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Creating Growth : Improving Society

Technology Trends and challenges for Transport Infrastructure

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Our scopes of action are aligned with the sustainable development goals (SDG)

With a multi-sectoral and multi- technological perspective, we listen and work with companies to respond to the major global challenges.

In this way, we are able to generate profit for companies and create value for society.

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Infrastructures Challenges and technology trends

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Trends and Challenges are causing a rapid and profound disruption of the industry

SUSTAINABILITY

RISING COSTS

LACK of QUALIFIED PROFESSIONALS

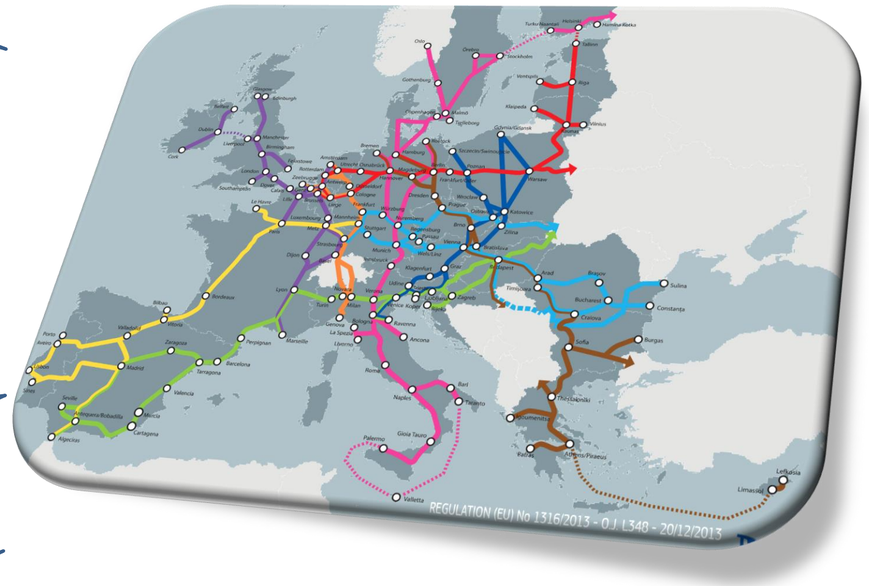
TECHNOLOGY

CLIMATE CHANGE

NEW MOBILITY

SAFETY

IoT and SENSORS



SMART INFRASTRUCTURE

DATA DRIVEN DECISION

AUTOMATION

AGEING and NEW INFRASTRUCTURE

MATERIALS

INFRASTRUCTURE FINANCE

CONSTRUCTION TECH

ACCESSIBILITY and AGEING POPULATION

SOCIAL INEQUALITY

CRITICAL INFRASTRUCTURE PROTECTION

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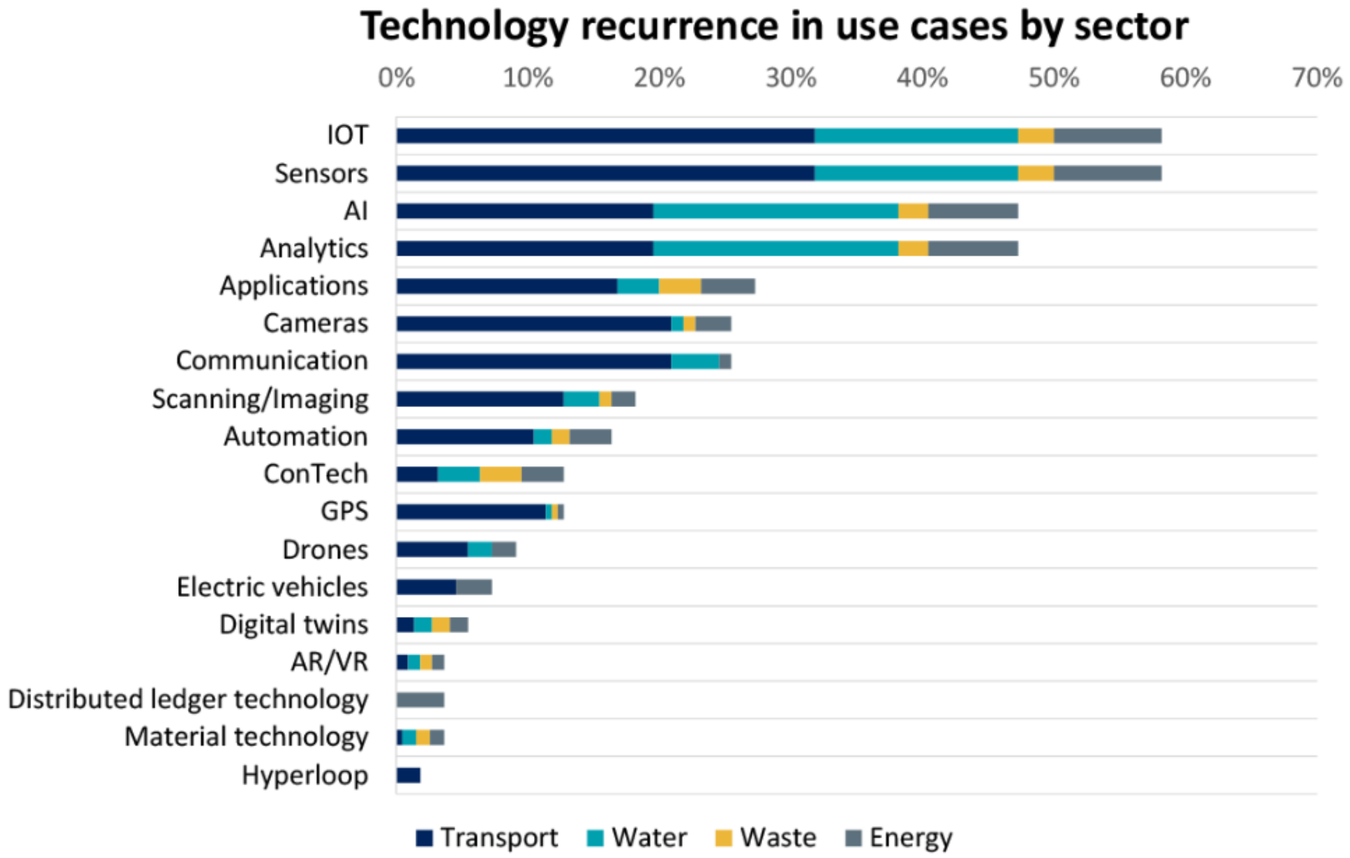
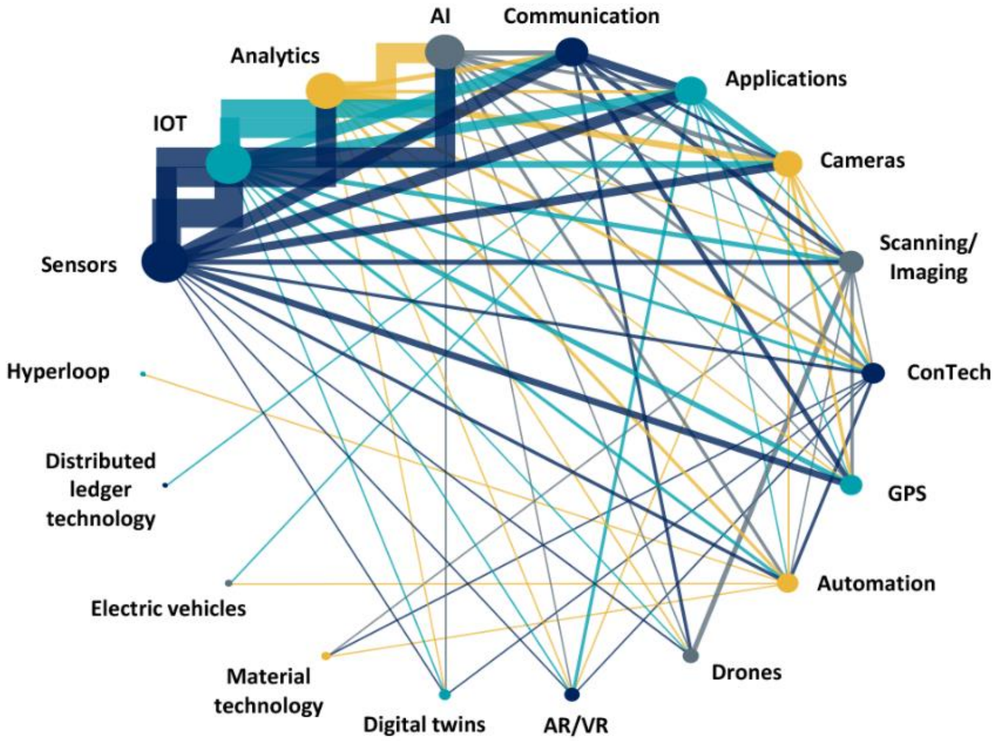
Technology is disrupting on infrastructure development stages – from planning and construction to maintenance and decommission



