Interreg

Co-funded by the European Union

Italy – Croatia

DIGITPORTS

3D GIS and migration process from CAD – a case study

Matteo De Minicis

High Level Training on Digital Twin applications in Port ecosystems, Venice 28th Jan 2025

Interreg

Co-funded by the European Union

Italy – Croatia

DIGITPORTS

3D GIS is a foundation for Digital Twins

Interreg Co-funded by the European Union

Italy – Croatia

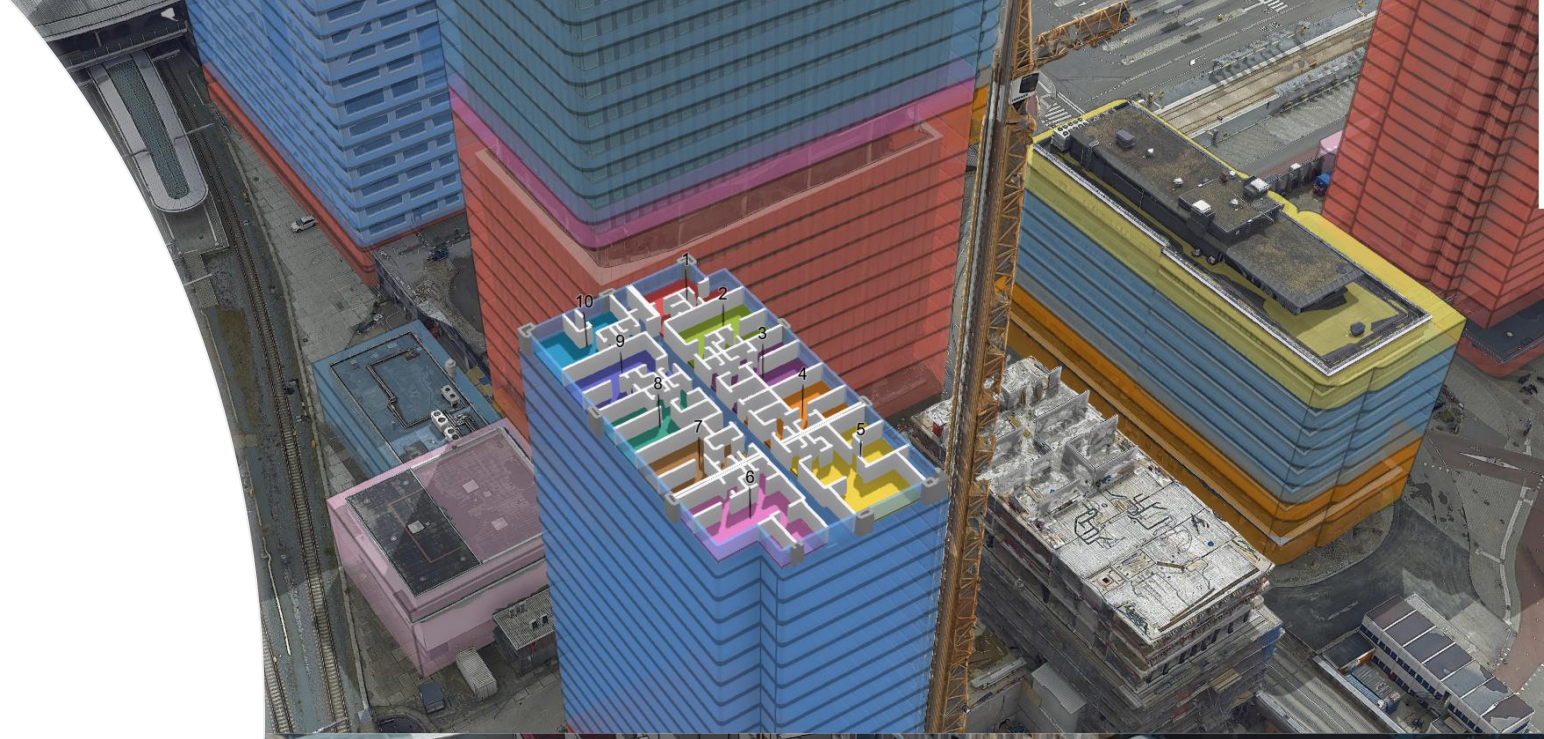
DIGITPORTS

3D buildings are significant assets in a 3D GIS

Not only for representation purposes

BIMs are a great place to start

.. but they are often not available



Interreg Co-funded by the European Union

Italy – Croatia

DIGITPORTS

