



PROJECT OVERVIEW

INGENIOUS Final Event
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Presenter: Giuseppe Vella (giuseppe.vella@eng.it) – ENG

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Ingegneria Informatica S.p.A



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End date: 01/09/2025

Call and topic: HORIZON-CL3-2021-BM-01-03

*The **FLEXI-cross project** targets the deployment and continuous validation of a **toolkit of innovative border-checking solutions, in real operational environments.***

Freight and passenger transport is an ever increasing and significant part of the European Economy
Enhanced mobility will intensify border-crossings of citizens and goods, which in turn will generate a significantly increased load on customs and security procedures, calling for smarter, more effective and cost-efficient solutions for border checks.

Human trafficking, irregular crossings and contraband smuggling is a major concern for EU which will only intensify with the realisation of the TEN-T vision

Measures like **Entry/Exit System (EES)**, modifications to the **Schengen Borders Code, Smart Borders package**

Technologies like **Automated Border Control** systems and biometrics or automatic borders lands surveillances with tools like **Passenger Name Records directive (2016)**, the **ETIAS system**

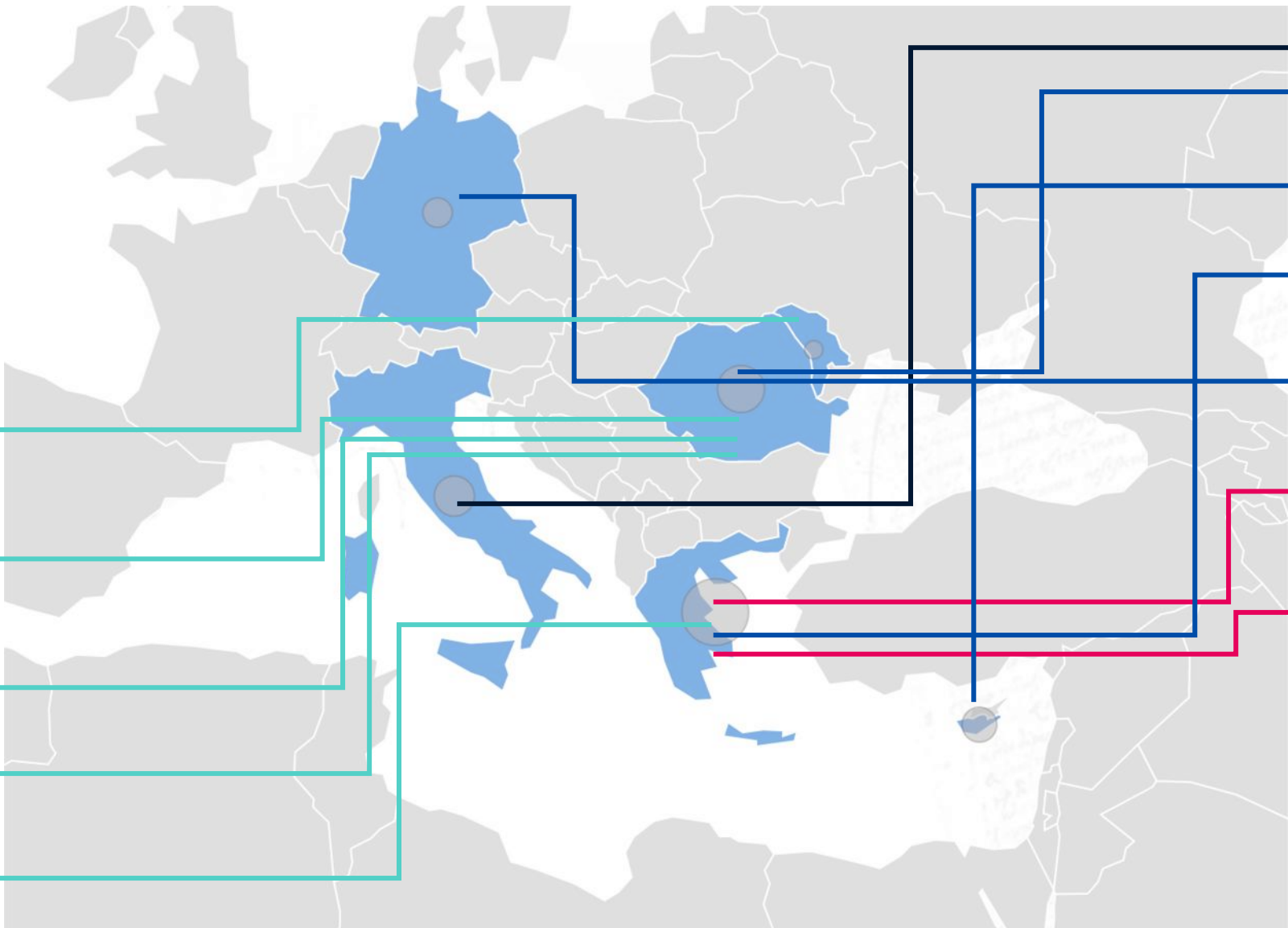
Passenger and freight border-crossings calls for even **more flexible, dynamic and effective procedures** when it comes to border-checks, which can be enabled by innovative technologies, such as 5G and Internet of Things (IoT), Artificial Intelligence (AI) and Machine Learning (ML), Big Data and Predictive Analytics, Cloud and Edge Computing