Source: Global Infrastructure Hub



But the use of technology generates several interrelations

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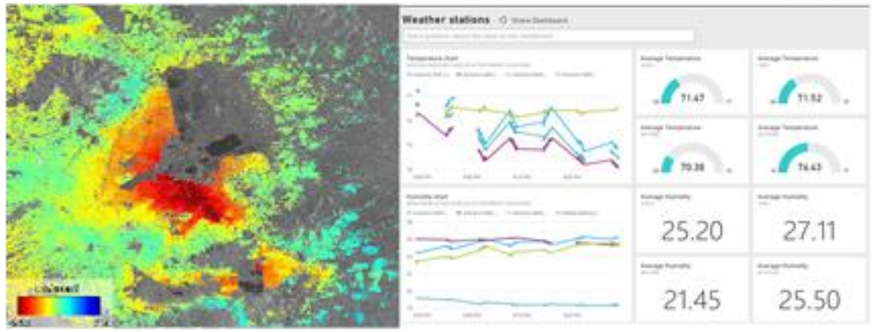
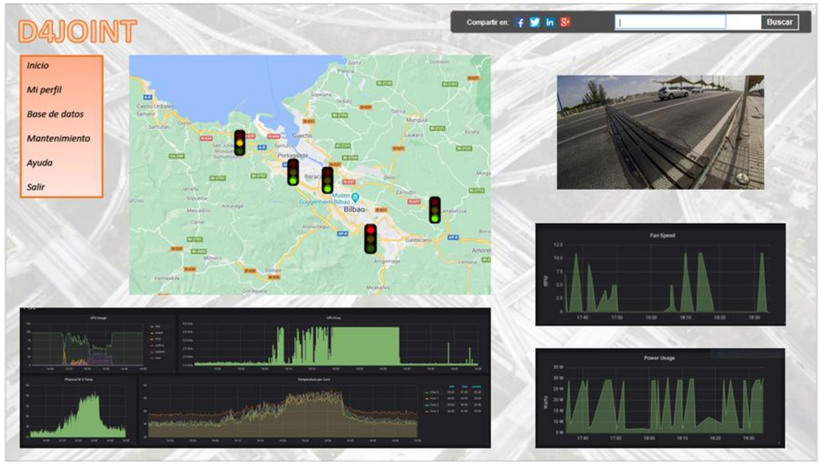
Some Examples

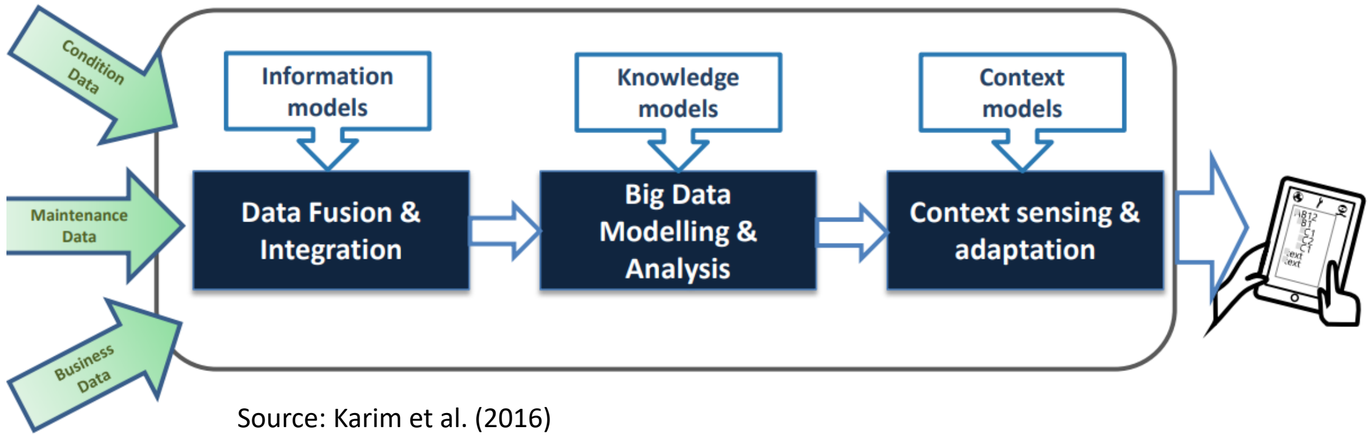
Data driven decissions for infrastructure maintenance