Case study - Digitalization of railway Stations Project

Centralize and normalize the **floor plans (CAD)** of the stations.

Standardizing the data model – **IMDF (Indoor Mapping Data Format)** of the Open Geospatial Consortium OGC

Create a geodatabase functional to the management of indoor spaces and indoor navigation.

Census and geolocate the relevant **units and equipment** for maintenance, regulatory and commercial activities.

Automate the drafting of **Station Usage Plans** (PuDS)

Start an **integration between management systems** on a floor plan basis.

Open Geospatial Consortium

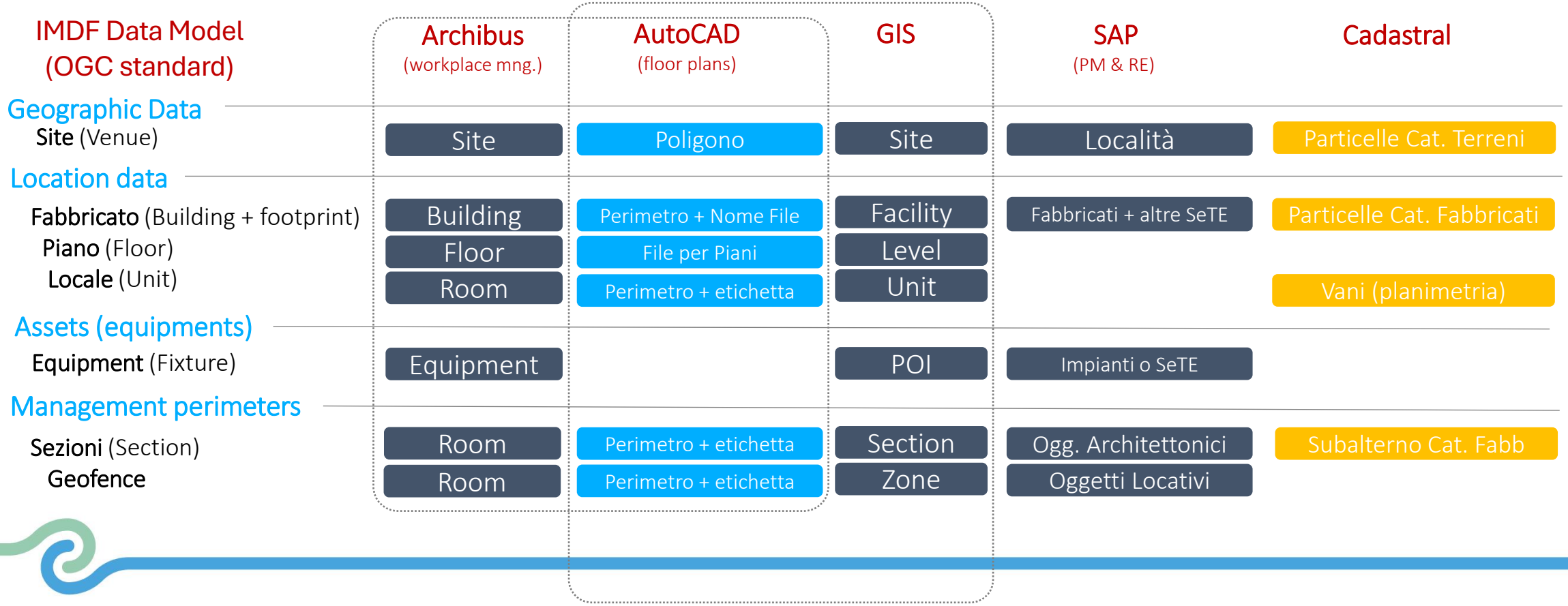
195 main Italian railway stations involved along Italian railway network

