OVERVIEW

SHUTTLE is a **Horizon 2020** project financed by the European Union (EU), aiming to develop a toolkit, which will facilitate the microtraces analysis collected in crime scenes.

The development of the SHUTTLE toolkit will be realised through **a pre-commercial procurement** (**PCP**) action, which is coordinated and jointly carried out between forensic institutes across **Europe**.

More precisely, the forensic institutes will organise and manage procurement of R&D services involving risk benefit sharing under market conditions, and competitive development in phases.

Thanks to the EU funding (7.4M€ for the subcontracted activities), the SHUTTLE project will contribute to strengthening the **forensic collaboration across countries and institutions in Europe and possibly beyond**. It also will catalyse innovation by allowing public authorities to invest cost effectively in innovation by sharing costs and lessons learnt.

SHUTTLE started in May 2018 and will run until the summer of 2022. It has a budget of 10.5M€ and a consortium of 8 partners led by the **MINISTERE DE L'INTERIEUR**.

PCP PROCESS AND TIMELINE

- **Phase 0** – In **2018 and 2019**, the consortium defined the requirements for the **SHUTTLE Machine + Toolkit** and organised an open market consultation.
- **Phase 1** – In **January 2020**, 3 contractors were selected to produce a concept design, consisting of detailed hardware and software design specifications.
- **Phase 2** – In **November 2020**, the 3 contractors were invited to build a prototype of their concepts. Evalutions took place in **July 2021** and 2 contractors were selected for Phase 3.
- **Phase 3** – The 2 selected prototypes will be validated in SHUTTLE partners' laboratories, subjected to a series of tests to assess their operationality in relevant conditions. **Phase 3 started in August 2021** and will last 5 months.

SHUTTLE PARTNERS

Ministère de l'Intérieur

Netherlands Forensic Institute
Ministry of Justice and Security

KEMEA

Lietuvos teismo ekspertizės centras

Polícia Judiciária

ARTTIC
a PNO international management services company

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SHUTTLE

***S**cientific*
***H**igh-throughput*
*and **U**nified **T**oolkit*
*for **T**race analysis*
*by forensic **L**aboratories*
*in **E**urope*

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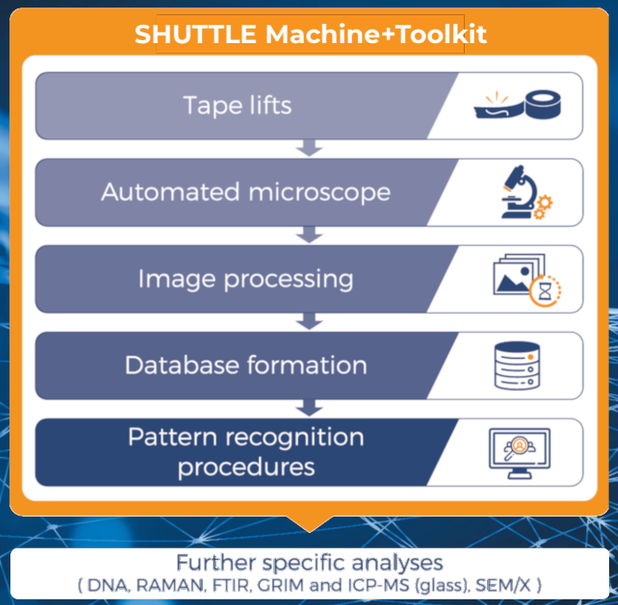
CONCEPT

Historically, trace analysis lean on the "microscopist eyes". It's time-consuming, selective and hardly objective due to the complexity of the process.
The SHUTTLE toolkit will help to solve the current difficulties. Each of the tools, as well as their fluent interaction, is required for optimal operation.

- Microscopic grade **tape**.
- An **automated microscope** that will form the eyes of the SHUTTLE toolkit.
- Algorithms for **image processing** that will form the brain of the SHUTTLE toolkit.
- A **database** and search algorithms, that will form the memory of the SHUTTLE toolkit.



The aim is to make a powerful and versatile toolkit to solve the major issues in forensic trace evidence investigation. Additional specifications have been set on privacy issues, training, user-friendliness, long-term sustainability, and integration with other techniques.

VISION

SHUTTLE will automate a significant part of forensic trace evidence examinations. The SHUTTLE **toolkit** will mainly consist of an **automated microscope** that will acquire high quality images of recovered traces. Images will be processed automatically, and an overview of available traces will be reported. **Algorithms** to classify additional traces, or to classify traces more accurately can be developed by users and added as plug-ins to extend the range of traces that can be classified. The data will be stored in a computer **database**, thereby facilitating future data analysis, such as provenance of traces and forensic comparisons.

THE SHUTTLE PHASE 3 PROTOTYPES

AG SHUTTLE Toolkit Jena

The AG SHUTTLE Toolkit Jena design concept is a brand new approach to automated microscopy for forensic trace analysis. The innovative approach consists of imaging the material of a trace carrier completely, with the required optical resolution and in all required spectral modes.

The image stacks are digitally recorded and evaluated by means of Artificial Intelligence (AI), and classification results are stored in an "Enterprise Content Management System (ECM)". All main components – optics/mechanics, AI and ECM – are modular in design and can be expanded to include further components.

Altogether, the innovations of the toolkit are:

- A novel combination of optics/mechanics, a high-performance optical sensor, the AI and an ECM.
- The result in the form of a full-page A4 scan and the thus complete recording of all traces including their optical and spectroscopic properties.
- This result is achieved after less than 5 hours.
- Users can merge the knowledge of different persons on various locations to get best decision based on all available consolidated experience.
- But nevertheless users can use the toolkit for standalone use in connection with other proven tools.

This innovative solution is a totally new product:

- It realises a completely new working process, as it delivers a complete scan of a track carrier in all required optical and spectral properties.
- The product has been developed from scratch, using the latest or innovative components on both the hardware and software side.

OPTIMAL SYSTEMS
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TRACES Consortium

The Spectral Multimodal Microscope for the Automated Recognition of Traces (SMMART) forensics toolkit developed by the TRACES consortium improves radically all aspects of traces collection and analysis processes:

- Collection of evidence with a novel thin recyclable lifting tape/backing system with special optical properties that does not influence the collected samples.
- Automated high content screening corresponding to the surface of four A4 papers.
- Multimodal image acquisition operation through a graphical user interface.
- Fully automated and motorized scanning requiring no human presence or intervention.
- Automated analysis and identification of traces using a variety of classification algorithms.
- A sophisticated database for data storage and retrieval for remote locations as well as secure data handling.

The SMMART forensics toolkit is a totally new product that will radically improve the collection and analysis of microscopic traces. Looking at the state-of-the-art in forensics microscopy, the workflow of an operator or lab expert involves many actions making the microscopic examination of traces a cumbersome, time consuming and error prone process.

The SMMART forensics toolkit introduces a novel trace collection system, a high-end microscope and sophisticated algorithms offering the forensics lab expert a fast and easy-to-use microscopic trace analysis process.

All aforementioned elements are new and innovative and do not depend on existing products or services. elevated to the transformational degree of innovation.

SPECTRICON
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