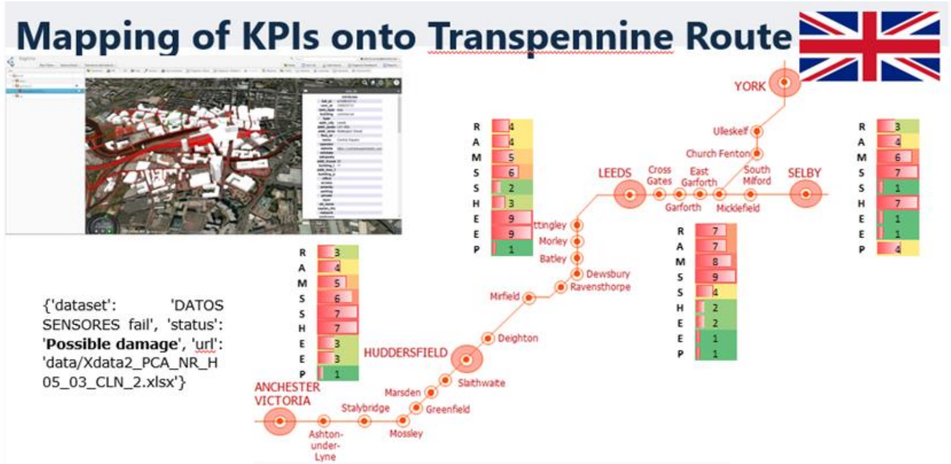
Source. SLOPED platform combinind satellite and local data.



Source. D4JOINT. Smart bridge joints and performance monitoring.



Source: Karim et al. (2016)



Source. H2020 – Ragtime. Rail network performance monitoring.

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RESILIENCE AND PROTECTION OF CRITICAL INFRASTRUCTURE

CWA developing Guidelines for resilience assessment of transport infrastructures based on the FORESEE project just released. . A CWA is a consensus-based specification with a maximum lifetime of 6 years. Within that period, it can be transformed into a standard (EN) at the initiative of any CEN member of any CEN/CENELEC Technical Committee.
https://www.cencenelec.eu/media/CEN-CENELEC/CWAs/RI/cwa17819_2021.pdf

