



# SUPERVISION AND MONITORING SYSTEMS FOR THE RAILWAY

Capgemini Engineering – a key partner  
in tackling the digital rail transformation

# Introduction

An acceleration in the growth of rail traffic requires operators to adjust maintenance levels to ensure efficient lifecycle management and improve the regularity of traffic flow. To support this goal, supervision and monitoring systems must transition from analog to digital in order to maximize asset availability, reduce maintenance costs, reinforce security, and improve the quality of service for passengers. As they do so, ensuring optimal performance will become a key issue that needs to be managed.

Cappgemini Engineering's expertise in rail can support the digitalization of global railway networks, thanks to our strong and recognized experience in railway monitoring systems, our global footprint, and a strong local presence. These are all underpinned by an engineering delivery transformation model, cross-sector expertise to accelerate product development, and an agile approach throughout the solution development lifecycle.



# Market context

With growing attention on the environmental impact of other forms of travel, rail travel has become increasingly popular.

Key numbers:

- 1,044.4 million – expected number of train users by 2026<sup>[1]</sup>.
- +40% – increase in rail traffic in the last 10 years<sup>[2]</sup>.

To cope with this increased demand, infrastructure needs to be regularly analyzed – often on a large scale – to detect potential technical failures on tracks, signaling systems, overhead power lines, electrical distribution, level crossings, switches, and more.

1. Source: Statista  
2. Source: NewCivilEng



# Market challenges

While ensuring the optimum performance of rail networks can prove to be a challenge, digital supervision and monitoring systems, especially when operated on a large scale, can present a number of opportunities. For example, they can:

- Reduce the Mean Time to Repair (MTTR) i.e., – the time between incident detection and on-site intervention to maximize the availability of assets and maintain performance
- Reinforce security, to anticipate deficiencies and shortages of materials, and avoid bringing rail traffic to a stop
- Enable efficient communication between supervisory agents, train regulators, and maintenance operators
- Reduce maintenance costs
- Improve the quality of service for passengers, with real-time information
- Break organizational silos, by applying digital continuity
- Explore new technologies, while ensuring legacy compatibility

Key numbers:

- 25% – reduction in response time when digital systems are implemented<sup>[3]</sup>.

3. Source: NewCivilEng

# An integrated approach to the digitalization of railway networks

The aim of digitalized railway networks is to ensure optimum performance:

- Real-time alerts and geolocated incidents allow the network to be monitored and supervised remotely
- Agents can be mobilized more efficiently thanks to mobile applications digitalizing their intervention process

This transition to digital systems requires:

- A demanding approach to the design process
- The capacity to build interoperable connected systems
- A deep experience in data management in maintenance and supervision domains, particularly in preventive actions, to anticipate incidents before they arise. This is done in order to reduce down-time

Key numbers:

- 30,000 km – length of the railway network that will be improved through the French rail infrastructure operator's digitalization program<sup>[4]</sup>.

4. Source: NewCivilEng

We delivered a field-to-cloud architecture using Azure and OPC Unified Architecture (UA) with an initial application in one supervision center, and with three more centers in the 2022 plan. The application is a centralized management solution for alarms issued by new and legacy infrastructure monitoring systems. The solution allowed SNCF Réseau to :

1. Guide the right operator or team to the right place, at the right time
2. Reduce intervention time for field maintenance operators
3. Quickly identify the probable root cause of multiple incidents
4. Digitalize the whole intervention process i.e., – planning, route, and operations
5. Localize incidents in real-time from a geographical map of the assets and tracks
6. Ensure digital continuity between industrial systems in a multi-network context



# How we engage?

From strategic consultancy and industry knowledge to delivering PoC or large projects, Capgemini Engineering can efficiently support players in the rail industry in tackling digital transformation challenges.

## Program governance

- Carry out diagnosis and maturity assessments for clients regarding their supervision and monitoring processes
- Co-construct the target vision and implementation roadmap, and define business use cases that can bring added value
- Adapt the organization for digital transformation, including design authority, stakeholder management, operations, agile methodologies, and more

## Data-driven architecture

- Manage data from collection to usage, and storage
- Use the data as a shared asset between business and IT to digitalize work from the control room to the field
- Display information adapted to usage and context. For example, a video wall for global supervision, a mobile app for field use, and mapping software for incident localization
- Build the basics for smart troubleshooting, including natural language processing, machine learning, predictive and cognitive engineering, and AI

## End-to-end software engineering

- Build the target OT or IT architecture through the reuse of existing projects and assets
- Bring our advanced knowledge of rules and standards from the railway sector and industries
- Implement quick-win assets through prototyping, PoC or PoV, and software packages
- Industrialize solutions for better reliability, performance, and security
- Maintain the solution with Total Privileged Access Management (TPAM) and product support services



# Why Capgemini Engineering?

Our expertise and assets in rail supervision and monitoring systems will support the digitalization of global railway networks.

Capgemini Engineering has a strong and recognized experience in railway monitoring systems, including:

- A strong partnership with the national infrastructure manager in France which resulted in the reuse of assets and methodologies designed for its transformation program
- The development and maintenance of monitoring solutions on incident processes, device management, and hyper vision

A global footprint and strong local presence, underpinned by an engineering delivery transformation model. This includes:

- Railway systems expertise across the globe with over 5,000 engineers which include more than 100 railway maintenance specialists, supported by dedicated front offices, onshore, and global shore centers
- A tailored approach that offers flexibility and versatility, as well as dynamic end-to-end governance to deliver a cost-effective solution

Cross-sector expertise to accelerate product development. This includes:

- Software innovation with faster and more agile cloud-native development teams, telecom services, such as R&D and network consulting services, and IoT and analytics services to accelerate the transformation
- Business cases of supervision and monitoring in multiple sectors, including industrial and sensitive domains such as aeronautics, railway, defense, and energy

An agile approach throughout the solution development lifecycle.

- From business case development to industrialization, including quick prototyping, simulation, modelling, testing, assistance, Capgemini Engineering ensures end-to-end solutions, bringing together business and IT/OT

Find out more about how Capgemini Engineering can partner with players in the rail industry to tackle the digital transformation of their supervision and monitoring systems.

Please get in touch today to arrange a call or meeting with a Capgemini Engineering expert:

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## About Capgemini Engineering

Capgemini Engineering combines, under one brand, a unique set of strengths from across the Capgemini Group: the world leading engineering and R&D services of Altran – acquired by Capgemini in 2020 – and Capgemini’s digital manufacturing expertise. With broad industry knowledge and cutting-edge technologies in digital and software, Capgemini Engineering supports the convergence of the physical and digital worlds. Combined with the capabilities of the rest of the Group, it helps clients to accelerate their journey towards Intelligent Industry. Capgemini Engineering has more than 52,000 engineer and scientist team members in over 30 countries across sectors including aeronautics, automotive, railways, communications, energy, life sciences, semiconductors, software & internet, space & defence, and consumer products.

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