Deliver intelligent remote and mobile checks for people and goods, improving border-crossing experience for travellers and authorities

Advanced biometric checks with cross-referencing of data and document verification may speed up the check and provide increased security and anti-trafficking protection.

dynamic/ad-hoc deployment of check points and remote based inspection and verification of contents, contributing to anti-smuggling protection and contraband detection

- 12 partners
- 1 Large company
- 2 Research organizations
- 4 Innovative SME
- 5 End Users



To design and develop mobile, cost-effective and efficient solutions

that will significantly **upgrade the operational capacity** of EU BCPs and will introduce **flexible planning and check-point deployment** procedures leading to a **seamless** border crossing **experience** for **travellers** (reduction of waiting times), **operators** (deployment of mobile-check points, increased traffic handling capacity) and **staff of border authorities** ("Bird's eye view" of all available data, reduction of biometric check time), tailored to the **real-life requirements** of the EU border authorities. (WP1, WP2, WP5)

To increase security, reliability and privacy during cross-border checks

for both passengers and cargo, by providing **advanced anti-trafficking and anti-smuggling mechanisms** while **securing and protecting people's fundamental rights and personal data**, through a comprehensive data governance framework. (WP2, WP5)

To set-up three state-of-the-art border-crossing facilities based on real operational EU border environments

making use of and **expanding/upgrading existing infrastructure and legacy systems** from consortium partners and previous EU funded projects, capable to support the thorough **testing/trialling of the envisioned use cases** in the road, port and rail environments. Access to the facilities and some experimentation tools will also be facilitated via cloud-based FLEXI-cross functionalities. (WP2, WP3)

To validate the FLEXI-cross solutions in real-life EU border-crossing environments using real end-user data

that will showcase the **maturity and business-readiness of the solutions** (TRL≥7), demonstrating the superior performance in terms of **traffic handling capacity, waiting times, security and privacy** of the integrated, FLEXI-cross solutions, compared to the current border checking operations. (WP1, WP3, WP4)

To accelerate the adoption of the proposed dynamic, flexible and mobile technological solutions

by the EU border authorities, and to **maximize the resulting impact on daily border management and operations**, in close liaison with existing projects and initiatives. (WP3, WP4)

Objectives

Implement a seamless border crossing experience for travelers (reduction of waiting time) operators (increase traffic handling capacity) and border authority staff (birds eye view, reduction of biometric check time)

Increase security, reliability and privacy during cross border checks for both passengers and cargo

