness demonstrated the victim's position at the time of discovery and the circumstances of moving the body using a dummy. Subsequently, the experts modeled the process of turning the body onto its back using both the dummy and a person matching the victim's body measurements, following the discovering witness's account and based on the results of the bloodstain pattern analysis (Fig. 2.). According to the discovering witness's demonstration, both the dummy's and the model person's head aligned with the centerline of the cabinet door behind the body, contrary to the victim's head position, which was aligned with the edge of the cabinet (Fig. 1A. and Fig. 2A-B.). This position did not explain the bloodstains found on the victim's arm, face, chest, or the floor and wall. In the experiment where the victim's rotation began from a prone position, based

on the bloodstains, the final supine position of the body showed similarities with the victim's condition during the death scene examination, with the head aligning with the cabinet's edge (Fig. 1A. and Fig. 2C-E). The prone starting position explained the bloodstains found on the face, chest, and right arm, assuming that the body with bleeding injuries had its right arm resting on the first step of the staircase leading to the basement before being turned onto its back. However, the evidence of force impacts visible on the edge of the blood pool around the head (impact pattern) and the multiple spatter stains visible on the walls were not explained by the mechanisms of falling from the stairs and being turned onto the back.

Figure 2.
A-B: The victim's initial and final positions as demonstrated by the discovering witness. C-E: Phases of the expert reconstruction model experiment based on bloodstain pattern analysis. (The author's own recordings.)

The crime scene photographs were also examined by a physics expert. The fall to the location described by the discovering witness is not qualitatively supported by the laws of Newtonian mechanics, which in itself raises

the possibility of third-party involvement. Due to the complexity of the case, empirical model experiments were planned within the framework of an on-site expert examination, where the accidental nature described by the discovering witness was examined as a null hypothesis, and the possibility of third-party involvement as an alternative hypothesis. It was necessary to empirically examine how the body could have reached its final state under different initial conditions (from which step, from what body position, with what initial velocity).

The experts examining the null hypothesis dropped a forensic dummy in the model experiment to simulate a possible illness, and pushed it to simulate stumbling from the staircase at the incriminated scene toward the ground floor. Accordingly, the dummy was thrown from several possible positions, such as being dropped and pushed face-forward and backward from different steps, and being pulled toward the railing. Testing the alternative hypothesis, the dummy was pushed face-forward from the kitchen toward the hallway. The results showed that the most likely process for the body reaching its discovery position – in light of the data available at the time of the examination – could have been falling or being pushed face-forward from the kitchen door (Fig. 3A-B.). Furthermore, in two cases – when pushed backward from the sixth step (Fig. 3 D-E.) and when pulled down by the arm from the third step – the dummy landed on the hallway floor in a position similar to that described by the discovering witness. However, according to the medical expert's report, injuries typically caused by reflexive support during a possible stumbling or loss of balance (palm, elbow, and knee injuries) were absent. From a medical expert's perspective, the absence of these injuries may indicate that the deceased had lost consciousness before reaching the ground. Based on these findings, the null hypothesis could therefore be refuted, as the body, when released or pushed from various positions, could not have landed in its discovery position merely by falling from the stairs.