Interreg Co-funded by the European Union

Italy – Croatia

DIGITPORTS

Indoor Mapping Data Format – Interoperability



Interreg Co-funded by the European Union

Italy – Croatia

DIGITPORTS

a) setup the workflow - POC Trastevere Station

1) Preparation of the CAD environment of Georeferencing (one-off)
2) Georeferencing floor plans
   Creation of a basic CAD file for the georeferencing of the floor plans for all stations
3) Creating integration perimeters
   Using Architectural Objects, Cadastral objects, Rental Contracts, Functional areas of equal accessibility and visibility
4) Units creation and function pre-assignment
   Perimeter the rooms within each object and attribute a preliminary function of the units
5) CAD to GIS conversion and data integration
6) Deploying the GIS data in a central Geodatabase
7) Field verification and survey
   With the use of a Mobile App in the field, verification of unit functions and census of equipments

Integration perimeters

Units function pre-assignement

CAD 2 GIS conversion

Interreg

Co-funded by the European Union

Italy – Croatia

DIGITPORTS

Workflow for Digitalization of 195 stations

1 *CAD Digitalization*

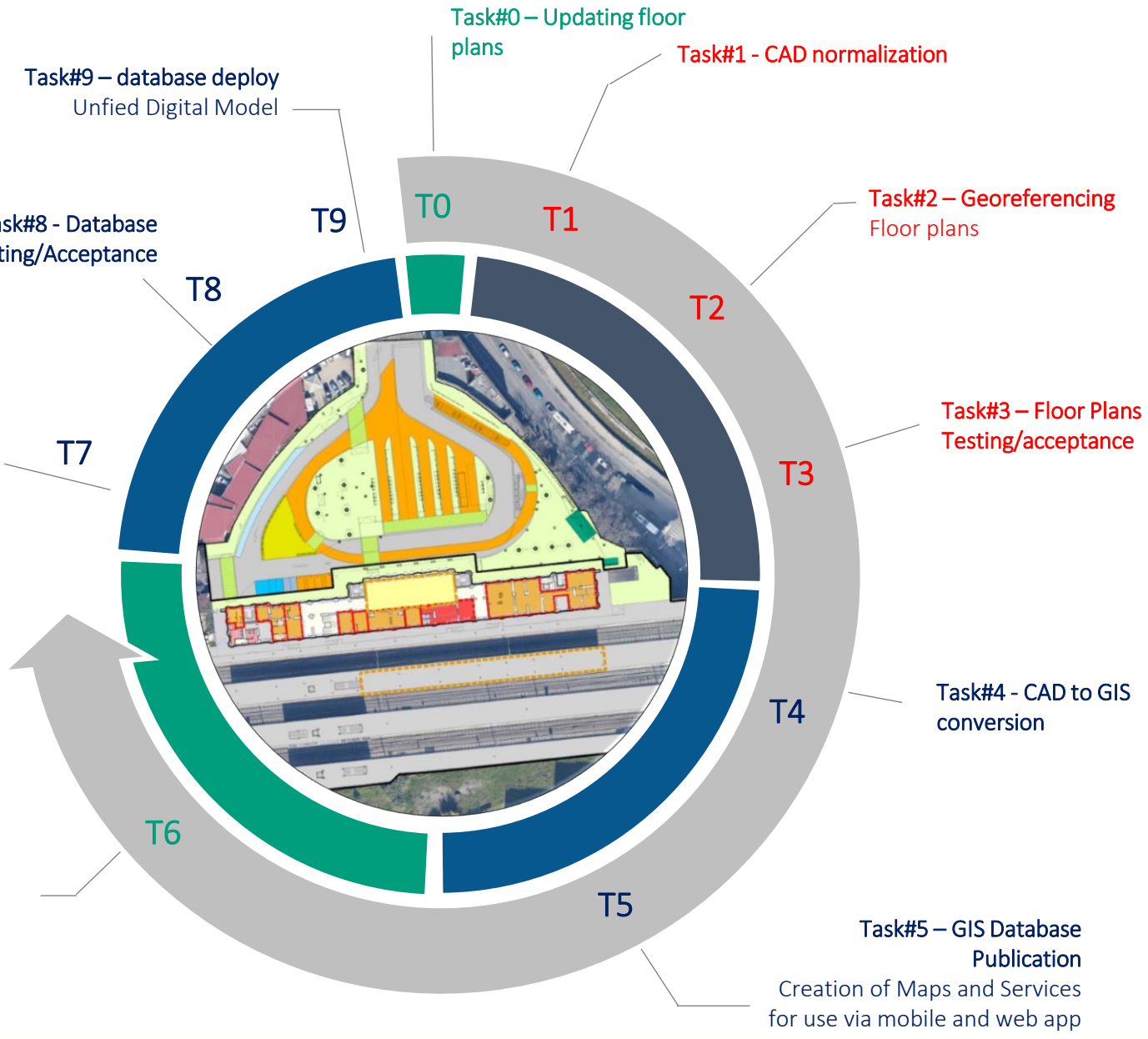
CAD processing experts

2 *GIS Integration*

GIS and CAD integration experts
Knowledge of real estate and cadastral aspects

3 *Field survey*

Maintenance and Commercial Asset Experts to be detected in the field



Task#0 – Updating floor plans

Task#1 - CAD normalization

Task#2 – Georeferencing
Floor plans

Task#3 – Floor Plans Testing/acceptance

Task#4 - CAD to GIS conversion

Task#5 – GIS Database Publication
Creation of Maps and Services for use via mobile and web app

Task#6 - Survey Equipment
Commercial relevance
Maintenance relevance

Units
Type
Access
State

Task#7 - Database Integration
Master data
Technical data
Architectural objects
Rental properties
Contracts

Task#8 - Database testing/Acceptance

Task#9 – database deploy
Unfied Digital Model

Interreg Co-funded by the European Union

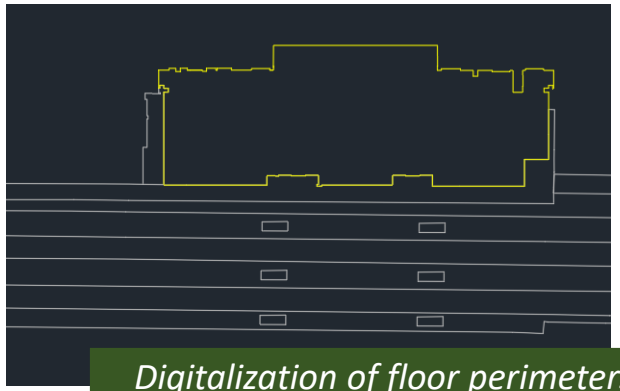
Italy – Croatia

DIGITPORTS

2) testing the digitalization process - POC Vicenza

TASK 0: Updating of floor plans

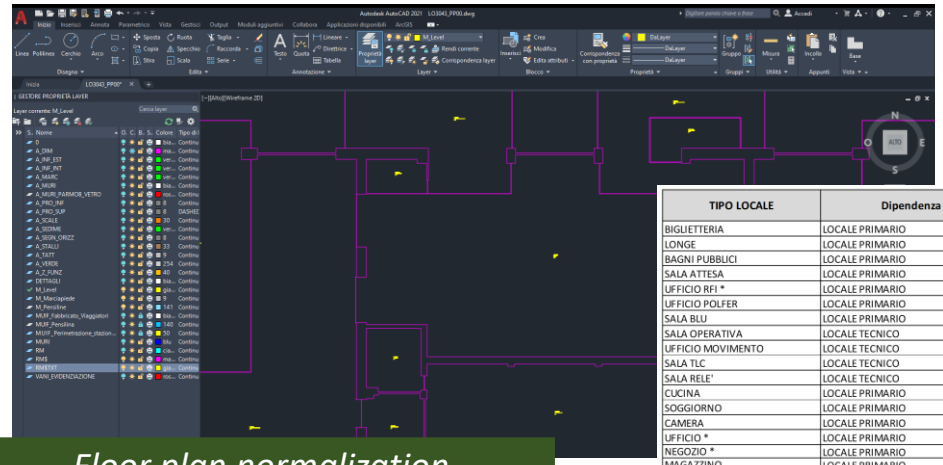
Pre-analysis on the status of the floor plans available



