



D2.9 – White paper on BIMprove open layer services software and data structure



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Reviewer(s)	Gabor Sziebig (SINTEF)

Abstract

The BIMprove project is dedicated to open-access research and an Open Research Data Pilot has been created in the frame of project. This deliverable describes where to find the parts of the data pilot. The main benefit is an open-access dataset called "BIMprove", where all the three Pilot Use-Cases are shown, along with a laboratory use-case setup.

Keywords

Software development, IFC, Open-access, Data repository, ORDP

Revisions

Version	Submission date	Comments	Author
v0.1	21.11.2022	Initial version	Dag Fjeld Edvardsen (CATENDA)
v0.2	16.12.2022	Data approved for release	HRS, VIAS, AFG, ZHAW
v1.0	30.12.2022	Approved, final version	Gabor Sziebig (SINTEF)

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BIMprove project

In the past 20 years, productivity in the European construction industry has increased by 1% annually only, which is at the lower end compared to other industrial sectors. Consequently, the sector has to step up its digitization efforts significantly, on the one hand to increase its competitiveness and on the other hand to get rid of its image as dirty, dangerous and physical demanding working environment. Construction industry clearly needs to progress beyond Building Information Modelling when it comes to digitizing their processes in such a way that all stakeholders involved in the construction process can be involved.

The true potential of comprehensive digitization in construction can only be exploited if the current status of the construction work is digitally integrated in a common workflow. A Digital Twin provides construction companies with real-time data on the development of their assets, devices and products during creation and also enables predictions on workforce, material and costs.

BIMprove facilitates such a comprehensive end-to-end digital thread using autonomous tracking systems to continuously identify deviations and update the Digital Twin accordingly. In addition, locations of construction site personnel are tracked anonymously, so that **BIMprove** system services are able to optimize the allocation of resources, the flow of people and the safety of the employees. Information will be easily accessible for all user groups by providing personalized interfaces, such as wearable devices for alerts or VR visualizations for site managers. **BIMprove** is a cloud-based service-oriented system that has a multi-layered structure and enables extensions to be added at any time.

The main goals of **BIMprove** are a significant reduction in costs, better use of resources and fewer accidents on construction sites. By providing a complete digital workflow, BIMprove will help to sustainably improve the productivity and image of the European construction industry.

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1. Open Research Data Pilot

In BIMprove project an Open Research Data Pilot has been created.

The first step was to publish the used application protocol interfaces:

In the D1.5 Data Integration Interfaces for Building Industry using BIM and Digital Building Twins details has been [published](#).

This was followed by all the functionalities, which can be [seen](#) in D2.7 User interface software and interface description. Including all software developed available as an open-source solution.

As a last step, all three Pilot Use-Cases provided all the necessary source files, forming the so called "Dataset BIMprove". The repository view is shown in Figure 1.

The screenshot shows a Bitbucket repository page for 'Dataset BIMprove'. The interface includes a left sidebar with navigation options like 'OpenAccess', 'Source', 'Commits', 'Branches', 'Pull requests', 'Pipelines', 'Deployments', 'Jira issues', 'Security', 'Downloads', and 'Repository settings'. The main content area displays a file list with columns for file name, size, and commit information. Below the file list is a 'readme.md' file viewer showing the following text:

Dataset BIMprove

All data owners have given permission to use the data for scientific and academic purposes. The data is gathered during the BIMprove - Improving Building Information Modelling by Realtime Tracing of Construction Processes. BIMprove is a joint effort among 12 European partners (from Norway, Spain, Germany, Switzerland and Finland) covering all key areas of the construction value chain. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No.950450.

Please pay attention: This repo uses Large File Storage. Install this [Git extension](#) on your client side.

The dataset contains the following elements:

- Design model in .JFC and
- Issues (collision / clash detection) in BCF (.bz2zip)
- Subcontractor models in .JFC
- Flooring
- Walls
- Stairs
- Fencing
- Steel
- Roofs
- Prefab
- Schedule/Planning in .mmp
- As-planned models in .JFC
- As-built models in point cloud formats .LAS and .E57
- Results comparison as-planned and as-built models in BCF (.bz2zip)

Some files contain some errors and therefore have to be treated carefully.

On the right side of the repository view, there are sections for 'Repository details' (showing last updated time, pull requests, branches, watchers, forks, and access level) and 'Builds' (with a 'Set up a pipeline' button).

