ISSN 2599-8293

European Commission

CORDIS Results Pack on

countering migrant smuggling

A thematic collection of innovative EU-funded research results

November 2024

A multifaceted approach to fight migrant smuggling



Research and Innovation

Contents

3
Throwing a wider net to close gaps in civilian maritime surveillance

5
Building for better border safety

7
Maritime domain awareness: big data and seamless information sharing

9
Technology helps halt human trafficking

12
Predictive tool to help NGOs better manage migrant needs

14
Vast dataset delivers insights on migration

16
Smugglers beware: Big Data informs automated services for detection and tracking

Editorial

Rising poverty and social and political unrest are pushing increasing numbers of people towards criminal networks that facilitate unauthorised entry, transit or stay in the EU. This new CORDIS Results Pack features seven EU-funded projects that contribute to the fight against migrant smuggling.

People smugglers exploit land, sea and air routes for migration into and within the EU. These journeys can be extremely dangerous, particularly when they take place by sea, and often expose migrants to life-threatening risks and violence from smugglers.

Smuggling networks are also closely linked to other forms of serious and organised crime such as terrorism, money laundering and human trafficking. While not all smuggled migrants are trafficked, and not all trafficked individuals are smuggled migrants, those who do become victims of smuggling could also then become victims of trafficking, which is when people are moved for purposes such as forced labour, sexual exploitation and other forms of modern slavery. As such, the issue demands a firm response at both the EU and global level.

Research and innovation projects supported by the Horizon 2020 funding programme have achieved significant results in studying and developing tools that can help fighting the smuggling of migrants and of human trafficking, and enhancing maritime surveillance.

Greater cooperation among relevant authorities, support for victims of smugglers, and the deployment of advanced technologies and reinforcement of investigative capacities are all examples of how progress can be achieved in addressing this humanitarian challenge.

Recent legislative proposals targeting migrant smuggling place a notable emphasis on enhancing cooperation among law enforcement agencies and the role of Europol, which has also been strengthened through the establishment of the Europol European Migrant Smuggling Centre. Moreover, the Global Alliance to Counter Migrant Smuggling, launched concurrently with this legislative package, underlines the significance placed on cooperation with third countries. Here, too, EU-funded research is playing a role.

Improvement of cooperation mechanisms among government officials, law enforcement and NGOs will enable victims of migrant smugglers to be more easily identified and protected.

Finally, increased maritime surveillance plays a vital role in detecting and countering migrant smuggling activities along sea routes by enabling authorities to identify and intercept vessels that may be used by smugglers, as well as help search-and-rescue missions for migrant ships in distress. In these ways, EU-funded research is helping to make the world a safer place for both migrants and EU citizens.

Throwing a wider net to close gaps in civilian maritime surveillance

AI-backed networks of manned and unmanned surveillance assets coordinated in real time exponentially increase civilian maritime surveillance capabilities cost-effectively.

A plethora of commercial monitoring systems for terrestrial and marine environments and assets are now available. However, integration into coast guards' tasks of maritime surveillance operations to address migrant smuggling, drug trafficking and other concerns is suboptimal.

For example, the unmanned aerial vehicle (UAV) industry is well developed and increasingly used on land. Nevertheless, affordable systems are not designed to operate at sea and more expensive systems used by some individual ships are not integrated into a large-area surveillance network.

The EU-funded COMPASS2020 project brought together 16 partners from nine countries to address this critical challenge. The project's solutions enable not an evolution but a step change – with AI-supported, coordinated, long-range and persistent civilian maritime surveillance 24 hours a day at maximum resolution.

Integrating manned and unmanned surveillance platforms

COMPASS2020 laid the foundation for a 'system of systems' by demonstrating the ability of existing offshore patrol vessels (OPVs) to autonomously launch and operate UAVs and autonomous underwater vehicles (AUVs). The UAVs and AUVs significantly enhance OPVs' surveillance range and the types of data available to them. The OPVs can also receive data from long-endurance UAVs deployed from shore.

According to project coordinator João Piedade of the Portuguese Navy: "the UAV TEKEVER AR3 is easily deployed by an OPV. It can augment the surveillance capabilities of the vessel tenfold." COMPASS2020 demonstrated this capability — and this was just the beginning.

Coordinating multiple OPVs via a central command centre

"If an OPV is not working alone but integrated in a wider surveillance system using all the data from the network, the area that can be monitored is enormous," adds Piedade. COMPASS2020 made this possible with its system of systems leveraging data fusion and sharing to connect many OPVs in real time.



If an offshore patrol vessel is not working alone but integrated in a wider surveillance system using all the data from the network, the area that can be monitored is enormous.

Its 'agnostic integrator', deployed onboard the OPV and at an onshore maritime command centre, can receive data from different maritime assets, no matter the provider or operational environment (air, surface or subsurface). It integrates real-time data streams from UAVs, AUVs, and conventional monitoring systems (radar and automatic identification systems) to enhance situational maritime awareness. For example, a radar system can detect a target but, when augmented with AI, can provide indications of anomalous behaviours in addition to location, direction and speed. A UAV enhanced with image recognition systems

can provide vessel classification information (for example, a fishing vessel, speed boat or merchant vessel) and the number of visible occupants.

The maritime command centre not only receives data from the OPVs but transmits it to them. Leveraging data fusion and AI, it can plan and optimise the deployment of combined maritime assets according to threats and risks, simultaneously coordinating the activity of several OPVs.

Closing gaps – literally and figuratively – in maritime surveillance

"The project was very challenging. We've integrated many systems, including the AIRBUS system that enables automated take-off and landing of a UAV from a moving OPV. Most importantly, COMPASS2020 demonstrated that data from different available aerial and underwater systems can be integrated to form a wide-area, persistent maritime surveillance network," concludes Piedade.

Piedade underscores the invaluable collaboration between end users and industrial and scientific partners, who worked together to demonstrate the solutions in real-life scenarios. COMPASS2020 solutions expand surveillance coverage and enhance temporal and spatial resolution. The greater reliability and availability of data and the AI-backed coordination of maritime assets will lead to greater maritime safety and security cost-effectively.



© Project COMPASS2020

PROJECT
COMPASS2020 - Coordination Of Maritime assets for Persistent And Systematic Surveillance

COORDINATED BY
Directorate-General of the Maritime Authority in Portugal

FUNDED UNDER
Horizon 2020 - SECURITY

CORDIS FACTSHEET
cordis.europa.eu/project/id/833650

Building for better border safety

Innovations in methodology and technology improve tools to address human trafficking, public health concerns and other challenges to border management.

Borders are busy places, and in our complex world they present many security challenges. Border officials have systems in place to identify challenges, but these tools have shortcomings, particularly when it comes to considering a broader understanding of risks, including those related to exploitation and smuggling of migrants. The EU-funded CRiTERIA project builds on existing risk analysis methodologies and analysis of how open source information and modern AI technology can be used to broaden the risk perspective and enhance risk analysis at European borders.

A human-centred methodology

Annual figures show total net immigration to Europe of 4.25 million people in 2022. Existing methodologies for border security, such as the Common Integrated Risk Analysis Model prioritise safety, but they could more adequately address a necessary wider perspective on risks. The CRiTERIA methodology incorporates related risk aspects and better considers risks such as health risks, vulnerabilities of migrants and the risks



© Ajdin Kamber/stock.adobe.com

of human trafficking. Analysing open-source information such as social media trends, events and narratives are detected and mapped to risk indicators.

The project designed a risk assessment methodology that focuses on narratives, experiences and attitudes. According to project coordinator Claudia Niederée: "The most promising methodological results of the project are the online threat indicators for cross-border threats and the enhanced vulnerability assessment for irregular migration carried out with the assistance of the Human Security Filter – a composite indicator which enables organisations to better measure the impact of security policies on vulnerable populations, such as migrants."

Leveraging technology for border control

The rapid growth of technology presents new opportunities for risk analysis and threat management. CRiTERIA builds on existing text, media, data and network analysis technology, as well as AI designed to support multimedia and network analysis. The project's technology improvements include novel methods such as opinion dynamics, event detection on visual content and media content verification.

CRiTERIA developed a toolkit to facilitate migration-related risk analysis. Among the tools in the toolkit is CREST. Niederée shares: "Close collaboration between methodology and technology resulted in the innovative risk analysis tool CREST, which uses modern AI-based content analysis technology to support open-source intelligence analysis for border security."

Tools to tackle border challenges

Several factors in addition to the rising tide of immigration complicate border security. The COVID-19 pandemic introduced a major public health concern that threatened border personnel and migrants alike. While social media provides useful data for managing border security, the restrictive regulations of platform providers often make it difficult to use.

Contemporary security challenges are complex and require transdisciplinary solutions. The 15 partners of the CRiTERIA team have done a lot to meet this need. Through constant engagement with stakeholders and border agencies, the project has developed a comprehensive toolkit that includes analytic results, training materials and guidelines for legal framing. As Niederée says: "Toolkit content can be used in a variety of ways including for policy decisions, for employee training, for guiding the development and roll-out of systems, and for improving risk analysis processes."

By building on existing methodologies and technologies, CRiTERIA has paved the way for making European border management both more secure and more sensible to migrants' vulnerabilities. As Aitana Radu, Work Package Leader in CRiTERIA, states: "A dynamic understanding of the humanitarian impact on vulnerable communities needs to be an integral part of tomorrow's risk analysis for border security."

A dynamic understanding of the humanitarian impact on vulnerable communities needs to be an integral part of tomorrow's risk analysis for border security.

PROJECT
CRiTERIA – Comprehensive data-driven Risk and Threat Assessment Methods for the Early and Reliable Identification, Validation and Analysis of migration-related risks

COORDINATED BY
Leibniz University Hanover in Germany

FUNDED UNDER
Horizon 2020 - SECURITY

CORDIS FACTSHEET
cordis.europa.eu/project/id/101021866

PROJECT WEBSITE
project-criteria.eu/

Maritime domain awareness: big data and seamless information sharing

A 'data lake' architecture and an interoperability framework enabling sharing up to the European level will have an unprecedented impact on civilian maritime security.



© Scanrail/stock.adobe.com

Most IT systems that collect and analyse maritime data cannot process heterogeneous data, leaving gaps in maritime situational awareness. Furthermore, the various IT systems of diverse stakeholders are not interoperable, which is a barrier to information sharing and collaboration. Smugglers acting at European level are often at an advantage.

The EU-funded EFFECTOR project, a consortium of 16 partners including government and national authorities, set out to address these critical challenges and unlock the full capabilities of maritime surveillance and data sharing systems for coast guards' tasks, for more effective operational response in both search-and-rescue and tackling criminal activities at sea.

Big data in a 'data lake' and interoperability

EFFECTOR's solution is based on a multi-layer data lake, a centralised repository able to store and process large amounts of data in its native format, structured or not. "Layers include new concepts and tools for knowledge extraction, semantic data representation, data fusion and analytics supported by AI, and federated querying that can scale to local, regional, national and transnational levels," explains Linda Bama-Tandia of EFFECTOR's coordination team at France's Secretariat General for the Sea.

In addition, it is integrated with CISE, Europe's maritime common information sharing environment, and JORA, the joint operation reporting application of the European Border and Coast Guard Agency Frontex. JORA provides automated behaviour monitoring services (also known as anomaly detection) to Frontex, which operates EUROSUR, the European Border Surveillance system. Alkis Astyakopoulos of the Greek Center for Security Studies and EFFECTOR's R&D project manager notes: "We developed a CISE JORA adaptor to integrate JORA with the EFFECTOR framework. The adaptor was offered to Frontex after the project for further exploitation."

Enhanced maritime domain awareness, locally and internationally

EFFECTOR's solutions enable stakeholders to access many more sources of data in near real time while ensuring connections with legacy systems. Maritime domain awareness for coast guards currently relies primarily on position information via a vessel's automatic identification system, radars and unmanned autonomous vehicles. To that, EFFECTOR added a plethora of sources including satellite communications services, satellite observation data and services (for example, Copernicus), and national vessel traffic monitoring and information systems. The team even leveraged a platform allowing sharing of geo-localised images by individuals.

This information can be shared at all levels through the interoperability with CISE and EUROSUR to support more effective coordination and collaboration in maritime operations such as countering migrant smuggling, search and rescue, and maritime accidents.

The EFFECTOR system allows faster detection of new events, better-informed decision making, and joint understanding and undertaking of a situation across borders. This enables seamless cooperation between operating authorities and on-site intervention forces ...

Demonstrating fast detection, activation and resolution

EFFECTOR's solutions were tested in various scenarios in Greece and France involving cooperation among stakeholders at various levels and across national borders. For example, the Hellenic police, coast guard and navy worked with national and European authorities in a chain of events leading to the apprehension of rogue actors involved in migrant smuggling within a matter of hours – and beginning with a fisherman uploading a picture of an unusual boat in the area.

Overall, "the EFFECTOR system allows faster detection of new events, better-informed decision-making, and joint understanding and undertaking of a situation across borders. This enables seamless cooperation between operating authorities and on-site intervention forces while ensuring that all existing privacy and data protection rules are fully respected," summarises Bama-Tandia. Taken together, this translates to rapid detection, action and resolution – and greater maritime security.

PROJECT
EFFECTOR - An End to end Interoperability Framework For MaritimE Situational Awareness at StrategiC and TacTical OpeRations

COORDINATED BY
General Secretariat for the Sea (SGMer) in France

FUNDED UNDER
Horizon 2020 - SECURITY

CORDIS FACTSHEET
cordis.europa.eu/project/id/883374

PROJECT WEBSITE
effector-project.eu/

Technology helps halt human trafficking

Care providers and engineers work together to fight child sexual abuse, exploitation and human trafficking with a focus on prevention, investigation and victim assistance.

The trafficking of human beings (THB) has accelerated worldwide. In Europe, most human trafficking victims are sexually exploited women and children. Information and communication technologies exacerbate the problem, creating new ways for crimes to happen. The tools available to agencies dedicated to combating these crimes have trouble keeping up with the rapid pace of technological growth and the speed with which criminals put new technology to use. The EU-funded HEROES project addresses this problem by bringing together an interdisciplinary international team committed to stopping THB through a technology-driven, victim-centred approach.

Prevention, investigation and victim assistance

Guiding the project's work is a three-pronged focus on distinct aspects of child sexual abuse (CSA) and child sexual exploitation (CSE). In terms of prevention, raising awareness is an essential strategy. According to project coordinator Luis Javier García Villalba: "Children and young people are not sufficiently aware of the risks they face when using social networks and communicating online with strangers. Moreover, adults with a duty to care for children struggle to find the right words to talk to them about online risks and tend not to understand the apps and platforms children use."

When it comes to investigating CSA and CSE, law enforcement is in need of new tools that address the growing quantity of criminal material present on the web. It is time-consuming and traumatising for officers to comb through images and other content related to CSA or CSE. Identifying such material is an excellent application for AI.

Stakeholders also need to do better when it comes to caring for victims, particularly ensuring that they are not re-victimised by the legal process. Villalba shares: "Victims are still struggling through the justice system, from making the first report all the way through to potential rehabilitation. HEROES aims to create solutions to better support victims of CSA/CSE and trafficking crimes, and to do so we have developed research, protocols and guidelines."

Victims are still struggling through the justice system, from making the first report all the way through to potential rehabilitation. HEROES aims to create solutions to better support victims of CSA/CSE and trafficking crimes, and to do so we have developed research, protocols and guidelines.

Leveraging technology to protect THB victims

HEROES has 24 partners across 17 countries, spanning Europe, South America and Asia. One challenge of this consortium was bridging communication differences between social workers and IT developers. The project held several workshops to bring these cohorts together, and in the end the varied perspectives and experiences of the participants led to richer dialogue and robust results.

Project partners developed multiple tools for law enforcement, including a tool for automatic identification and classification of CSA/CSE material in multimedia files. HEROES also produced a suite of open-source intelligence tools that can locate CSA/CSE material on the dark web and the surface web. Other achievements include a novel tool to help investigate peer-to-peer networks and a forensic tool to identify relevant data related to THB and CSA/CSE crimes from seized devices.



© doidam10/stock.adobe.com

HEROES used technology to target prevention too. Villalba says: "In HEROES, we have developed preventive tools such as an anti-grooming mobile app that detects grooming at early stages, a fake job offer classifier to help prevent trafficking through fraudulent online job offers, and a mobile application that allows citizens to report incidents regarding potential THB and CSA/CSE cases."

The project has developed non-technical resources as well, including frameworks, awareness raising guidelines and a manual for early identification of potential victims of THB and CSA/CSE.

HEROES has also developed international prevention campaigns to complement the technological tools it produced. In Bangladesh, the HEROES Red Heart Campaign promotes the rights of children who have been sexually exploited. In Colombia, the

Barranquilla Carnival 2024, a party for the prevention of trafficking and commercial sexual exploitation, and Renacer Foundation against sexual violence join the fight against the trafficking of children.

By combining the expertise of psychologists, sociologists, lawyers, social workers, health workers, computer developers, and experts in computer security and forensics, HEROES is making the world safer for children and others at risk of human trafficking.

PROJECT
HEROES - Novel Strategies to Fight Child Sexual Exploitation and Human Trafficking Crimes and Protect their Victims

COORDINATED BY
The Complutense University of Madrid in Spain

FUNDED UNDER
Horizon 2020 - SECURITY

CORDIS FACTSHEET
cordis.europa.eu/project/id/101021801

PROJECT WEBSITE
heroes-fct.eu/

Predictive tool to help NGOs better manage migrant needs

A tool that predicts migration flows for humanitarian purposes has been developed. This could help NGOs ensure that the needs of people seeking asylum are properly addressed.



© DC Studio/stock.adobe.com

For many irregular migrants arriving in the EU, critical points of contact are often organisations dedicated to ensuring their welfare. This work can involve ensuring adequate resources are available, or providing information on the number of asylum applications forecast for a specific EU country.

These NGOs however face a range of challenges, not least in anticipating when and where migrants will arrive.

Information is not always regularly updated, and it can be difficult to ascertain which sources are most reliable.

"One reason for this is that the information NGOs receive about migrant arrivals is so fragmented," explains ITFLOWS project coordinator Cristina Blasi Casagran from the Autonomous University of Barcelona in Spain.

"This can make it difficult to best allocate resources for future arrivals. Information is not always regularly updated, and it can be difficult to ascertain which sources are most reliable."

Mapping all sources of information

The aim of the ITFLOWS project was to provide intelligence support for these NGOs. By collecting relevant data concerning migrant flows, and presenting this information in a more accessible and user-friendly manner, the project team hoped to give NGOs a valuable tool to help them better anticipate and prepare for arrivals.

The project team began by mapping all available sources of information. This included data provided by the likes of Eurostat and the UNHCR, as well as less well-known sources such as GDELT.

"GDELT collects news headlines from all over the world," adds Blasi. "You can select keywords and filter topics, which could bring new events. For example a revolution in one country could lead to people fleeing."

Models to help NGOs forecast migrant arrivals

From this initial analysis, the project team developed the EUMigraTool, designed specifically for the needs of these NGOs. This online tool enables users to forecast migrant arrivals, using four predictive models that utilise the data gathered.

The first model is designed to help NGOs make rough short-term predictions. Users identify the main countries of origin of migrants, and then access data that enables them to see what is going on. "This can help them to make predictions one month ahead," says Blasi.

A second model zooms in closer to these countries of origin, helping users to identify where, say, new conflicts might have arisen. Blasi points out that most migrants fleeing a conflict zone stay in their home country, or head to a neighbouring country.

"Another model provides predictions of migrant flows three to five months ahead," remarks Blasi. "For this we mostly used Google Trends. By using keywords, we can see what potential migrants are searching for."

A fourth model gives users insights into the perceptions of migrant arrivals among recipient communities. Accessible data includes social media posts that can be classified as negative, positive or neutral.

Recommendations on key migration issues

The EUMigraTool was piloted in Greece, Italy and Spain, and by 20 NGOs, and was well received. The tool is still in the prototype phase, and further funding is required to expand its use.

"We were clear from the beginning that this tool is specifically for NGOs and not governments," notes Blasi. "We do not intend to charge a fee for this service, as many of these organisations rely on donations."The project team did however prepare a number of policy briefs for decision-makers. These provide recommendations on issues such as effective policies for the socio-economic integration of migrants to the EU, and some of the challenges in forming external partnerships to address migration.

PROJECT
ITFLOWS – IT tools and methods for managing migration FLOWS

COORDINATED BY
Universitat Autònoma in Autonomous University of Barcelona in Spain

FUNDED UNDER
Horizon 2020 - SECURITY

CORDIS FACTSHEET
cordis.europa.eu/project/id/882986

PROJECT WEBSITE
itflows.eu/

Vast dataset delivers insights on migration

Data collection across 26 research areas in countries of origin and transit guides policymakers and informs academic programmes focused on migration.

European countries have been searching for policies to better manage migration from outside the EU. Sometimes, sweeping assumptions about the root causes of migration hinder effective management by failing to accurately assess why and when people choose to migrate. The EU-funded MIGNEX project addresses this issue by collecting and analysing data from 10 countries of origin or transit and disseminating results to stakeholders.

Diverse data collection

The MIGNEX consortium includes academic and outreach institutions in Africa, Asia and Europe. Together, partners conducted research in 26 local communities in 10 case countries to gain insight into the root causes of migration. These countries are: Afghanistan, Cabo Verde, Ethiopia, Ghana, Guinea, Nigeria, Pakistan, Somalia, Tunisia and Türkiye.

According to project leader Jørgen Carling: "The overarching objective of MIGNEX was to contribute to more effective and coherent migration management through evidence-based understanding of the linkages between development and migration." Data collection took the form of 13.174 surveys, 104 focus group discussions, 516 key informant interviews and 168 policy expert interviews.

The time frame of the project – extended from five to six years due to the COVID-19 pandemic – enabled ambitious data collection and analysis plans. It also meant MIGNEX was able to carry out a pilot data collection and fine-tune their tools. The diversity of the consortium contributed to the high-quality results achieved as well. In addition to standard approaches for analysing data, the project employed innovative approaches such as multi-level analysis, mediation analysis and qualitative comparative analysis.

Disseminating results

The project produced over 80 publications during its lifetime, and these materials are publicly available on Zenodo. The data gathered by MIGNEX will guide policymakers and academic researchers for years to come.

The types of publication varied and were suited to specific audiences for specific purposes. The project published 10 policy briefs – short publications on specific findings relevant to policy makers. The 14 handbook chapters produced, while initially intended for internal use, proved very successful with academic and research audiences. MIGNEX published 29 scientific papers that provide foundations for conclusions that guide policy. Case study briefs document migration dynamics in each of the 26 research areas.

One of the main things we learned is that migration can mean different things in different contexts, and that the drivers and impacts of migration are more divergent than similar across research areas.

The project's approachable and targeted publications were successful in reaching policy audiences. Jessica Hagen-Zanker, who leads the Communication and Impact work for the project, shares: "One end-user at the European External Action Service showed us his marked-up copies of the reports as evidence of how much they have been using it, and also requested further copies to share with a visiting delegation from the African Union."

The MIGNEX policy conference was another successful avenue for disseminating the project's results. Held in Brussels in April 2024, the conference convened 120 experts from around the world with the aim of promoting open policy dialogue. Wider MIGNEX policy impacts are outlined in this publication.



© Marie Godin

Addressing the challenges of migration is difficult. As Carling says: "One of the main things we learned is that migration can mean different things in different contexts, and that the drivers and impacts of migration are more divergent than similar across research areas." Whether migration is seen in a positive or a negative light depends, among other things, on the decisions of policymakers in the EU and beyond. Through evidence-based research, MIGNEX makes sure governments have the best information available to guide policy decisions.

Learn more about MIGNEX from their YouTube channel.

PROJECT
MIGNEX – Aligning Migration Management and the Migration-Development Nexus

COORDINATED BY
Peace Research Institute Oslo in Norway

FUNDED UNDER
Horizon 2020 – SOCIETY

CORDIS FACTSHEET
cordis.europa.eu/project/id/770453

PROJECT WEBSITE
mignex.org/

Smugglers beware: Big Data informs automated services for detection and tracking

A common data infrastructure and AI enable authorities to collaboratively exploit exceptional heterogeneous data sources and significantly improve real-time maritime domain awareness.

Maritime surveillance helps detect events including migrant smuggling, piracy, illegal fishing and oil spills, and assists in search-and-rescue operations. It is essential to safety, security and commerce, with global impact.

Surveillance entails the Herculean task of monitoring high-traffic regions as far as 370 km from the coastline. The EU-funded PROMENADE project set out to make that easier and more effective with automated solutions for vessel tracking, behaviour analysis and anomaly detection, leveraging AI and big data technologies.



The challenge was twofold: first, the large-scale exploitation of heterogeneous data sources with AI-based services and, secondly, the seamless integration and exchange of information among maritime authorities.

'Bigger' and better data

According to project manager Alkis Astyakopoulos from the Center for Security Studies of the Hellenic Ministry of Citizen Protection "The challenge was twofold: first, the large-scale exploitation of heterogeneous data sources with AI-based services and secondly, the seamless integration and exchange of information among maritime authorities."

PROMENADE vastly extended the types of data available to its models and services. In addition to conventional positional information provided by large ships via their automatic identification system (AIS) or obtained from land-, air- and sea-based radars, the project pioneered the use of beacon devices (tracking devices on some high-risk vessels) for vessel behaviour analysis. It also integrated imagery from satellites, unmanned aerial vehicles and fixed Earth observation/infrared (EO/IR) cameras.

Port traffic data was obtained from the 'Maritime Single Window' digital platform for international maritime traffic. Profiles of vessels or shipping companies including information about association with criminal activities (detentions/sanctions, spills, tax evasion, money laundering and terrorist financing) were integrated from open-source intelligence and large databases.

Seamless data integration and exchange

PROMENADE's AI/big data-based automated services are grouped into five categories: classification, pattern detection, risk assessment, future state prediction and data infrastructure. "Leveraging machine learning and deep neural networks trained with immense historical data, PROMENADE's AI models can extract patterns and trends formerly difficult or impossible to identify," explains Astyakopoulos.



© PROMENADE Consortium

PROMENADE's 'data lake' infrastructure seamlessly integrates, stores and distributes the heterogeneous data. Furthermore, its services are fully compliant with the Common Information Sharing Environment (CISE) data model, a voluntary collaborative initiative in the EU. PROMENADE relies wholly on CISE internally and uses it at the interface with end-users' legacy infrastructures. "PROMENADE promotes CISE as an industry standard to unleash information sharing and cooperation among cross-border maritime authorities," Astyakopoulos notes.

Successful irregularity detection in real-world scenarios

The maritime area between Spain and Morocco has long been used by smugglers to bring migrants to Europe and has also become a major narcotics smuggling route. One of the busiest maritime areas in the world, it is particularly challenging to monitor. PROMENADE's 'Activity Classification Service' successfully detected a very fast 'patera taxi' – a small boat used for irregular migration, often managed by criminal organisations.

The sea around the island of Corfu in Greece is widely used for drug trafficking and more recently for irregular migration and armed smuggling. PROMENADE's 'Vessel Detection in Image Data' service automatically detected, classified and tracked a small vessel typical of smuggling and irregular migration from coastal EO/IR camera images. Furthermore, a Hellenic Coast Guard van was transformed into an energy-autonomous mobile command-and-control system that uses PROMENADE's state-of-the-art services.

The maritime area near Klaipeda in Lithuania is a site of goods smuggling (mostly tobacco) on cargo/fishing vessels. The smugglers typically switch off their AIS when navigating close to Lithuania's territorial waters. PROMENADE's 'Anomaly Detection' service timely detected an AIS switch-off event and its 'Vessel Detection' service accurately detected, geo-localised and classified the suspicious vessel from tower cameras and unmanned aerial vehicles.

PROMENADE's AI/big data-based services and interoperability will make a step change in the ability of law enforcement and border control authorities to detect and act on anomalies, substantially increasing safety and security in the maritime domain.

PROJECT
PROMENADE - imPROved Maritime awarENess by means of AI and BD mEthods

COORDINATED BY
Ministry of Maritime Affairs and Insular Policy in Greece

FUNDED UNDER
Horizon 2020 - SOCIETY

CORDIS FACTSHEET
cordis.europa.eu/project/id/101021673

PROJECT WEBSITE
promenade-project.eu/

CORDIS Results Pack

Available online in six language versions: cordis.europa.eu/article/id/453638

Published
on behalf of the European Commission by CORDIS at the
Publications Office of the European Union
L-2985 Luxembourg
LUXEMBOURG

cordis@publications.europa.eu

Disclaimer

Online project information and links published in the current issue of the CORDIS Results Pack are correct when the publication goes to press. The Publications Office cannot be held responsible for information which is out of date or websites that are no longer live. Neither the Publications Office nor any person acting on its behalf is responsible for the use that may be made of the information contained in this publication or for any errors that may remain in the texts, despite the care taken in preparing them.

The technologies presented in this publication may be covered by intellectual property rights.

This Results Pack is a collaboration between CORDIS and the European Research Executive Agency (REA).

Print	ISBN 978-92-78-44254-5	ISSN 2599-8285	doi:10.2830/13475	ZZ-AK-24-019-EN-C
HTML	ISBN 978-92-78-44253-8	ISSN 2599-8293	doi:10.2830/544132	ZZ-AK-24-019-EN-Q
PDF	ISBN 978-92-78-44257-6	ISSN 2599-8293	doi:10.2830/83705	ZZ-AK-24-019-EN-N

Luxembourg: Publications Office of the European Union, 2024
© European Union, 2024

The reuse policy of European Commission documents is implemented by Commission Decision 2011/833/EU of 12 December 2011 on the reuse of Commission documents (OJ L 330, 14.12.2011, p. 39, ELI: http://data.europa.eu/eli/dec/2011/833/oj).
Unless otherwise noted, the reuse of this document is authorised under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence (https://creativecommons.org/licenses/by/4.0/).
This means that reuse is allowed provided appropriate credit is given and any changes are indicated.
Cover photo: © European Union, 2024
For any use or reproduction of elements that are not owned by the European Union, permission may need to be sought directly from the respective rightholders.

Safety at Sea

In this episode we are looking at how AI, augmented reality, smart life jackets and heat-detecting drones are making life at sea safer for passengers and for crew.

Tune in and enjoy: **cordis.europa.eu/article/id/444430**



The CORDIScovery podcast brings together remarkable people carrying out groundbreaking EU-supported research. Listen in to find out how they're tackling the world's most pressing societal, ecological and economic challenges.
Find out more: cordis.europa.eu/videos-podcasts

Publications Office
of the European Union

Follow us on social media too!
facebook.com/EUresearchResults
x.com/CORDIS_EU
youtube.com/CORDISdotEU
instagram.com/eu_science

EN