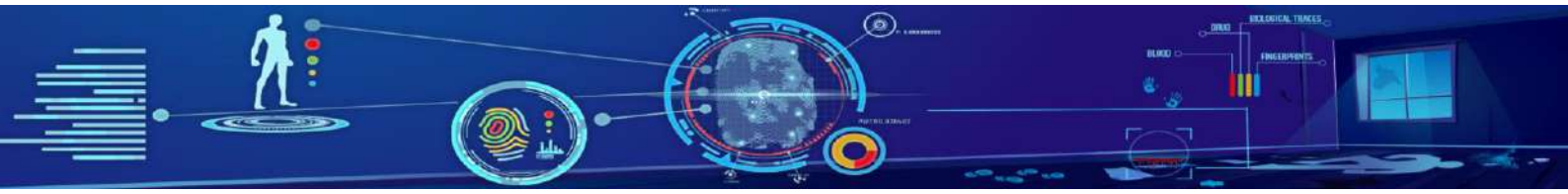
RISEN Newsletter
REAL TIME ON-SITE FORENSIC TRACE QUALIFICATION



Issue No. 6, July 2023

The RISEN Project

The aim of the RISEN project is to develop a set of rapid, contactless sensors and an Augmented Crime Scene Investigation system for the optimization of trace identification, classification and interpretation on site, capable of creating an interactive 3D model of the crime scene with the position and labelling of traces and the relative results of the on-site analysis.

The RISEN Consortium comprises 20 partners from 12 different European Countries that represent Research Institutes, Law Enforcement Agencies, Universities, Small and Medium Enterprises, and Standardisation Institutes. The management structure of the RISEN project is organized to meet the specific needs and scope of the challenge ahead, ensuring the involvement of all partners in the Consortium's decision-making process, whilst retaining the necessary level of autonomy allowing for fast decisions on operational and technical issues. RISEN's management structure consists of two main management boards, the Coordinator Team and the RISEN Steering Board, both supported by the Ethics Advisory Board, the Security Board and the Stakeholders and Practitioner Advisory Board.

The RISEN project is accomplished through the scientific and technological innovations stemming from 11 work packages, from scenario definition and the elicitation of user and system requirements to the preparation, development and delivery of the RISEN technologies.

Importantly, RISEN foresees an extensive training, testing and validation trials program that brings technical partners and LEAs together to improve and mature the RISEN system and enhance the EU's forensic investigation state-of-play. In the process, standardisation and full compliance with existing legal and ethical aspects support the conduct of a thorough cost-effectiveness assessment of the RISEN system, while contributing to reinforce the RISEN's trustworthiness and acceptance by LEAs across Europe.

RISEN Consortium and key actions

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 883116.

The RISEN project meeting and field trials on 3D crime scene documentation in Warsaw (9-11 May 2023)

The RISEN project partners met on May 9-11 2023 at the Military University of Technology (WAT) in Warsaw, Poland to discuss project progress and to test innovative technologies developed within the project. During first two days RISEN partners discussed progress in each of the Work Packages and took part in four Technical Sessions dedicated to organisation of future project tests and trials as well as RISEN API standardisation and validation.

On May 10-11, RISEN partners took part in field trials on 3D crimes scene documentation, which were very well prepared by the Military University of Technology. Trials were an excellent occasion to tests some of the technologies being developed in the RISEN project. The tests carried out at WAT mainly verified the possibility of practical use of the scene imaging devices available on the market, including 3D scanning. In addition, a system for detecting trace amounts of chemical compounds on contaminated surfaces and a bioaerosol detector were tested.

The mock terrorist attack scene with use of explosives was prepared by the partners from the Institute of Optoelectronics and the Faculty of New Technologies and Chemistry of the Military University of Technology. According to the scenario, the safety of operations in the place where the bomb attack took place was verified using a remotely controlled UGV. Then, the event scene was imaged with a laser scanner, and 360-degree cameras and photographic documentation were prepared.

