

An intelligent platform for effective policing



★ Evidence gathered from digital devices plays an important role in modern criminal investigations, yet it is not always easy to gather and analyse relevant data. Researchers in the INSPECTr project are developing intuitive, easy to use tools and an intelligent platform that will help law enforcement agencies combat crime more effectively, as **Dr Ray Genoe** explains.

Evidence gathered from digital devices like phones, computers and tablets often plays an important role in modern criminal investigations, both for cybercrimes and non-cybercrimes. The police commonly search through a suspect's devices for information relevant to an investigation, yet this can require a lot of time and resources. "Many law enforcement practitioners use up to 50 different tools to investigate a cyber-crime. One tool might be for a certain type of mobile device, another for computer forensics, and so on," outlines Dr Ray Genoe, Director of the Centre for Cybersecurity and Cybercrime Investigation, part of University College Dublin.

There are a number of problems associated with this approach, one of which is the cost of purchasing licenses for these tools and training staff in how to use them. "One of those tools could easily cost a single officer thousands of

Euros a year, while the training costs could run to tens of thousands," says Dr Genoe.

INSPECTr project

As the Principal Investigator of the INSPECTr project, a research initiative funded under the Horizon 2020 programme that brings together 18 partners from across Europe, Dr Genoe is working to address this, and many more issues. The aim in the project is to develop intuitive, easy to use tools that will be made freely available to law enforcement agencies (LEAs) and integrated on an intelligent platform. "The only outlay would be on hardware," explains Dr Genoe. One significant challenge for researchers is to develop a common data format. "None of the tools currently used speak the same language, in terms of the reports that they output. Some of them might create PDF reports, others could produce XML with customised namespaces. What LEAs need is a

common data format, to assist with processing the huge volumes of data coming to them from disparate sources," says Dr Genoe. "Once you have good analytic tools available, you can do time-filter analysis and cross-device and cross-case correlations, due to the common data format and analytical processes."

A common data format will also make it easier to discover evidence that may be held in other jurisdictions, which is an important issue when dealing with cross-border crime. Dr Genoe and his colleagues are working with the CASE ontology, which enables more detailed analysis of the evidence gathered, including for example the provenance of that evidence. "That's very appropriate for court presentations and for validating your findings and chain of evidence," he outlines, "and it is supported in INSPECTr by an immutable blockchain ledger that records every interaction with the tools on the platform"

One area where national linguistic differences have to be considered is in how the evidence that's presented is interpreted. "We are working on a number of tools for that. For example, we're working with partners who are developing what we would call multi-lingual natural language processing (NLP)," continues Dr Genoe. "We use NLP for a number of things, such as parsing legal documents."

Anonymity plays a strong role in protecting criminals online. One of the topics Dr Genoe is looking at with the AI tools is how to determine authorship, and whether linguistic markers can be used to assess whether two seemingly different individuals are actually the same person. "By analysing linguistic markers and the interactions between various authors, we can determine whether a criminal network has reappeared on another forum," he outlines.

Many LEAs also encounter huge volumes of data during the course of an investigation, yet it is not easy to manually process all of the documents, messages, pictures and videos, a context in which AI tools can play an important role. "NLP and media processing tools, will help LEAs to make sense of the available data," says Dr Genoe.

There is also a forecasting element to the project's work, with AI tools being used for intelligence-led policing. Similarly to how a business might scan the market to identify trends, LEAs can use AI tools to process historical data and anticipate problems before they occur. "For example, robberies might be known to increase in a specific residential area at a particular time of year. This can help guide decisions on where to deploy police at a particular time, thereby increasing public security," says Dr Genoe.

A key feature of the INSPECTr platform is the ability to discover and exchange data, which is crucial given the cross-border nature of much cybercrime. Rather than physically exchanging a hard drive with a counterpart from another jurisdiction, the platform will provide the ability to exchange data with their peers in other countries on a technical level, which Dr Genoe says represents an important advance. "Information needs to be discoverable in other jurisdictions," he stresses. This however needs to be controlled, and data must be discovered and exchanged in a way that is compliant with the relevant legislation. "We're putting controls in place to ensure data privacy is respected and that the tools are used in a way that complies with legislation controls, while still enhancing the capacity of LEAs to investigate

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crime effectively," continues Dr Genoe. "Data exchange should occur after existing protocols have been observed, such as Mutual Legal Assistance Treaty (MLAT) approval."

