


Brief reflections on the role of forensic evidence in the Italian criminal justice system.

Brevi riflessioni sul ruolo della prova forense nella giustizia penale italiana

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Abstract

The paper expands on the role of scientific evidences within criminal justice. After a brief analysis on Deoxyribonucleic acid (DNA) and ballistics evidence, it focuses on the issues connected to the use of digital forensics evidence.

Il lavoro affronta il problema della prova scientifica nel diritto penale. Dopo aver discusso brevemente in ordine alla prova del Dna e a quella balistica, l'Autore indaga i problemi connessi all'utilizzo della prova digitale.

Keywords: Deoxyribonucleic acid (DNA) evidence; ballistics evidence; digital forensics evidence.

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Introduction.

The value of forensic sciences has been long established in criminal justice procedure.¹ The issues surrounding their use and applications are numerous and quite complex, and to adequately explore them in depth would require more than a 'short essay'. This speech, then, will focus on a few specific topics, with the aim of highlighting, in general terms, some of the issues related to contemporary innovations in forensic evidence for criminal justice procedure. The report is divided into three sections, each expanding on a specific topic: the first, on Deoxyribonucleic acid (DNA) evidence; the second, on ballistic evidence; the third, focused on digital forensics. For a brief and consistent presentation, the latter category will include computer inspection and search, satellite tracking and trojan horse. In the section dedicated to digital forensics, we will also briefly discuss the topic of utilizing artificial intelligence within the realm of criminal justice.

1. Deoxyribonucleic acid (DNA) Evidence.

The collection of Deoxyribonucleic acid (DNA) Evidence entails all those activities necessary to identify a specific genetic profile from a biological specimen (such as, but not limited to, saliva, blood or sperm). In recent time, Deoxyribonucleic acid (DNA) evidence have been identified also in extremely small quantities of organic materials collected on the crime scene, the so-called contact traces.²

¹ G Fiandaca, 'Il giudice di fronte alle controversie tecnico – scientifiche' (2005) *Diritto e questioni pubbliche*, 7; D Pulitanò, 'Diritto penale fra vincoli di realtà e sapere scientifico' (2006), *Rivista italiana di diritto e procedura penale*, 795; L De Cataldo Neuburger (ed), *La prova scientifica nel processo penale*, (Cedam, 2007); O Dominioni, 'Prova scientifica (diritto processuale penale)', *Enciclopedia del diritto, Annali* (2008), 976; C Conti, 'La prova scientifica', in P Ferrua, E Marzaduri and G Spangher (eds), *La prova penale*, (Giappichelli, 2013), 87; PP Rivello, *La prova scientifica* (Giuffré, 2014); F Giunta, 'Questioni scientifiche e prova scientifica tra categorie sostanziali e regole di giudizio', in M Bertolino and G Ubertis (eds), *Prova scientifica, ragionamento probatorio e decisione giudiziale*, (Jovene, 2015), 57; A Incampo and A Scalfati (eds), *Giudizio penale e ragionevole dubbio*, (Cacucci, 2017); G Canzio, G Carlizzi and G Tuzet (eds), *La prova scientifica nel processo penale* (Giappichelli, 2018); R Bartoli, 'Diritto penale e prova scientifica', in G Canzio and L Luparia Donati (eds), *Prova scientifica e processo penale* (Cedam, 2022), 77.

² R Orlandi, 'Il problema delle indagini genetiche nel processo penale' (1992), 3, *Quaderni Camerti*, 418; O Dominioni, *La prova penale scientifica. Gli strumenti scientifico – tecnici nuovi o controversi e di elevata specializzazione* (Giuffré, 2005), 25; C Fanuele, 'L'indagine genetica nell'esperienza italiana e in quella inglese' (2006), *Rivista italiana di diritto e procedura penale*, 732; U Ricci, C Previderé, P Fattorini and others, *La prova del DNA per la ricerca della verità*, (Giuffré, 2006) 114; F Caprioli, 'La scienza «cattiva maestra»: le insidie della prova scientifica nel processo penale' (2008), *Cassazione penale*, 3521; S. Lorusso, 'La prova scientifica', in A Gaito (ed), *La prova penale* (Giappichelli, 2008), 229; A Scarcella (ed), *Prelievo del DNA e Banca dati nazionale. Il processo penale tra accertamento del fatto e cooperazione internazionale* (Cedam, 2009); M Scoletta, 'La tutela penale dei dati e delle informazioni genetiche', in