Digitalization of floor perimeters

TASK 1: CAD floor plan normalization - geometries & attributes

- CAD templates with **layers according to standard nomenclature**
- **Digitalization of building floor perimeters;**
- **Geometry improvement processes**:
  - geometries modified for connection with the detailed model of the floors: "Sidewalks" and “Porches“
  - newly created geometries: "Underpass", "Location Porche", "Station Square", "Parking Areas“
- **Verification of the “Unit Type" nomenclature** according to the data model specifications



TIPO LOCALE	Dipendenza
BIGLIETTERIA	LOCALE PRIMARIO
LONGE	LOCALE PRIMARIO
BAGNI PUBBLICI	LOCALE PRIMARIO
SALA ATTESA	LOCALE PRIMARIO
UFFICIO RFI *	LOCALE PRIMARIO
UFFICIO POLFER	LOCALE PRIMARIO
SALA BLU	LOCALE PRIMARIO
SALA OPERATIVA	LOCALE TECNICO
UFFICIO MOVIMENTO	LOCALE TECNICO
SALA TLC	LOCALE TECNICO
SALA RELE'	LOCALE TECNICO
CUCINA	LOCALE PRIMARIO
SOGGIORNO	LOCALE PRIMARIO
CAMERA	LOCALE PRIMARIO
UFFICIO *	LOCALE PRIMARIO
NEGOZIO *	LOCALE PRIMARIO
MAGAZZINO	LOCALE PRIMARIO
RIPOSTIGLIO	LOCALE ACCESSORIO
SOTTOTETTO	LOCALE ACCESSORIO
BAGNO	LOCALE ACCESSORIO
BALCONE	LOCALE ACCESSORIO
TERRAZZO	LOCALE ACCESSORIO
ATRIO	LOCALE CONNETTIVO
CORRIDOIO	LOCALE CONNETTIVO
SCALE	LOCALE CONNETTIVO
ASCENSORE	LOCALE CONNETTIVO
* Altro da qualificare	

Floor plan normalization

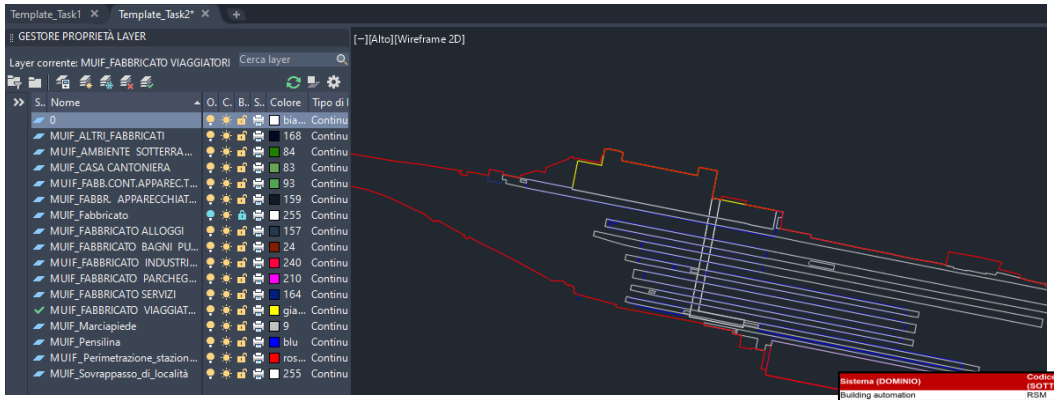
Interreg Co-funded by the European Union