Ethical protocols

Researchers are looking into how to manage the ethical and legal considerations around these types of issues through data protection impact assessments and data-sharing agreements. Once it is clearer how exactly the platform can be used in different jurisdictions, Dr Genoe believes it will bring significant benefits to LEAs. "The first point is the reduced training requirements for investigators. They will only have to learn one tool, which is our platform, because the interface to all of the other tools will be the same. It's a kind of one-stop shop for all your tools," he explains. This would be much more efficient than using multiple different tools. "If you want to use a certain tool on a certain day, you simply click, and it goes off and automates the process. Then it presents you with results in a format that you'd expect," continues Dr Genoe. "Then you can go over to your analytics and expect to access the data with an analytics system that is capable of filtering through all of the data in a familiar and intuitive manner."

to LEAs, Dr Genoe says they should not be used to reduce data or make decisions independently. "An AI system should offer suggestions to a human, and make those suggestions explainable. The data should be presented to a human user," he says. "This way the issue of bias can be reduced and the ethical use of AI tools can be enhanced, while also reducing the risk of over-reliance on AI."

The aim is to replace what were previously manual processes with an automated approach that leads to standardised outputs which are easier to analyse, allowing staff to focus their energies on other work.

Looking to the future

The platform is also very extensible, so new features can be quickly deployed to reflect changing demands. "We've utilised technologies that are sufficiently flexible to enable the rapid deployment of new features. If there's something more that law enforcement need, they could put in a request," says Dr Genoe. The project partners include both research organisations and LEAs, who play an important role in guiding research and providing feedback. "We operate a living lab environment, which is a way of co-designing and co-creating with your end-users, which in

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There is however potential for these tools to be misused, an issue of which Dr Genoe is well aware. The regulations in this area may vary across different parts of Europe, an issue that has been taken into account in the project. "For example, one of our tools can be used for the preservation of online media content. It can be used in certain jurisdictions, but not in others," he outlines. "An administrative officer has to make a decision as to whether this tool can be available to a police officer." Similarly, regional differences may render the tools ineffective in certain jurisdictions. "We're going to provide a machine-learning framework where we'll provide default models, which can then be re-trained for different regions," explains Dr Genoe. "Furthermore, the AI tools in INSPECTr will simply prioritise media, and a human is required to make final decisions."

These tools are designed to prioritise the data to be presented to a human user rather than to make automated decisions themselves. While AI tools can bring significant benefits

our case is the LEAs," explains Dr Genoe. "We have monthly meetings with LEAs, where we can show them specific features."

These LEAs have developed three highly realistic use cases, on which all aspects of the platform will be tested, including digital forensics, open-source intelligence gathering and evidence exchange. These use cases are highly realistic scenarios, some of which involve multiple different jurisdictions. "They're based on what LEAs are seeing out in the field. They're very relevant, and they're constantly being tweaked to address any changes that LEAs are seeing," says Dr Genoe. The aim in the project is to reach technology readiness level (TRL) 6, essentially demonstrating a proof-of-concept, with Dr Genoe keen to explore the possibility of continuing the research and ultimately bringing the platform to practical application. "We'd like to take the recommendations and findings from LEAs on this project, and move forwards with further funding to make this a fully operational tool, at TRL 9," he concludes.

INSPECTr

Intelligence Network and Secure Platform for Evidence Correlation and Transfer

Project Objectives

The principal objective of INSPECTr will be to develop a shared intelligent platform and a novel process for gathering, analysing, prioritising and presenting key data to help in the prediction, detection and management of crime in support of multiple agencies at local, national and international level.

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Project Partners

<https://inspectr-project.eu/index.html#partners>

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