



INFRASTRUCTURE

#ENVIRONMENTAL IMPACT ASSESSMENT #PLANNING
#MONITORING #CLIMATE CHANGE RESILIENCE

*“Earth observation is crucial
in ensuring safer, climate resilient
and sustainable infrastructure”*

WHERE ARE WE NOW?

The current state-of-play in the sector. Maturity of EO and its contribution to addressing the challenges of the sector.



POLICY

- Physical networks of roads, railways and pipelines are an **important backbone of industry** and society that **require surveying and monitoring**.
- Transportation infrastructure investment in the EU is around €100bn per year while maintenance is around €25bn.

Main relevant policies and initiatives:

- Trans-European Transport Network (TEN-T)
- EU Road Safety Policy Framework 2021-2030 - Next steps towards "Vision Zero"
- The Connecting Europe Facility (CEF)
- European Green Deal



EO MARKET MATURITY

- Revenues from the sales of EO data and services to the infrastructure sector were around €192m worldwide in 2020.
- The level of **uptake** of EO-based solutions (e.g. monitoring movements of roads, bridges, pipelines and vegetation impeding railways) is **growing**, but is still at an **early stage**.



R&D

- Upstream R&D focuses on **small satellite technology** to provide semi real-time monitoring, useful for faster response to extreme weather events.
- R&D on **EO applications** focuses on **real-time ground motion** disaster mitigation system, road **infrastructure resilience**, monitoring and modelling the Earth's surface deformations and **seismic risk**, identification of water **pipeline leaks**, etc.

WHERE DO WE WANT TO BE?

Guiding aims and priorities for the future as defined through the FIRE consultation process with sectoral users and EO professionals.

ADOPTION OF EO IN ESTABLISHED APPLICATIONS

- Adoption of **large-scale ground movement mapping** including large archives of data for retrospective analysis.
- Large scale use of EO to monitor **vegetation encroaching** on roads and railways.

EO TO HELP ADHERE TO STANDARDS AND REGULATIONS

- EO helps address important challenges linked to regulations, especially regarding **sustainability**, the **EU transportation network** and the **safety** of transportation networks.
- EO should be part of standards and regulations.

DEVELOP NEW APPLICATIONS/ MARKETS FOR EO SOLUTIONS IN INFRASTRUCTURE

- New applications can be further developed and marketed, e.g. detecting water leaks, thus **preventing disasters** with dams and bridges by detecting ground subsidence at early stage, etc.

INCREASE EO CAPABILITIES OF INFRASTRUCTURE ENGINEERS AND OPERATORS

- Specific **capacity building programmes** should boost EO expertise to help implement EO solutions more easily into day-to-day operations.

MAKE COPERNICUS DATA ACCESS AND UNDERSTANDING TRIVIAL

- All **data** access and analytics should be migrated to **cloud-based platforms** and state-of-the-art AI should enable the production of actionable insights.

ACCELERATE THE AVAILABILITY AND UNDERSTANDING OF NEW TECHNOLOGIES AND DATA SOURCES

- Various emerging technologies such as **multi-static SAR** and "**smallsats**" should be made available and understood.
- Various AI/data driven applications** should also be considered in this process, e.g. advances in digital elevation models, real-time monitoring, etc.

HOW TO GET THERE?

Selected actions to be taken by the community of practitioners (both EO and non-EO) to achieve the envisaged future.

ROADMAP ACTIONS





- 01 **WIDESPREAD UPTAKE OF GROUND MOVEMENT MAPPING**
- 02 PRE-COMMERCIAL PROCUREMENT FOR ROAD AND RAILWAY OPERATORS
- 03 EO TO DEVELOP CLIMATE CHANGE RESILIENT INFRASTRUCTURES
- 04 SUPPORT MINERS WITH IMPLEMENTATION INCORPORATE EO IN REGULATION DRIVING LARGE-SCALE INFRASTRUCTURE PROJECTS

01 WIDESPREAD UPTAKE OF GROUND MOVEMENT MAPPING

InSAR-based solutions supporting different stages of the infrastructure development should be widely adopted.
 Next to technical developments on the supply side, there is a significant need for market development support, engagement of actors and replication of best practices.

WHY	— Increase awareness on InSAR technologies and latest R&D developments.
	— Increase adoption of InSAR technologies, by infrastructure managers and construction companies.

HOW	Improve data storage capacity .	Handbook on InSAR technology.	Push EO applications in EU and/or national regulation .
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WHO	 EU institutions	 EO service providers	 Researchers, academia	 Regional/national authorities
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MID-TERM
2-5 years

IMPACT

End users	HIGH
EO service providers	HIGH
Multipliers	MEDIUM
Governance actors	MEDIUM

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02 PRE-COMMERCIAL PROCUREMENT FOR ROAD AND RAILWAY OPERATORS

EO is being used for **vulnerability analyses** and **exposure assessments** of critical infrastructure in the road and rail domains. The objective of this action is to expand the use of these services throughout the EU.

WHY


- More road and rail companies and organisations **engagement** in the process.
- Increased operational **adoption** of EO solutions in road and railway infrastructure monitoring.

SHORT-TERM	
1-2 years	
IMPACT	
End users	HIGH
EO service providers	HIGH
Multipliers	MEDIUM
Governance actors	MEDIUM


HOW

Assess the extent to which current and evolving **user needs** can be met by EO-based solutions and what types of improvements (in terms of R&D) are needed.


Organise a dedicated **Horizon Europe call** focussing on pre-commercial procurement.



EU institutions



Sector Professionals



EO service providers

HOW TO GET THERE?





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03

EO TO DEVELOP CLIMATE CHANGE RESILIENT INFRASTRUCTURES

Due to **climate change**, infrastructures are increasingly exposed to unfavourable conditions, such as **extreme weather**. Further R&D is required to define solutions to develop climate change resilient infrastructures.

WHY	<ul style="list-style-type: none"> — Increased awareness on EO benefits for Infrastructure sector actors. — Increased adoption of EO solutions by Infrastructure sector.
HOW	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%; text-align: center;"> <p>Launch a dedicated Research and Innovation Actions (RIA) call or equivalent.</p> </div> <div style="width: 45%; text-align: center;"> <p>Engage both collaboration between academia and industry in developing appropriate downstream solutions.</p> </div> </div>
WHO	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  EU institutions </div> <div style="text-align: center;">  EO service providers </div> <div style="text-align: center;">  Sector Professionals </div> <div style="text-align: center;">  Researchers, academia </div> </div>

SHORT-TERM
1-2 years

IMPACT

End users	MEDIUM
EO service providers	MEDIUM
Multipliers	LOW
Governance actors	HIGH

HOW TO GET THERE?

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04 INCORPORATE EO IN REGULATION DRIVING LARGE-SCALE INFRASTRUCTURE PROJECTS


There is **no provision on the utilisation of EO in current regulation** for the Trans-European Transport Network. This constitutes a missed opportunity for market development and the associated benefits which come from EO solutions.

- WHY**
- **Appropriate framework conditions** that accelerate uptake of EO.
 - Increased **adoption** of EO solutions by the infrastructure sector.
 - Increased **awareness** on EO benefits for the infrastructure sector actors.

HOW

Develop a **comprehensive roadmap** for the incorporation of EO in relevant regulation.

This entails a thorough **analysis of the current state of play** both in terms of regulatory provisions and in terms of practices at Member State level.

- WHO**
- 
 EU institutions


 Sector Professionals

SHORT-TERM
1-2 years

IMPACT

End users	MEDIUM
EO service providers	MEDIUM
Multipliers	MEDIUM
Governance actors	HIGH



... to know more ...