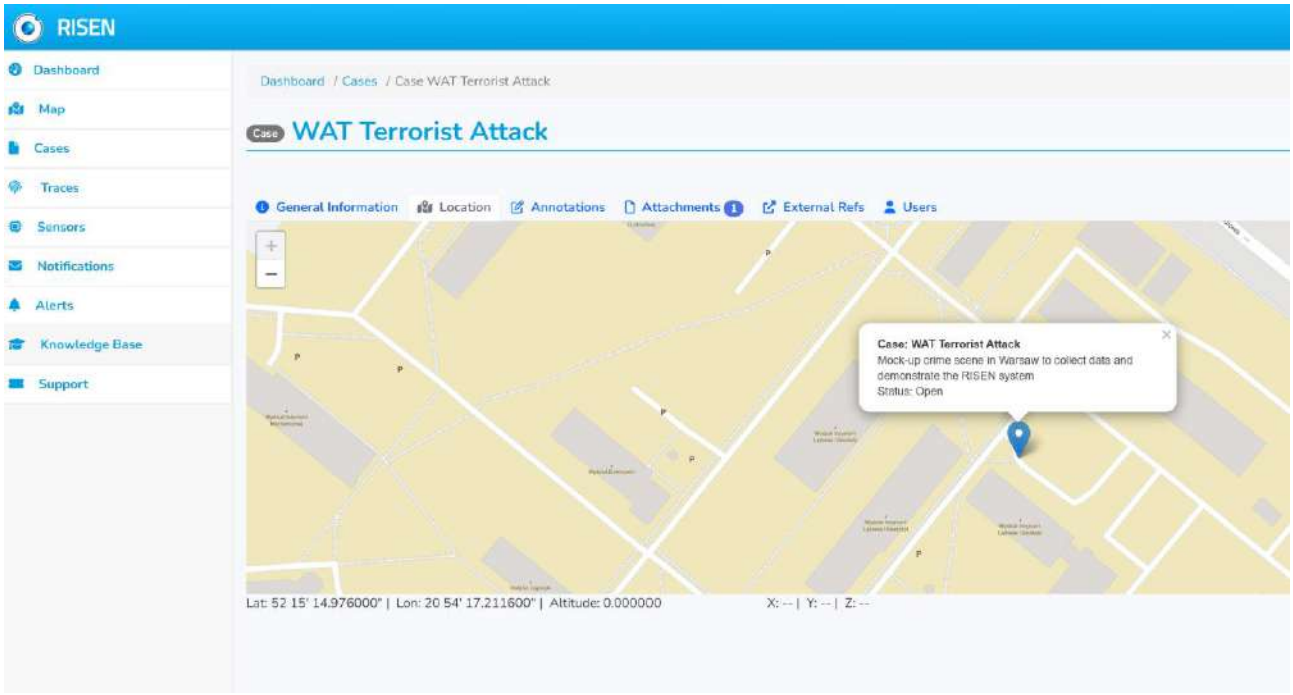




In addition to tools for crime scene documentation, the RISEN partners also tested a system ensuring the safety of crime scene investigators and a tool for detecting and identifying trace explosives. Scientists from the WAT tested the operation of the bioaerosol detector, which in real-time warns people working on the scene about potential biological threats. The biodetection system was tested in scenarios where biothreats were dispersed using explosives and drones.

A representative of the MasaTech company from Slovakia conducted tests of an ion mobility spectrometer combined with laser desorption used as a tool for detecting trace amounts of various explosives. Laser desorption has been proven to be a useful technique for the desorption of explosive traces from different surfaces.

The results of the conducted tests were sent in real-time to the digital evidence management system developed by Particle from Portugal, and the system's operator was able to remotely access and visualise the tests data. The platform's task was to integrate and visualise data from various tools created in the project. Operational and data integration tests of all devices developed in the RISEN project were successful.



The trials were also attended by representatives of the Industrial Research Institute for Automation and Measurements - Łukasiewicz Network (PIAP), the Forensic Laboratory of the Polish Military Police, and companies CYBID and Magic Leap. PIAP representatives presented the possibility of using a mobile robot for special applications developed at the PIAP and used by the Polish Armed Forces to assess the scene of the event regarding CBRNE threats. Representatives of the Military Police presented equipment for imaging the event scene, which they use in their daily work. The CYBID company presented the possibilities of software and systems supporting the documentation and analysis of road, criminal and fire incidents. In addition, a representative of the Magic Leap company presented augmented reality glasses and software that can be used in the training of services and the army.