Italy – Croatia

DIGITPORTS

TASK 2: CAD georeferencing

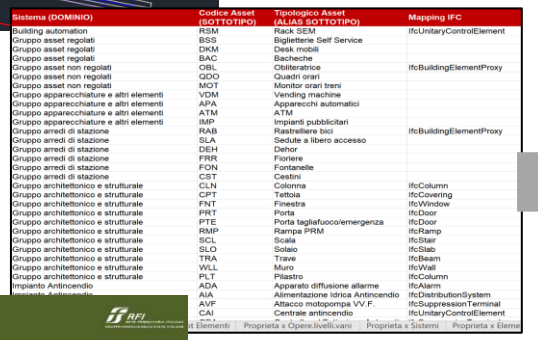
- Unique CAD template for georef. Plans
- CAD floor plans geographically placed



TASK 3: CAD testing/acceptance

TASK 4: CAD to GIS conversion and SAP data integration

TASK 5: Data deploy in central data model



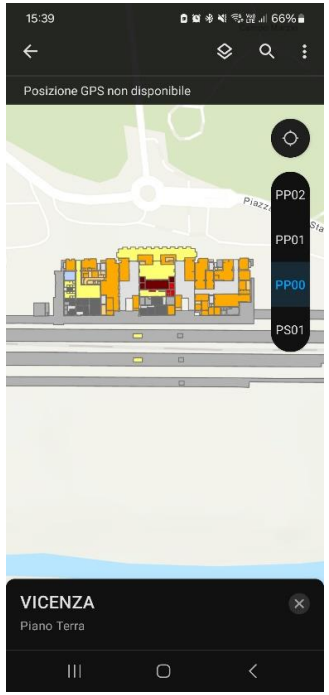
Interreg Co-funded by the European Union

Italy – Croatia

DIGITPORTS

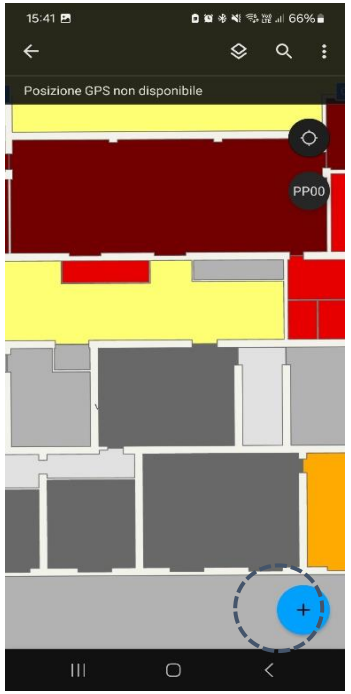
TASK 6: Equipment survey and unit verification

Survey mobile app - Detecting equipments



1.Data model published online (webGIS).

