openBIM® Processes Helped Minnucci Associati s.r.l. Deliver Whole-life Value for Naples Station

buildingSMART International

About Naples Centrale Station

The Naples Centrale Station is the main railway station in the city of Naples, Italy. The station is the sixth largest for passenger flow in Italy, catering for around 150,000 people a day with around 400 trains in operation. The owner-operator, Rete Ferroviaria Italiana (RFI), is responsible for the management and safety of rail traffic on the entire national network including the track, stations and installations.

With the need to develop new buildings and better understand their existing assets, RFI required a solution that could capture and model their existing buildings and an open and collaborative framework for integration into their facilities management system to help improve the whole-life value of their assets. This openBIM solution would need to integrate with their existing facilities management platforms. With passenger flow, experience and health and safety being of central importance to the station, RFI required all project participants to work in a standardised methodology.

Improving the Management of Data

The aim of this project was to improve the overall passenger experience, including safety and flow as well as better integrate services from commercial buildings. RFI also wanted project teams to work within buildingSMART standards and toolkits to better manage the flow of information.

Part of the scope of the project included a scan and survey of the station. This was needed because they didn't have a digital representation of the existing assets within the station itself. The data captured would need to be modelled by a team of BIM specialists to develop new digital representations of the existing station. By capturing the existing assets and developing a digital workflow, RFI wanted a process to connect BIM deliverables with their teams in an automated workflow.

To keep pace with growing demands, the owner needed to eradicate existing paper-based decision-making for new building installations and ongoing maintenance decision-making. RFI also wanted to enforce open and interoperable standards to improve the flow of the newly created data.

As BIM manager for the project, Minnucci Associati s.r.l. needed to develop a BIM model covering the 5 main buildings, spanning over 400,000 square meters to provide a digital data workflow to manage thousands of components including electrical, HVAC, hydraulics, and other critical assets that need regular maintenance.

Creating a Common Data Environment

Minucci also needed to create a common data environment (CDE) to set up an exchange, storing and verification of the BIM deliverables. GRAPHISOFT's BIMcloud was the chosen solution. This solution would provide the platform to collaborate and communicate with all project stakeholders and develop an openBIM methodology to manage the digital flow of data that was needed for asset performance. The CDE needed to be open and interoperable and inclusive of participants from other organizations. It also had to meet the technical specifications and documentation as set out by RFI.

The CDE needed to house 12,500 components that were divided into 65 groups. These components included the geometry, parametric values and a location code. The CDE helped to federate 44 different models to create their Asset Information Models (AIM) which could be connected to their maintenance system, SAP.

All assets were then modelled and tagged, and a mobile app was developed enabling mobility of information and asset recognition through barcode recognition. This level of innovation relied on good data management through the CDE and interoperability between their digital applications.

Project Overview
Minnucci Associati s.r.l.

Location:
Naples, Italy

Objectives:
To develop an openBIM methodology to integrate with existing facilities management processes

Software used:
Leica TruView, CloudCompare, Smart City 3D, ARCHICAD, BIMcloud, BIMx Pro, SOLIBRI Model Checker (SMC), Tekla BIMsight, GeoWeb Fm, GeoWeb Smart Build CCDE, Lumion 7

buildingSMART tools:
IFC 2x3
BCF
bSDD

Napoli Centrale is the main railway station in the city of Naples and in southern Italy and the sixth largest station in Italy in terms of passenger flow. The station has 150,000 daily passengers, 400 operational trains and an annual ridership of 50 million passengers.

Highlights:

- 44 different designs that totaled 12,500 components

- Point clouds were 380 gigabytes in size

- 7 different stakeholder organizations involved in the project

Managing Big Data

Spanning the 5 main buildings, Minucci had to map and model this large surface area with multi-layers of complexity. A high-level of detail was needed so an accurate solution was developed. Laser scanners were used to capture the existing assets with a point cloud of the area totalling 380 gigabytes. To make this process more manageable, the data was partitioned into smaller groups and assigned to a designer. Each designer connected the existing drawings and models with the new point cloud data and the result was stored and managed in the CDE.

GRAPHISOFT's ARCHICAD was the chosen BIM authoring tool with an open workflow with IFC. The 44 models created were shared with the owner for approval. By mapping the BIM authoring tool with IFC open standards, Minucci was able to create automated workflows and instant asset recognition.

buildingSMART Tools Deployed

This project benefited from a variety of buildingSMART tools and solutions to enable better collaboration, cooperation and value from their BIM deliverables. IFC2x3 was deployed for Coordination View, Reference View, Design Transfer View and FM Handover View. By committing to this way of working, and adopting buildingSMART standards, this project was able to take advantage of an openBIM workflow to meet the overall project demands.

Coordination View

The IFC coordination view was able to merge different models to better check geometric interferences and IFC sheet information inconsistencies. IFC files were exchanged with other BIM checking tools (Solibri Model Checker) to validate the model. This was used for clash detection, deficiency detection, and enabling the matching of elements.

IFC Reference View

The IFC standard was used for delivering the milestones for the client through the various stages of the lifecycle of the project. This process helped RFI represent the ongoing progress of the virtual model against the state of the project as a method for progress reporting. As a result, the client was kept up-to-date with the project milestones and timelines.

Design Transfer View

As part of the contractual obligations, the IFC models were delivered to the client either at revision stage or against final completion of the milestones.

The validation, contract compliance and final model acceptance were based on IFC files jointly authored. The IFC models were imported into the CDE-integrated IFC view for all project participants.

FM Handover View

IFC standards were used to import models into the existing SAP facilities management platform. Properties were mapped to their IfcProperty and gathered into IfcPropertySet. All maintenance objects were identified, classified and placed into the model using IFC standard.

BIM Collaboration Format

The XML format open file BCFXML and the BCF open file were used to check the compound's buildings geometric interferences. All models were merged into a unique reference view in Solibri Model Checker software and the BIM coordinator generated the revision report.
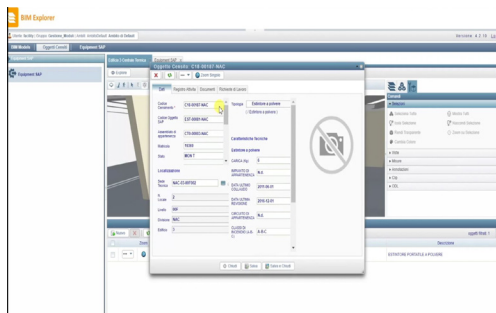
Minucci used a variety of tools to connect to an existing facilities management system

buildingSMART Data Dictionary

The buildingSMART Data Dictionary (bSDD) was used as reference guide to define all undergone maintenance objects within Naples Centrale Station, classifying them either as IFC type level or at lower level as IFC subtype. This consistent language provides greater assurance to all stakeholders on the project.

The value of openBIM

As a result of adhering to open standards, Minucci was able to demonstrate true value in developing, managing and exchanging BIM deliverables as well as seamless integration with existing facilities management tools. This openBIM approached helped to not only capture and model the existing station but enabled better decision-making by providing accurate digital information that would be used for the ongoing operations and maintenance of the Naples Centrale Station.

"The most complex and important aspect that BIM offered us was the ability to support the need for building stock management throughout the project.

We are able to design and create a virtual building model using the latest openBIM technologies, delivering exceptional management and maintenance capabilities during the entire process.

This was only possible thanks to the buildingSMART's open digital data workflows."

Ernesto Minnucci
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