

PATHWAYS TO MARKET REPORT 02

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About ENACT

ENACT is a knowledge network focused on the fight against crime and terrorism (FCT). The network is funded under the Horizon Europe Framework Programme in Cluster 3 – Civil Security for Society. The project addresses the call topic HORIZON-CL3-2022-SSRI-01-02 ‘Knowledge Networks for Security Research & Innovation’, aiming to collect, aggregate, process, disseminate and make the most of the existing knowledge in the FCT area.

The project aims to satisfy two major ambitions,

- Provide evidence-based support to the decision-makers in the EU research and innovation (R&I) ecosystem in the FCT domain, targeted explicitly at enabling more effective and efficient programming of EU-funded R&I for the fight against crime and terrorism.
- Act as a catalyst for the uptake of innovation by enhancing the visibility and reliability of innovative FCT security solutions.



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Acronyms

AI	Artificial Intelligence
AP4AI	Accountability Principles for Artificial Intelligence
BAS	Business Acceleration Services
BG	Border Guard
CERIS	Community of European Research and Innovation for Security
CRL	Commerical Readiness Level
CSE	Child Sexual Exploitation
DHA	Drug Hunter Analyzer
EACTDA	European Anti-Cybercrime Technology Development Association
EIC	European Innovation Council
ETR	Europol Tool Repository
EU	European Union
EUCS	European Union Civil Security [taxonomy]
FCT	Fight against Crime and Terrorism
IRL	Integration Readiness Level
ISF	Internal Security Fund
LEA	Law Enforcement Agency
LPERL	Legal, Privacy and Ethics Readiness Level
KER	Key Exploitable Result
MRL	Manufacturing Readiness Level
NFP	National Focal Points
NGO	Non Governmental Organisations
PtM	Pathways to Market
R&D	Research and Development
REA	Research Executive Agency
R&I	Research and Innovation
SecRL	Security Readiness Level
SIA	Security Innovation Award
SME	Small and Medium Sized Enterprise
SocRL	Societal Readiness Level
TRL	Technology Readiness Level

EXECUTIVE SUMMARY

The ENACT Pathways to Market (PtM) report serves as a comprehensive framework designed to support FCT R&I projects in their journey from validation to market implementation. This report outlines the results from the first validation services performed by the ENACT project and the pathways to market report for the individually validated project solutions. These Pathways to Markets reports assist projects in identifying viable commercialisation routes and enhance their market potential. The PtM reports represent a crucial component of ENACT's validation facility, working in conjunction with ENACT External Cooperation activities to provide actionable recommendations for market uptake and exploitation.

The methodology combines expert validation through structured surveys with project self-assessment tools, creating a dual perspective on market opportunities and challenges. By leveraging the EU Civil Security (EUCS) taxonomy and operational validity assessments, the process ensures a comprehensive evaluation of each solution's market readiness and potential. This systematic approach enables the identification of both barriers and accelerators to market entry, while also highlighting standardisation and certification opportunities.

The report establishes a standardised framework for future PtM analyses, ensuring consistency and measurable value across all validated projects. This methodology will continue to evolve based on practical implementation experiences, maintaining its relevance and effectiveness in supporting the successful commercialisation of civil security innovations.

INTRODUCTION

The Pathways to Market reports and studies are ENACT products that the project offers to other FCT R&I projects that enter the validation facility as part of the task on External Cooperation Activities. The reports support these projects by providing recommendations for further marketability, identifying (innovative) pathways to uptake, and providing recommendations based on the validation results of the solutions conducted by the ENACT pool of experts. These reports are delivered to the projects before the end of their project to allow them to implement the recommendations in their exploitation plans and actions. This is the second PtM report, with the first focusing on introducing the methodology, the validation guide and project survey.¹

In addition to the ENACT Validation Facility, the Pathways to Market reports (PtM) are part of the Innovation Uptake and Exploitation Pathways task. These project-specific pathways to marketability and innovation uptake help to feed into the Impact Reports' section on exploitation, which extrapolates the trends and insights from these PtMs.

Finally, this document reports on the ENACT Validation Facility service performed for the first nine FCT R&I projects validated during the 2nd ENACT Annual Event on 16 and 17 December 2025 in Lisbon.

¹ van de Crommert, P., Perez de Leon-Huet, V., Brumter, G., & Versteeg, D. (2025). Pathways to Market Report. European Network against Crime and Terrorism (ENACT). <https://doi.org/10.5281/zenodo.18732095>

PATHWAYS TO MARKET - METHODOLOGY

The PtM reports follow a simple but effective methodology, using various information sources to explore potential ways to bring a validated technology to market. It then analyses the best routes and actions for successful adoption. In short, the goal is to find the most practical and effective path to commercialisation.

