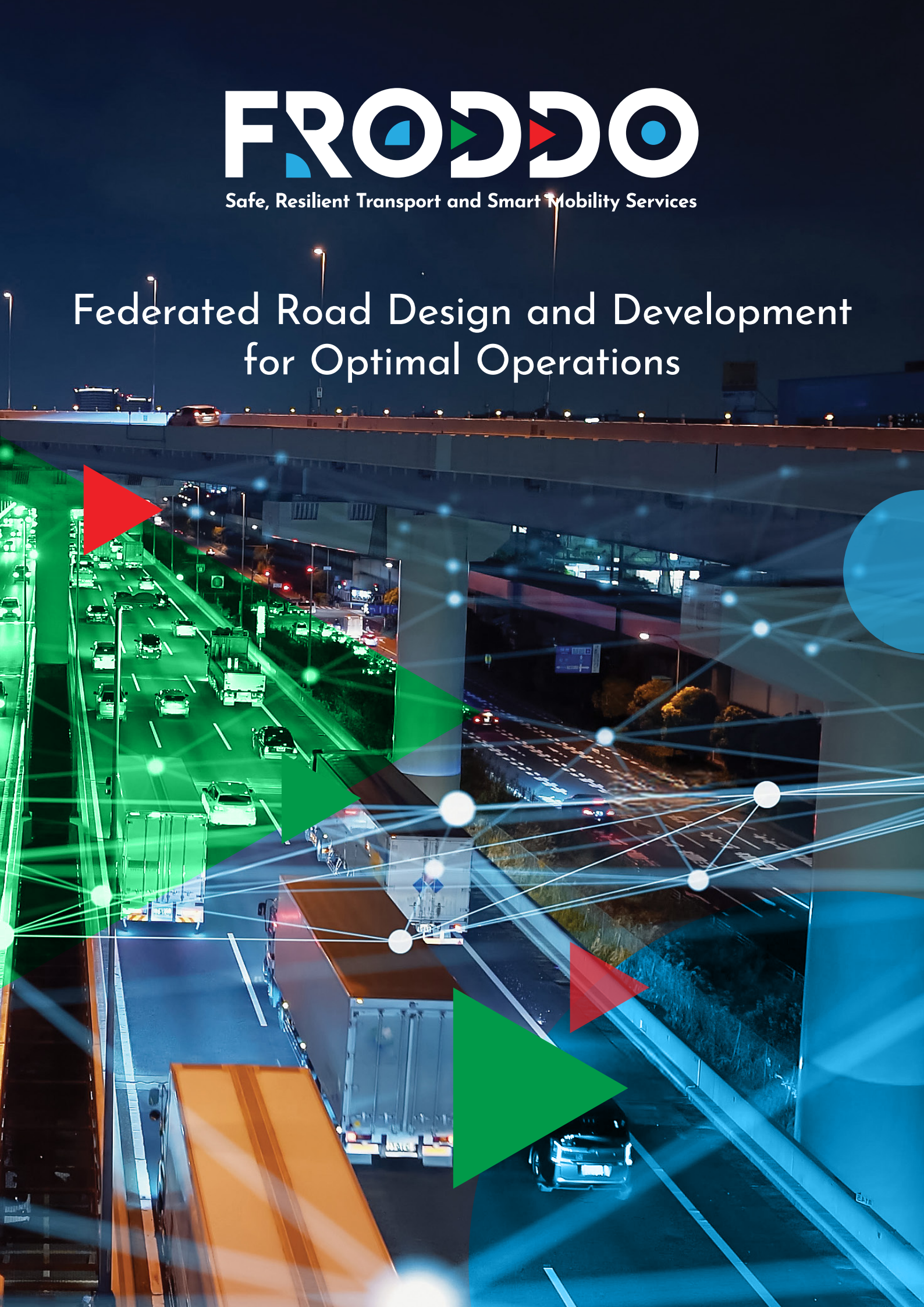
FRODDO

Safe, Resilient Transport and Smart Mobility Services

Federated Road Design and Development for Optimal Operations



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What is FRODDO?

The **FRODDO** project is at the forefront of addressing one of the most significant challenges in modern mobility – ensuring that Cooperative, Connected, and Automated Mobility (CCAM) systems can operate safely and efficiently in dynamically changing road environments. By focusing on the development of **Operational Design Domains (ODDs)**, **FRODDO** aims to design and implement a robust infrastructure that seamlessly integrates both **physical** and **digital** elements, ensuring safe and secure communication and interaction between vehicles and infrastructure.

FRODDO aims to provide methods and tools to enable CCAM systems to adapt to physical, technological, and social challenges, ensuring that autonomous systems operate safely in real-world conditions.