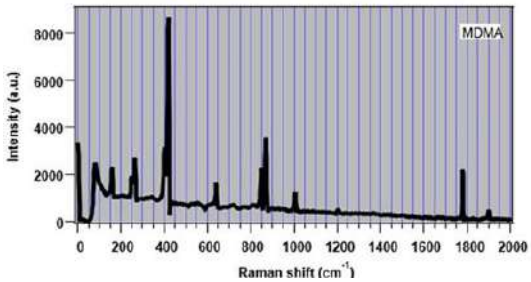

Further joint tests of the systems being developed within the project are scheduled in the coming months in the Netherlands and Germany.

Link: https://www.wojsko-polskie.pl/wat/articles/aktualnosci-w/nowe-metody-analityczne-usprawnia-dzialania-kryminalistyczne/

Twitter: https://twitter.com/NaukaEdukacja/status/1659567966877351937?s=20

Trials in the Netherlands for database development of illicit drugs (NFI) (12-16 June 2023)

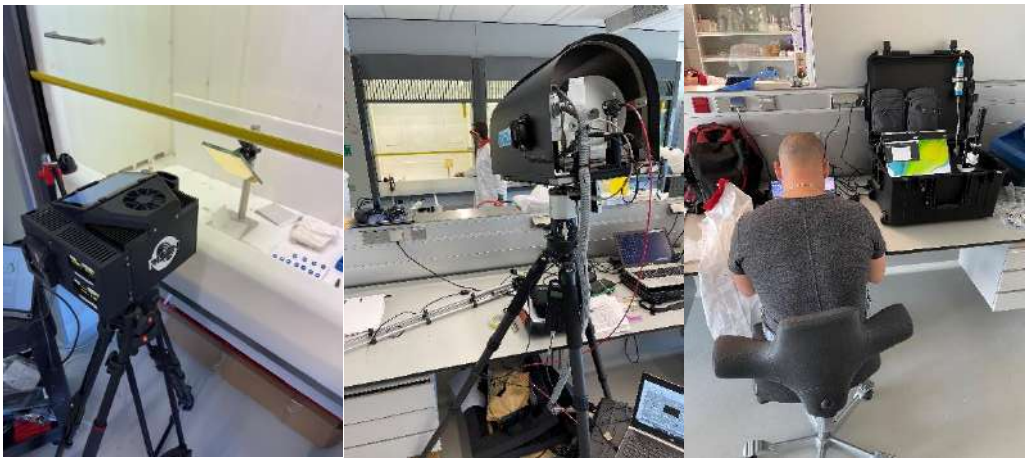
Trials in The Netherlands, hosted by NFI, were organised between 12 and 16 June 2023 for the database development of illicit drugs. The trials were conducted in collaboration with the RISEN Consortium and were aimed at developing a comprehensive database of illicit drugs.



The Dutch Forensic Institute (NFI) has been working, together with the Dutch National Police, to combat the production and distribution of illicit drugs in The Netherlands. As part of this effort, the NFI is responsible for developing a comprehensive database of illicit drugs, which will be used to assist in the identification and analysis of drug-related crime.

The team involved in the trials selected the illicit drug traces, while NFI prepared the samples and workspace necessary for the trials.

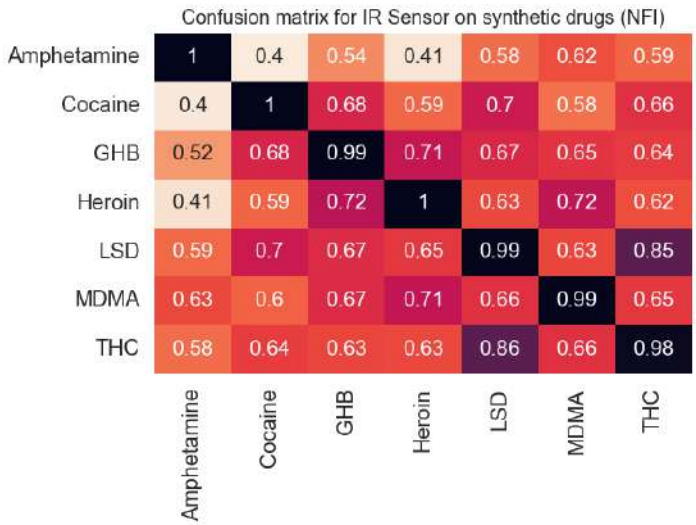
The substances provided by NFI were tested by the following RISEN sensors: 1) Raman (ENEA); 2) QEPAS (CREO); 3) IMS (MaSaTech; 4) IR (Fraunhofer-IAF).