2. Choice of group/plant to detect equipment.



3. Zoom in to identify location.

4. Positioning and choice of the type of equipment to detect

5. Added information to the survey: photo, attachment, notes

Interreg Co-funded by the European Union

Italy – Croatia

DIGITPORTS

TASK 6: Survey results

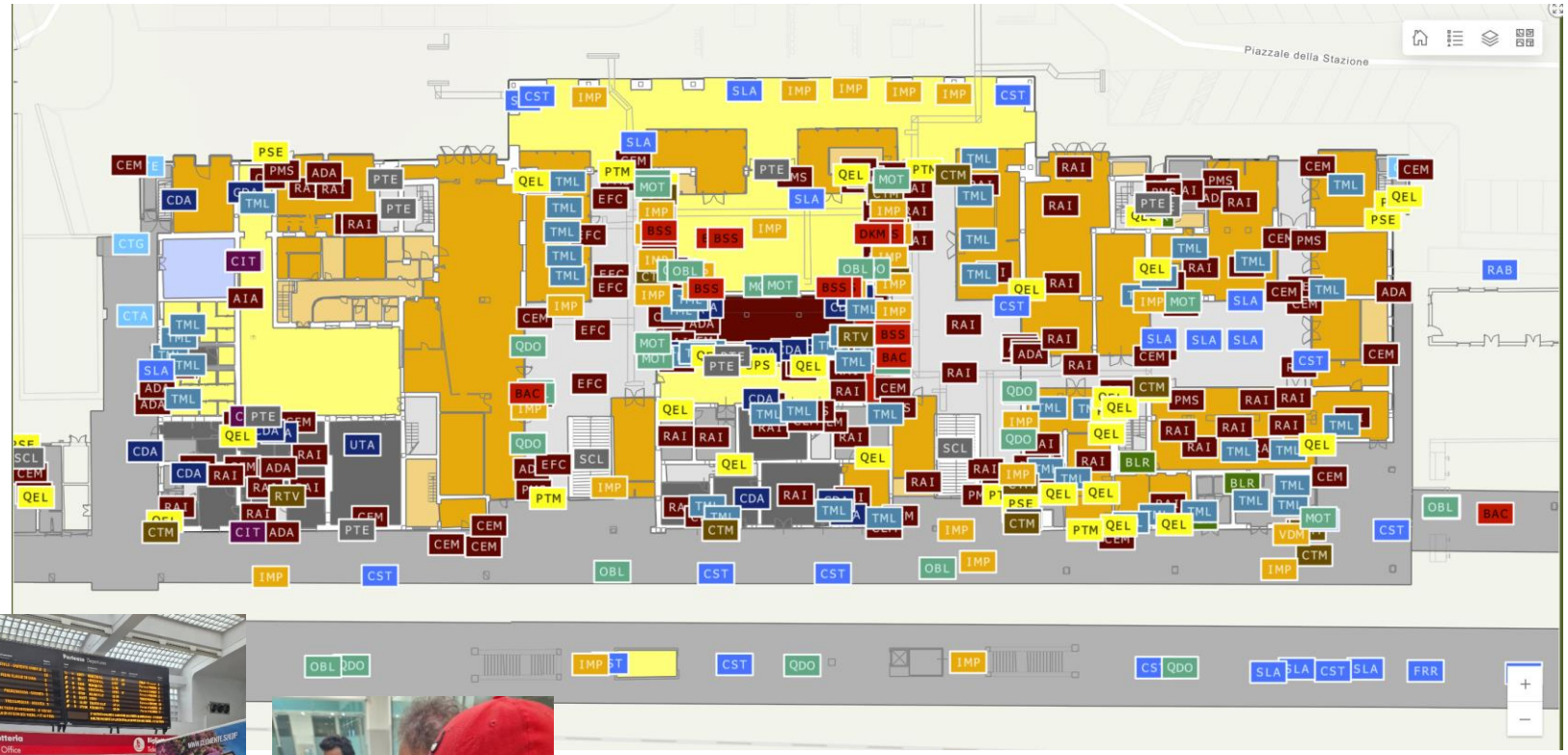
600+ items detected

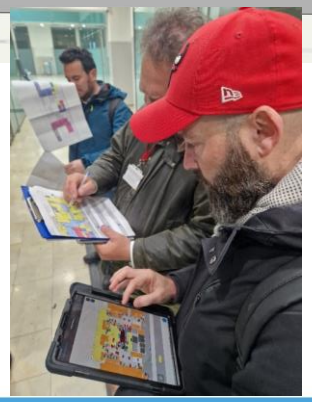
65 equipment types

261 units detected/verified

2 floors + 1 underpass

4 sidewalks





STATO DI OCCUPAZIONE	Dipendenze	Descrizione
APERTO	TITOLO LOCATIVO LOCATO	Locale locato aperto
CHIUSO	TITOLO LOCATIVO LOCATO	Locale locato ma non in esercizio
LIBERO	TITOLO LOCATIVO NON LOCATO	locale libero
SOSPESO	TITOLO LOCATIVO LOCATO	Locate temporaneamente chiuso (lavori)
OCCUPATO	TITOLO LOCATIVO / NON LOCATO	Locale occupato senza titolo