When mentioning Deoxyribonucleic acid (DNA) identification in criminal justice, the first famous case that comes to mind is that of Yara Gambirasio. Yara was a 13-year-old girl living in a small town near Bergamo, in northern Italy. She disappeared on November 26th, 2010, and was then found dead on February 26th, 2011. The case immediately caught the attention of national media, both because it involved such a young girl and for the particular cruelty and brutality of the crime itself, but also because of the torturous progress of the investigations. First a suspect was taken in but quickly released: to arrest him the police had even forced a ferryboat to return back to port, but it later came out that the arrest had been ordered based on the mistranslation of a phone surveillance recording. Later, the law enforcement conducted extensive genetic research on the local population, performing 25,700 Deoxyribonucleic acid (DNA) tests. As is known, it was precisely thanks to the Deoxyribonucleic acid (DNA) evidence collected that the culprit was identified: Massimo Giuseppe Bossetti, a construction worker from the town of Mapello, sentenced to life imprisonment on October 12th, 2018.

When it comes to Deoxyribonucleic acid (DNA) evidence, however, several issues still stand out to attention.

Firstly, collection of Deoxyribonucleic acid (DNA) samples is not an easy and straightforward procedure. The judicial police have a duty to be on site and, with immediate urgency, to collect samples of everything that could be potentially related to the case, keep them in custody and store them.³ The urgency of this first phase is necessary to properly carry out a number of investigations and processes, like collecting the corpus delicti, the body of evidence, and all related materials. Carrying out these operations as efficiently and urgently as possible allows investigators, on the one hand, to collect and preserve any evidence without the risk of being tampered with, and on the other hand, guarantees the privacy and personal freedom of all parties involved. The suspect's lawyer has a right to witness these operations, but not to be given notice of them in advance⁴. During this phase, the judicial police is free to autonomously perform only urgent examinations, not body inspections, which are solely performed by the judicial authority.⁵ Urgent examinations include the collection of fingerprints data, anthropometric measurements, descriptions and pictures, as well as the collection of any biological materials inadvertently left at the crime scene (e.g., traces of sweat on fingerprints or saliva traces collected during a medical examination, or even fallen hair and cigarette stubs).

L Marafioti and L Lupària (eds), *Banca dati del DNA e accertamento penale* (Giuffrè, 2010), 130; U Ricci, 'Limiti e aspettative della genetica forense', in C Conti (ed), *Scienza e processo penale. Nuove frontiere vecchi pregiudizi* (Giuffrè, 2011), 254; A Camon, 'La disciplina delle indagini genetiche' (2014), Cassazione penale, 1437; F Taroni, J Vuille and L Lupària, 'La prova del DNA nella pronuncia della Cassazione sul caso Amanda Knox e Raffaele Sollecito' (2016), I, *Diritto penale contemporaneo, rivista trimestrale*, 155.

³ G Ichino, 'L'attività di polizia giudiziaria', in M G Aimonetto (ed), *Indagini preliminari e istruzione del processo*, (Utet, 1999), 182; S Bozzi and A Grassi, 'Il sopralluogo tecnico sulla scena del delitto', in M Picozzi and A Intini (eds), *Scienze forensi. Teoria e prassi dell'investigazione scientifica* (Utet, 2009) 40; S Lorusso, 'L'esame della scena del crimine nella contesa processuale' (2011), *Diritto penale e processo*, 261; D Curtotti, *Rilievi e accertamenti tecnici* (Cedam, 2013) 215.

⁴ Art. 356 c.p.p.: «Il difensore della persona nei cui confronti vengono svolte le indagini ha facoltà di assistere, senza diritto di essere preventivamente avvisato, agli atti previsti dagli articoli 352 e 354 oltre che all'immediata apertura del plico autorizzata dal pubblico ministero a norma dell'articolo 353 comma 2».

⁵ P Felicioni, *Accertamenti sulla persona e processo penale. Il prelievo di materiale biologico* (Ipsos, 2007), 96.

The second issue pending on Deoxyribonucleic acid (DNA) evidence concerns the analysis of biological materials. After sample collection, judicial police will often refer to professionals with the relevant technical skills for sample analysis.⁶ However, the best and most suitable course of action would be to entrust this process to the Public Prosecutor, who will appoint a consultant. In this case, and as provided for in article 360 of the Italian Code of Criminal Procedure (CCP), the Prosecutor shall appoint an expert in the presence of all parties involved in the proceedings; the parties appointed consultants may also witness any experts' activities.

The last and possibly most pressing issue relating to Deoxyribonucleic acid (DNA) evidence is their use within the proceeding itself. As is well known, the evaluation of Deoxyribonucleic acid (DNA) testing is subject to probabilistic laws and, as such, it almost never provides for certain results.⁷ More in details, within the famous Franzese ruling,⁸ the Supreme Court of Cassation has already stated the unreliable nature of statistics laws and their related results, for the sake of safeguarding the principle requiring a ruling to be made 'beyond all reasonable doubt.' A significant portion of studies on this matter considers Deoxyribonucleic acid (DNA) evidence as merely circumstantial, meaning that they could lead to conviction only if supplemented by other evidence. The Franzese ruling could potentially provide a criterion to rule out this causality problem, which is the logical likelihood of the event. Within this framework, a judge would be free to use and leverage information coming from Deoxyribonucleic acid (DNA) evidence only if within the evidence gathered there are no elements suggesting a plausible and logical alternative scenario.⁹ In any case, the debate on this issue is still open and ongoing.

2. Ballistic Evidence.

The Ballistics is the field of mechanics concerned with the launching and flight behaviour of bullets, where 'bullets' refers to free-moving objects subject to gravity, air drag and the friction acting on their surface. The bullet has its own momentum, an initial velocity generated by an impulsive force, and thus perseveres in its movement by the

⁶ A Gaito, 'Le funzioni della polizia giudiziaria tra 'assicurazione' e 'valutazione' delle fonti di prova: il problema dell'esperto' (1996), II, *Giurisprudenza italiana*, 601; C Cesari, '«Prova del DNA» e contraddittorio mancato' (2003), III, *Giurisprudenza italiana*, 539.

⁷ C Robino, 'Diversità di metodi, diversità di risultati: margini di errore e variabili nell'esecuzione del test del DNA', in M Chiavaro (ed), *Nuove tecnologie e processo penale* (Giappichelli, 2006), 51.

⁸ Cassazione penale, Sez. Un., July 10 2002, (2002), II, *Il Foro It.*, 602 ss.

⁹ F Antolisei, *Il rapporto di causalità nel diritto penale*, (Cedam, 1934); F Stella, *Leggi scientifiche e spiegazione causale nel diritto penale* (Giuffrè, 1975); CE Paliero, 'La causalità dell'omissione: formule concettuali e paradigmi prasseologici' (1992), *Rivista italiana di medicina legale*, 821; M Donini, 'La causalità dell'omissione e l'imputazione «per l'aumento del rischio»' (1999), *Rivista italiana di diritto e procedura penale*, 142; P Veneziani, 'Il nesso tra omissione ed evento nel settore medico: struttura sostanziale ed accertamento processuale', in E Dolcini and CE Paliero (eds), *Studi in onore di Giorgio Marinucci*, (Giuffrè, 2006), 1969; M Romano, 'Nesso causale e concretizzazione delle leggi scientifiche in diritto penale', in *Scritti per Federico Stella*, (Jovene, 2007), 899; F Viganò, 'Riflessioni sulla c.d. 'causalità omissiva' in materia di responsabilità medica' (2009), *Rivista italiana di diritto e procedura penale*, 1679; G Marinucci, 'Causalità reale e causalità ipotetica nell'omissione impropria' (2009), *Rivista italiana di diritto e procedura penale*, 523; R Bartoli, 'Responsabilità penale da amianto: una sentenza destinata a segnare un punto di svolta?' (2011), *Cassazione penale*, 1712; R Blaiotta, 'L'educazione sentimentale del giudice. A proposito di giustizia, amianto, vittime diffuse' (2021), *Sistema penale web*;

principle of inertia. Such movement is at the centre of ballistics tests.¹⁰

When it comes to ballistic evidence, the case that instantly comes to mind is that of Marta Russo's murder. Marta, a 22-year-old law student, was in the courtyard of La Sapienza University in Rome on May 9th, 1997, when she was severely wounded by a gunshot, which ultimately led to her death five days later in the hospital. Her murder sparked a complex investigation and a long judicial proceeding, with wide media coverage, both because of the location of the crime and because of the difficulties met by investigators in understanding the motive behind this murder. In fact, several unconfirmed theories were aired: it could have been a case of mistaken identity, the so-called 'perfect crime', a terrorist attack or a simple firing accident. Finally, in 2003, Giovanni Scattone - assistant professor of philosophy of law - was convicted with a final ruling of aggravated manslaughter. Scattone himself has always claimed he was innocent. However, in the first judgement it was clearly stated that Scattone had inadvertently fired a shot while holding the gun for unknown reasons. It is possible he was going to test the weapon by firing it at a wall, or he didn't know it was loaded. The court ruled it as manslaughter based on evidence such as the ballistics tests, which stated that, based on his alleged position at the time, Scattone could not have fired a targeted shot.

As with DNA testing, ballistics tests and evidence also give rise to a number of controversial issues.

The first step is always the inspection of the crime scene, to check the number of shell casing present, the type of damages, craters, scratches or scorch marks on the surrounding objects, together with any residue from the gunshot or the explosion. In urgent cases, the same kind of exam can be performed on people, provided that it is a non-invasive examination, therefore ruling out inspection and limiting the exam to the outside of the body. In this specific context, the collecting gunpowder residue by swabbing the hands is considered a non-invasive act, granted that it is performed within a short time from the events. Pursuant to art. 365 of the Code of Criminal Procedure, the defence lawyer is allowed to witness the examinations and tests, but has not right to be given notice in advance.

Still, what was true for the DNA also stands for ballistic evidence: the main issue revolves around how this kind of evidence is used within the proceedings.¹¹ In general, ballistics reports are not considered a form of evidence, but rather a tool to better assess and understand the crime scene and the objects and traces related to it. Therefore, the court is not bound to the report and, actually, according to the renowned formula '*iudex peritus peritorum*,' a judge is free to make a reasoned and directly opposing assessment

¹⁰ D Compagnini, E Zernar and G Siscaro, *Balística forense e processo penale* (Giuffrè, 1999) 59; M Neri, S Di Donato, E Turillazzi and others, 'L'istopatologia nella diagnostica della lesività da arma da fuoco: contributo sperimentale su di un'ampia casistica' (2005), *Rivista italiana di medicina legale*, 106; V Milana and A Milana, 'La perizia balistica', in I Barbagallo (ed), *Le prove*, (Utet, 2007), 1073; G M Baccari, 'La rilevazione dei residui dello sparo: dal 'guanto di paraffina' allo stub', in C Conti (ed), *Scienza e processo penale. Nuove frontiere vecchi pregiudizi* (Giuffrè, 2011), 315; G Zambonini, 'La balistica come strumento d'indagine, gli accertamenti tecnici, i profili giuridici' (2015), *Sicurezzaigiustizia.it*, 10.

¹¹ E. Aprile, 'Le indagini tecnico - scientifiche: problematiche giuridiche sulla formazione della prova penale' (2003), *Cassazione penale*, 4035.

to that of the expert.¹²

3. Digital forensics Evidence.

The widespread use of computers and digital devices led to the rise of a number of unlawful behaviours and conducts, generally classified in the main category of computer crimes. These offenses include cases where the device is used as a tool and where it is the 'victim'. In both cases, however, all evidence related to the crime are contained within the computer, or the device.¹³

The most famous and emblematic case revolving around digital forensics is certainly the one built around WikiLeaks, an international non-profit organization founded by Julian Assange that published many documents classified by the United States government thanks to document caches protected by a strong encryption system. Edward Snowden - former computer intelligence consultant of CIA and of the National Security Agency (NSA) - was inquired in the US in relation to WikiLeaks. Snowden used WikiLeaks to disclose detailed information on highly classified US and UK government programs, publishing classified documents on intelligence activities.

In 2013 Snowden was granted asylum by the Russian government and has been a Russian citizen since 2022. American investigators were able to trace the leak back to him thanks to the digital trace he left behind, which led them to his computer.

It is worth noting, however, that the use of digital evidence is also related to a number of serious issues.

Primarily, this type of evidence consists of virtual objects, records, files, source codes, digital traces, software and bitstreams. By its nature, it is not-material and, as such, almost impossible to convert into paper documents to be filed in court. There are records of different solutions to this, both in law theory and case-law. As of recent years, it has been argued that, even lacking the possibility for material apprehension of the evidence, just as other goods or energy, data streams should be considered a mobile

¹² PP Dell'Anno, 'Accertamento e valutazione nelle attività di consulenza disposta dal pubblico ministero' (1991), *Giustizia penale*, 241; R E Kostoris, *I consulenti tecnici nel processo penale* (Giuffrè, 1993), 146.

¹³ O Mazza, 'Recenti sviluppi nella repressione internazionale dei crimini informatici: la Convenzione di Budapest del 2001' (2004), *Comunità internazionale*, 91; F Novario, 'Criminalità informatica e sequestro probatorio: le modifiche introdotte dalla L. 18 marzo 2008, n. 48 al codice di procedura penale' (2008), *Rivista di diritto processuale*, 1071; A Logli, 'Sequestro probatorio di un personal computer. Misure ad explorandum e tutela della corrispondenza elettronica' (2008), *Cassazione penale*, 2956; E Vitale, 'La nuova disciplina delle ispezioni e delle perquisizioni in ambiente informatico o telematico' (2008), *Diritto Internet*, 509; A Macrillò, 'Le nuove disposizioni in tema di sequestro probatorio e di custodia ed assicurazione di dati informatici' (2008), *Diritto di internet*, 511; B. Braghò, 'L'ispezione e la perquisizione dei dati, informazioni e programmi informatici', in L Lupària (ed), *Sistema penale e criminalità informatica* (Giuffrè, 2009), 190; S Carnevale, 'Copia e restituzione dei documenti informatici sequestrati: il problema dell'interesse a impugnare' (2009), *Diritto penale e processo*, 472; L Lupària, 'Computer crimes e procedimento penale', in G Garuti (ed), *Modelli differenziati di accertamento* (Utet, 2009), 369; C Conti, 'Il volto attuale dell'inutilizzabilità: derive sostanzialistiche e bussola della legalità' (2010), *Diritto penale e processo*, 790; R E Kostoris, 'Ricerca e formazione della prova elettronica: qualche considerazione introduttiva', in L Ruggeri and L Picotti (eds), *Nuove tendenze di giustizia penale di fronte alla criminalità informatica. Aspetti sostanziali e processuali* (Giappichelli, 2011), 180; F M Molinari, 'Questioni in tema di perquisizione e sequestro di materiale informatico' (2012), *Cassazione penale*, 696; G Corrias Lucente, 'Perquisizione e sequestro informatici: divieto di inquisitio generalis' (2012), *Diritto dell'informazione e dell'informatica*, 1146; C Costanzi, 'Perquisizione e sequestro informatico. L'interesse al riesame nel caso di estrazione di copie e restituzione dell'originale' (2016), *Archivio nuova procedura penale*, 269.

object and, as such, can be filed within legal proceedings.

The most common examples of forensics evidence are the reports and findings of computer inspection and searches. When performing a digital inspection, the investigators can only look and study the data contained in the device, but not acquire them, while a search consists in seizing the device to inspect it and acquire all relevant data. Even opening a file or a folder can be considered a search in itself.

It is clear that inspecting, searching or seizing a computer or any digital device requires different procedures compared to these same activities performed with regards to a physical object or location, which are limited in space and can be easily identified in advance.

Let us take the example of precautionary seizure web page. In this case, the precautionary measure does not entail a material seizing of the objects relating to the crime, as is the case, but rather it consists in forcing the suspect, the defendant or a third party to actually do something (e.g., performing the necessary technical operations to shut down a website). Often, the subjects of this kind of injunctions are internet providers, who are required to block access to a specific website or web page via a filter system.

3.1. Satellite Tracking

The still another example of digital forensics is satellite tracking. It represents the technological evolution of traditional tracking operations, such as stakeouts, and allows investigators to track a person's or a vehicle's movements from a distance, thus avoiding all risks and limitation naturally linked to classic stakeout and watching activities.

in the absence of a clear procedural discipline, the use of satellite technology in the context of investigations raises the question of how to properly define it within a legal framework. tracking is based on technologies similar to those used for eavesdropping and conversations recording to gather information, yet they are considered as two separate types of activities. Wiretapping concerns the covert acquisition of private information and, as such, it requires a substantiated decision and Court judgement to compensate for the necessary breach of individual rights to freedom and privacy. Satellite tracking, on the other hand, is a less intrusive activity since it consists in recording unencrypted and public information, free of any private attribute. Therefore, wiretapping and recording conversations is not comparable to satellite tracking and cannot constitute a suitable legal reference. The tracking, however, cannot be considered as 'urgent investigations' as defined in art. 354 of the Italian Code of Criminal Procedure, since it does not aim at preserving evidence, traces or objects relevant to the case. In conclusion, it would appear that satellite tracking falls under the macro category of atypical evidence, pursuant to art. 189 CCP, however the debate on this is still open.

3.2. The so-called 'Trojan Horse'.

Digital forensics also include the 'Trojan Horse'. Also known as spyware, a trojan horse is a software, or more accurately a malware, secretly installed in a computer or any cyber system with the aim of taking control of the device and the network it is

connected. In some case, using this software it is possible to transform a mobile phone into a working transceiver.¹⁴

The use of a tool like this obviously raises issues of compatibility with the founding principles of our national constitution.¹⁵

In 2016, the Criminal Division of the Court of Cassation has endorsed the use of information collectors «*within criminal proceedings regarding organized crime, also where the provisions of art. 614 of Italian Criminal Code apply and even if the specific location is not clearly stated in the authorization decree, without needing to provide justified reasons to believe that a criminal activity is ongoing at that location*». ¹⁶ Later, the lawmakers also weighed in on this topic with Law Decree no. 216, December 29th, 2017, stating that placing an information collector in mobile devices is ‘always’ permitted to intercept communications but only within those proceedings relating to crimes listed in art. 51, paragraph 3-bis and 3-quater, CCP. It is also possible to use Trojan viruses in proceedings related to crimes listed in art. 266, paragraph 1, CCP. The so-called Bonafede reform also moves along the same direction. The Law no. 3, January 19th, 2019, states that the amended art. 266, paragraph 2-bis of the Code of Criminal Procedure shall allow for the use of Trojan viruses also within investigations on crimes committed by public officers against the public administrations and punishable with a maximum penalty of at least five years of imprisonment. On December 30th, 2019, Law Decree no. 261 has extended the provisions listed in art. 266 paragraph 2-bis, CCP, also

¹⁴ M M Corraera and P Martucci, ‘La fenomenologia dei «virus» nei computer crime. Aspetti criminologici e giuridici’ (1996), *Rivista di polizia*, 545; A Valastro, ‘La tutela penale delle comunicazioni intersoggettive, fra evoluzione tecnologia e nuovi modelli di responsabilità’ (1999), *Rivista italiana di diritto e procedura penale*, 989; G Melillo, ‘Le intercettazioni tra diritto alla riservatezza e efficienza delle indagini’ (2000), *Cassazione penale*, 3488; C Parodi, ‘Profili penali dei «virus» informatici’ (2000), *Diritto penale e processo*, 632; A Macchia, ‘«Grande orecchio» e diritto di difesa. Il punto sull’utilizzabilità di quanto registrato in segreto’ (2003), *Diritto e giustizia*, 31; A Innocenti, ‘Le Sezioni Unite aprono all’utilizzabilità dei risultati di intercettazioni disposte in «diverso procedimento»’ (2014), *Diritto penale e processo*, 148; M Torre, ‘Il virus di Stato nel diritto vivente tra esigenze investigative e tutela di diritti fondamentali’ (2015), *Diritto penale processo*, 1163; G Delvecchio, ‘La «circolazione trasversale» delle intercettazioni eseguite in un diverso procedimento’ (2015), *Diritto penale e processo*, 206; G Amato, ‘Reati di criminalità organizzata: possibile intercettare conversazioni o comunicazioni con un «captatore informatico»’ (2016), *Guida al diritto*, 76; F Cajani, ‘Odissea de captatore informatico’ (2016), *Cassazione penale*, 4139; A Cisterna, ‘Spazio ed intercettazioni, una liason tormentata. Note ipograntistiche a margine della sentenza Scurla delle Sezioni Unite’ (2016), *Archivio penale web*; G Corasaniti, ‘Le intercettazioni «ubiquitarie» e digitali tra garanzia di riservatezza, esigenze di sicurezza collettiva e di funzionalità del sistema delle prove digitali’ (2016), *Diritto dell’informazione e dell’informatica*, 88; P Di Stefano, ‘Grande fratello sì, intercettazioni con lo smartphone ma solo per la criminalità organizzata’ (2016), *Il Foro italiano*, 513; P Felicioni, ‘L’acquisizione da remoto di dati digitali nel procedimento penale: evoluzione giurisprudenziale e prospettive di riforma’ (2016), *Processo penale e giustizia*, 118; L Filippi, ‘L’ispe- perqui- intercettazione «itinerante»: le Sezioni Unite azzeccano la diagnosi, ma sbagliano la terapia (a proposito del captatore informatico)’ (2016), *Archivio penale web*; S Furfaro, ‘Le nuove intercettazioni ‘ambulantí’: tra diritto dei cittadini alla riservatezza ed esigenze di sicurezza per la collettività’ (2016), *Archivio penale web*; L Giordano, ‘Sulle modalità esecutive dell’autorizzazione ad eseguire intercettazioni all’interno di un veicolo’ (2016), *Archivio penale web*; E Lorenzetto, ‘Il perimetro delle intercettazioni ambientali eseguite mediante «captatore informatico»’ (2016), *Diritto penale contemporaneo*; L Picotti, ‘Spunti di riflessione per il penalista dalla sentenza delle Sezioni unite relativa alle intercettazioni mediante captatore informatico’ (2016), *Archivio penale web*; A Camon, ‘Cavalli di Troia in Cassazione’ (2017), *Archivio nuova procedura penale*, 91; S Aterno, ‘La Cassazione, alle prese con il captatore informatico, non convince sull’acquisizione mediante screen shot’ (2018), *Diritto penale e processo*, 1065; M Caroleo Grimaldi, ‘Spy software: gli oscillanti confini della legalità’ (2019), *Cassazione penale*, 3908.

¹⁵ A Camon, ‘Le riprese visive come mezzo di indagine: spunti per una riflessione sulle prove «incostituzionali»’ (1999), *Cassazione penale*, 1192.

¹⁶ Cassazione penale, Sez. Un., July 1, 2016, n. 26889.

to crimes performed by public services representatives, with the same penalty as defined by law. Recently, however, a new trend is emerging as Carlo Nordio, the current Minister of Justice, dubbed the Trojan virus as an 'uncivilized weapon,' announcing future legislative measures to limit its application.

3.3. Artificial intelligence and criminal justice.

Another example of digital forensics evidence pertains to data acquired through the application of artificial intelligence (AI). According to the 'European Ethical Charter on the use of artificial intelligence (AI) in judicial systems and their environment,' adopted by the European Commission for the Efficiency of Justice at its XXXI plenary meeting in Strasbourg, on December 3, 2018, AI is defined as follows: "a set of scientific methods, theories, and techniques designed to replicate, through a machine, the cognitive abilities of human beings."¹⁷.

Focusing on the theme of forensic evidence, and leaving a more detailed exploration of the relationship between criminal law and AI to other studies, one of the most common applications of AI consists of identifying individuals based on their physical or behavioral traits. In this context, a distinction is made between: a) 'Physical biometric applications,' which harness distinct and measurable characteristics of specific parts of the human body, such as the face, iris, DNA, veins, fingerprints, and more, and b) 'Behavioral biometric applications,' which rely on unique behavioral traits, like typing rhythm, interactions with devices, gait, and vocal patterns.

Biometric applications have significantly broadened the scope of tasks that were once challenging. This encompasses 'facial recognition,' which entails identifying a person by analyzing facial features extracted from a digital image or frame, 'fingerprint recognition,' involving the identification of fingerprints based on ridge patterns on a finger, and 'voice recognition,' which entails recognizing a person's voice based on tone, cadence, or vocal tract characteristics¹⁸.

¹⁷ L Floridi, 'Etica dell'intelligenza artificiale. Sviluppi, opportunità, sfide' (Raffaello Cortina Editore, 2022), 40.

¹⁸ A Bernasconi, 'La ricognizione di persone nel processo penale. Struttura e procedimento probatorio' (Giappichelli, 2003); A Bertillon, 'La photographie judiciaire. Avec un appendice sur la classification et l'identification anthropométriques' (Gauthier-Villars et fils, 1890); G Borgia, 'Profili sistematici delle tecnologie di riconoscimento facciale automatizzato, anche alla luce dei futuribili sviluppi normativi sul fronte eurounitario' (2021), *Legislazione penale*; G Cecanese, 'Aspetti problematici e snodi interpretativi dell'individuazione di persone e di cose' (2018), *Archivio penale – Rivista web*, 1; Q Bu, 'The global governance on automated facial recognition (AFR): ethical and legal opportunities and privacy challenges' (2021), *International Cybersecurity Law Review*, 120; G Contissa, G Lasagni and G Sartor, 'Quando a decidere in materia penale sono (anche) algoritmi e IA: alla ricerca di un rimedio effettivo' (2019), *Diritto di internet*, 620; E Currao, 'Il riconoscimento facciale e i diritti fondamentali: quale equilibrio?' (2021), *Diritto penale e uomo*; J Della Torre, 'Quale spazio per i tools di riconoscimento facciale nella giustizia penale?' , in G Di Paolo and L Pressacco (eds), *Intelligenza artificiale e processo penale. Indagini, prove, giudizio* (Università di Trento, 2022), 7; P Felicioni, 'Il riconoscimento del parlante tra prassi e modelli normativi', in A Scalfati (ed), *Le indagini atipiche* (Giappichelli, 2019), 282; B Galgani, 'Giudizio penale, habeas data e garanzie fondamentali' (2019), *Archivio penale – Rivista web*, 1; B Keenan, 'Automatic Facial Recognition and the Intensification of Police Surveillance' (2021), *Modern Law Review*, 886; O S Kerr, 'Digital Evidence and the New Criminal Procedure' (2005), *Columbia Law Review*, 279; M Leta Jones, 'The right to a human in the loop: Political constructions of computer automation and personhood' (2017), *Social Studies of Science*, 216; R Lopez, 'La rappresentazione facciale tramite software', in A Scalfati (ed), *Le indagini atipiche*, (Giappichelli, 2019), 239; A Mcstay, 'Emotional AI, soft biometrics and the surveillance of emotional

Nevertheless, AI serves not only as a tool for the prosecution but also as a resource for defense attorneys, in the examination of forensic evidence. The range of potential actions is very broad. For instance, this may involve formulating a potentially winning defense strategy, utilizing databases with advanced logical reasoning methodologies, or working in contexts demanding specialized linguistic or legal expertise, even if only to identify relevant regulations.

Conclusions.

It is important to highlight that while we should strongly promote and support the use of forensic science and research within criminal procedures due to the expedited investigative benefits they offer, we cannot overlook the limitations and potential infringements on constitutional freedoms of these technologies.

Although we have previously discussed the advantages of adopting new technologies, a glimpse into the concerns raised by this practice can be found in a recent and thought-provoking paper by William Lucy. The English philosopher predicts, "I foresee the demise of law, particularly the distinctive mode of judgment that modern law embodies, and I suggest it will occur sometime before 2061"¹⁹.

Lucy identifies "technological management" as the culprit behind the future demise of law, which involves "the design of products or places, or the automation of processes... [that] seeks to exclude (i) the possibility of certain actions which, in the absence of this strategy, might be subject only to rule regulation [and/] or (ii) human agents who otherwise would be implicated in the regulated activities"²⁰.

To illustrate this contrast between rule regulation and technological management, he presents a standard hypothetical scenario related to road traffic regulation. Traditional rule regulators would set a maximum speed limit, publicize it, establish penalties for exceeding it, and enforce those penalties against violators. However, a technological management approach, driven by efficiency, might bypass these steps if cars can be designed not to exceed speed limits in specific areas. This approach would eliminate the need for human agency in both knowing and complying with the regulatory goal, as the vehicles themselves would ensure compliance. Lucy contends that technological managers would prefer this approach as it directly integrates the

life: an unusual consensus on privacy' (2020), *Big Data & Society*, 1; G Mobilio, *Tecnologie di riconoscimento facciale. Rischi per i diritti fondamentali e sfide regolative* (Editoriale scientifica, 2021); I Neroni Rezende, 'Facial recognition in police hands: Assessing the "Clear view case" from a European perspective' (2020), *New Journal of European Criminal Law*, 2020, 375; F Nicolichia, 'I controlli occulti e continuativi come categoria probatoria' (Cedam, 2020); U Pagallo, 'Algoritmi e conoscibilità' (2020), *Rivista di filosofia del diritto*, 93; F Paolucci, 'Riconoscimento facciale e diritti fondamentali: è la sorveglianza un giusto prezzo da pagare?' (2021), *Media Laws – Rivista di diritto dei Media*, 208; L Parlato, 'Libertà della persona nell'uso delle tecnologie digitali: verso nuovi orizzonti di tutela nell'accertamento penale' (2020), *Processo penale e giustizia*, 298; E Sacchetto, 'Spunti per una riflessione sul rapporto tra biometria e processo penale' (2019), *Diritto penale contemporaneo – Rivista trimestrale*, 476; L Saponaro, 'Le nuove frontiere tecnologiche dell'individuazione personale' (2022), *Archivio penale – Rivista web*, 1; M Torre, 'Nuove tecnologie e trattamento dei dati personali nel processo penale' (2021), *Diritto penale e processo*, 1042; M. Zalnieriute, 'Burning Bridges: The Automated Facial Recognition Technology and Public Space Surveillance in The Modern State' (2021), *The Columbia Science & Technology Law Review*, 243.

¹⁹ W Lucy, 'The death of law: another obituary' (2022), *Cambridge Law Journal*, 110.

²⁰ R Brownsword, 'In the Year 2061: From Law to Technological Management' (2015), *Law, Innovation and Technology*, 1, 18.

regulatory goal into the means (the vehicle), while rendering human agency redundant²¹.

Lucy's hypothetical scenario is indeed thought-provoking and captivating from one perspective. However, from a broader standpoint, it raises significant concerns. The importance of law as a foundational element for the stability and cohesion of society cannot be understated. As emphasized in Plato's 'Protagoras', justice and morality are not mere optional skills but are fundamental to the very existence of thriving societies. As we navigate the integration of new technologies and artificial intelligence into our legal systems, it is imperative that we remain vigilant in upholding these core principles of justice and fairness, ensuring that they continue to serve as the cornerstone upon which our societies are built.

²¹ W Lucy, 'The death of law: another obituary' (2022), *Cambridge Law Journal*, 115.