FRODDO's Core Objectives:

- **Develop Adaptable and Scalable ODDs** that can adjust to varying road conditions, vehicle capabilities, and user needs. These ODDs will ensure that autonomous systems operate safely and efficiently even in complex environments.
- **Enhance Communication and Data Exchange** through developing frameworks for safe and secure communication between vehicles, road infrastructure, and road users. This will help improve decision making processes and enhance safety in high-risk areas.
- **Improve User Interfaces for Vehicle Safety** with clear and timely alerts to drivers of automated vehicles, ensuring that they remain aware of traffic conditions and potential hazards, improving their overall driving experience and safety.
- **Strengthen Positioning and Navigation Systems** used by autonomous vehicles by leveraging technologies like **GNSS**, **5G**, and **AI**. This will enable accurate and reliable navigation, even in environments where traditional GPS signals are weak or unavailable, such as tunnels or urban canyons.
- **Test and Validate in Real-world Pilots** across Europe to ensure the practical application of its innovations. FRODDO will test its solutions in different environments and refine them based on real-world data and feedback.

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Project Excellence

The project's core objectives are designed to ensure the success and real-world applicability of its innovative solutions.

Key innovations of FRODDO include:

- Developing broader **ODDs** that consider traffic, weather conditions, road hazards, and human interaction, to ensure safe and efficient CCAM operations.
- Enhancing **data exchange** and communication that allow for cooperation between vehicles and infrastructure.
- Building **fail-safe designs** that, through a combination of advanced AI, Machine Learning (ML), simulations, and digital twins (DT), reduce accidents and create a resilient adaptable, and secure CCAM ecosystem.
- Creating real-world pilot sites to test and refine these systems.

Vision

FRODDO envisions a future where **autonomous vehicles** and **connected infrastructure** work seamlessly together, allowing for safe, secure, and efficient road transport. This future will leverage the **latest advancements in AI, machine learning,** and **digital twins** to create a resilient transportation system. The system will be designed to cope with real-world challenges, such as changing road conditions, adverse weather, and complex traffic situations, all while ensuring the safety and trust of its users.

FRODDO's vision is to:

- Create **ODDs** that allow autonomous systems to adapt to both normal and extreme driving conditions.
- Integrate **physical and digital road infrastructures** for enhanced vehicle and road interaction.
- Boost **proactive safety** by enabling data-driven decisions between vehicles and infrastructure.

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Pilot Projects and Use Cases

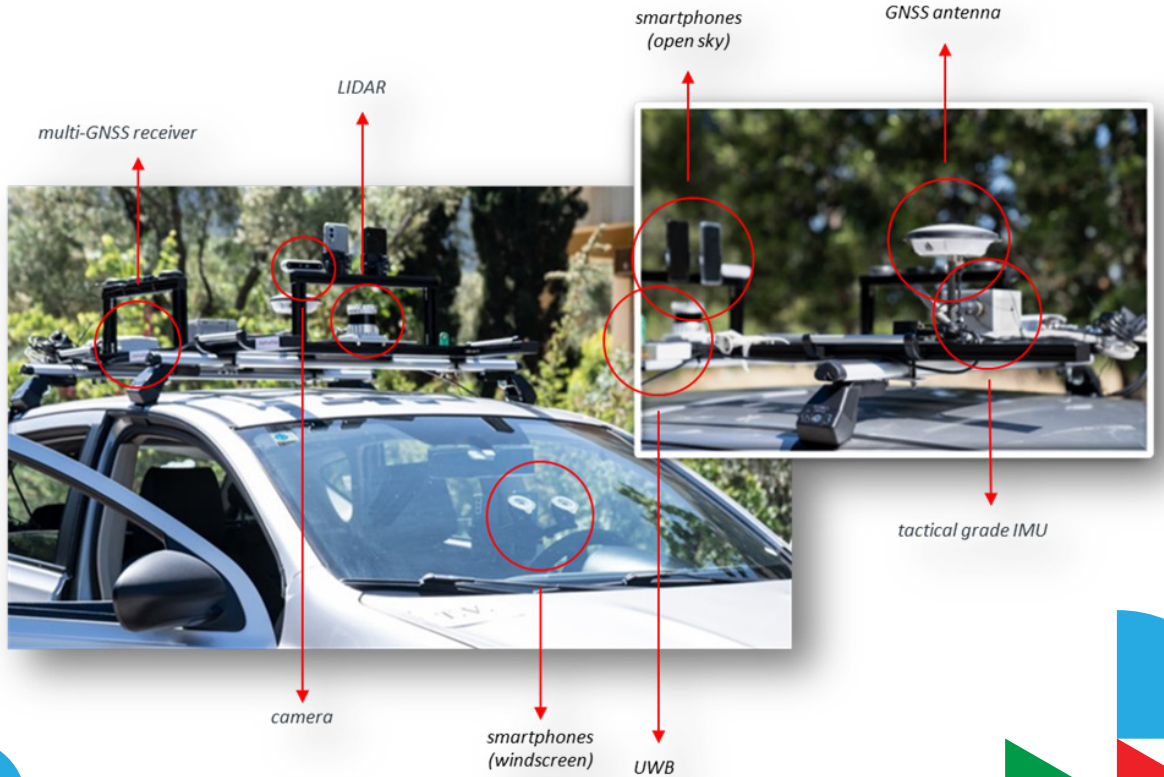
FRODDO is conducting **four pilots** across Europe to demonstrate and test the effectiveness of its solutions in real-world conditions. Each pilot is designed to address specific challenges related to CCAM and ODD systems.

