Rail Summit 2024

How is the digital twin capable of creating a virtuous circle into a mega-project

Speaker

Michele Positano

BIM Manager Webuild

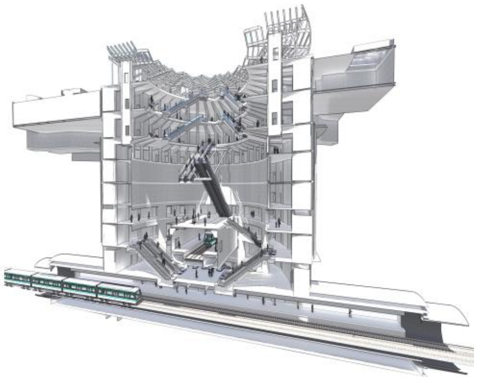
Currently I’m BIM Manager on construction site

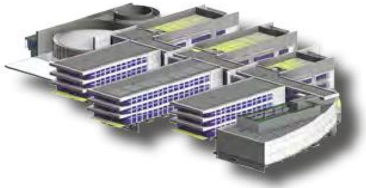
Speaker

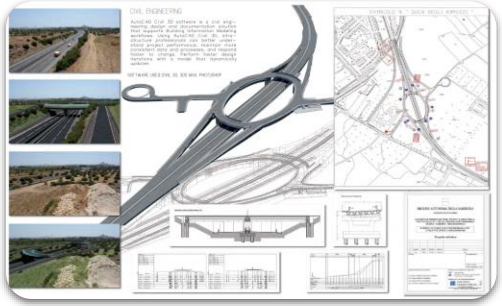
Experience

I have gained experience from different types of projects

- Maldives Airport
- Bangkok Airport
- Dubai Entisar Tower
- Foundation Cartier Paris
- Montpellier Hospital

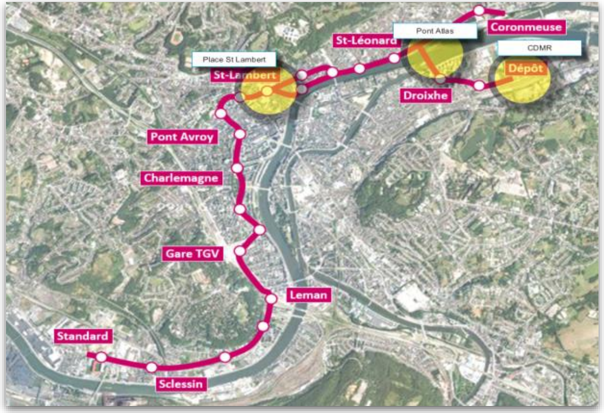


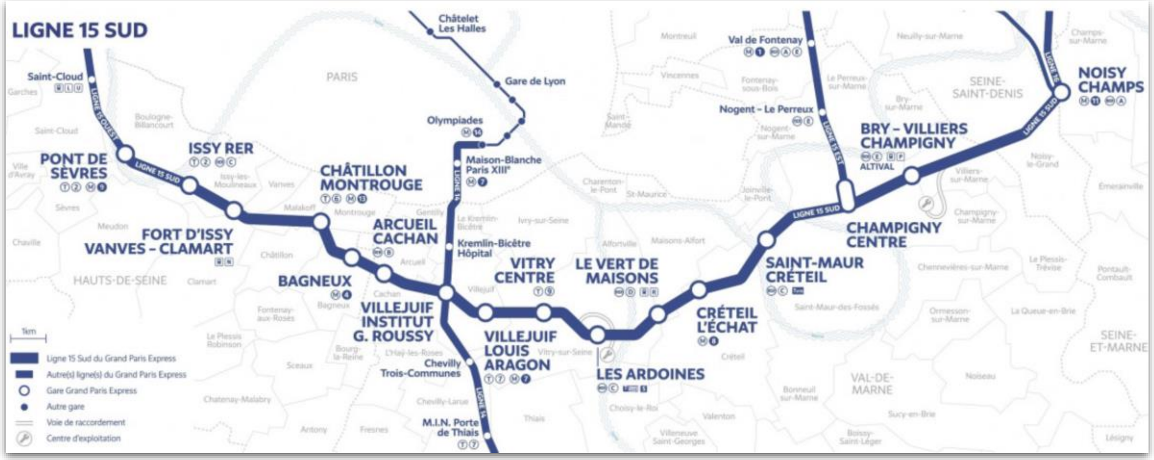




Experience

Tramway Liege





Metro 15 Paris

Speaker

Salvatore D’Alfonso

BIM Manager TELT

I am an Italian Transport Engineer and a Senior Project Manager with over 40 years of experience in Italy and abroad.