Interreg Co-funded by the European Union

Italy – Croatia

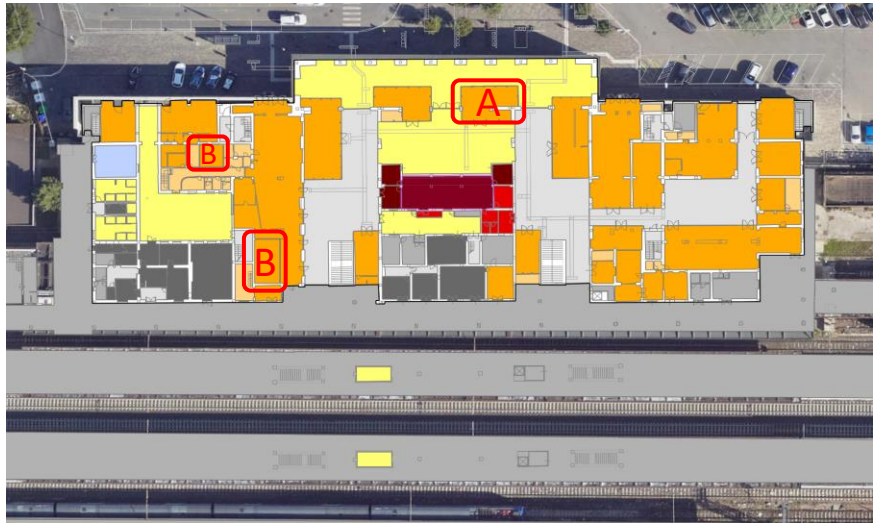
DIGITPORTS

POC Vicenza - Post-survey activities

TASK 7: Database integration

TASK 8: Database verification and testing

- **Discrepancies and problems detected:**
  - Planimetric correction on a non-existent unit**[A]**
  - units without access (walled) inside rented commercial premises**[B]**
  - PUdS mismatch with occupancy status of units**[C]**
  - Dicrepancy between units present in PUdS Vicenza and Contracts



Digital model VICENZA Station

PUdS - Plan for the use of VICENZA Station

Interreg Co-funded by the European Union

Italy – Croatia

DIGITPORTS

c) Project - Working teams

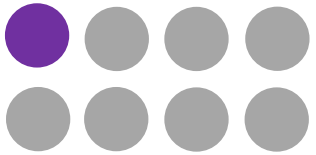
Central team

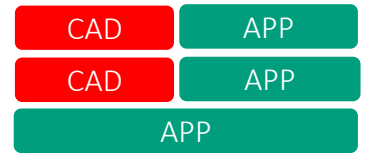
- *Project Manager*
- *General staff*
- *CAD Expert Team*
- *3 GIS/CAD Experts*

Duties

- Centralization and management of floor plans
- Defining and Applying the Data Model
- Testing of collected data
- Training and support to the territory

Regional Teams





- *1 Data Manager*
- *1 CAD Expert*
- *Surveyors Team (spot)*

Duties

- Testing of surveyed floor plans
- Survey of relevant assets

Subcontractors

- *Surveyors and CAD Team*

Duties

- Planimetric update to the current state
- Normalization and georeferencing of floor plans
- Specific assets Survey

Interreg Co-funded by the European Union

Italy – Croatia

DIGITPORTS

c) Project - Execution plan

Preliminary activities

PH. 0 Preparatory activities for the start of the station digitalization project

By Q1 2024

Digitalizalition activities

PH 1 Digitalization of the **195 Railway Stations**

By Q3 2024

Re-alignment activities

PH 2 Verification and alignment of the real estate database (cadastral remediation)

To be done

Interreg

Co-funded by the European Union

Italy – Croatia

DIGITPORTS

Contacts

Esri Italia, IT

mdeminicis@esriitalia.it

+39 348 1934662 / +39 335 5758262

https://www.italy-croatia.eu/it/web/digitports