DigitMan
Occupant-based DIGITal predictive MANteinance to improve the built environment

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WP 1 – Conceptual framework and database definition

T.1.3 – Data acquisition methodology

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Abstract

This deliverable reports on the data acquired and structured to build the knowledge base of the DIGITMAN project, encompassing an array of databases and models useful for the project's purposes. The document details the creation of tables that synthesize building data from partner institutions' buildings, structured in integrated relational and graph databases for consistency and ease of querying. In particular, the static elements and related semantic data are stored within a graph database, maintenance textual logs are deposited within a MySQL database, and sensors' observation are store into JSON documents. Finally, the deliverable provides the building information models developed for three significant buildings within the sample analyzed. These models are stored in formats compatible with industry-standard software such as Autodesk Revit, Industry Foundation Classes (IFC), and Topologic JSON files.

Keywords

Relational Database, Knowledge Graph, Text Logs, Sensor Logs, Building Information Models, Building Topology Models

Approvals

Role	Name	Partner	Date
Coordinator	Marco D'Orazio	UNIVPM	26/07/2024
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Revision versions

Revision	Date	Short summary of modifications	Partner
001	02/05/2024	Document creation and drafting	UNIBO
002	23/07/2024	Text formatting and grammar checking	UNIBO

Summary

1 Tables

The methodology for delivering the DIGITMAN data acquisition table is detailed in Deliverable 1.1. To reference the collected data, Table 1 below provides the links to access the documents.

Table 1: Tables of Spaces and Systems classified by DIGITMAN.

Deliverable	Content	Type	Link
1.3.1.1 Table of Buildings	Table summarizing information about the buildings under investigation with identification of topological relationships and the basic attributes aligned in a common notation.	Table	DIGITMAN_Tables_TableOfBuildings_b.xlsx
1.3.1.2 Table of Spaces	Table summarizing information about the spaces under investigation with identification of topological relationships and the basic attributes aligned in a common notation.	Table	DIGITMAN_Tables_TableOfSpaces_d.xlsx
1.3.1.3 Table of Devices	Table summarizing information about the equipment and sensor devices under investigation with identification of topological relationships and the basic attributes aligned in a common notation.	Table	DIGITMAN_Tables_TableOfDevices_d.xlsx
1.3.1.4 Table of Sensor Points	Table summarizing information about the sensor points under investigation with identification of topological relationships and the basic attributes aligned in a common notation.	Table	DIGITMAN_Tables_SensorPoints-b.xlsx

2 Graphs

The methodology for delivering the graph database file is presented in Deliverable 1.1. Table 2 below outlines the details of the Spatial and Equipment Element Database, including the topological and equipment hierarchies of the selected case studies, as well as the property sets of the main elements. The graph database is provided as a JSON-LD document.

Table 2: Graph database for Spatial and Equipment elements classified by DIGITMAN.

Deliverable	Content	Type	Link
1.3.2.1 Spatial and Equipment Element Database	Graph database containing the topological and equipment hierarchies of the selected case studies, as well as the property sets of the main elements.	JSON-LD document	DIGITMAN_Graphs_SpatialAndEquipmentElementDatabase.json