Validation Guidelines Survey to the Validators

The validators that are drawn from the pool of experts act as the primary source of information for defining potential exploitation routes. To collect the necessary information to approve the technology, these experts are given validation guidelines which include questions to assess the barriers and accelerators of the given technology/solution. For each project that goes through the validation facility, the validators are all given the same guidelines in order to ensure uniform evaluation across the facility throughout the project lifetime. Mapping the solution/technology via the EUCS taxonomy allows for ENACT to understand where it fits within the civil security market and better provide tailored recommendations for potential paths and actors to focus on when it comes to exploitation.

Following this mapping the operational validity of the technology/solution is analysed by the validator on behalf of ENACT. This allows for ENACT partners and the validator to assess whether or not the technology/solution is able to perform in an operational setting, how easy the technology/solution is to use for the end-user, and potential areas for further development. These insights play a crucial role in the final analysis.

Pathways to Market Survey to the Projects

Similar to the Validation Guidelines, a survey is shared with the projects that are participating in the validation facility to understand what barriers and accelerators have already been identified by the project. The questions are the same as those asked in the validation guidelines, and measure how the project views what needs to be done in order to reach successful exploitation.

Additionally, the preliminary exploitation plan is uploaded by the projects for ENACT to review, in order to better understand the Key Exploitable Results (KERs), their owners, and any potential standardisation/certification opportunities already underway.

In addition to the above survey, structured interviews with the project may be undertaken to better understand the project's existing exploitation plans.

Analysis & Production of Pathways to Market Report

Once the technology/solution has gone through the validation facility, the ENACT partners in charge of tasks - Innovation Uptake and Exploitation Pathways and External Cooperation Activities, namely the Netherlands Police and European Organisation for Security (EOS), begin analysing the outcomes. The first step in analysing the results of both surveys is to compare the answers regarding the pathways to market and measure the levels of congruence. In the case that the answers align, then the Netherlands Police and EOS are able to define accurately the focus areas for the projects to successfully exploit their technology/solution based on the common results. Additionally, the Netherlands Police and EOS will be able to use the answers to the technologies and functions areas from the validators' questionnaires to identify any trend suggesting one or more specific areas (Functions areas level 2) or technologies facing development and deployment issues.

In the case that the answers are not congruent, then the ENACT partners will prioritise the answers from the validators, ensuring that the end-user feedback lays the groundwork for the pathways to market. For example, they would need to isolate the new needs from the results, potentially find out more details to have a clear vision. This could be done through interviews with the experts. With the new information, adjustments would take place to better suit the technology to the needs of the end users. It would be important to ensure changes are documented. A shift in direction will lead to a more successful and useful final product.

These conclusions enable the identification of the key areas for increased support and the definition of the most suitable supporting scheme.

PATHWAYS TO MARKET FOR VALIDATED FCT PROJECTS

During the 2nd Annual ENACT event on 16 and 17 December 2025 in Lisbon, the ENACT Validation Facility was performed on nine FCT-funded project solutions. The Validation Facility uses the MultiRATE assessment and comprises validation by external experts and a self-assessment by the project team of the validated solution.

MultiRATE (Holistic framework for the MatUurity evaLuaTion of ReAdiness level for security Technologies), funded by Horizon Europe under Grant Agreement #101073929, aimed to support the European research and development (R&D) community, European Commission (EC)-Chaired initiatives, Community for European Research and Innovation for Security (CERIS), and European Commission Agencies with a multi-disciplinary and holistic evaluation methodology and calculation to measure the Readiness Level (RL) of the outputs of EU R&D projects. It was built upon seven main RL domains: Technology RL (TRL), Societal RL (SocRL), Security RL (SecRL), Legal, Privacy and Ethics RL (LPERL), Integration RL (IRL), Commercialisation RL (CRL) and Manufacturing RL (MRL). Therefore, MultiRATE provides an advanced cross-disciplinary methodology and tool for the common and harmonised assessment of all EU-funded activities.

As aforementioned, the projects were required to answer an ENACT survey regarding their perceived pathways to market in order to provide a baseline for analysis, as well as understand pre-existing barriers. The survey mirrors many of the questions that the ENACT Validators will answer in order to have a direct comparison regarding the gap between the perception of practitioners and the developers.

The final piece of the Validation Facility is the responses from the expert practitioners ENACT has seconded to use their expertise and knowledge to validate whether a solution/innovation is fit for an operational purpose and to highlight any areas for improvement. This feedback is of vital importance to research and innovation (R&I) projects, as these practitioners are often the end-users who will decide whether or not to invest in or purchase these solutions. Therefore, these responses should serve as a guide for future improvements.

The following paragraphs summarise the results of the nine projects the Validation Facility serviced.

CEASEFIRE

Advanced versatile artificial intelligence technologies and interconnected cross-sectoral fully-operational national focal points for combating illicit firearms trafficking (CEASEFIRE), funded by the Horizon Europe Cluster 3 call HORIZON-CL3-2021-FCT-01 and with the Grant Agreement n° 101073876, aimed at developing a highly innovative, holistic, multi-disciplinary, high-tech and versatile approach for aiding EU LEAs in their struggle to detect, analyse and track cross-border illicit firearms trafficking. It has delivered relevant, advanced AI tools and established fully-operational National Focal Points (NFPs), aiming to increase LEA operational capabilities and alleviate existing organizational, cooperation, cross-jurisdictional, trans-border and information exchange challenges.