CEN WORKSHOP AGREEMENT

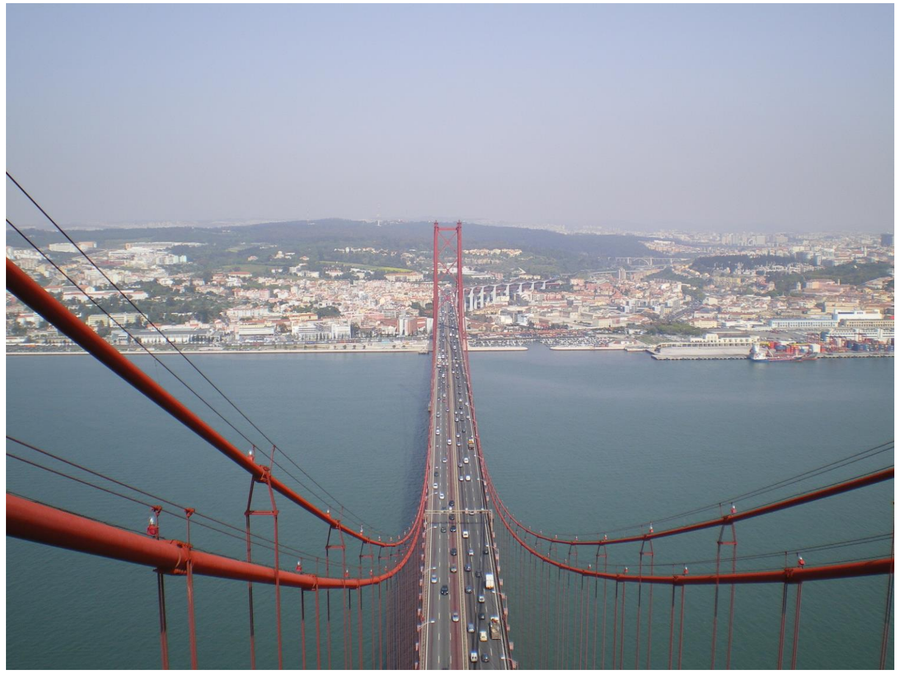
CWA 17819

November 2021

ICS 03.220.01; 13.200

English version

Guidelines for the assessment of resilience of transport infrastructure to potentially disruptive events



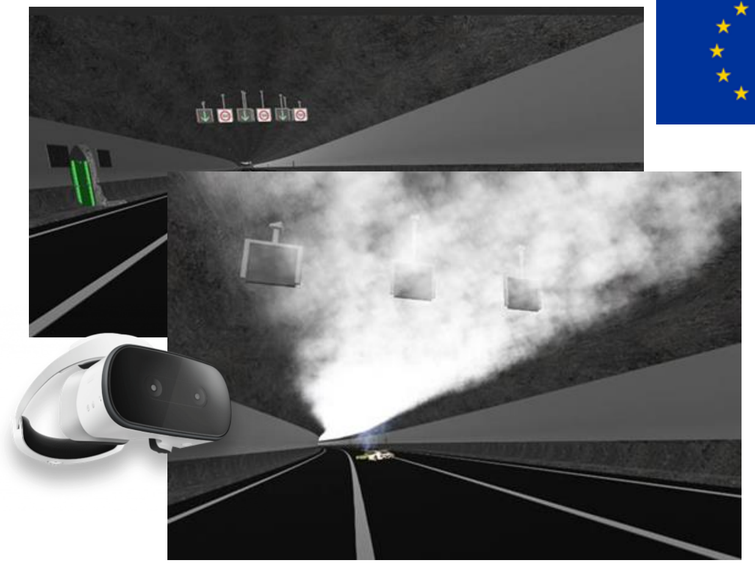
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769373"

Hybrid Threats affect to EU transport infrastructure from clima, deterioration and man made hazards including cyber. Integrated approaches ae required to improve:

Risk Assessment - Prevention – Detection – Mitigation & Response – Recovery

Key Elements:

- Dynamic risk assessment based on real time information and infrastructure performance.
- Damage identification al location based on real time data and SHM algortihms.
- Generation of dynamic event simulations such as fire events comabined with evacuation analysis into a real time or near to real time scenarios.
- Integration into infrastructure operation and maintenance plans.



Virtual and gamification technologies applied to emergency scenarios, decisión making and training of first responders.

Source: Twintunnel Project.

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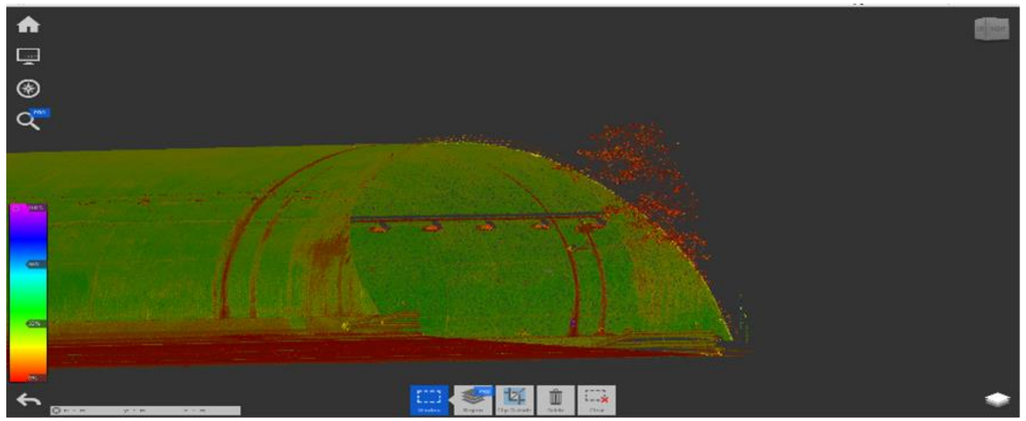
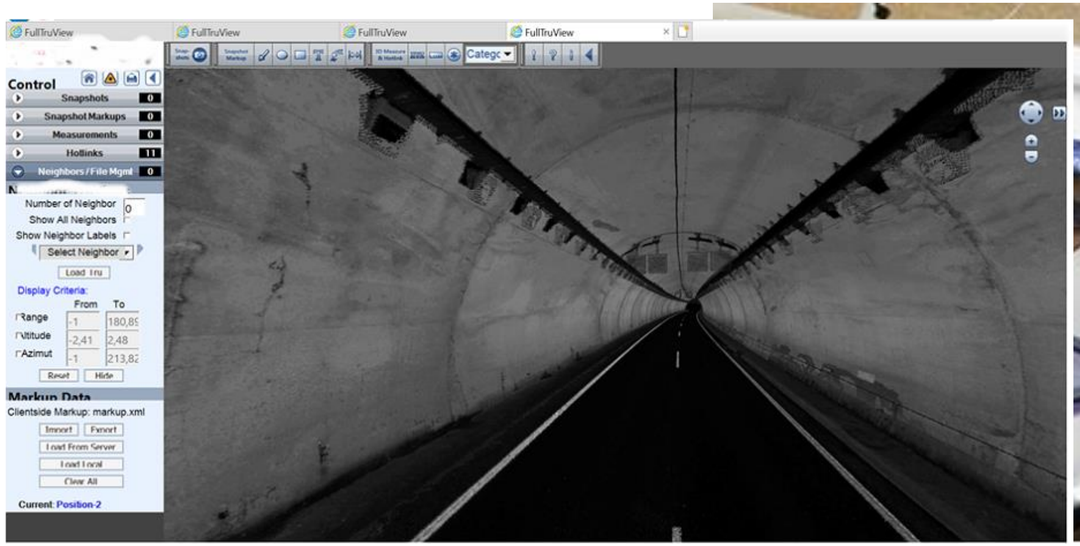
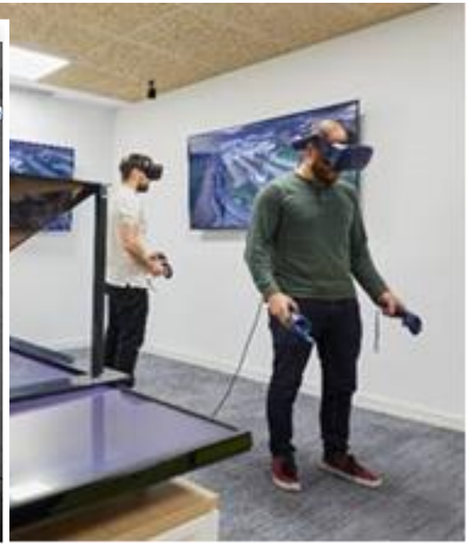
VR/AR for remote asset inspection







Use of headsets to perform inspections on a tunnel. More than 30km tunnel section point clouds and high-resolution photos are mapped to 3D models and using a HoloLens connected to the cloud, the user can zoom in and out, rotate, and move around the structure from anywhere in the world.

Source: Tunnel inspection projects and SCANTUN

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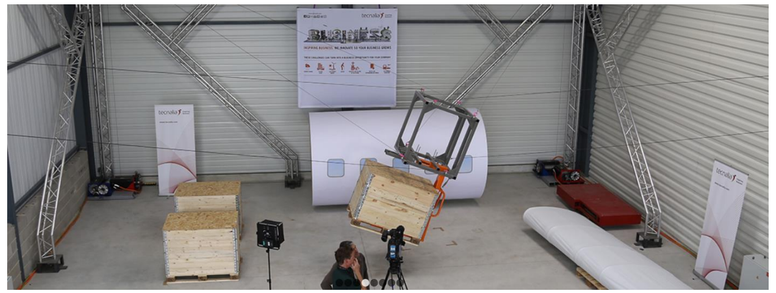
AUTOMATION

The adoption of autonomous and automated technologies such as robots will impacts how the projects are planned and delivered improving productivity and the use of resources we need

- Autonomous machines on-site. Impacting on construction processes themselves: on-site work is done by robots, drones and other automated and autonomous machines.
- Employee impacts and improved health & safety A big impact will be on health and safety as physically demanding and hazardous jobs will be undertaken by robots; reducing the risk of accidents or health problems.
- Prefabrication and modular construction There will be a push to prefabricate components offsite as much as possible in a protected and predictable environment and to minimise the necessary on-site work
- Robot – Human collaboration is critical as well as worker involvement for technology acceptance.



Source:
Ephaestus H2020 projects

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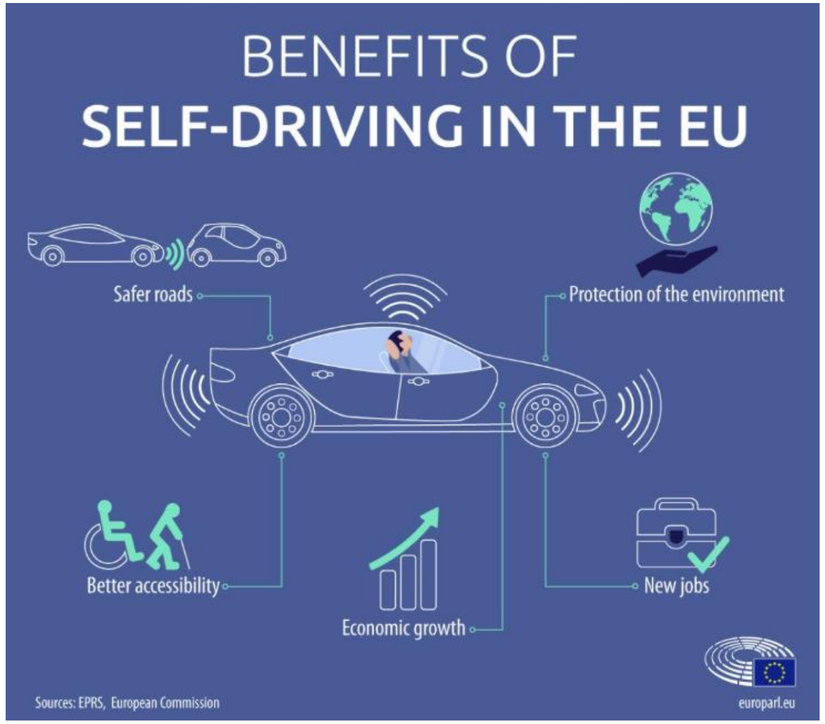
New sustainable & autonomous Mobility Solutions to commit with ZERO carbon transport solutions



MOBILITY

Paris air taxis begin test flights in run-up to 2024 Olympic launch

How will transform our cities and transp infrastructure?

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Conclusion

Conclusions

- Infrastructure industry is facing radical changes which come at un unprecedent speed, motivated by EU policy, environmental challenges, changes of social patterns, global economics and supply chains, ageing society and the disruption of new technologies.

- Many of these forces come in tandem with each other and need important investments, development of skills in the construction workforce and might create breaches between early adopters and the rest of the industry, specially SMEs.

- Many of the Digital Technologies are dominated by non-EU companies and there is a major risk of technology dependence that can put at risk the leadership of the European construction sector.

- The sector must invest more in research to reach higher productivity gains. Large scale research and innovation projects are needed to generate new knowledge in EU and demonstrate the impact of new technologies.

- There is a need to generate living labs and knowledge hubs for construction where SMEs can access to knowledge and technologies, testing facilities and validate them.

- Innovation projects should improve the business innovation strategies, looking beyond the project itself, and defining strategies to upscale the technologies and bring them to the mass market.

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