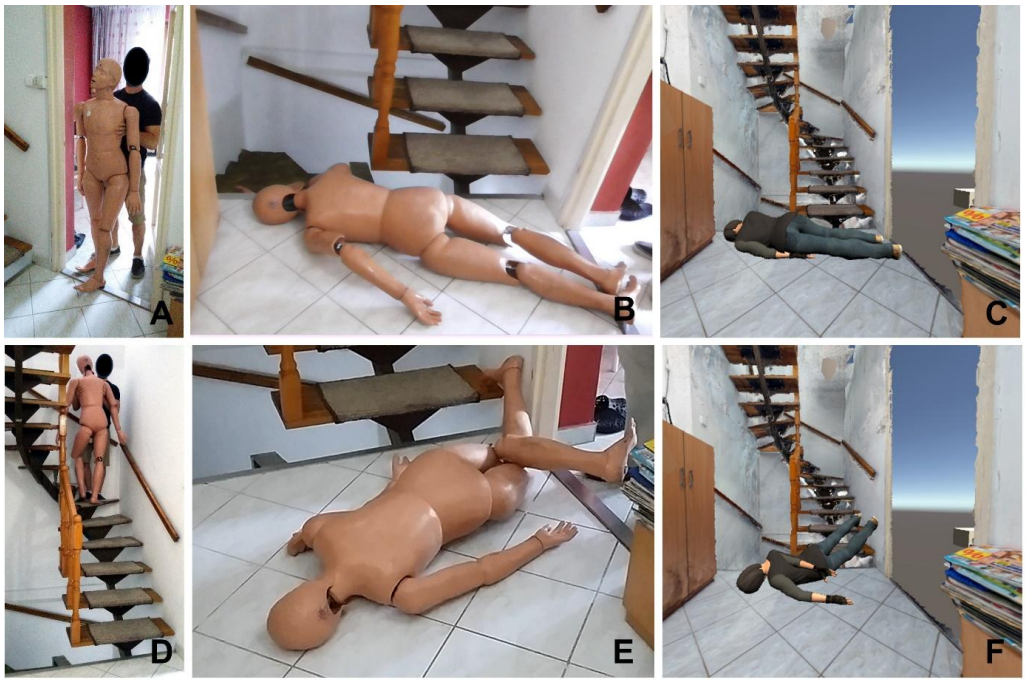

Figure 3.
Empirical and virtual model experiments at the scene. A-C: Initial and final states of pushing the victim face-forward from the kitchen door. D-F: Initial and final states of pushing the victim backward from the 6th step of the stairs. (The author's own photographs.)

Photogrammetry and Virtual Model Experiments

Photogrammetry has long been used in the film and gaming industries, among others, to create accurate, realistic digital models of various buildings and objects. It is a three-dimensional imaging process where specialized imaging software determines the approximate three-dimensional structure of objects using photographs taken from different viewpoints and applying mathematical methods, with the resulting three-dimensional models quite accurately reflecting the geometric structure of the reconstructed

objects [10]. Photogrammetry can be an effective tool in forensic practice for photographing bodies and reconstructing crimes and accidents [11]. Three-dimensional models can be created using photogrammetry software. In Hungary, for the first time during this case's on-site expert examination, alongside empirical experiments, we created three-dimensional models of the stairwell (the railing, stairs, and steps) and relevant parts of the hallway using photogrammetric methods, using RealityCapture (Version 1.2.0.16813) photogrammetric imaging software. The three-dimensional model of the scene details was scaled based on measurements taken at the scene and the sizes of marker stickers placed on the wall, approximately reflecting the actual geometry.

The tool for implementing the action in a virtual environment was the Unity (v2021.2) graphics engine and the Ragdoll Wizard integrated into the application, which helped bring the photogrammetric 3D model of the scene to life. We imported the photogrammetric model of the original scene into Unity and placed a virtual dummy (ragdoll) in this model to reproduce the fall from the stairs, with body segments adjusted to match the victim's body mass. Thanks to Unity's physics engine (PhysX engine), physical parameters can be freely adjusted in the software, such as the magnitude of gravitational acceleration, elastic properties of objects involved in collisions, coefficient of restitution, friction, air resistance, and the magnitude, direction, and point of application of external forces in three spatial directions. We also created a custom script that allowed us to apply forces of any magnitude and direction to any point on the ragdoll's body surface, enabling simulation of the forces experienced by the victim.

[10] Ujvári, Zs. – Metzger, M. – Gárdonyi, G. (2023): A consistent methodology for forensic photogrammetry scanning of human remains using a single handheld DSLR camera. Forensic Sciences Research 2023. 8(4) 295–307

[11] Metzger, M. – Újvári, Zs. – Gárdonyi, G. (2020): Application of photogrammetry for forensic purposes: reconstruction of locations, corpses, objects in three dimensions. [A fotogrammetria kriminalisztikai célú alkalmazása: helyszínek, holttestek, tárgyak rekonstrukciója három dimenzióban.] Belügyi szemle 2020. 68(11) 57–70

We repeated the empirical model experiments previously conducted with the forensic dummy in a realistic virtual environment by dropping a ragdoll with the same body weight as the deceased 10 consecutive times from different positions, modeling collapse while standing on different steps in the digitized stair landing. As a final result, we obtained the same results as the empirical model experiments, namely that when pushing the body face-forward from the kitchen door, the dummy reached the deceased's discovery position (Fig. 3C.), while pushing from the stairs resulted in at most a similar position (Fig. 3F.).