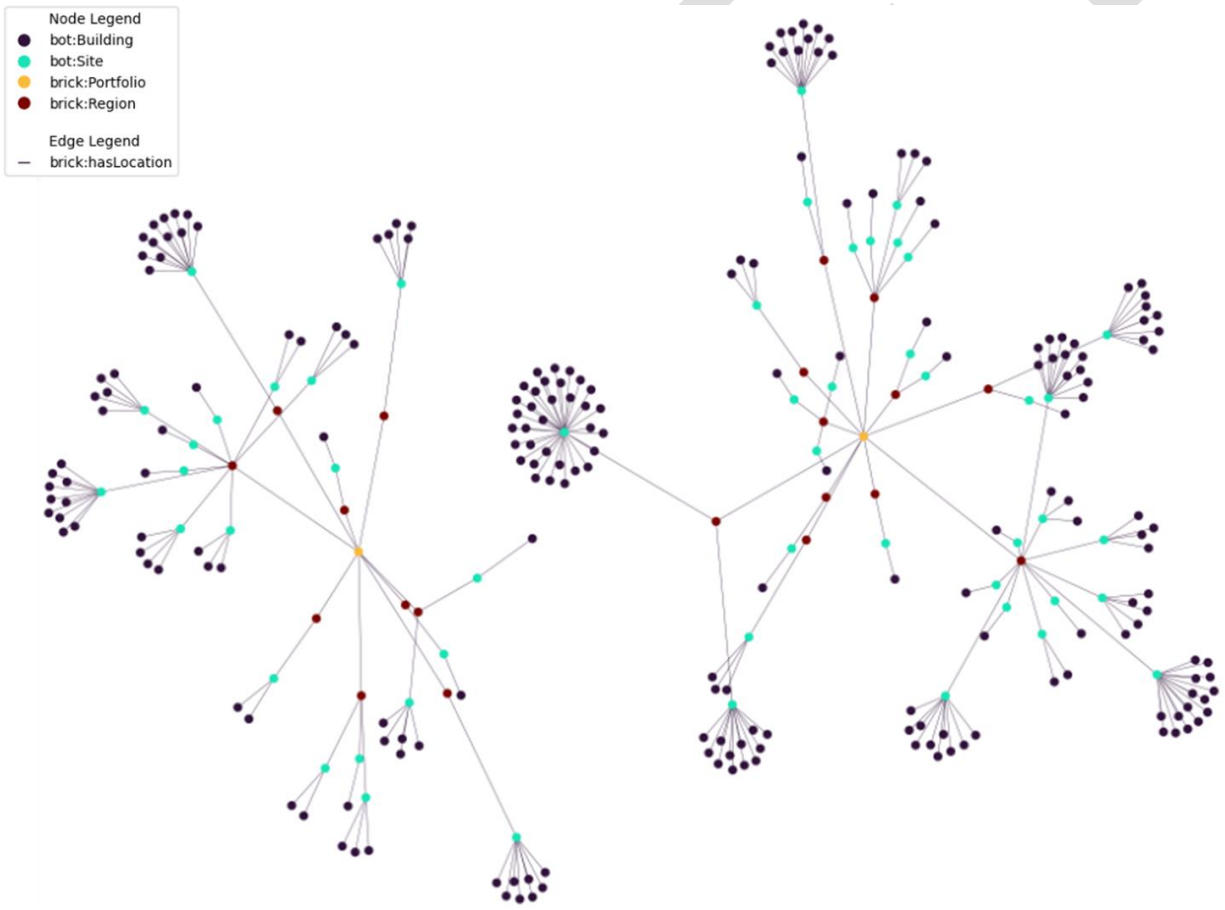

Figure 1: View of a part of the graph database mapping some spatial elements belonging to the portfolios in question.

3 Logs

The methodology for delivering the logs is presented in Deliverable 1.1. Table 3 below outline the details of the Maintenance Activity Logs and Sensor Observations, respectively. These databases contain maintenance requests and sensor measurements in shared notation formats.

Table 3: Database tables for Logs and Observations acquired by DIGITMAN.

Deliverable	Content	Type	Link
1.3.3.1 Maintenance Activity Logs	Database containing all the maintenance requests in a shared notation.	SQLite3 database	DIGITMAN_LogsAndObservations_MaintenanceActivityLogs.db
1.3.3.2 Sensor Observations	Database containing all measurements taken by sensors in a shared notation.	JSON document	DIGITMAN_LogsAndObservations_SensorLogs.json