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Agenda

1. Abstract
2. Context
3. Objectives
4. Solutions
5. Benefit fact
6. Next steps

Abstract

Abstract

- Maturity of BIM infrastructure (TUNNEL)
- Digital Twin
- Healthy and safety

Abstract

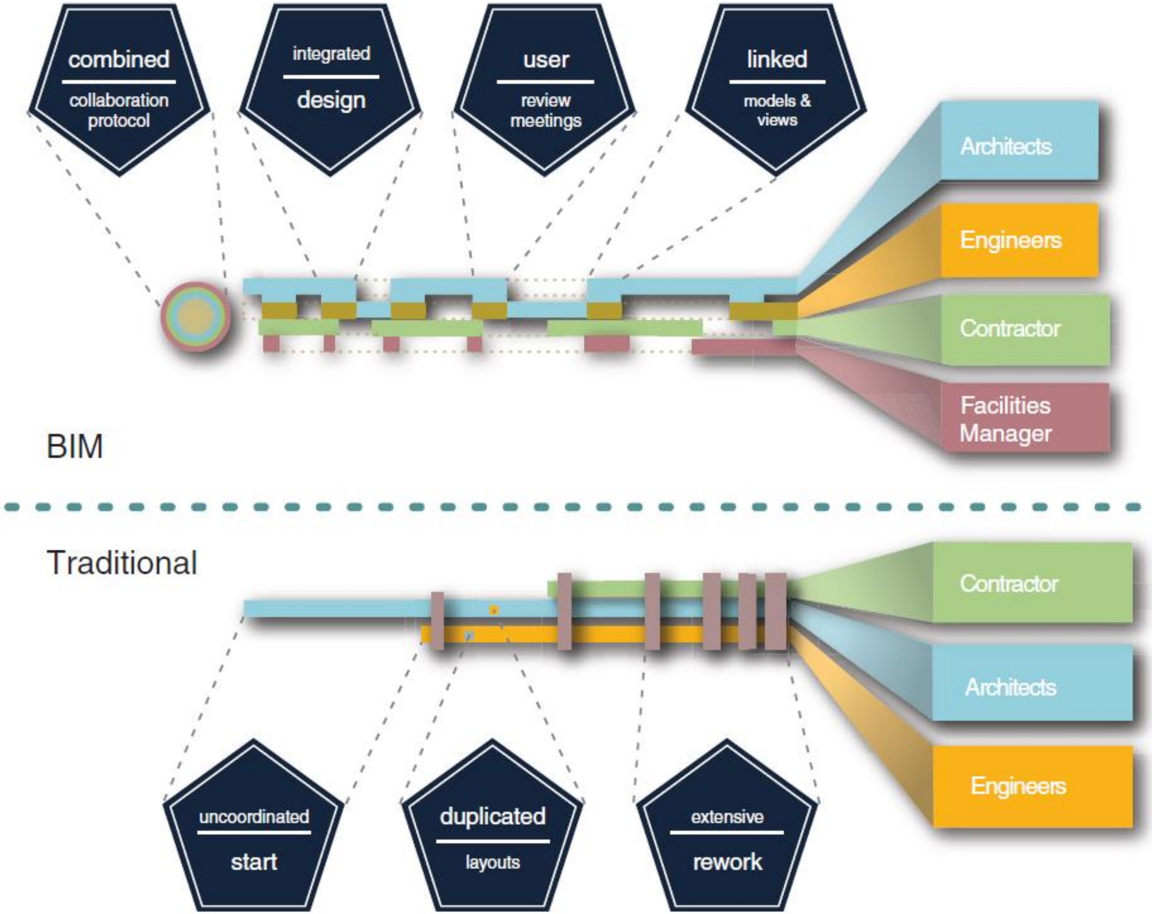


Figure 1–8 Comparing BIM versus traditional methods of delivery: Applying a combined protocol to regulate collaboration among stakeholders.

Context

TELT

In a nutshell

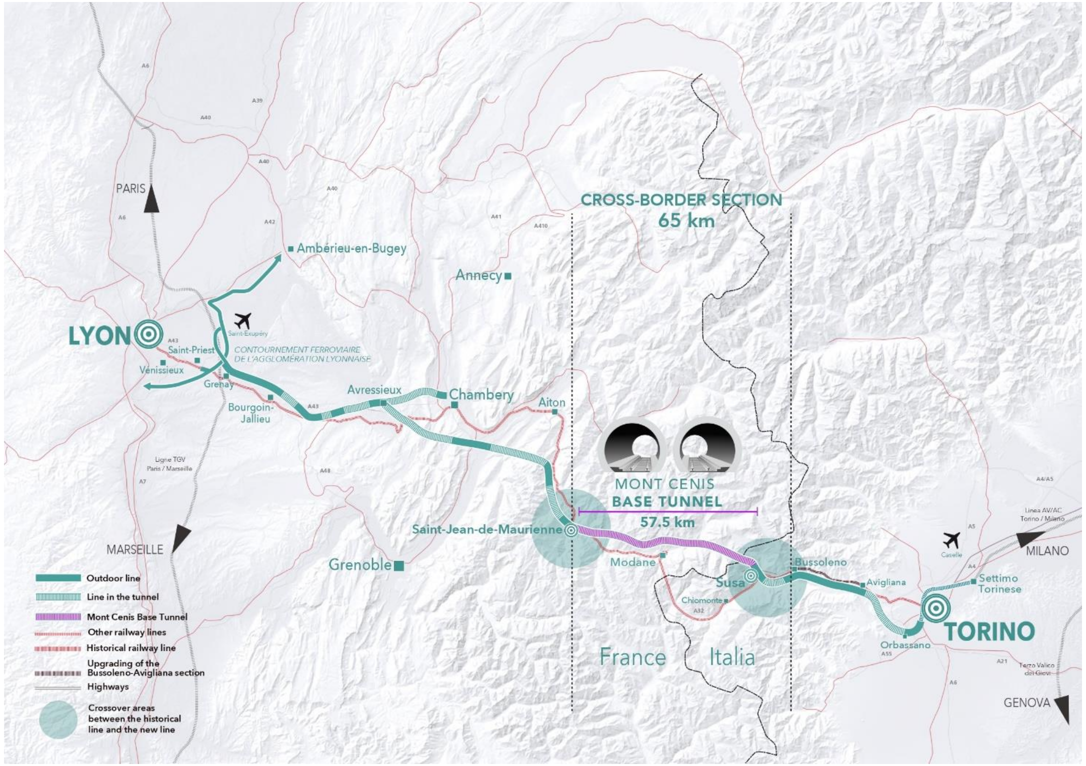
About the Project

The cross-border section of the new Lyon-Turin line is a new railway line of approximately **67 km** linking Saint-Jean-de-Maurienne to Susa in Italy and Bussoleno, where it connects to the historic Turin-Modane line.

The line required the digging of a **57.5 km two-tube tunnel**, with one lane per direction, of which about 45 km was in French territory and about 12.5 km in Italian territory.