During the investigative phase of the criminal proceedings, the experts had to examine the sequence of events demonstrated by the suspect during their on-site interrogation. Since the previous empirical and virtual model experiments encompassed the main elements of the sequence of events described by the suspect, and the physical processes during the empirical experiments showed good agreement with the virtual model experiment results thus validating each other, it was sufficient to only investigate in the virtual space and refine the initial conditions with the statements made in the suspect's testimony. The suspect presented the version that the victim was walking down the stairs in front of him when the victim suddenly stopped around the fourth step from the bottom and looked back. At this point, the suspect, moving downward with momentum, couldn't stop in time and pushed the victim, causing them to fall face-forward onto the floor. When the victim landed on their left side, they weren't bleeding yet but also didn't move. According to his account, panic and rage overtook him, he kicked the body several times, then lifted the victim's head to check for signs of life and dropped it back. The physics expert modeled these statements in the virtual stairwell. He examined the accidental push as approximately 900 N and the intentional push as approximately 1665 N force (impact), applied to the victim's head, back, leg, or hip area. After considering the possibilities, he finally concluded that the victim's fall from the stairs could have been caused by a sudden push, hit, kick, or foot-pushing either to the head while the body was half-turned to the right and backward, or to the hip area

while facing forward (Fig. 4.). Subsequently, the experts jointly concluded that the victim did not suffer the fatal injuries during the fall from the stairs, but afterward during abuse on the floor tiles, during the hyperextension of the head and impacts of the face with the ground. Therefore, the victim was alive when they suffered the abuse on the ground, with the suspect repeatedly kicking the helpless victim, kneeling on their back, hyperextending their upper body, and forcefully slamming their head into the floor tiles at least twice. During the autopsy, the medical experts documented injuries on the victim's body consistent with both the fall from the stairs as described by the suspect (Fig. 4E-F.) and the subsequent abuse. The objective evidence presented by the experts and the sequence of events inferred from these, together with the suspect's testimony, were collectively sufficient to prove the charge of aggravated murder.