The CEASEFIRE project participated to the ENACT Validation Facility and presented two of its tools: the Desktop system for detecting firearms in scanned parcels through its X-Ray Image Analyser App; and the mobile application for firearm recognition on the crime spot.

VALIDATION FACILITY CONCLUSIONS

The CEASEFIRE Desktop and Mobile Apps represent technologically advanced solutions with strong potential to enhance LEA capabilities in combating illicit firearms trafficking. However, their path to market and operational deployment requires addressing critical gaps in real-world validation, integration, and ethical/legal compliance.

Key Recommendations:

- **Advance Operational Readiness:** Prioritise real-world testing to achieve TRL7+ and validate performance in operational environments.
- **Enhance Integration and Interoperability:** Collaborate with early adopters (e.g., consortium LEAs) to refine integration with legacy systems and ensure compatibility with existing tools.
- **Strengthen Ethical and Legal Frameworks:** Utilise tools like the AP4AI (Accountability Principles for Artificial Intelligence)² Compliance Checklist to address gaps in Human, Legal, and Ethical Readiness.
- **Leverage Exploitation Support:** Apply for Horizon Results Booster's Go-to-Market Service and explore Europol's Tool Repository (ETR) for non-commercial distribution.
- **Secure Additional Funding:** Extend collaboration among consortium partners and seek new funding to sustain development and validation efforts.

By addressing these areas, CEASEFIRE can transition from advanced prototypes to operationally deployed solutions, maximising their impact on EU law enforcement and border security. The insights from this validation process will also contribute to broader ENACT Impact Reports and the Market Observatory's analysis of standardisation and uptake opportunities in the civil security market.

² <https://centric-research.co.uk/projects/ap4ai>

The **Drug Hunter** project, funded by the Internal Security Fund (ISF) under Grant Agreement No. 101114520, was conceived in response to a critical gap in the market for precise, on-site illegal drug testing. The rising prevalence of drug misuse across Europe, coupled with the limitations of existing drug testing methods, highlighted an urgent need for a solution that could provide reliable, immediate results in various settings, including roadside testing and public events. Traditional drug testing methods often involve delays and logistical challenges, particularly when samples need to be sent to laboratories for analysis. These challenges can undermine law enforcement efforts and public safety measures.

To address these issues, the project aimed to develop and expand the market reach of the Drug Hunter Analyzer (DHA), an innovative device designed for rapid and accurate drug detection. Complementary to the DHA innovation is the SALIKIT, a compliant drug testing kit that meets rigorous bioanalytical method requirements, enabling secure and effective sample collection and treatment in the field. The project sought to establish a robust network of distributors, business partners, and customers across Europe. By validating the needs of these customers and aligning the product with relevant regulations, the project aimed to ensure that the DHA could be effectively deployed where it is most needed.

Moreover, the project not only focused on the technological aspects but also integrated a comprehensive business strategy to support its market introduction and growth. This included updating the business model, refining financial projections, and developing targeted marketing and sales strategies. By securing distributor agreements in multiple countries and establishing partnerships in diverse markets, the project laid a solid foundation for broader market expansion.

VALIDATION FACILITY CONCLUSIONS

The Drug Hunter Analyzer exemplifies how cutting-edge technology can address pressing gaps in law enforcement and public safety. With near-final technological maturity (TRL7–8) and a strong commercial foundation (CRL8–9), the solution is poised for deployment, but its success hinges on overcoming regulatory and systemic barriers.

The lack of EU-wide harmonization for saliva-based drug testing emerges as the single greatest obstacle to scaling adoption. Without standardized thresholds and evidentiary criteria, cross-border enforcement and legal admissibility will remain fragmented, limiting the tool's potential. Collaboration with EU institutions (EUROPOL, FRONTEX, etc.) and political advocacy are essential to align national regulations and unlock widespread use.

Beyond regulation, two priorities stand out:

- Scientific refinement: Improving THC detection sensitivity (to ≤ 10 ng/mL) will strengthen the tool's reliability and competitiveness.
- Continued operational validation: Field testing in diverse environments (e.g., roadside checks, festivals) will build trust and demonstrate real-world efficacy.

For Drug Hunter, the path forward is clear: Technological excellence must be matched by strategic engagement with policymakers, end-users, and certification bodies. By addressing these dimensions, the project can transition from a promising prototype to a transformative tool for European law enforcement, setting a precedent for how R&I projects bridge the gap between innovation and impact.

EMERITUS

EnvironMental cRimes iTelligence and investigation protocol based on mUltiple data Sources (EMERITUS), funded by Horizon Europe under grant agreement #101073874, aimed to create a single-entry point platform for law enforcement authorities and border guards to improve investigative proof collection capabilities against environmental waste crimes. The EMERITUS platform consists of external system connectors, integration layer, data storage, processing component, dissemination layer, system extensions components and real-time mission components. The ambition of EMERITUS was to explore and demonstrate how these technologies and specialised training could improve the efficiency of environmental crime detection and intelligent risk profiling to optimise resources, reducing the risk for operators and providing a deterrent for offenders, making it a cutting-edge project.

EMERITUS intends to generate technological and societal impacts with both a medium and long-term perspective. Indeed, on the one side EMERITUS will foster the uptake of state-of-the-art technologies for the investigation of environmental crimes (Platform). On the other side, it will improve the expertise of LEAs/Border Guards (BGs) in this domain (training programme) and facilitate the lawful court-proof collection of crime evidence (Protocol) and the cross-border and multidisciplinary collaboration (Community of Practice). As such, EMERITUS will ultimately contribute to enhancing the prevention, detection and deterrence of environmental crimes as well as evidence-based policymaking in this domain at national, cross-border and international levels.

VALIDATION FACILITY CONCLUSIONS

The validation of the EMERITUS platform within the ENACT Validation Facility confirms both the strong operational relevance and the solid technological maturity of the solution, while also clearly identifying the key steps required to reach full market readiness. The MultiRATE assessment demonstrates that the platform is already well advanced in terms of technological and security readiness, while human, integration, collaboration, and commercial readiness still require further consolidation. The convergence between the project's self-assessment and the validators' feedback reinforces a shared recognition of the tool's added value, particularly in terms of performance improvement, time efficiency, collaboration, and usability in operational environments. At the same time, both sources highlight that the main barriers to deployment are not legal, ethical, or data-related, but rather technical and operational, notably the need for additional investment, further testing and validation, last-mile product development, and effective integration with legacy systems. Importantly, the divergence observed between validator perceptions of deployment difficulty suggests that contextual factors such as infrastructure and user expertise will play a great role in adoption, indicating the need for a more standardised and robust deployment framework. Overall, EMERITUS can be considered a functionally mature and high-value solution, whose pathway to market now primarily depends on finalising product development, strengthening validation and reliability evidence, and ensuring smooth integration across diverse operational environments, which together will significantly enhance its readiness for widespread uptake by law enforcement authorities across Europe.

Empowering the Uptake of AI-Powered Investigative Tools for Law Enforcement (EMPOWER), funded by the European Union's Digital Europe programme under grant agreement no. 101102724, aimed to enhance the operational capabilities of law enforcement agencies (LEAs) across the EU by fostering the adoption of advanced AI-driven investigative technologies in critical areas such as Child Sexual Exploitation (CSE), cybercrime, terrorism and the protection of public spaces. Through piloting a suite of innovative tools that leverage big data, machine learning and federated analytics, EMPOWER sought to support LEAs in improving detection, prediction, evidence collection and analytical workflows.

In particular, researchers and developers within the EMPOWER consortium brought eight investigative tools to near-operational readiness, covering domains such as image/video analysis, voice/text processing and federated learning, which validated with real-world datasets by partner agencies. By equipping practitioners with scalable, trustworthy AI solutions and accompanying training materials, recommendations and anonymised datasets, EMPOWER strengthened both the technical and procedural foundations for modern policing across the EU. Through open repositories and licensing schemes coordinated with key stakeholders (including Europol and other law enforcement networks), EMPOWER promoted wider uptake and ethical use of AI tools in operational settings, ultimately enhancing public safety and investigative effectiveness throughout Europe.

VALIDATION FACILITY CONCLUSIONS

ENACT's validation of the EMPOWER project's Calligraphus Administrative tool underscores its high technological and operational potential to enhance LEA capabilities in critical areas such as CSE, cybercrime, and terrorism. The tool's strong technical foundation and positive usability feedback reflect its readiness to support LEAs in their investigative work. However, the path to full market adoption is marked by critical challenges that must be addressed.

Validator feedback highlights the need for seamless integration with legacy systems, enhanced interoperability, and robust data governance to ensure the tool meets the diverse operational needs of LEAs. While the tool's technological maturity is undeniable, its scalability and effectiveness depend on addressing legal, ethical, and regulatory compliance, particularly in sensitive areas like data privacy and AI governance.

The way forward is clear: prioritise real-world testing, refine integration and interoperability, and align with regulatory frameworks to enable widespread deployment. By leveraging early adopters, compliance tools, and repositories like ETR and from EACTDA (European Anti-Cybercrime Technology Development Association)³, EMPOWER can bridge the gap between technological maturity and operational readiness. With these steps, the Calligraphus Administrative tool can achieve its full potential as a scalable, impactful solution for LEAs, ultimately enhancing public safety and security across Europe.

³<https://www.eactda.eu>

IMPROVE

Improving Access to Services for Victims of Domestic Violence by Accelerating Change in Frontline Responder Organisations (IMPROVE), funded by HE under grant agreement #101074010, aimed to help the issue of domestic violence and violence against women across the EU (affecting 1 in 3 women) by developing a series of tools to increase reporting and detection of domestic violence. In particular, researchers used a conversational (multilingual) AI chatbot that provides the victims immediate advice, risk assessment and guidance towards the available service provisions. By empowering the victims to understand their rights for services and justice, and by supporting the police as well as Non-Governmental Organisations (NGOs) to enhance their competencies, IMPROVE will eventually change policymaking in this field.

The Conversational (multilingual) AI Chatbot (AinoAid™) provides victims with immediate advice and risk assessment as well as guidance towards the available service provisions. AinoAid™ is a chatbot which can handle various tasks like answering questions, giving recommendations, offering support, and having engaging human-like conversations with users for anyone affected by domestic violence and seeking help. The tool also serves those who are using violence or are afraid they might use violence. The content and conversation flows have been developed by the experts representing different therapy methods, the victims who have become survivors and future creators from diverse cultural backgrounds. The IMPROVE project/AinoAid also earned the Security Innovation Award (SIA) 2025 from DG HOME, which granted it eligibility for ENACT's own SIA. AinoAid is currently using the ENACT SIA to help support the uptake and success of their innovation.

VALIDATION FACILITY CONCLUSIONS

ENACT's validation of the AinoAid™ Conversational AI Chatbot underscores its high technological promise and operational potential in addressing domestic violence and supporting victims across the EU. The tool's TRL and IRL scores reflect strong technical and integration maturity, while its innovative approach - recognised by the Security Innovation Award 2025—positions it as a valuable asset for law enforcement, NGOs, and policymakers.

However, the path to full market adoption is not without challenges. The last mile remains the primary hurdle, as further development is needed to address legal, ethical, and societal readiness, particularly around data privacy, user trust, and cultural sensitivity. The validator's feedback, while overwhelmingly positive, highlights the necessity for additional research, support infrastructure, and expert oversight to ensure the tool's content remains clinically appropriate and up-to-date.

Since AinoAid has reached TRL8 where several pathways to market can be used:

- Identify a commercial partner to support marketing, business development, and EU-wide market expansion, while leveraging WeEncourage's capacity for deployment in Finland.
- Engage early adopters from consortium end-user organisations to support further development, testing, and integration with existing systems.
- Utilise Horizon Europe support services, such as the Horizon Results Booster and EIC Business Acceleration Services, to strengthen market readiness, exploitation, and commercialisation.
- Increase dissemination and exploitation activities using resources such as the REA Dissemination and Exploitation Starter Kit.
- Consider making AinoAid available through the Europol Tool Repository to increase adoption among EU law enforcement agencies and border guards.
- Develop relationships with interested validators and practitioners to support real-world deployment, feedback collection, and potential commercial opportunities.

The way forward is clear: prioritize final product refinement, expand operational validation, and strengthen business and user-centric strategies. By addressing these areas, AinoAid™ can overcome existing barriers and achieve its full potential as a widely deployed, impactful

PARTESS-COM (Participatory Approaches to Protecting Places of Worship), funded by HE under grant agreement No. 101073876, aims to strengthen the protection of public spaces and places of worship across the EU by enhancing cooperation between security authorities, local communities, and civil society actors. In response to the increasing threat of targeted attacks against religious communities and public gathering spaces, PARTESS-COM develops practical tools and training frameworks to improve preparedness, risk awareness, and coordinated response mechanisms. The project places particular emphasis on trust-building and participatory security governance, ensuring that protection measures are both effective and socially inclusive.

A central pillar of PARTESS-COM is the development of operational toolkits, training modules, and community engagement methodologies designed for law enforcement authorities, local administrations, and faith-based organisations. These tools support risk assessment, vulnerability mapping, and tailored protection planning for places of worship and other sensitive sites. By fostering structured dialogue and joint exercises between public authorities and community representatives, the project strengthens mutual understanding, improves communication channels, and enhances crisis response capabilities.

VALIDATION FACILITY CONCLUSIONS

ENACT's validation of the Faith Guardian tool underscores its high conceptual and technological potential in strengthening the protection of places of worship and fostering trust between communities and law enforcement. The tool's strong technological foundation and user-friendly design, particularly its anonymity feature, reflect its readiness to support participatory security governance. However, the path to full operational deployment is marked by critical challenges, particularly in alignment with LEA needs, integration with legacy systems, and interoperability.

Validator feedback highlights the need for tailored development to ensure Faith Guardian meets the operational requirements of LEAs while maintaining its community-focused approach. The organizational implementation will largely determine its success. Additionally, distribution via ETR or EACTDA repositories and leveraging the BOOSTER 'Go-to-Market Support' Service can accelerate its journey toward operational maturity.

The way forward is clear: finalize last-mile development, address interoperability and integration barriers, and align the tool with end-user needs. By doing so, Faith Guardian can achieve its full potential as a scalable, impactful solution that empowers communities and LEAs to collectively enhance the security of places of worship across Europe. With these steps, PARTESS-COM can pave the way for sustainable, inclusive, and effective security governance.



PERIVALLON

Protecting the European Territory from organised environmental crime through intelligent threat detection tools (PERIVALLON), funded by Horizon Europe under grant agreement #101073952, aimed to provide an improved and comprehensive intelligence picture of organised environmental crime and develop effective and efficient tools and solutions for detecting and preventing such types of criminal activities and for assessing their environmental impact based on geospatial intelligence, remote sensing, scanning, online monitoring, analysis, etc. by leveraging the latest advancements in AI in the fields of computer vision and multimodal analytics. As a result, enhanced investigation processes and methodologies were derived through the capabilities provided by the developed tools and solutions, and the insights obtained through the proposed Environmental Crime Observatory.

The PERIVALLON project tackled organised environmental crime by integrating advanced AI-driven technologies into a single, powerful platform. Using geospatial intelligence, satellite and aerial imagery, and real-time AI analysis, it detects and monitors illegal activities like waste dumping and pollution, helping authorities respond faster and more effectively. The platform also features digital twins and immersive training programs to prepare law enforcement for real-world scenarios, while blockchain technology ensures secure data sharing and international cooperation. By equipping frontline responders with cutting-edge tools and supporting evidence-based policymaking, PERIVALLON aims to transform how environmental crimes are detected, investigated, and prevented across Europe. The project's innovations have been validated through real-world pilot demonstrations in multiple European countries, showcasing their practical impact and scalability.

VALIDATION FACILITY CONCLUSIONS

The validation of the PERIVALLON Remote Sensing Tool as part of the ENACT Validation Facility not only underscores its strong technological grounding, but also its potential for assisting law enforcement agencies in fighting organized environmental crime. In fact, as can be noted from the results of the MultiRATE evaluation, the Technology RL of the system is strong, being at point TRL7, as is its Integration RL, IRL7. However, its SocRL, SecRL, LPERL, and CRL are still in their earlier stages. Both from its self-assessment and from the information provided by the independent validator, there is a convergence towards a consistent view. The concerns related to legality, ethicality, interoperability, as well as those related to legacy systems, seem limited in nature. The data concerns pose a moderate level of obstacle, mainly related to integration as well as operational deployment. Nevertheless, the major impediment to full-scale market adoption revolves around matters associated with the final stage of development. This includes further testing and validation, as well as significant last mile/product development, as the major hurdles to full-scale preparation of the solution. From the feedback, there is further confirmation of the added value of the tool, including positive feedback on performance improvement, time savings, collaborations, and usability. Though there was identified some complexity and technical support required, there was high satisfaction with both the tool and the ENACT validation process in general. In summary, it can be said that the innovation and practical uses of PERIVALLON and the path to market mainly involve how it can further reinforce its level of maturity by thorough validation and investment in the development of the final product, and these will greatly improve its level of preparedness for widespread adoption in the civil security context in Europe.

STARLIGHT

Sustainable Autonomy and Resilience for LEAs using Artificial Intelligence against High priority Threats (STARLIGHT), funded by H2020 under grant agreement #101021797, aimed for an inclusive and sustainable vision for increasing the awareness, capability, adoption and long-term impact of AI in Europe for LEAs. Five strategic goals underpin STARLIGHT's approach:

- Improve the widespread understanding of AI across LEAs to reinforce their investigative and cybersecurity operations and the need to uphold legal, ethical and societal values;
- Provide opportunities to LEAs to exploit AI tools and solutions in their operational work that are trustworthy, transparent and human-centric;
- Ensure that LEAs can protect their own AI systems through privacy- and security-by-design approaches, better cybersecurity tools and knowledge;
- Raise LEAs' expertise and capacity to combat the misuse of AI-supported crime and terrorism; and
- Boost AI for LEAs in Europe through high-quality datasets, an interoperable and standardised framework for long-term sustainability of solutions, and the creation of an AI hub for LEAs that supports a strong AI security industry and enhances the EU's strategic autonomy in AI.

STARLIGHT aimed to ensure European LEAs lead the way in AI innovation, autonomy and resilience, addressing the challenges of now and the future, prioritising the safety and security of Europe for all.

5 tools were presented during the course of STARLIGHT's attendance to ENACT's Validation Facility.

The first, **CPI**, is a specialised technical tool designed to help law enforcement agencies efficiently extract and analyze indicators of compromise from large-scale network firewall logs, significantly reducing investigation time from hours to minutes. It offers adaptable, vendor-agnostic log parsing, statistical analysis, and explainable visual reports—enabling faster, more effective responses to sophisticated cyberattacks like ransomware campaigns across Europe.

The **MMDA** is an integrated AI-powered platform that automates the analysis of both open-source news data and multimedia recordings. It uses advanced language models to classify and visualise global events for early detection of trends like migration, while also providing transparent, browser-based analysis of audio and video content—enabling law enforcement and analysts to efficiently extract actionable insights from large-scale, diverse data sources.

The **Suspect Tracking Tool, or STRACT**, is a geospatial analysis platform that transforms raw GPS and location data into actionable intelligence for law enforcement. It visualises suspect movements, maps interactions between individuals, and uses predictive analytics to identify key locations and behavioural patterns, enabling proactive investigations and enhanced situational awareness through custom surveillance zones and anomaly detection.

The **Synthetic Face Sketch Generation Tool** is an AI-powered platform that enables law enforcement to create highly customizable, realistic facial composites from witness descriptions. By combining selectable facial attribute templates with natural language prompts (such as gender, age, ethnicity, and extra features), the tool generates both sketch-style and photorealistic suspect images, enhancing investigations where traditional photo or video evidence is unavailable.

Finally, the 5th tool STARLIGHT presented was the **Trainable Logo Detector**, an AI-driven tool designed to rapidly identify and track logos on clothing in images, recorded videos, and live streams. By generating synthetic datasets from just a few logo examples, it trains custom deep learning models to detect and monitor specific logos—enabling law enforcement and security teams to efficiently analyze visual media for investigative or surveillance purposes. Overall of these AI-powered tools help LEAs leverage innovation to drastically reduce the time to conduct investigations and improve efficiency.

VALIDATION FACILITY CONCLUSIONS

ENACT's validation of the STARLIGHT project's AI-powered tools underscores their high technological potential to revolutionise law enforcement operations across Europe. The tools (CPI, MMDA, STRACT, Synthetic Face Sketch Generation, and Trainable Logo Detector) demonstrate strong operational capabilities, with proven effectiveness in areas such as cyber investigation, data analysis, suspect tracking, and visual identification. Their advanced technological maturity reflects STARLIGHT's commitment to delivering innovative, AI-driven solutions tailored to the needs of LEAs.

However, the path to full market uptake is marked by critical challenges that must be addressed. Legal, ethical, and societal readiness, particularly concerning data privacy, compliance with GDPR and the EU AI Act, and public trust, remain significant barriers for tools like the Synthetic Face Sketch Generation Tool and Trainable Logo Detector. Interoperability, integration with legacy systems, and data-sharing concerns were also highlighted as obstacles that require strategic solutions. Additionally, while tools like CPI and STRACT are already operational in some contexts, further testing, validation, and last-mile development are essential to ensure scalability and seamless adoption across diverse LEA environments.

The STARLIGHT consortium's proactive approach (pursuing distribution via Europol's ETR and EACTDA repositories, and leveraging the BOOSTER 'Go-to-Market Support' Service) demonstrates a clear commitment to overcoming these barriers. By finalizing last-mile development, addressing legal/ethical concerns, and fostering collaboration with end-users, the STARLIGHT tools can achieve their full potential as indispensable assets for LEAs.

The way forward is clear: refine operational validation, enhance interoperability, and align with regulatory and ethical standards to ensure the STARLIGHT tools are not only technologically advanced but also trusted, scalable, and impactful in the fight against high-priority threats. With these steps, STARLIGHT can pave the way for a new era of AI-driven law enforcement in Europe.

TRACY

The TRACY project aims to gain a deeper understanding of the operational procedures involved in resolving crimes, particularly focusing on data-driven evidence processing. This includes investigating the methods, tools, and types of evidence data utilised. With this objective in mind, we aim to develop cutting-edge data analytics and artificial intelligence solutions to address the challenges of crime resolution while adhering to the regulations set by the European Union and its Member States regarding the collection of evidence data. To achieve this, we plan to employ advanced forms of network analytics that enable the collaborative processing of sensor data and assumptions about the individuals involved. For instance, we will analyse data from cameras, number plate recognition systems, face detection systems, non-content data from communications, and other relevant sources. By leveraging this information, we can deduce approximate behavioural patterns of the perpetrators, aiding in the identification of suspects.

The main development and coordination are carried out by a SME, whereas a specialised law firm (also SME) focuses on related fundamental right challenges. A university specialised in police training coordinates the training process, whereas a leading AI research institute assures the scientific quality of the solution. An ESP is responsible for creating pseudo-operational data (anonymised datasets). The main pilot shall be executed by a highly experienced LEA with the support of a well-renowned research institute. Additional LEAs for the validation of the solution are included in the consortium partners. To measure the overall quality of the project, a set of KPIs has been defined within the deliverables of each task/work package, meeting the requirements of the action.

VALIDATION FACILITY CONCLUSIONS

TRACY's participation in the ENACT Validation Facility confirms a project with genuine technological strength: a mature, operationally validated core solution (TRL 8) already in real-world use with a national police force. This is a meaningful achievement and a strong foundation for market entry.

At the same time, the validation results — and particularly the contrast between the project's own PtM survey and independent validator feedback — indicate that the consortium's confidence in the tool's readiness for broader adoption outpaces the current experience of practitioners outside its first deployment context. Integration, interoperability, usability, and the surrounding legal and commercial readiness dimensions represent the clearest remaining barriers to market, and are consistently identified as such by validators even where the consortium perceives them as minor.

Closing this perception gap — through targeted investment in usability, interoperability, and formalised legal and commercial planning — represents TRACY's most direct pathway to market. Doing so before the end of the project will allow the consortium to convert a technically strong, single-site success into a solution that is credible and deployable across the wider LEA community.

PATHWAYS AND SUPPORTING TOOLS

It is only at TRL 9 where the solution has grown from prototype and tested/validated tool to a product that is ready for market uptake, provided other aspects of a product (beyond functionality and customer compliance) have been realised.

Over the past years, European agencies and institutions have worked on websites, tools, knowledge bases, accelerators and more to support, teach, inform funded project consortia about how to exploit and better be prepared for the post-project phase with the targeted Innovation/Market uptake in reaching TRL 9.

TRL 9 is the highest step on the Technology Readiness Level scale. It means a new technology is fully mature, tested, and proven to work in real-world use. The product or system is ready for regular commercial production, routine operations, or daily mission use.

What does TRL 9 mean?

- The technology works in actual operational conditions.
- It passes all tests for real-world tasks.
- Industry, SMEs and/or Spin-offs make and sell it as a regular product.
- It moves past tests and trial phases.

Some of the available instruments are listed below in no particular order:

- The BOOSTER ‘Go-to-Market Support’ Service. The service aims to help projects to focus on different aspects such as increasing the maturity level of Key Exploitable Results (KERs), developing effective business plans to facilitate market access and impact, and identifying opportunities for further exploitation or reuse of research results.
<https://www.horizonresultsbooster.eu/ServicePacks/Details/55>
- If the tool/solution focuses on LEAs, Border Guards and forensic agencies as end-user the consortium can also decide to make the tool/solution available for other EU LEAs and Forensic Agencies via the Europol Tool Repository (ETR). ETR is only for non-commercial tools. ETR is part of the Europol Innovation Lab: <https://www.europol.europa.eu/how-we-work/innovation-lab>
- The European Commission’s Research Executive Agency (REA) has released a new starter kit designed to help Research and Innovation (R&I) projects make the most of their results under Horizon Europe. The practical guide provides essential tools, explanations, and examples to support projects in maximising both the economic and societal impact of their work through effective Dissemination and Exploitation (D&E) activities. The starter kit can be found at: <https://op.europa.eu/en/publication-detail/-/publication/51daa317-afc0-11f0-b37f-01aa75ed71a1/language-en>

- Another option could be to connect with EACTDA repository and follow the EACTDA methodology concerning market uptake, licensing schemes and overall support.
<https://www.eactda.eu/index.html>
- The European Innovation Council has developed EIC Business Acceleration Services (https://eic.ec.europa.eu/eic-funding-opportunities/bas_en). The EIC Business Acceleration Services (BAS) are built to unlock the full potential of EIC-backed innovations and help you achieve market leadership. From finding your first corporate partner to expanding into global markets, we provide hands-on support at every stage so that European innovations don't stop at the lab door.
- Apply for additional post-project funding via Europol's Low Value Grant. Additional research and development can be funded (max EUR 60.000) and tested with shared confidential test or real-world datasets in the new Sandbox environment at Europol's premises in The Hague to comply with any legal issues.

CONCLUSIONS & FUTURE WORK

This report has introduced a comprehensive methodology for ENACT's Pathways to Market (PtM) initiative, which aims to guide FCT R&I projects through their innovation uptake journey. The methodology consists of three key components:

1) Expert validation process:

- Structured surveys conducted by qualified validators from the expert pool
- Assessment of operational validity and market readiness
- Mapping solutions to the EUCS taxonomy for precise market positioning
- Evaluation of technical performance and user experience

2) Project Self-Assessment Framework:

- Detailed questionnaires for project teams to identify barriers and opportunities
- Integration of preliminary exploitation plans (if available)
- Structured interviews for deeper insights into commercialisation strategies
- Analysis of Key Exploitable Results (KERs) and their potential impact

The methodology's dual perspective approach enables:

- Comprehensive market opportunity assessment
- Identification of potential commercialization/uptake challenges
- Strategic alignment with industry standards and certifications
- Clear pathways for market entry and growth

3) Continuous Improvement Strategy:

As ENACT implemented this framework within the ENACT validation facility, ENACT will continuously refine our approach based on real-world feedback and results. This iterative process ensures our methodology remains current and effective in supporting civil security innovations. These continuous improvement iterations, throughout the course of the ENACT project phases, will lead to a final guidance document for all projects/solutions based on the ENACT findings with respect to the Pathways to Market and the Innovation uptake process.

Future Post-Project Development Priorities:

- Enhancement of survey instruments with detailed validation metrics
- Development of comprehensive assessment guidelines to address validator-project perspective gaps
- Implementation of quantitative impact measurement systems
- Creation of an extensive database documenting successful market entry strategies
- Integration of market trend analysis tools
- Development of standardised reporting templates



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