Pilot 1 (Slovenia) – Autonomous Vehicle User Interface Testing

This pilot focuses on evaluating a multi-modal user interface for autonomous vehicles, using simulated environments to test how well the interface can convey alerts about the operational design domain (ODD) in order to provide user wellbeing and comfort.

Pilot 2 (Greece) – Improving Traffic Conditions via PNT Solutions

In Greece, FRODDO will develop and test a **Position-Velocity-Time (PVT)** solution to enhance vehicle navigation and traffic management in dense urban areas, such as deep-urban canyons where satellite signals are weak.



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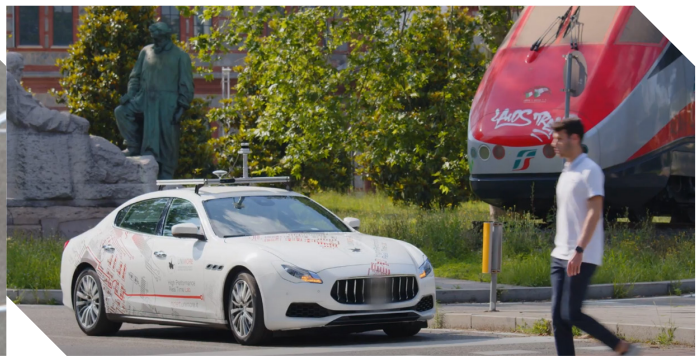
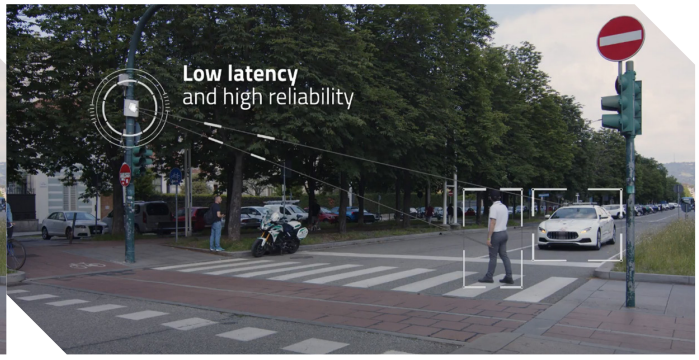
Pilot 3 (Italy) – Cross-sectional Safety Awareness

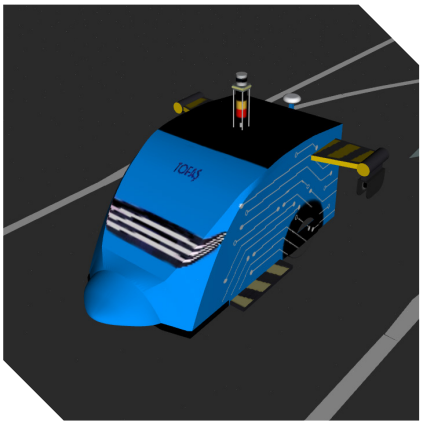
This pilot will focus on improving cross-sectional awareness and safety by integrating advanced sensing and communication technologies at key intersections and high-risk zones, aiming to reduce pedestrian and vehicle accidents.





Pilot 4 (Turkey) – Fleet Management for Autonomous Tow Trucks

The final pilot addresses fleet management challenges for **autonomous tow trucks** in an industrial environment. The goal is to ensure safe and efficient operation through improved **PVT solutions** and **communication strategies**.



FRODDO's Impact

By the end of the project, FRODDO aims to:

- **Boost road safety** through advanced communication and positioning systems.
- **Reduce traffic congestion** and accidents with enhanced vehicle-infrastructure cooperation.
- **Set the standard** for the future of autonomous driving, providing scalable, adaptable, and resilient solutions for CCAM.
- **Influence European policies** and standards related to **road safety, autonomous systems**, and **digital twins**.

Project Partners

FRODDO is a consortium of 19 key partners, including leading academic institutions, research organizations, and industry leaders from across Europe. The consortium includes:

These partners collaborate to ensure the success of FRODDO's ambitious objectives, leveraging their expertise in **artificial intelligence, digital twins, road infrastructure**, and **autonomous driving technologies.**

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