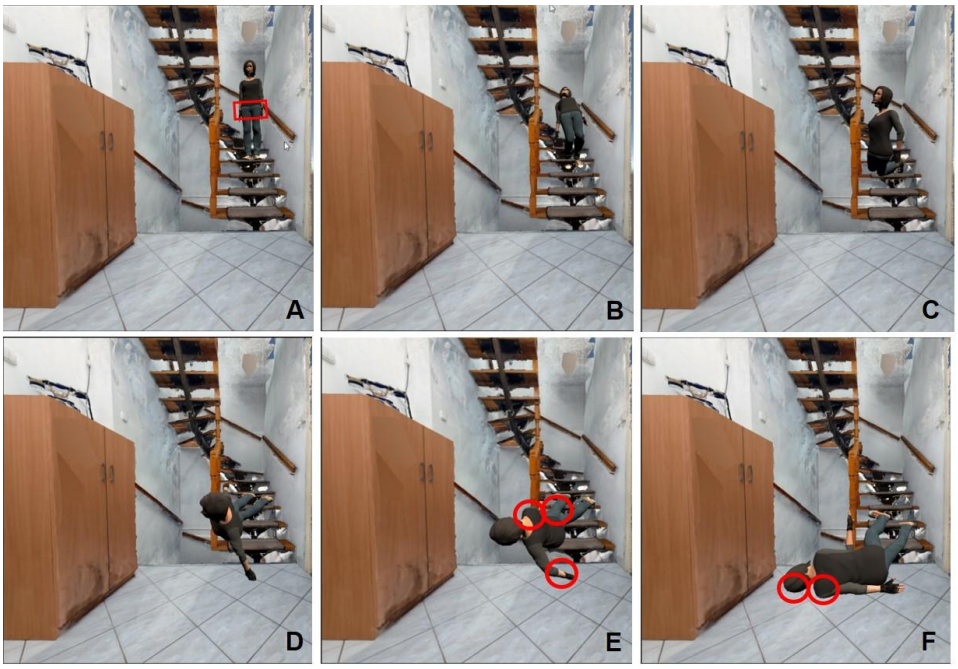

Figure 4.
A-F: The most likely moments of the victim's fall from the stairs in the virtual model experiment. Based on the suspect's statements during the on-site interrogation and the results of expert examinations, the suspect pushed the victim in the hip area while coming down the stairs, and the victim fell to the floor. In moments E and F, we have circled the body parts that were injured and documented during the autopsy when making contact with the stairs (right thigh, right shoulder, right upper arm, left forearm) and the floor (left shoulder, left forehead). (The author's own recordings.)

Discussion

The case detailed above provided numerous innovations from both the appointing authority's and experts' perspectives. For the investigating authority, it is always challenging to quickly find clear evidence during the investigation of an unusual death whether intentional actions or accidents

led to the deceased's death, especially when no substantial physical evidence is available. The close cooperation between multiple expert fields and the innovative, multi-perspective approach to the incriminated event opened new dimensions where the joint expert report, as the sole means of evidence, could form a self-contained logical chain serving as the basis for a conviction. The further significance of the case presented in this study is that it demonstrates how effective communication between the appointing authority and experts can help solve a case that began as an unusual death and concluded as aggravated murder.

The case also helps highlight how multifaceted experts' work is and what complex perspectives and thinking it requires even within a single case. At the time of the first expert appointment, only the crime scene data and the discovering witness's testimony were available, so the experts operated in „investigative mode." At this stage, they primarily conducted diagnostic examinations, providing objective data regarding the sources of discovered evidence. Later, summarizing the results, they examined possible processes (mechanism of reaching the ground) at the activity or action level. During the second expert appointment, they switched to "evaluative mode." This means that during the examination, they sought to answer whether the suspect's statements aligned with the injuries on the victim's body, the bloodstains, and the model experiments simulating the fall from the stairs.

The case's uniqueness provided an excellent opportunity to test and try the photogrammetry method in practice (through its application in virtual model experiments). Its criminalistic (in a narrower sense forensic) significance lies in its versatile applicability at any time during administrative or criminal proceedings. In this case, we focused on the repeatability of expert experiments conducted to examine complex movements and the quick and cost-effective possibility of testing different scenarios. This required the most accurate possible three-dimensional model of the original stairwell that we could implement in a software environment where the laws of physics could be realistically simulated. We chose the Unity game de-

sign software. First, we had to verify the correctness of the software's embedded physics engine to determine if the virtual model experiment results were reliable, acceptable, and applicable as an examination method in similar cases. Thus, from this perspective, this case can be interpreted as a kind of validation process. Comparing the final results of empirical and virtual experiments, it can be said that the forensic dummy can be replaced with the ragdoll. Based on our examinations, Unity's physics engine correctly simulates the movement of bodies colliding with other objects under gravitational force (however, it's important to emphasize that it does not simulate their deformation). Experiments with the virtual dummy falling from the steps of the virtual stairwell in the gravitational field produced equivalent results to experiments conducted in reality. In forensic practice, this enables the verification of testimony content and testing of action details using Unity Ragdoll Wizard in other cases as well.

In light of the outlined results, it can perhaps be boldly stated that every innovative effort, high professional knowledge, teamwork, and a bit of luck were needed to make this case provable. We hope our work can serve as an example and help in numerous similar cases in the future!

Acknowledgments

Special thanks to Police Sergeant Blanka Mayer, without whom this case would not have undergone expert examination. We thank Police Major General Dr. Attila Petőfi for the opportunity to collaborate and for his support.

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ODDVAR MOLDESTAD – KJELD H. HELLAND-HANSEN

Handsfree documentation on-site to enhance situational awareness and the use of AI for a more cost-effective way of reporting by using speech-to-text

The „Jodapro”

The „Jodapro” project began when crime scene investigator Oddvar Moldestad in the Norwegian police found out about a voice-controlled camera used in parts of Norwegian healthcare. The camera made it possible to stream, among other things, wound treatment of patients in their own homes, to doctors sitting in their offices. In Norway, the distances can be quite large, and in this way the healthcare system saves both time and money.

Moldestad presented the idea of using this camera, made by the American (USA) manufacturer „RealWear” with Norwegian software from „Jodapro” within the police. The project was underway!

As mentioned, the camera is made by Realwear and is called the „Realwear Navigator 520”. This is a camera that in many ways works like a smartphone, in that you can install apps and enter what you think is necessary to carry out different types of crime scene work. The main use, for our part, is streaming to experts and logging as an alternative to using pen and paper at the crime scene. Then, the speech will be transcribed on the laptop afterwards.

The need for artificial intelligence to transcribe speech will, based on the workflow and methodology of forensic sections, be mainly twofold. One will be when working out at a crime scene. The second will be when working in a laboratory / examination room. It is obvious in this project to combine speech and video, as this can easily be combined digitally. By combining voice and video, the needs will expand somewhat.

At the crime scene

Video recording. Documentation during the initial review of the crime scene before tracing.

Verbal description of the crime scene. Done at the same time as video filming of the crime scene during the initial review. The verbal documentation is transcribed into text.

Further verbal notation during the crime scene investigation.

Use of the video function for contact / conversation with the lead detective, investigation team, subject specialists (blood spatter analysts, projectile trajectories specialists, forensic anthropologists, forensic medical examiners and so forth) etc.

In the laboratory

Verbal description of objects / evidence. The verbal description is then transcribed.

Benefits

The benefits of using technology to improve workflow are measurable to varying degrees. Some of the potential gains to the needs mentioned in the previous paragraph are as follows:

A video of the crime scene taken before trace protection will describe the crime scene visually and be a digital confirmation of „how it was". In the same way that the crime scene is documented with photos, 360° photos, possibly 3D laser scanning, the video will supplement all other investigations. Documentation of the crime scene with video, as well as a forensic technician's description, will be positive for legal certainty and the quality of the final investigation. Recently, there has been a focus on reopening older cases. In such cases, video can be of great use.

Transcribing verbal documentation of a crime scene will save time and ensure that objective facts are included in the final product. The time saved will naturally depend on the size and nature of the crime scene. This must be tested during exercises. Time saving is financial saving. Furthermore, a future „Temporary crime scene report", which is currently reviewed at the Norwegian National police directorate, will be significantly quicker to implement.

It is difficult to quantify the contact with others in the investigation track. By being able to consult with subject specialists who could see the crime scene directly, you will perhaps be able to save one or even more days of crime scene work. In that case, this will be a direct financial gain. In districts or cases where contact with other professional personnel will be at a national level, this can perhaps prevent several days of extra crime scene work. It will also be beneficial and allow the investigator(s) to have the opportunity to see the crime scene when forensic technicians are on site. This can mean that the tactical investigator does not have to go out to the crime scene and can mean that he/she can initiate investigative measures that are of a time-consuming nature more immediately.

Transcribing verbal documentation of objects has the same benefit as mentioned under „Benefits".

Specs:

Hardware: Realwear HMT-1.

- Qualcomm Snapdragon 662, 8 core
- 64GB internal memory, with microSD slot for up to 512GB, 4GB ram.
- 3250mAh li-ion. Interchangeable.
- 6-8 hours of battery life. Hot swop (battery can be replaced without interrupting the recording/streaming)
- 272g weight.
- IP66.

- Screen: 1280x720 px resolution, WVGA.
- 4 microphones with active noise cancellation.
- Loudspeaker with 94dB output.
- Camera:
  - 48 mpx, optically stabilized.
  - Video 1080p @ 30fps.

Used software:
Jodapro

Testing

We have done a lot of tests regarding both the streaming function and logging and transcription.

During the streaming exercises, we have contacted experts both in Norway and in several other countries, including Cyprus and Australia. The feedback is good both in terms of the quality of the streaming and usefulness for the experts.

The camera has also been used for logging both in exercises and in real cases. The results are very good. The transcription afterwards makes it possible to search for the mentioned evidence, for example „knife" or „evidence K-2" etc.

After our presentation in Budapest, a lot of people were able to try the camera. The feedback was very good, and several people want more information and testing. We hope and believe that this is a good project that will be able to help us forensic technicians in the future. Thank you for letting us showcase our project.