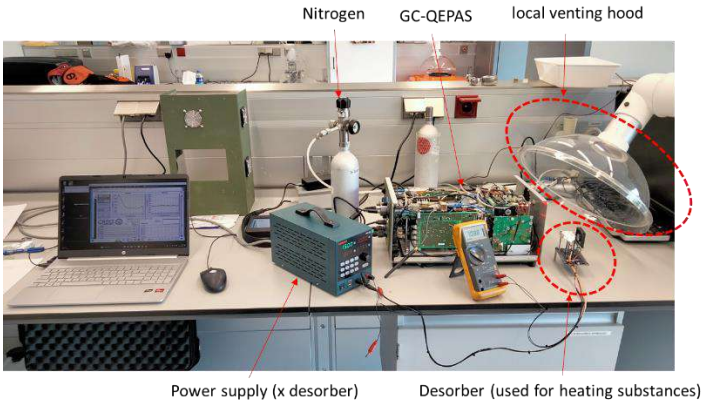
The long-wavelength spectral coverage of the IR sensor (1000-1300 cm^{-1} and 1500-1700 cm^{-1}) is advantageous for spectrally resolving fingerprint-features of several forensic relevant samples. Preliminary laboratory measurements with the IR sensor show that, whereas the short-wavelength region is useful for interrogating samples of biological origin, the long-wavelength region can be used to support detection and identification of several synthetic drugs as well as ERCs (explosive related compounds).

The laboratory trials at NFI showed that a good distinguishability capability within and between different sample families associated with illicit drugs (the synthetic drugs itself as well as their precursors, reactants and cutting agents) can be achieved with the IR sensor, at least at laboratory conditions. As an example, we show here the confusion matrix for measurements with the IR sensor on synthetic drugs. For each substance, two measurements were made under slightly different measurement conditions (slightly different measurement position within the sample).

Each measurement resulted in the acquisition of a reflectance spectrum and the confusion matrix quantifies the degree of similarity (between zero and 1) between each of those measurements. For each sample, there is a high degree of similarity between the two measurements conducted on the same sample, which is clearly visible from the diagonal character of the confusion matrix. We further observed that there is low risk of wrong identification within this sample family (synthetic drugs). These results indicate that the acquired data is a good basis for the construction of a spectral database for later use within the RISEN project.



Samples were analyzed with the GC-QEPAS using a compact thermal desorber, to promote the evaporation of solid material. Experiments were carried out under an extraction hood.

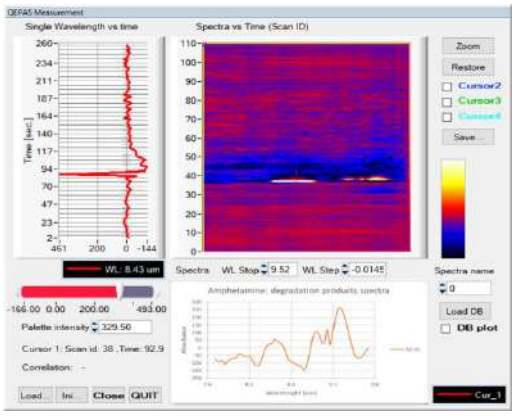


The following image shows the complete set of substances prepared for the tests at NFI with QEPAS. Most of the samples were solid (as hydrochloride salts). A very small quantity of the sample was taken from its vessel and put on the crucible.

Salts of substances were analyzed both in the crucible as they were and after a liquid-liquid extraction in order to obtain drugs as free base. Salts were dissolved in basic water to obtain their free base (liquid-liquid extraction)

Main results achieved on amphetamine:

1) a degradation product appears at around 93 sec.;
2) two spectra are recorded in the same chromatographic peak.



Some good results were also achieved on GHB, which are still under evaluation.