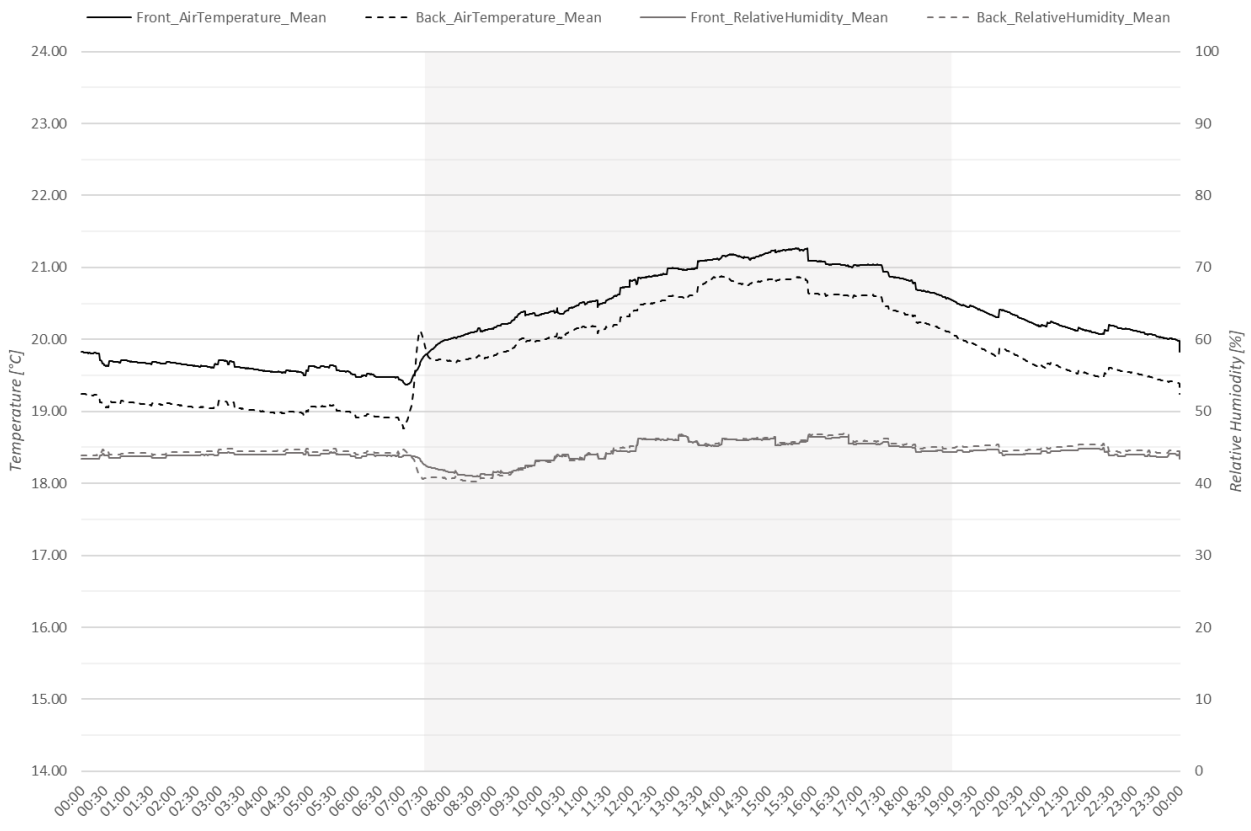

Figure 2: Example of processed data contained in the Sensor Observation, pertaining to the analysis of classroom A13.

4 Models

The methodology for delivering the Building Information Models (BIM) is presented in Deliverable 1.1. Table 4 below outline the details of the BIM models for the respective case studies. These models include various formats such as Revit, IFC, and Topologic.

Table 4: BIM models produced based on DIGITMAN methodology.

Deliverable	Content	Type	Link
1.3.4.1 Case Study 1's Building Information Models	BIM models of BAS Building (Ancona)	Revit/IFC /Topologic models	DIGITMAN_Models_UNIVPM-BAS
1.3.4.2 Case Study 2's Building Information Models	BIM models of Building 9 (Lecco)	Revit/IFC /Topologic models	DIGITMAN_Models_POLIMI-Edificio9
1.3.4.3 Case Study 3's Building Information Models	BIM models of Building 10 (Lecco)	Revit/IFC /Topologic models	DIGITMAN_Models_POLIMI-Edificio10

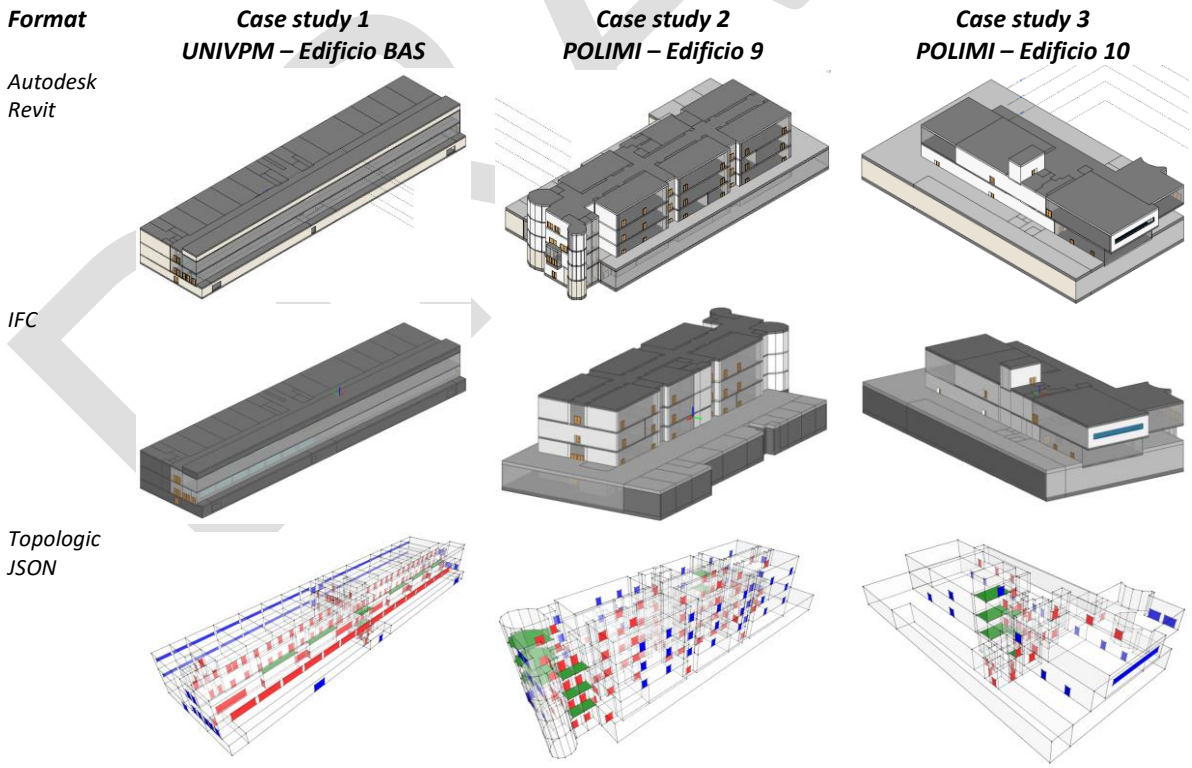

Figure 3. The IBIM models created for the DIGITMAN project case studies.