ENFSI-meeting in Budapest

The „Jodapro project" (Realwear/USA headset „Navigator 520", with the installed software from Jodatech/Norway) has been presented for fellow

colleagues in European police forces and parts of the forensic scientific institutes across Europe during the ENFSI work group meeting (Scene of Crime work group, with Blood Spatter analysis work group and the European meeting of forensic archaeology) in Budapest, Hungary. On Tuesday October 1st, the police superintendents Oddvar Moldestad and Kjeld H. Helland-Hansen presented the project for the whole assembly. During the rest of the meeting, the headset was tested by many participants. The response has been overwhelmingly positive. A representative from the Spanish police even called us „the sensation of the conference". Positive feedback given on the app „LinkedIn" supports this statement. Police in Switzerland, the Netherlands, Germany, and France have already asked us if we could be able to demonstrate it more extensively.

Just a few days prior to the ENFSI-meeting in Budapest, we acquired a new lens for the camera. The lens is easy to install („click on/off") and is combined with a standard lens as well, so there is no need to change back to the single lens. The lens is a thermo lens which can measure temperature with a +/- 5% accuracy up to 30 meters, according to the producers. We have not had time to test it properly yet but have done some minor testing. We will need to test it regarding temperature accuracy. We hope to use it to measure the body temperature of the deceased (as a preliminary measurement), search for hidden laptops/electronic devices with a heat signature, residual heat of used vehicles etc. The thermal cam has several modes and color chart settings.

The pictures:

Picture 1
Picture of the RealWear Navigator 520 by Kjeld H. Helland-Hansen

Picture 2
Picture of the examination of the „body" by Kjeld H. Helland-Hansen

Picture 3
Picture of crime scene investigator communicating with DNA experts by Kjeld H. Helland-Hansen. The video screen is in front of Kjeld H. Helland-Hansen's right eye.

Summary

Petr Bendl: Use of 3D scanning and modelling in forensic practice

The article explores the application of 3D technology within the Czech police force for crime scene documentation, forensic examinations, and the analysis of criminal incidents.

3D scanners have been in use by the Czech police for approximately 15 years. They are primarily employed in the documentation of serious crimes—such as homicides, large-scale fires, and other major events.

In his article, the author discusses both the use and potential of these technologies. The primary advantage of 3D documentation lies in its precision and the objectivity of the measured data. However, the time required for data processing can occasionally be a drawback.

To demonstrate the practical application of 3D scanning, the article presents several case studies. One particularly notable case is the death of the Czechoslovak Minister of Foreign Affairs on March 10, 1948. Jan Masaryk, the popular minister and son of the first Czechoslovak president, was found dead beneath the windows of his residence. More than 70 years later, the circumstances of his death remain unresolved. The author contributed to the 3D documentation of the scene and conducted an analysis of positional evidence using historical photographs in combination with modern comparison technologies.

Fenyvesi, Csaba – Fábián, Vanessza – Zsák, Zsófia: Criminalistical and criminal procedure law lessons of a knife homicide

This study presents the investigation and judicial phase of a murder case that occurred twenty years ago and has not yet been addressed in the literature. It refers to the turning points before the indictment and during the courtroom proceedings.

The aim of the study is to formulate the most important forensic and criminal procedure law lessons that may still be useful to legal practitioners today.

To achieve this goal, the authors reviewed the documents generated in the case. They analyzed the primary investigative actions, the suspect's interrogation, followed by the crime scene interrogation. Later, they also evaluated the subsequent interrogations of the defendant. The key points of the prosecution's charges were outlined, and the evidence presented by the first-instance court, as well as the reasoning behind the judgment, were examined. Both the prosecution's observations and the defense's appeal arguments were listed, which led to the decision of the appellate court.

The case analysis demonstrates the critical importance of the forensic „first strike" in leading to a successful investigation. A precise crime scene inspection, hot pursuit data collection, rapid searches, and professional interviews bring relevant evidence to the surface. Among them are material pieces of evidence, which – supported by expert opinions – can reinforce the century-old forensic principle: the principle of exchange, the intersection of material traces. These pieces of evidence are far more compelling than polygraph, graphological, or psychological tests with uncertain validity.