RISEN dissemination activities

RISEN: RTP3 interview

Polícia Judiciária (Portugal) recorded a short interview during which the RISEN project was presented. The interview was broadcasted on March 11th 2023 on RTP3, a Portuguese public television channel.

https://www.youtube.com/watch?v=1XPDsAvwdy0

RISEN: RAI NEWS 24 - FUTURO24

The RISEN project was presented inside the weekly science magazine "Futuro24" of the Italian national channel "RaiNews24", together with other research activities from the ENEA Research Center in Frascati.

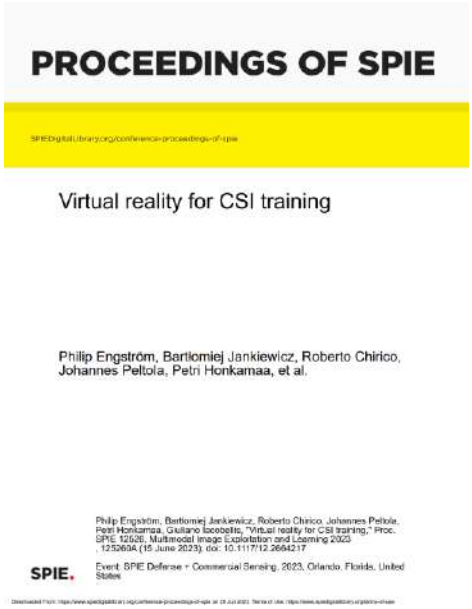
https://www.youtube.com/watch?v=fhFlbHn2ZAM

Virtual reality for CSI training

https://www.spiedigitallibrary.org/conference-proceedings-of-spie/12526/125260A/Virtual-reality-for-CSI-training/10.1117/12.2664217.short?SSO=1

Authors: Philip Engström, Bartłomiej Jankiewicz, Roberto Chirico, Johannes Peltola, Petri Honkamaa, Giuliano Iacobellis

Abstract
The EU-funded project, Real-Time On-Site Forensic Trace Qualification (RISEN) aims to enable the use of advanced sensors in the field in order to get results in near real-time. The project also aims to visualize the data by innovative means, such as in virtual reality (VR). The Swedish National Forensic Centre, NFC, has been developing methods for 3D modelling of crime scenes since 2016, and have conducted several studies in the use of VR for CSI application. This paper describes the status and possibilities with VR for CSI training and how the results from the RISEN project can be utilized within forensic training.

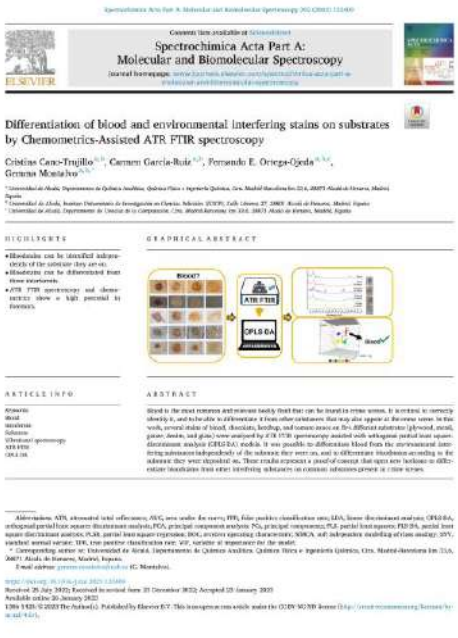


Differentiation of blood and environmental interfering stains on substrates by Chemometrics-Assisted ATR FTIR spectroscopy

https://www.sciencedirect.com/science/article/pii/S138614252300094X

Authors: Cristina Cano-Trujillo, Carmen García-Ruiz, Fernando E. Ortega-Ojeda, Gemma Montalvo

Abstract
Blood is the most common and relevant bodily fluid that can be found in crime scenes. It is critical to correctly identify it, and to be able to differentiate it from other substances that may also appear at the crime scene. In this work, several stains of blood, chocolate, ketchup, and tomato sauce on five different substrates (plywood, metal, gauze, denim, and glass) were analysed by ATR FTIR spectroscopy assisted with orthogonal partial least square-discriminant analysis (OPLS-DA) models. It was possible to differentiate blood from the environmental interfering substances independently of the substrate they were on, and to differentiate bloodstains according to the substrate they were deposited on. These results represent a proof-of-concept that open new horizons to differentiate bloodstains from other interfering substances on common substrates present in crime scenes.



