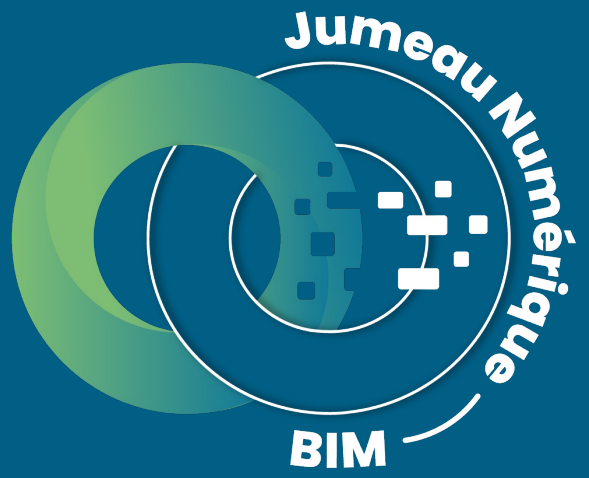
SNCF RÉSEAU · CentraleSupélec · COLAS RAIL · RATP · KAYRROS · IREX Institut pour la recherche appliquée et l'expérimentation en génie civil



MINERVE

avec la filière ferroviaire

MINERVE: COLLABORATIVE PROJECT ON FRENCH RAILWAYS SECTOR

FRANCE 2030 · bpifrance

The MINERVE project has been financed by the French government within the framework of France 2030

CONTEXT

Ecological and digital transition of the railway sector

- Need for **digital continuity** over the entire design - operation - maintenance cycle
- Need to **align the industry** with railway BIM tools and methods
- Need for new methods and tools that are more transparent, collaborative and sustainable, **shared by all stakeholders**
- Need to develop **BIM in the construction phase** (resource savings, frugality of models)
- For the operation and maintenance phase, a digital twin still requires further **research and development**

Convinced of the necessity to accelerate the digitalization of the construction, operation and maintenance processes for the railway infrastructure, we set up the MINERVE project with a double ambition :

- **Develop technological solutions** allowing the appropriation of new agile and collaborative digital work methods
- **Boost the entire railway construction ecosystem** and guarantee the ecological transition and decarbonization of the sector

BUILD THE BIM AND THE DIGITAL RAILWAY TWIN, WITH THE ENTIRE INDUSTRY!

MINERVE PROJECT OBJECTIVES

Develop **design and construction methods and tools** using BIM approaches that are effective for each domain

Anticipate and optimize the construction phase, based on a **sustainable BIM** (digital continuity, frugality of models)

Develop the digital twin (exploring the potential of AI for decision support): enhancing opportunities for biodiversity and the environment

Use the digital twin to **enhance resilience** to climate change.

Develop an **industrializable, standardized and shared vision** of the interfaces ensuring digital continuity via the BIM model in all phases

Build a collaborative ecosystem around the modeling of linear infrastructures and particularly the railway one

Contribute to the transition towards a

- **More efficient**
- **More reliable**
- **More environmentally friendly**

railway construction and operation

by designing and developing efficient digital methods and tools for infrastructure modeling

to reduce its overall impact on climate change while increasing its competitiveness.

TECHNOLOGICAL LOCKS & INNOVATIVE CONTENT

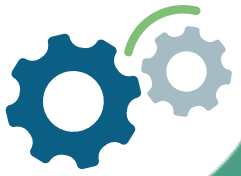
Build and guarantee digital continuity over the entire life cycle of railway infrastructures

RAILWAY BIM: NO CONTINUITY EXISTING CONDITIONS

Specific railways methods and tools for all technical fields, covering **design and works.**

Multi-domain & multi-phase collaborative platform.

Mass production of existing BIM models: industrialization of **BIM object identification using AI.**



DIGITAL TWIN: HETEROGENEOUS, INCOMPLETE, NON-INTEGRATED DATA

Digital Twin **reference architecture** (facilitating the use of heterogeneous data/repositories).

Laws for modeling infrastructure aging **adapted to real-time prediction.**

Real-time **replanning algorithms.**

The Digital Twin as a **reference platform for climate change resilience.**

THE MINERVE CONSORTIUM

A strong partnership between 6 actors: companies, institutes, research laboratories

“The will to mobilize the rail industry on a digital deployment, over a continuous and sustainable life cycle of the infrastructure”

SNCF RÉSEAU

AREP

SNCF GARES & CONNEXIONS

PROJECT LEADER

COLAS RAIL

KAYRROS

CentraleSupélec | université PARIS-SACLAY

IREX Institut pour la recherche appliquée et l'expérimentation en génie civil

RATP

SYSTRA

setec

egis

anteagroup

EIFFAGE

MIRE

TSO

Université Gustave Eiffel

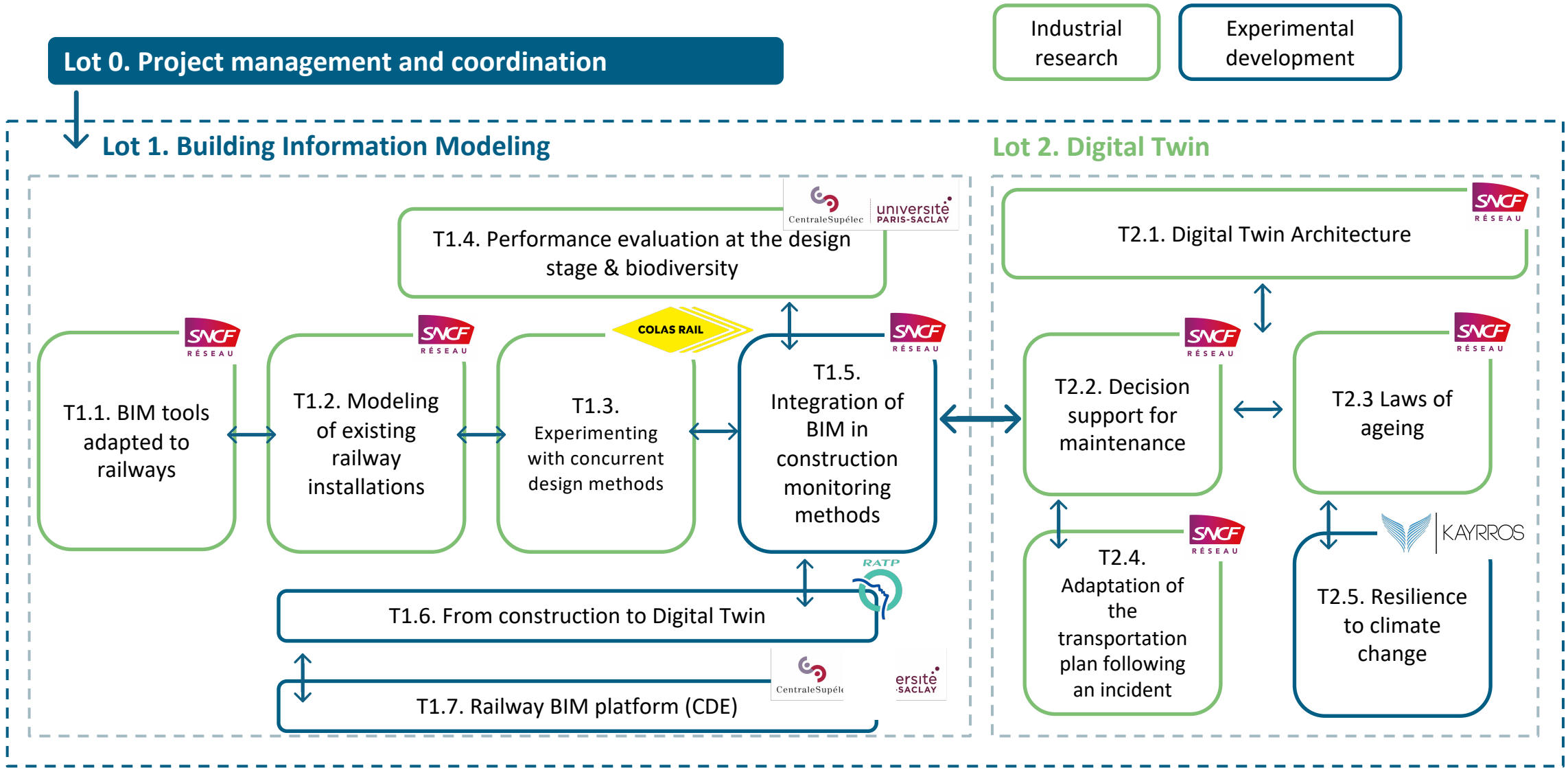
INGÉROP Inventons demain

ETF

RAILENIUM RAIL RESEARCH & INNOVATION

Total budget: 34.8 M€
Public funding obtained: 16,8 M€

PROJECT ORGANIZATION



ACTORS AND MARKETS TARGETED BY THE PROJECT

FRENCH RAILWAY MARKET

SNCF RÉSEAU

AREP

SNCF GARES & CONNEXIONS

National railway network and stations infrastructures

COLAS RAIL

French railway infrastructures

RATP

Metropolitan Transportation Service
Transport infrastructure projects outside France

BUILDING & CIVIL ENGINEERING MARKET

IREX
Institut pour la recherche appliquée et l'expérimentation en génie civil

Subway, urban development in the Paris / Ile de France region

INFORMATION PROCESSING MARKET

KAYRROS

Information processing for the prevention of climatic hazards and predictive maintenance of infrastructures

EDUCATION AND RESEARCH

CentraleSupélec

université PARIS-SACLAY

ECONOMIC OPPORTUNITIES & EXPECTED IMPACTS

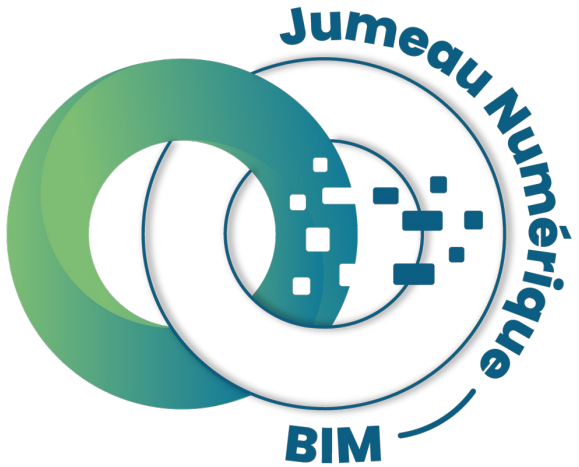
- Reduction of the environmental footprint
- Reduction of realization costs
- Resource savings

- Improve the life span of the infrastructure
- Productivity gains
- Interoperability, new standardized methods
- Biodiversity & environment approach

- Innovative solutions for the French civil engineering industry
- New R&D work in construction information modeling
- European visibility for BIM and JN in the railway sector

- Access to a new market
- Value creation in a growing sector

THANK YOU



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