The interrogations of the defendant, exemplary in criminal tactics, can discredit any subsequent changes in the defense's narrative.

Overall, every stage of the criminal proceedings conducted twenty years ago contains messages for today's legal practitioners: for investigative authorities and supervising prosecutors, forensic tactics and forensic techniques; and for courts at various levels, an objective and thorough examination of the facts.

Frigyer, László: Service dogs and the regulation of their possible use by the police

Many people may have heard about police service dogs through the media, as they assist law enforcement in numerous areas. However, far fewer possess in-depth professional or legal knowledge on the subject. An untrained observer may not fully grasp the seriousness and responsibility involved in

the care, training, and deployment of service dogs. This is partly because their training and operational use remain shrouded in mystery—representing a „blind spot" in public knowledge, and even for some professionals who lack direct experience in the field.

Hottó, István: Mosaics from the last decade of the former Border Guard

This study provides a comprehensive overview of the transformation of the Hungarian Border Guard from the late 1980s until its integration into the national police in 2008. It traces how the institution evolved from a former armed body responsible for border security into a modern law enforcement agency, adapting to the challenges posed by the regime change, regional conflicts, and accession to the European Union.

The paper examines the effects of changing migration dynamics—especially the increasing number of asylum seekers from the region, armed conflicts in neighboring countries, and the rise of transnational crime—on border protection. It discusses the institutional reforms, the professionalization of personnel, and the technological developments supported by EU programs such as PHARE and COOP, with particular attention to preparations for joining the Schengen Area. The study also highlights the importance of legal harmonization and international cooperation in shaping Hungary's border policy during this period.

Beyond institutional and operational developments, the study reflects on the symbolic and human dimensions of border guarding. The author draws on personal experience as a conscript border guard, having served as a squad leader and supply officer at the Apátistvánfalva post, where he also participated in coordinating its closure. Later, as a civil servant at the Office of the National Assembly in the position of deputy head of department, he witnessed the parliamentary processes related to the integration of the Border Guard. The combination of service-based experience within the Border Guard and insight into the legislative background provides a perspective

that lends both personal authenticity and historical value to the preservation of the institution's memory and legacy.

Petrétei, Dávid: Generative AI at the crime scene?

The report is an essential element of crime scene investigation, even though there are now many other tools available, such as photography, video recordings, and 3D scanning. However, the written word remains crucial, and this is unlikely to change in the future. While electronic devices such as smartphones and tablets are now commonly used in crime scene investigations, they are not always well-suited to the task. Furthermore, the process of typing up a report can be arduous and time-consuming. One potential solution could be the use of generative AI, particularly for generating text. This approach has already been applied to chatbots and customer service applications. While it is not yet suitable for generating images, it could potentially be used in the future to create written reports. However, it is important to ensure that such reports are accurate and reflect reality, rather than simply serving the needs or desires of the investigator. The study was originally presented on the third of October 2024, at the ENFSI Scene of Crime Expert Working Group meeting in Budapest.

Fullár, Alexandra – Fülöp, Péter – Ujvári, Zsolt – Metzger, Máté – Szécsi, András – Varga, Gyula – Varsányi Balogh, Melinda – Petrétei, Dávid: Empirical and virtual experiments: reconstruction of an extraordinary death

This article presents the forensic investigation of a homicide case in which a man pushed his mother-in-law down a staircase and assaulted her further, later claiming the incident was accidental. The multidisciplinary investigation involved experts in trace evidence, physics, and forensic pathology. The team conducted an in-depth analysis of the fall dynamics and bloodstain patterns to reconstruct the events. A 3D model of the scene was

created and used in virtual reality to simulate various fall scenarios, complemented by physical testing with a dummy at the actual location. The comprehensive forensic evaluation disproved the claim of an accident, leading to a conviction. The perpetrator was found guilty of murder and sentenced to 21 years in prison.

Oddvar Moldestad – Kjeld Helland-Hansen: Handsfree documentation on-site to enhance situational awareness and the use of AI for a more cost-effective way of reporting by using speech-to-text

„Jodapro” is a Norwegian software installed on the RealWear Navigator 520 head-mounted camera system. It enables hands-free documentation of crime scene investigations, as well as video conference calls with colleagues who are not present at the scene.