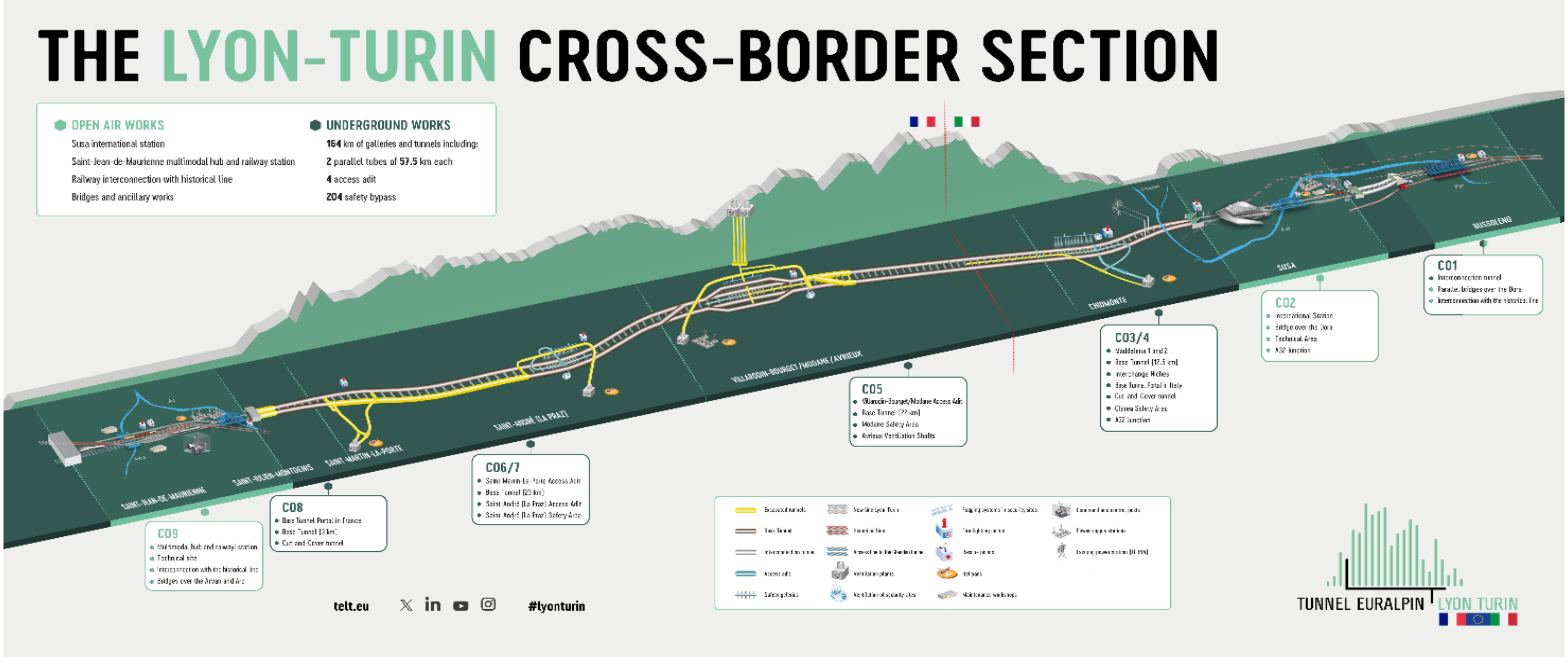
About TELT

TELT is the **public binational promoter**, founded on 23 February 2015, and responsible for the realisation and operation of the line. It is a French company owned 50% by the French State (via the Ministry for the Ecological Transition) and 50% by the Italian State (via the Ferrovie dello Stato Italiane group).



General view of the Project

A Project “unique” in its kind



General view of the Project

The figures and the topics of the complexity

KEY PROJECT DATA

164 Km of tunnels under the Western Alps, including 57.5 base tunnels	**12** Operational sites from Italy to France for the works management	**2** Brand new international multimodal railway stations	**8000** Number of employees involved between Italy and France

- **12 construction sites** between France and Italy: 9 are civil engineering worksites, 2 for the treatment of excavation materials and a unique worksite that will provide the installation of the technological equipment at the end of the construction of the civil works.
- A total volume of materials to be excavated of about **37 million tons**, of which 30 million tons on the French side and about 7 million tons on the Italian side.
- Lyon-Turin is a **bi-national Project**: BIM on infrastructures has not the same level of implementation and maturity in France and in Italy.
- The Project crosses the Alpine sites, with very high **environmental sensitivity**
- **Studies and preliminary works** carried out from October 2001 to February 2015 by LTF (Lyon Turin Ferroviaire), owned by the operators of the RFF and RFI railway networks, **with traditional methods**.
- TELT decided to introduce in the uses of BIM, beyond the 3D three-dimensional modelling, the temporal sequencing of the execution of works (4D) and the control of project costs (5D), also the **operation of the built structure and its maintenance over time (6D), the energy and environmental control (7D) and to add to the 3D model the security information (8D) to predict risks in the construction process and identify activities that need to be implemented to improve occupational safety and prevent accidents.**

Operational Sites 6&7

67 CHANTIERS
OPÉRATIONNELS
C06-C07

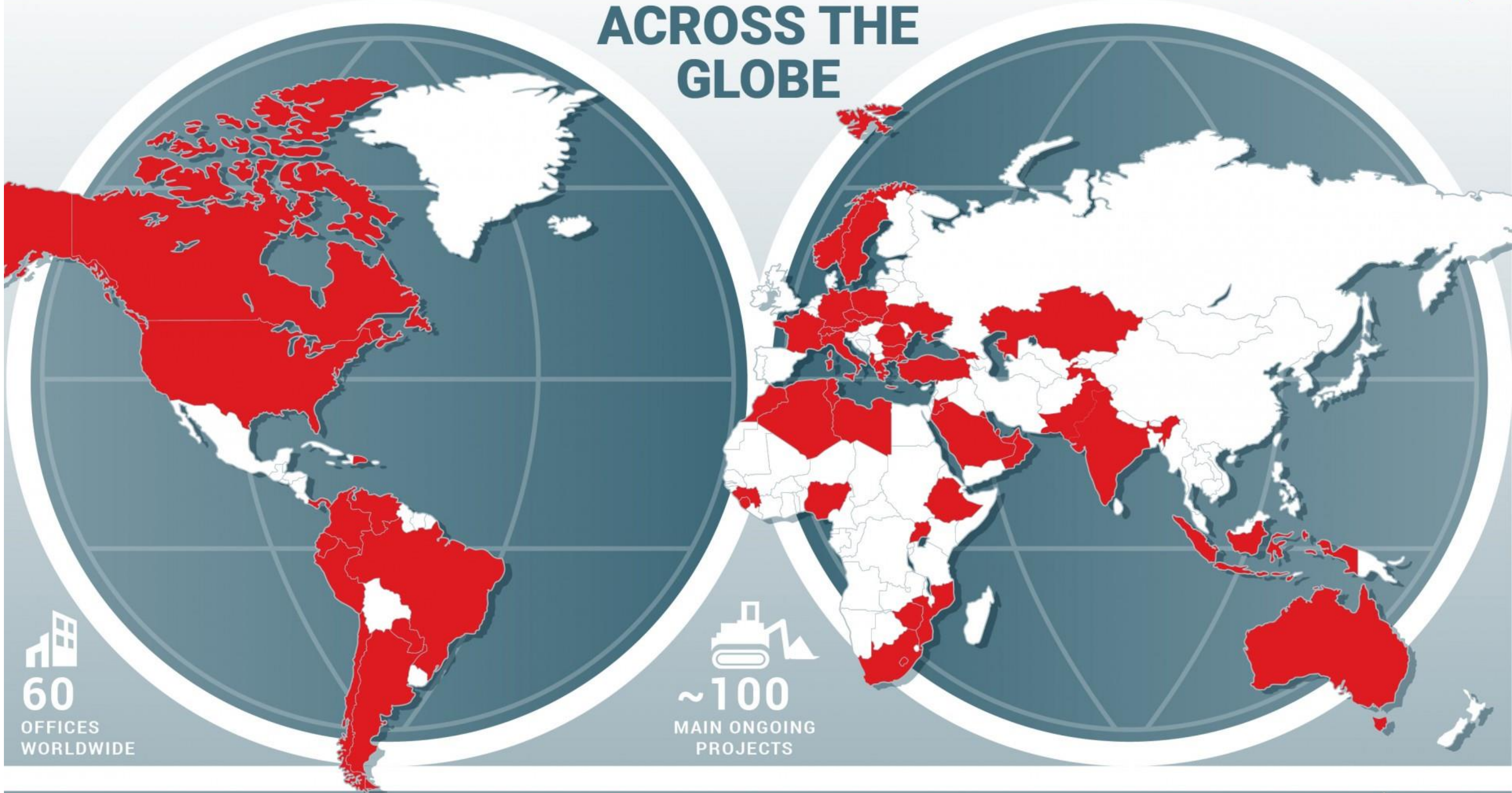
VINCI CONSTRUCTION webuild

Operational Sites 6&7

- Ligne 15
- Toronto

webuild

WEBUILD ACROSS THE GLOBE



60
OFFICES WORLDWIDE

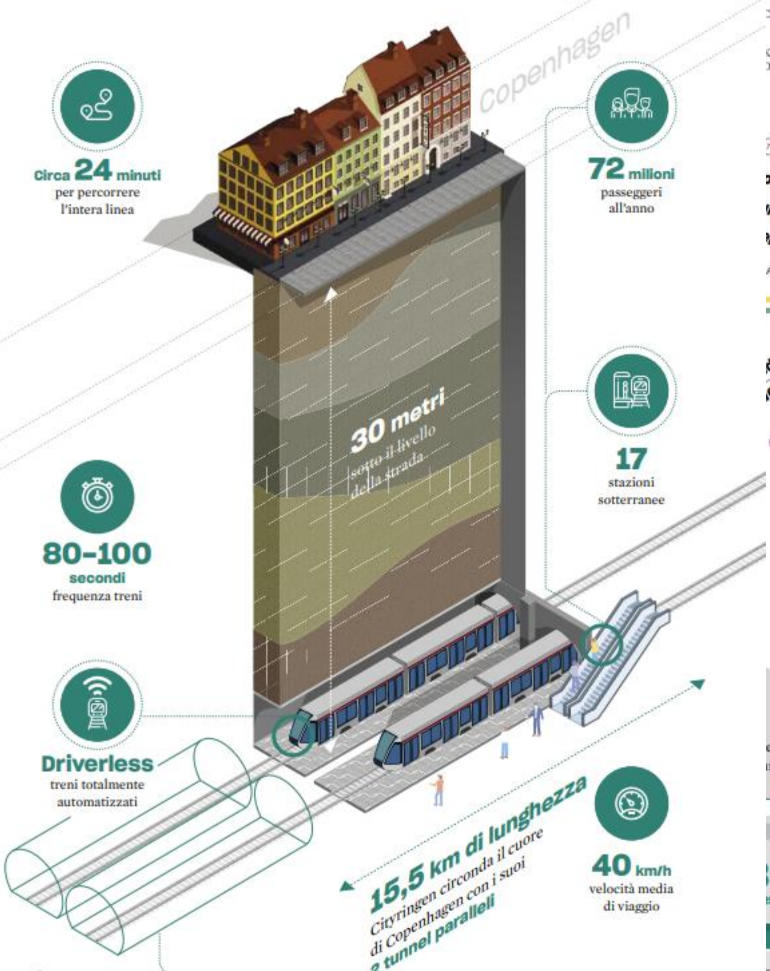
~100
MAIN ONGOING PROJECTS

TRACK RECORD

13,637 km	RAILWAYS AND METRO LINES
2,373 km	TUNNELS
80,291 km	ROADS AND MOTORWAYS
946 km	BRIDGES AND VIADUCTS
313	DAMS & HYDROELECTRIC PLANTS
52,900 MW	INSTALLED CAPACITY

October 2020

IL PROGETTO IN SINTESI



Circa **24 minuti** per percorrere l'intera linea

72 milioni passeggeri all'anno

17 stazioni sotterranee

80-100 secondi frequenza treni

Driverless treni totalmente automatizzati

15,5 km di lunghezza
Cityringen circonda il cuore di Copenhagen con i suoi **2 tunnel paralleli**

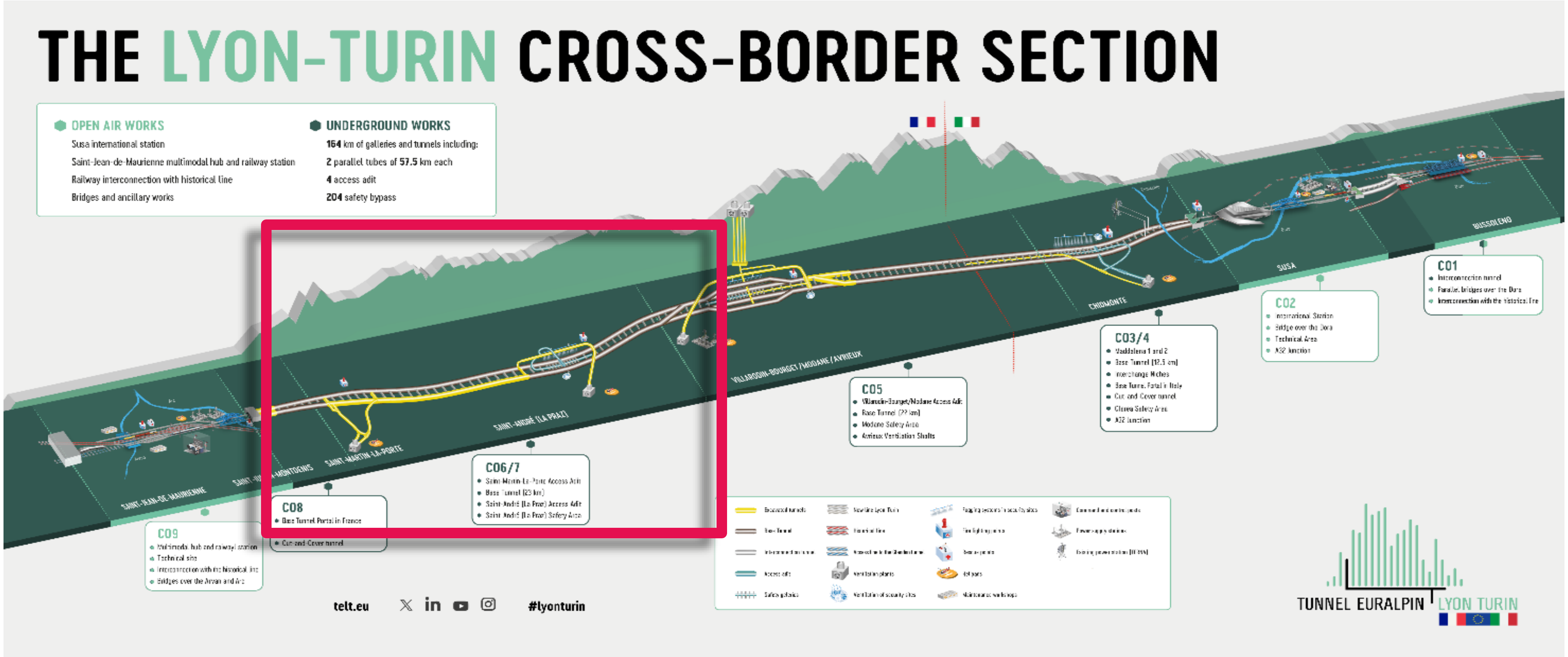
40 km/h velocità media di viaggio

ESTENSIONI DELLA CITTÀ

ei residenti si trova a un massimo di **600 metri**
na stazione metro o ferroviaria

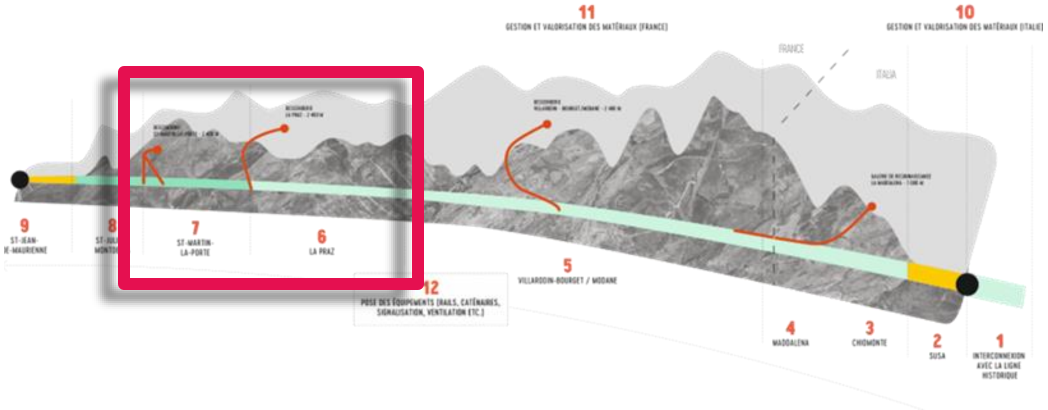
Project CO6-7

Major sector



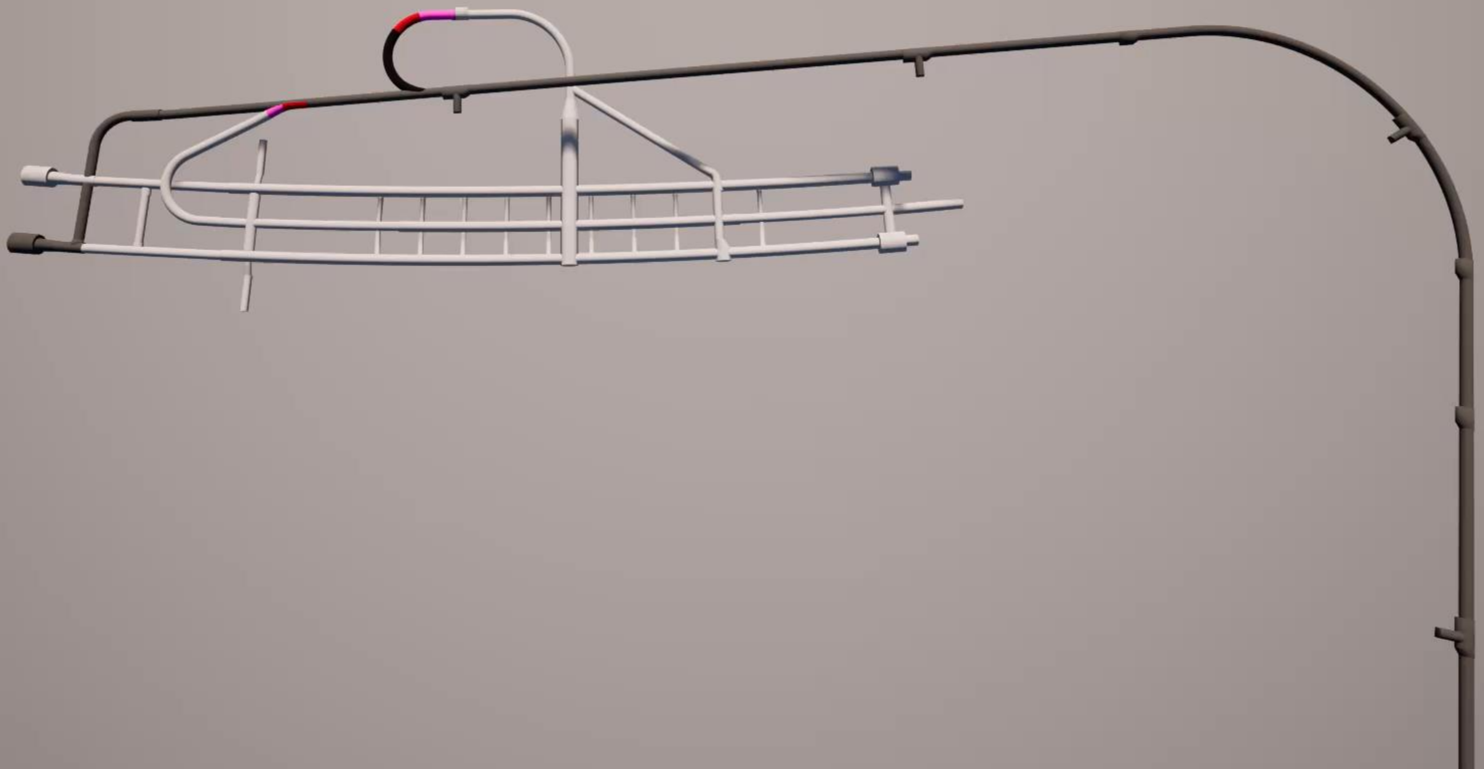
Operational sites 6 & 7

Major sector



- 45 km of galleries constructed with 3 segment TBMs (11717 rings)
- 1 segment prefabrication plant
- 21 km of galleries carried out in conventional method
- 55 km of conveyor belts to evacuate excavated materials

Operational sites 6



Operational sites 7

Objectives

Objectives TELT

Management

Safety

Quality

Environment

Objectives

How TELT manages the complexity of a mega-project

Objectives

Management
Organization
Collaboration
Facility Management
Safety
Sustainability

Objectives CO 6 & 7

- Management
- Safety
- Quality
- Sustenaibility

Solutions

Solutions

- Digital Twin
- Standards
- CDE
- 4D
- 5D
- 6D-7D-8D-9D-10D
- Training

Digital Twin

- Phases
  - Information update
  - Information exchange

Standards

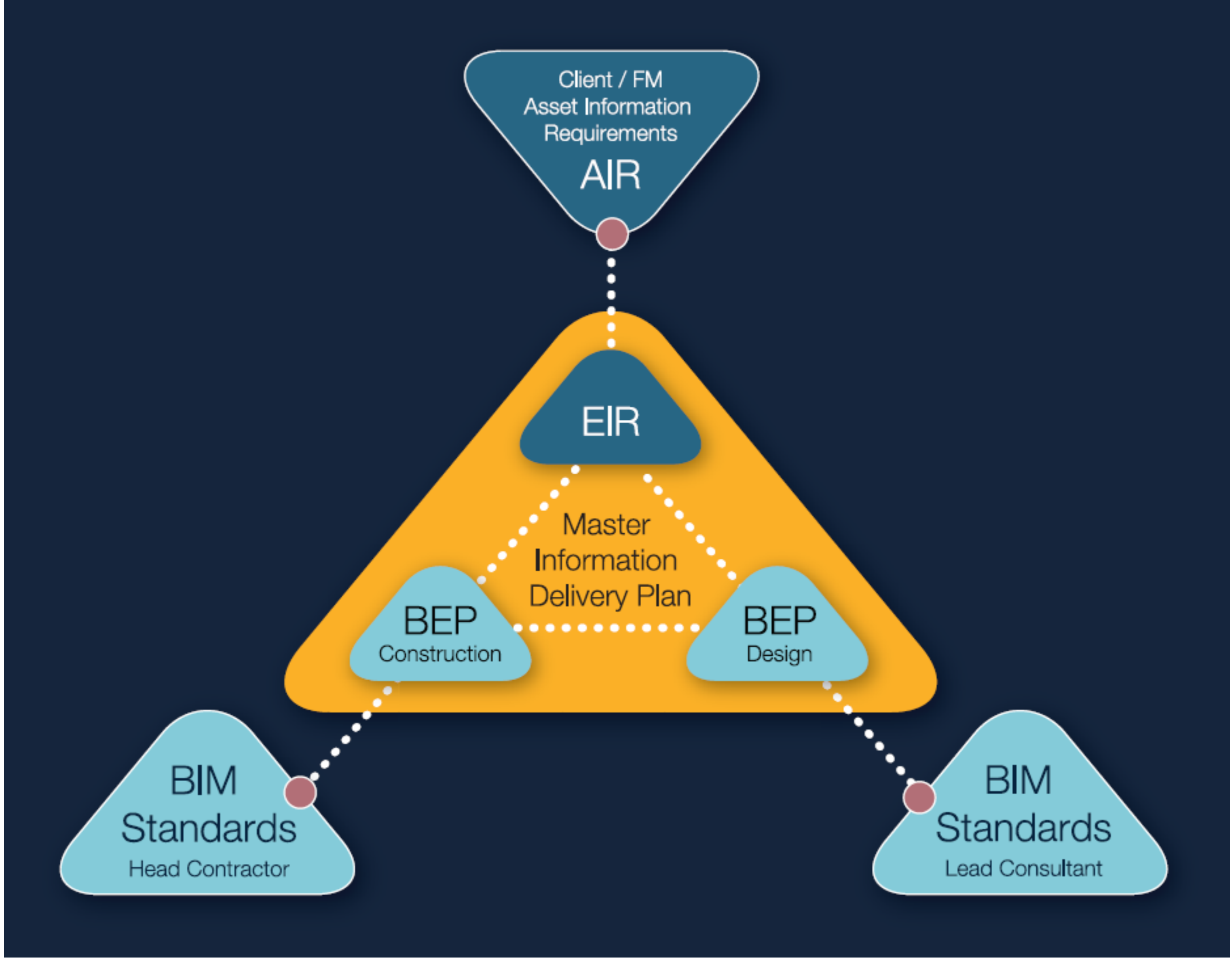
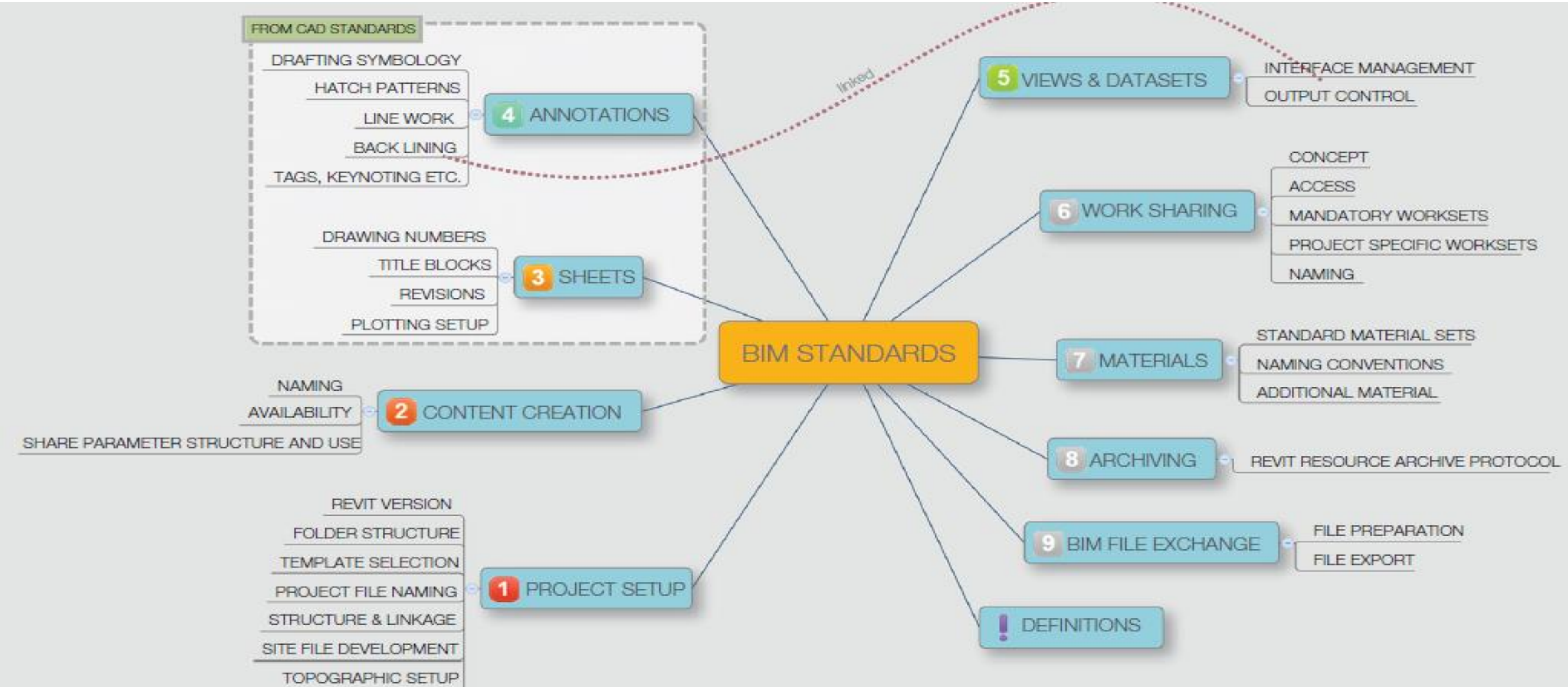


Figure 4–5 EIR in the context of other sources of information.

Standards



FROM CAD STANDARDS
DRAFTING SYMBOLOGY
HATCH PATTERNS
LINE WORK
BACK LINING
TAGS, KEYNOTING ETC.
4 ANNOTATIONS
DRAWING NUMBERS
TITLE BLOCKS
REVISIONS
PLOTTING SETUP
3 SHEETS
linked
5 VIEWS & DATASETS
INTERFACE MANAGEMENT
OUTPUT CONTROL
6 WORK SHARING
CONCEPT
ACCESS
MANDATORY WORKSETS
PROJECT SPECIFIC WORKSETS
NAMING
BIM STANDARDS
7 MATERIALS
STANDARD MATERIAL SETS
NAMING CONVENTIONS
ADDITIONAL MATERIAL
2 CONTENT CREATION
NAMING
AVAILABILITY
SHARE PARAMETER STRUCTURE AND USE
8 ARCHIVING
REVIT RESOURCE ARCHIVE PROTOCOL
9 BIM FILE EXCHANGE
FILE PREPARATION
FILE EXPORT
1 PROJECT SETUP
REVIT VERSION
FOLDER STRUCTURE
TEMPLATE SELECTION
PROJECT FILE NAMING
STRUCTURE & LINKAGE
SITE FILE DEVELOPMENT
TOPOGRAPHIC SETUP
! DEFINITIONS

Standards

- Sharing pictures CO8 – CO5

CDE

- LOD
- Deliverables

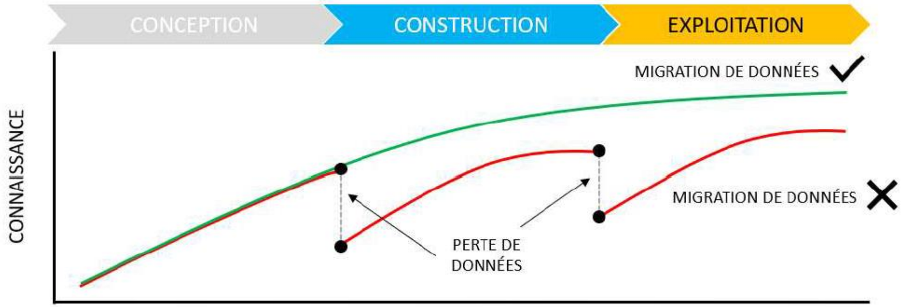
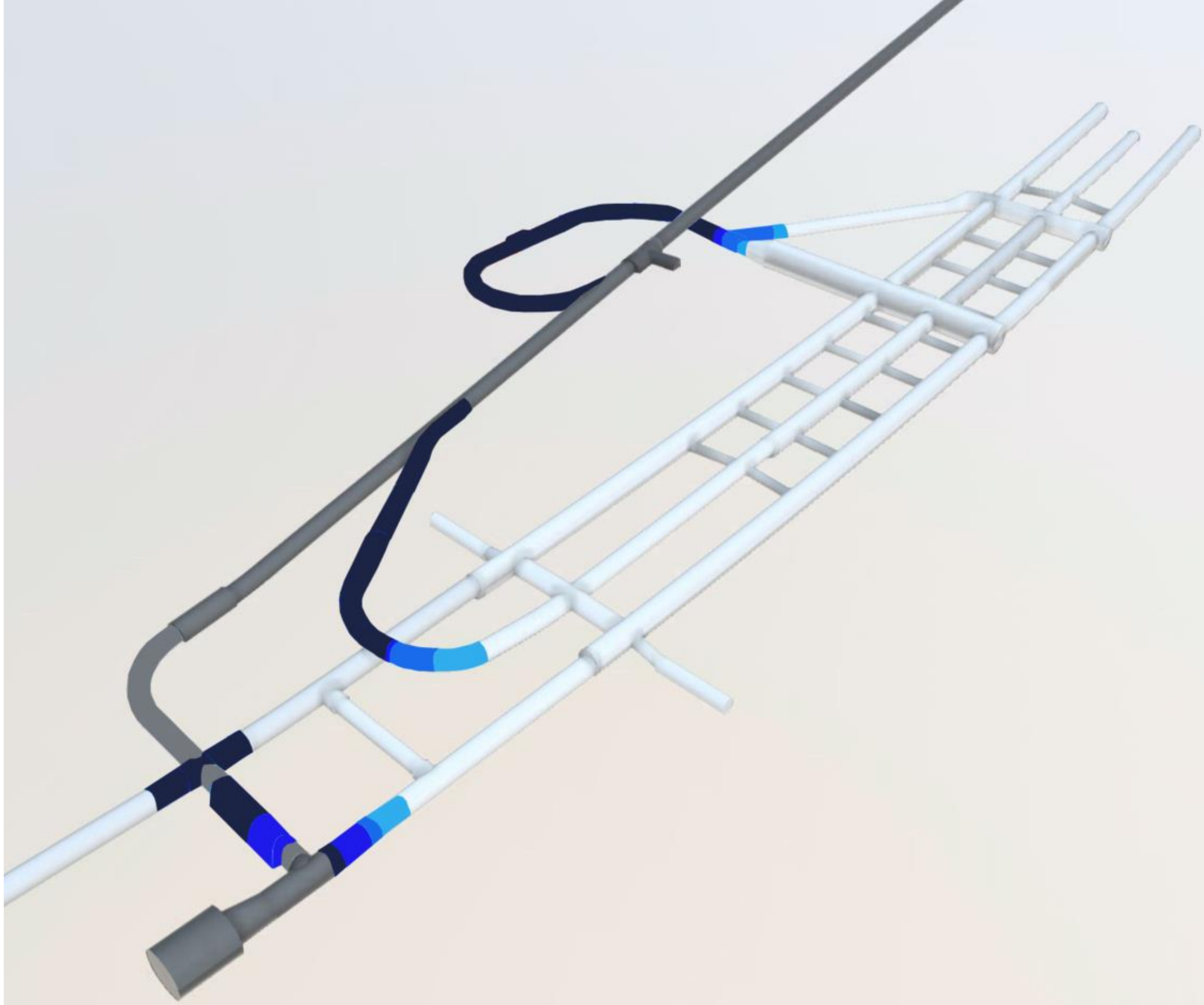


Figure 24 : Comparaison migration des données

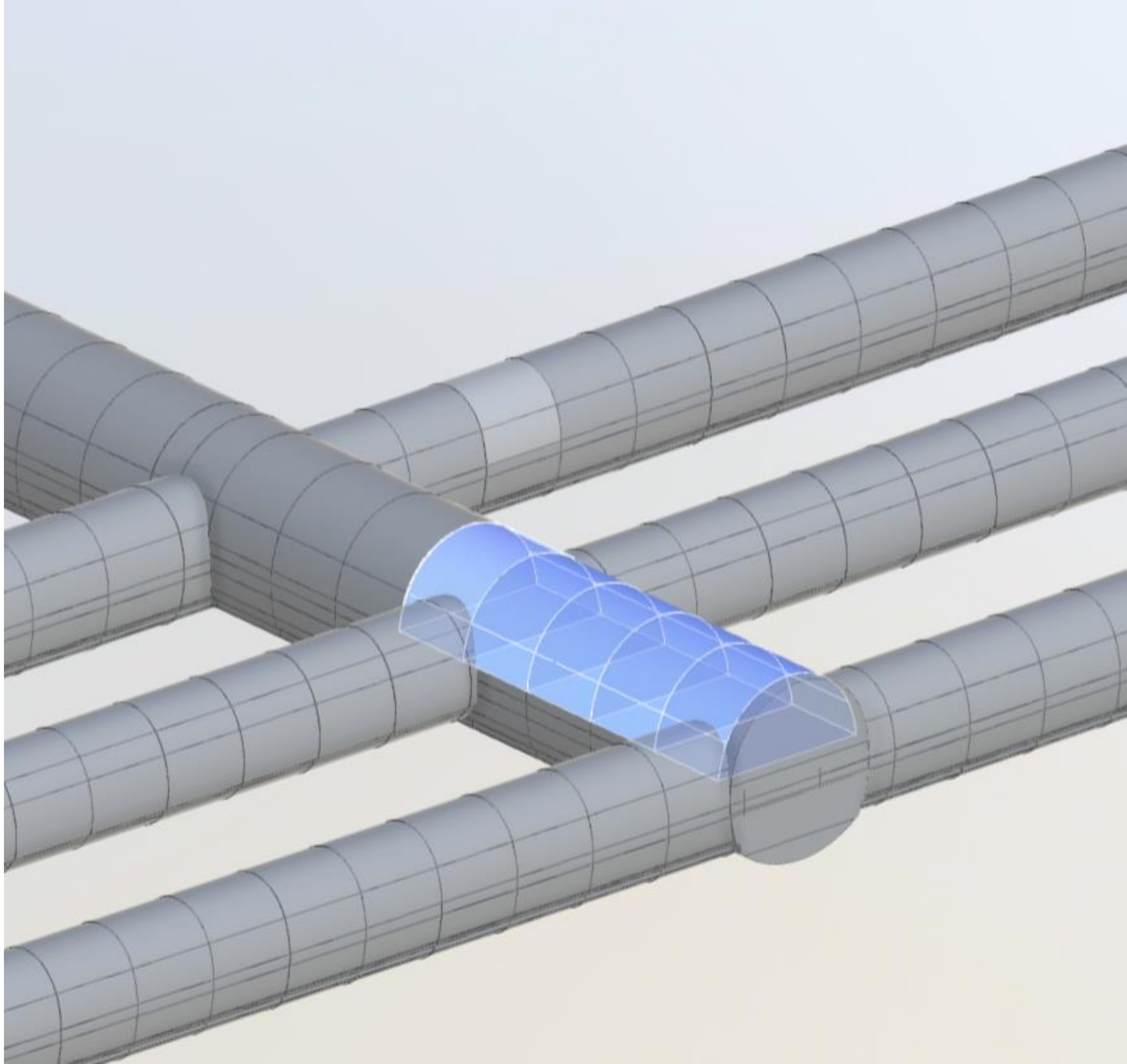
4D

- Easy to



5D

- Easy to



Training & Works

Training & Works

Benefit fact

Benefits

TELT

How BIM maximizes the added value

- Avoid demolition
- Respect milestones
- Minimize risks

Benefits

SO 6&7

How BIM maximizes the added value

- Avoid demolition
- Respect milestones
- Minimize risks

Next steps

Next steps

- IoT
- Machine learning
- Data Analysis

AUTODESK

“Il n’y a peut-être rien de si fou que de croire avoir toujours raison.”

“There is perhaps nothing so crazy as believing that you are always right.”

Voltaire

AUTODESK

Thank you!

Michele and Salvatore

Title

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