On the Path Towards Standardisation of a Sensor API for Forensics Investigations

https://www.scitepress.org/Link.aspx?doi=10.5220/0011688300003399

Authors: Marco Manso, Barbara Guerra, Fernando Freire, Roberto Chirico, Nicola Liberatore, René Linder, Ulrike Schröder, Yusuf Yilmaz

Abstract

Forensics investigations need to be conducted efficiently and accurately especially in situations where time is a scarce resource. Novel technologies, like forensic sensors, can aid investigators in trace detection, visualisation, identification and interpretation on site. Arising from the need to connect different sensors to a remote digital management software, a network-enabled Sensor API is proposed to enable any compliant CBRNe Sensor to connect and exchange information in a harmonised and interoperable way. As a result, a Standardisation Workshop agreement, on CBRNe SENSOR API - Network Protocols, Data Formats and Interfaces, was initiated to promote standardisation of the Sensor API. The new proposed standard will allow sensor manufacturers to focus on sensor development work, benefitting from already defined interfaces and data models. Moreover, forensic investigators, acting as end-users, can better understand and analyse (well defined) sensor outputs, thus improving their work efficiency and facilitating technology acceptance.


On the Path Towards Standardisation of a Sensor API for Forensics Investigations

Marco Manso[1], Bárbara Guerra[1], Fernando Freire[1], Roberto Chirico[2], Nicola Liberatore[3], René Linder[4], Ulrike Schröder[4] and Yusuf Yilmaz[4]

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Keywords: Forensics Analysis, CBRNe, Sensors, API, Standardisation.

Abstract: Forensics investigations need to be conducted efficiently and accurately especially in situations where time is a scarce resource. Novel technologies, like forensic sensors, can aid investigators in trace detection, visualisation, identification and interpretation on site. Arising from the need to connect different sensors to a remote digital management software, a network-enabled Sensor API is proposed to enable any compliant CBRNe Sensor to connect and exchange information in a harmonised and interoperable way. As a result, a Standardisation Workshop agreement, on CBRNe SENSOR API - Network Protocols, Data Formats and Interfaces, was initiated to promote standardisation of the Sensor API. The new proposed standard will allow sensor manufacturers to focus on sensor development work, benefitting from already defined interfaces and data models. Moreover, forensic investigators, acting as end-users, can better understand and analyse (well defined) sensor outputs, thus improving their work efficiency and facilitating technology acceptance.

1 INTRODUCTION

Crime scene investigation (CSI) involves careful and thorough observation of crime scenes to identify and collect forensics evidence potentially relevant to the solution of the case. It is important that the investigation is performed efficiently and accurately, since it will allow directing subsequent law enforcement actions towards well identified individuals or groups, supported by the collected evidence and under the rule of the law.

Over the years, CSI methods, technologies, tools and procedures have greatly evolved, accompanying scientific breakthroughs (e.g., DNA profiling), paving the way for the creation of the forensic science field. Technologies, in particular, have been developed to make the CSI process faster and safer for investigators, without compromising reliability.

While investigators have tools to use on-site (e.g., multispectral cameras, 3D scanners, drug kit tests), they still depend on laboratorial analysis, as the "golden standard", for classification and identification of traces[1] (e.g., drug profiling, fingerprint identification) and producing court admissible evidence. Notwithstanding, the laboratory analysis process may result in the destruction of the sample and can be lengthy, usually taking several hours or days. Time becomes a scarce resource, especially in crime scenes where preserving traces is challenging, such as outdoor environments or hazardous environments, contaminated by dangerous biological or chemical agents.

https://orcid.org/0000-0003-0053-6493a

[1] Traces are the most elementary information that result from crime. Traces [...] need to be detected, seen, and understood to make reasonable inferences about criminal phenomena, investigation or demonstration for intelligence, investigation and court purposes. (Margot, 2011).

15

FACTS AND FIGURES

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RISEN welcomes inquiries from press and media.

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The RISEN Project is a collaboration between: