JAN DE KINDER, BOARD CHAIRMAN OF THE EUROPEAN NETWORK OF FORENSIC SCIENCE INSTITUTES, HIGHLIGHTS THE IMPORTANCE OF INFORMATION SHARING, TRAINING, AND CROSS-BORDER COLLABORATION

Analysing forensics

Forensic science is entering a new era. New types of crime (e.g. cybercrime) are made possible by advances in technology and the use of increasingly complex and ever-more dangerous weapon systems (e.g. making use of chemical, biological, radiological and nuclear (CBRN) material). In addition, global crime (e.g. terrorism and people trafficking) is on the rise. These two developments result in additional pressure on the criminal justice system and therefore demand a renewed response from forensic science laboratories, which remain a key player in the investigation and prosecution of crime.

In recognition of this, in 2011 the Council of the European Union adopted conclusions on the creation of a European forensic science area to encourage closer co-operation between EU member states on criminal cases, facilitate a better exchange of forensic information and expertise, and agree on minimum quality standards for forensic investigation.

To find out more about the forensic science landscape in Europe, Pan European Networks spoke to Jan De Kinder, the board chairman of the European Network of Forensic Science Institutes (ENFSI), which is working to raise the practice of forensic science to a higher standard in Europe. Founded in 1995 with the purpose of strengthening the mutual exchange of information in forensic science and improving the quality of its delivery in Europe, ENFSI is today recognised by the European Commission as the monopoly organisation in the field of forensic science and boasts 67 member laboratories across 36 countries, as well as 17 different expert working groups focusing on issues such as DNA, road accident analysis, fire and explosions investigation, and forensic speech and audio analysis.

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Jan De Kinder

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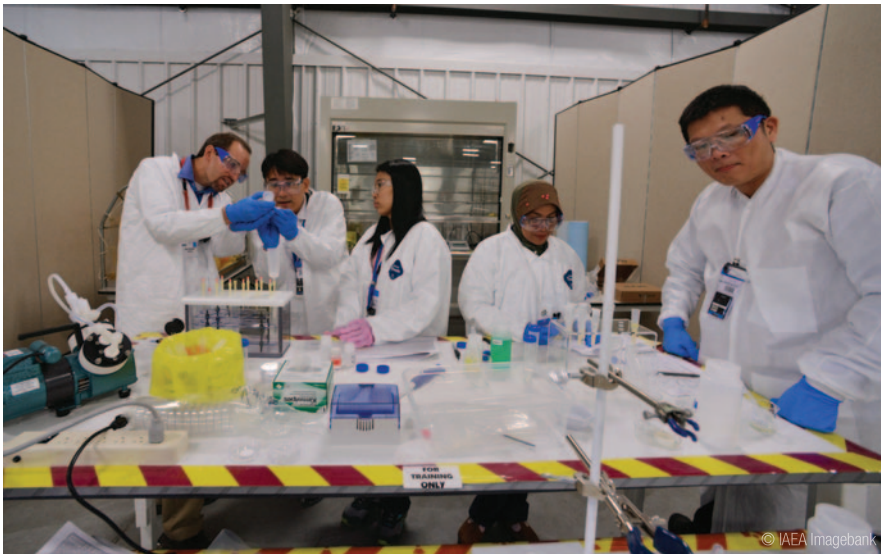

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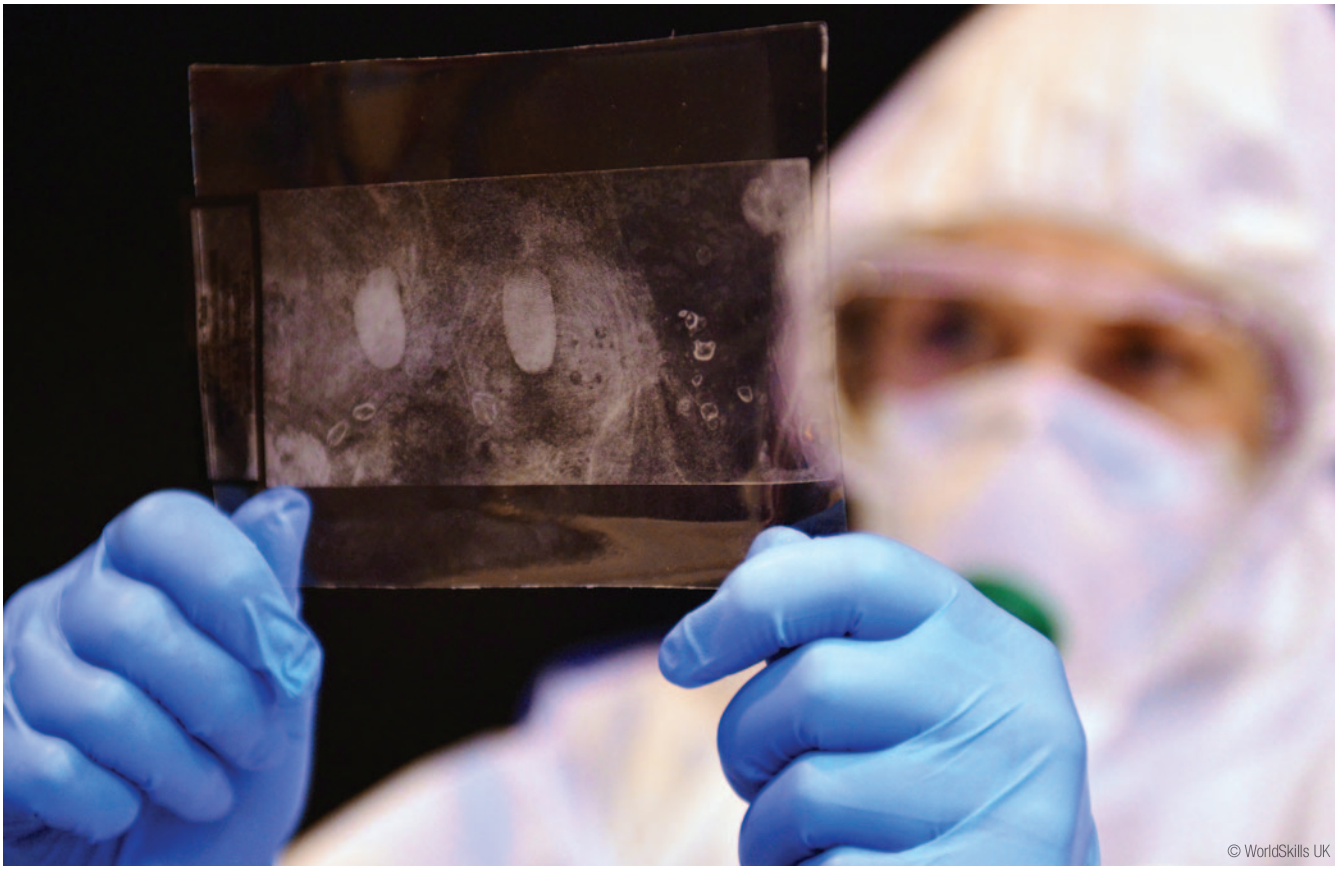
Here De Kinder discusses the impact of global terrorism, big data and popular TV show *Crime Scene Investigation* (CSI) on the field of forensic science, highlights the importance of a dedicated European forensic science area, and outlines the need for greater co-operation between the worlds of science and law.

In what way is digitalisation impacting the field of forensic science?

Forensics is currently going through a very challenging time. Firstly, forensic IT is becoming more and more important. This doesn't just refer to the analysis of computers capable of storing increasingly large amounts of data, but to technologies such as smartphones, which are evolving all the time. There is also quite a lot of attractive data available on other apparatus; for example, GPS can provide very interesting information about where a car has been and when, and surveillance cameras, which are becoming more and more ubiquitous, also offer a lot of digital information about a person's movements and actions. This became particularly evident during the inquiry into the recent terrorist attacks in Brussels, when investigators were able to follow one of the persons involved via shopfront cameras.

While these technologies provide very valid information, understanding this information and finding something specific within it requires a lot of data to be analysed, which demands an increasing amount of effort. Digitalisation therefore represents a clear opportunity but also a definite challenge.

This is complicated because individual countries are very limited as to what they can do. Certain crimes, like cybercrime, really require a European approach – Europol is making a lot of interesting steps forward in this regard.



What impact, if any, is the growing popularity of procedural dramas such as *CSI* having on the field of forensic science?

CSI and other series have drawn quite a lot of attention to forensic work, which has fostered a real sense of forensic awareness among the public. That's good, because it teaches people what's possible within forensic science. On the other hand, it also creates unrealistic expectations of what forensic science can achieve and when it should be used. Nowadays, people expect that if they are burgled at home, investigators will utilise every possible forensic technique available to them to find the perpetrators – but that depends on governmental policy and is therefore not always the case. Is it worth spending hundreds of euros to investigate a burglary in which only €100 was stolen? That's a valid question.

Such television shows are also not entirely realistic. Only about 50% of what you see on TV is correct and actually corresponds to what forensics can do. Things take a lot longer in real life and require a lot more work. Nonetheless, I think dramas like *CSI* do a good job of stimulating public interest, which is a very good thing.

The exchange of forensic information such as DNA, fingerprints and vehicle registration plates between different countries has shown that a significant amount of transnational crime is taking place

Investigations in the forensics lab stand a much better chance of success if first responders at the crime scene have a greater forensic awareness – how can this be ensured?

We absolutely have to invest quite a lot more in training, and that's something that's been identified in the European Commission's action plan for a European forensic science area 2020. Forensics is a very complicated area. We are now able to detect increasingly smaller and smaller traces of evidence, and the issue of contamination is becoming more and more crucial, so it's extremely important that first responders are aware of what they can and cannot do when they arrive at a crime scene, but that's just one part of forensic awareness. A second point is that judges and police officers, etc. need to be aware of the possibilities of forensic science in order to use it to its fullest extent. That sounds very obvious, but we are talking about two separate worlds – the judicial and scientific worlds are completely different, and neither is particularly well versed in the expertise or activity of the other. The two disciplines need to understand each other better, and that will require some continuous effort.

Belgium has actually begun to tackle this problem via the introduction of forensic advisors – people whose backgrounds are in forensics generally, rather than in one particular field. To go back to *CSI,* it often seems that just a couple of the characters know everything about forensics, but that's absolutely not the case in real life. Most forensic investigators are experts in one specific field; in big cases, we gather them around a table with a forensic advisor, and if that advisor needs in-depth information on one particular field, the expert in that field is available to provide that input. The advisor can then give advice to a prosecutor on how forensic

While digital technology offers much hope for the future, its impact is already clear in forensic sciences, where advances in medical imaging technologies are revolutionising the practice of forensic medicine and pathology. Operating at the interface of robotics, engineering, radiology, and forensic and computer science is Virtopsy®, a Swiss-based project established in the late 1990s which applies CT, MRI, optical 3D surface scanning, and 3D photogrammetry techniques to modern day crimes.

The first step of the Virtopsy process is to take a scan of the corpse surface using 3D photogrammetry. This is then combined with a series of X-ray slices (taken using a CT scanner) to produce a digital and 3D version of the cadaver for forensic investigation. If necessary, tissue samples can then be taken with a biopsy needle at the exact site of violence with the help of a manoeuvrable robotic arm ('Virtobot').

The benefits of virtual autopsies are such that they can be used to enhance – and in some cases even replace – conventional autopsies. A key advantage is their objectivity: digital imaging data can be stored permanently (unlike physical evidence) and can be re-examined in the light of new evidence or where a second opinion is required, and forensic evidence can be reproduced digitally in an unbiased manner suitable for use in court. Virtopsy is also minimally invasive, so can be used in instances where religious or cultural beliefs render a conventional autopsy impractical. What's more, it is all-seeing: Virtopsy can detect evidence of an assault even where there are no visible signs on the body, while the documentation of tissue damage and pattern injuries can be used to identify the possible injury-causing instrument – whether a car or crowbar.

Despite detractors in the medical and legal professions who point to the limitations of Virtopsy in particularly complicated cases, virtual autopsy techniques have become a common feature of forensic investigations across the globe, and this only looks set to continue as the technology advances.

science can be utilised in a particular investigation or for a particular line of inquiry, what is possible with forensics, and where its limits lie in relation to a case. From what we have seen so far, they provide a real added value to investigations.

What are your thoughts on the progress towards a European forensic science area by 2020?

This is very important – especially within the open border Schengen Area in continental Europe. The exchange of forensic information such as DNA, fingerprints and vehicle registration plates between different countries is regulated by the Prüm Convention of 2005. Belgium, for instance, exchanges its DNA database on a daily basis with France, the Netherlands, Germany and Luxembourg. What we have learnt from this is that there is a significant amount of transnational crime taking place, which indeed demonstrates the need for greater collaboration between judicial and law enforcement authorities across borders.

We also need to be sure that evidence that has been seized in one country can be used in criminal prosecutions in another country. Ideally, the same should apply to forensic analysis – an expert's opinion in one country should count for the same in another country without having to reanalyse everything.

There are also certain kinds of crime which individual countries cannot deal with alone and which demand a European response – cybercrime, for instance. Again, Europol is making quite a lot of interesting steps forward in this area, but a dedicated European forensic science area would be extremely helpful and would stimulate greater collaboration, as well as also increase confidence in and mutual trust between the forensic services of each country.

In what ways might forensic science evolve in the future?

Forensic DNA techniques are becoming more and more sensitive, to the point where we are able to uncover some morphological information about the perpetrator of a crime. Research is currently taking place across forensic institutes and universities to establish whether it is possible to predict a person's eye colour based on a DNA profile found at the crime scene, whether it is possible to predict the colour of their hair, their racial background, their age – to build a whole portrait of them on the basis of their DNA. This is opening up a new era of DNA analysis, and I hope we will see these techniques implemented in forensic laboratories in the next ten years or so. Of course, it will be very challenging and nothing is certain, but I certainly believe we're headed that way in the future.

The increasing likelihood of a CBRN terrorist attack is another hot topic in forensic science right now. CBRN materials make forensic analysis much harder because they contaminate the crime scene and demand decontamination procedures, which are not always easy to perform. I expect this area to evolve quite a lot in the coming years, and, as I have already mentioned, there is a lot going on in forensic IT right now, which will no doubt continue, particularly in the area of DNA and biometrics.

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