Improve organization, flexibility and planning of border checking points

Results

Improve efficiency

Improve BCP staff Awareness

Improve BCP and travelers' satisfaction

Improve security/privacy

Improve reliability of data

Improve detectability

Improve deployment time

Improve economic cost

Improve environmental conditions

Technical KPIs

Increased traffic handling capacity by $\geq 20\%$

Decrease Waiting+processing time by $>25\%$

Detection of abnormal behavior reduction by $>25\%$

Targeted vehicle search increase by 25%

Access to data from at least 5 different sensors/devices

BCP personnel/traveller's satisfaction increase by 50%

Reduction of data privacy incidents by 20%

Biometric based false negative rate below 0.1%

Availability of real-time cross-referencing of biometric checks/Availability of an early warnings system

Capability to detect abnormal behavior of travelers and vehicles

Increased detection rate of trafficking and/or smuggling attempts by 20%

Extension of an existing BCP in <1 hour

Deployment of an ad-hoc BCP in <1 hour

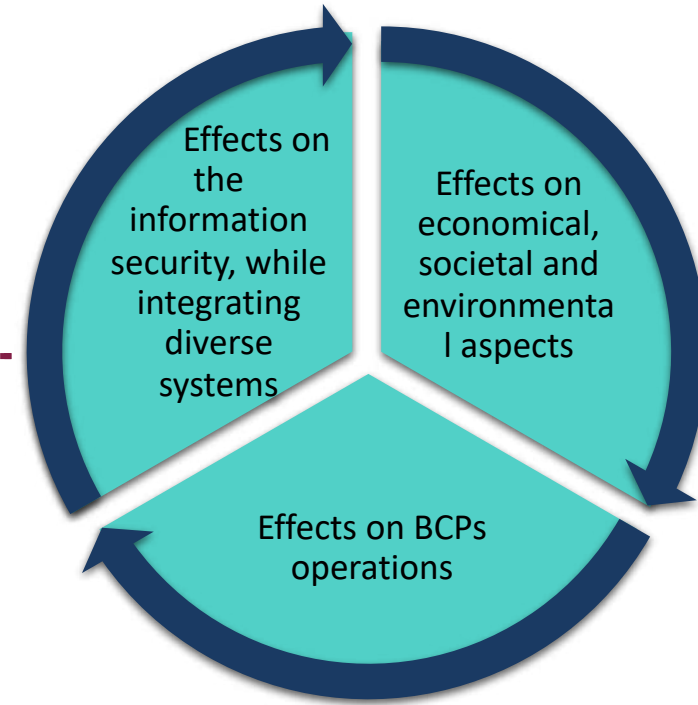
Reduce BCP operational cost by 30%

Reduce port berthing cost by 15%

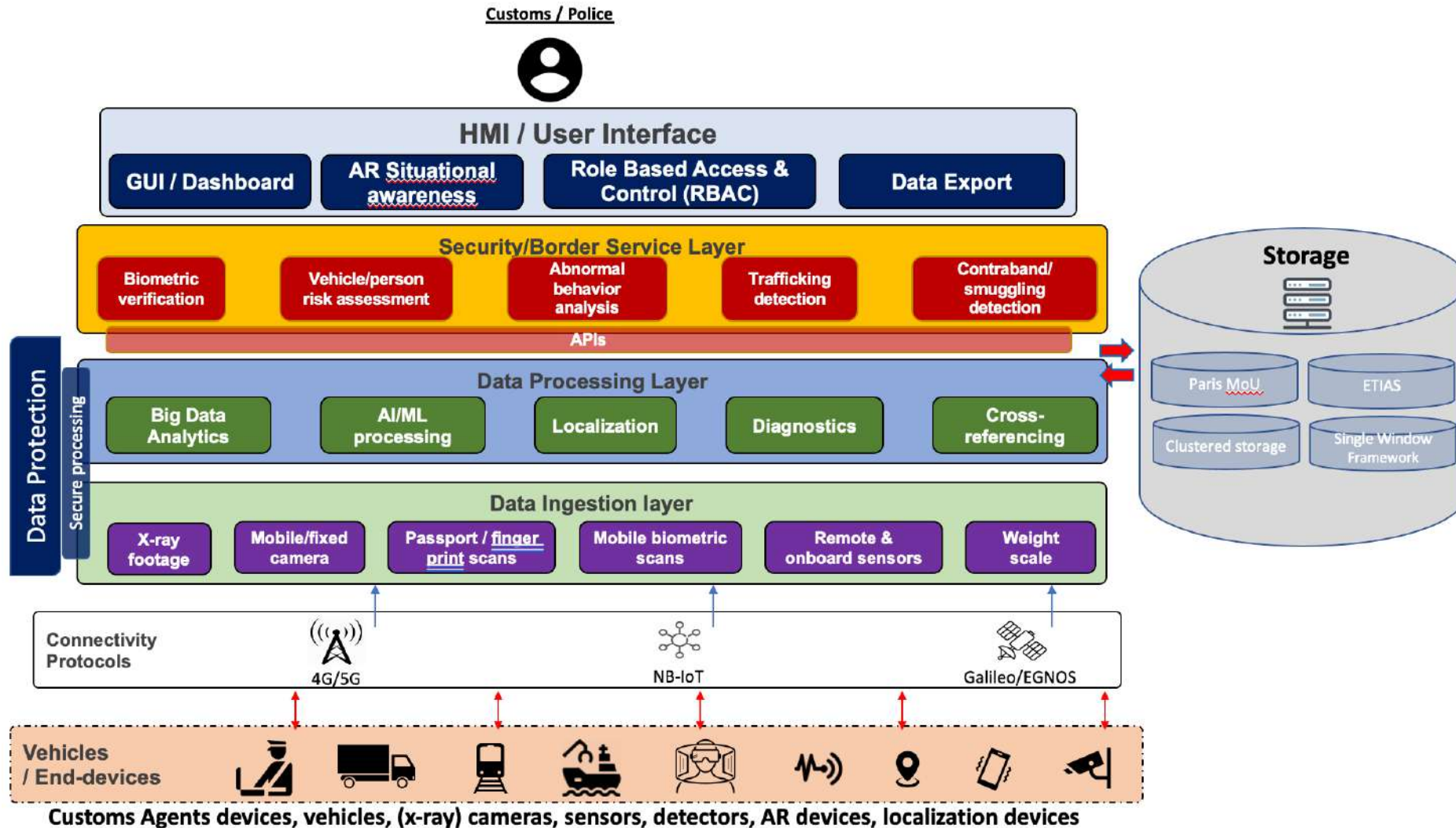
Reduce CHG emission by 15%

Reduce energy consumption by 20%

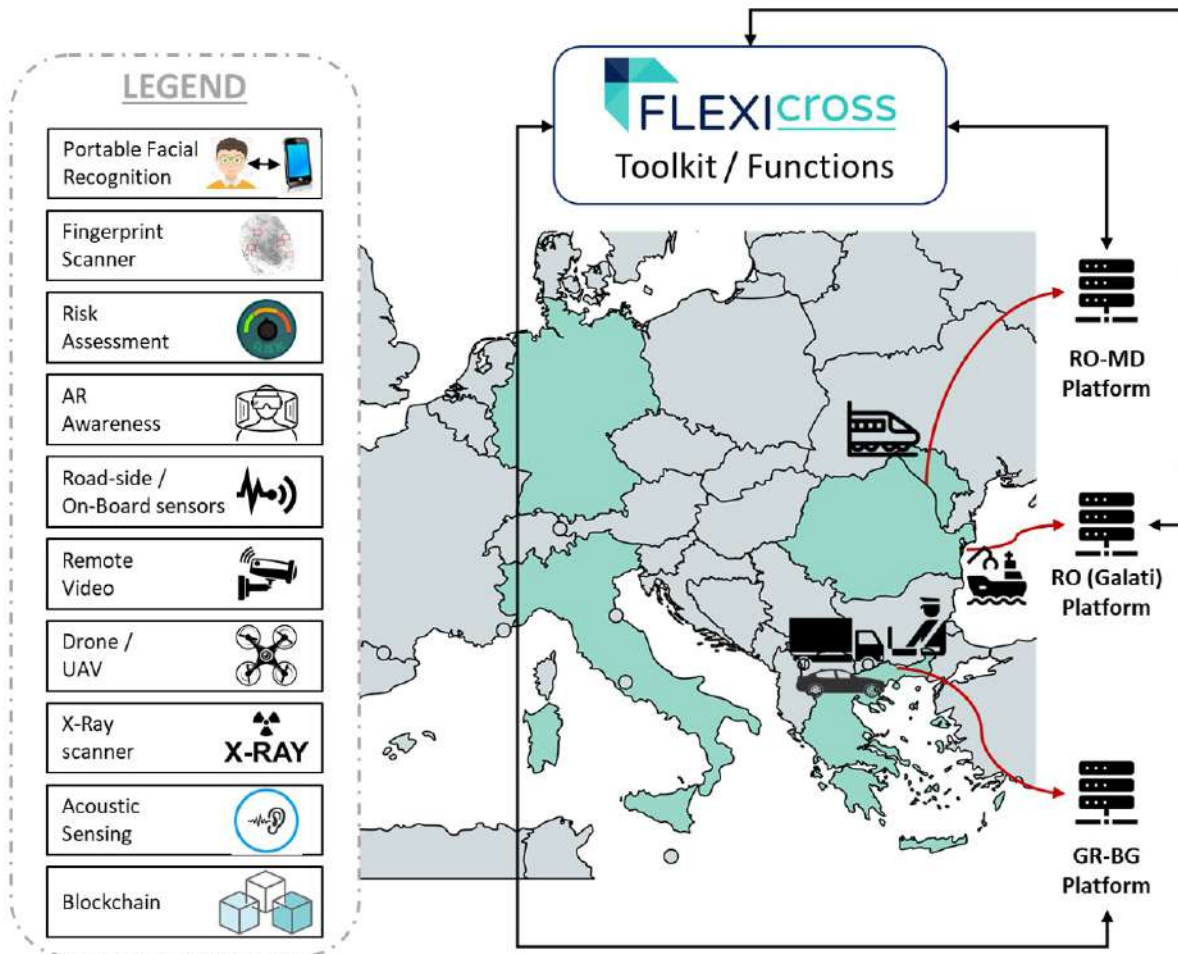
Impact maximisation



Concept and architecture



Validation use cases



Three different use cases will address road, port and rail-based border-crossing conditions in three different sites:

- the Danube based port of Galati in Romania,
- the Greek-Bulgarian borders at Ormenio
- the Romanian-Moldovan rail crossing.

- EA1: Cutting edge border-crossing functionalities delivered by real-life validated tools
 - Mobile biometric tools for people identification
 - Flexible border-checking processes allowing for quick, ad-hoc check-points setup
 - End-to-end situational awareness enhanced with AR
 - Predictive Risk assessment
- EA2: Framework for privacy and secure data processing protection and management
- EA3: Three state-of-the-art border-checking platforms

- Tuning of the architecture and the micro-architectures of the different software modules
 - Collection of user requirements
 - Collection of use cases
 - Dissemination activities of the project and synergies with other similar projects
 - Collection of key exploitable results, IPR and Expected outcomes impact
 - Ethics requirements compliance of the deliverables
 - Project coordination and management activities
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- The first 6 months of the project will be crucial to identify and complete all tasks above



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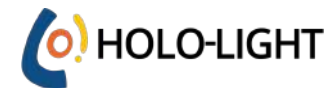
THANK YOU!



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