Figure 1 Screenshot from the repository hosted on Bitbucket

The repository is currently hosted on Bitbucket on the following link: <https://bitbucket.org/sintef-manufacturing/openaccess/>

1.1. Pilot Use-Case 1 (HRS)

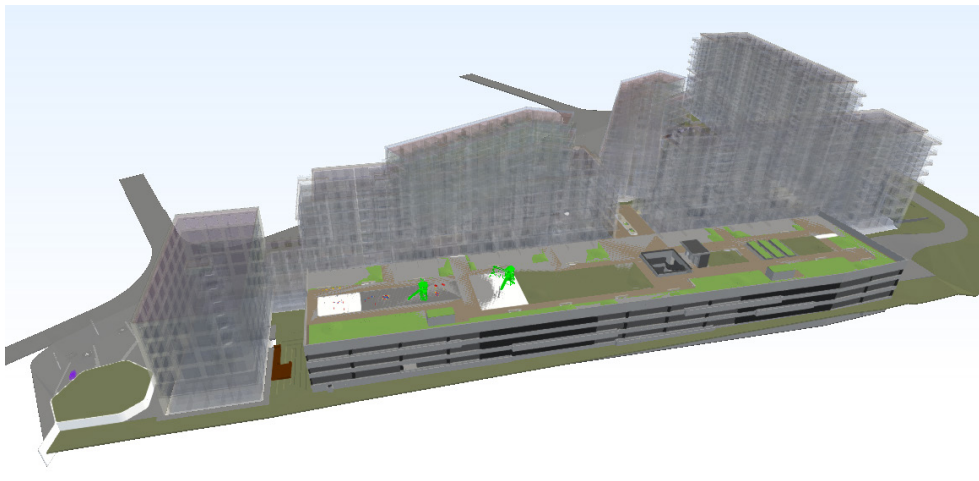


Figure 2 Visualization of apartments at HRS in Lausanne, Switzerland.

1.2. Pilot Use-Case 2 (VIAS)

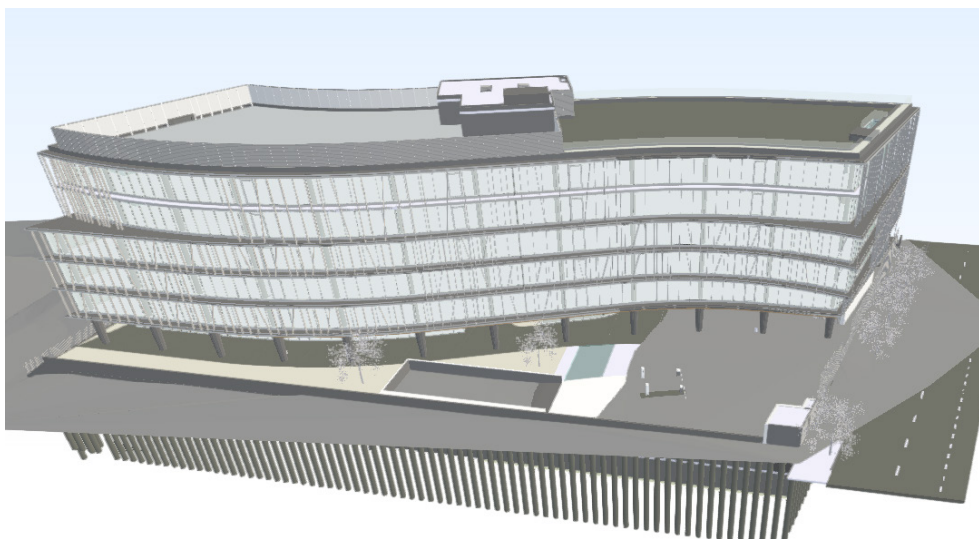


Figure 3 Visualization of Office building at VIAS in Madrid, Spain

1.3. Pilot Use-Case 3 (AFG)

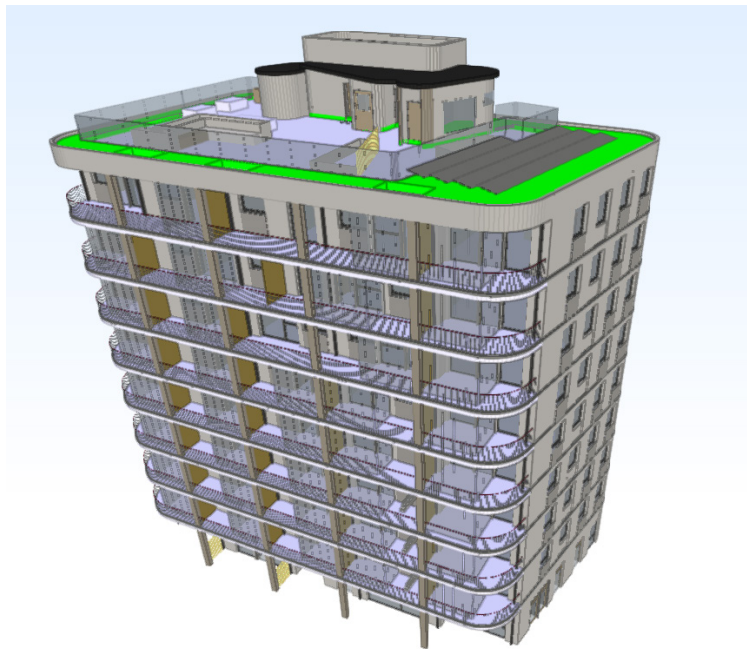


Figure 4 Visualization of Building D at AFG in Oslo, Norway

1.4. Laboratory Use-Case (ZHAW)

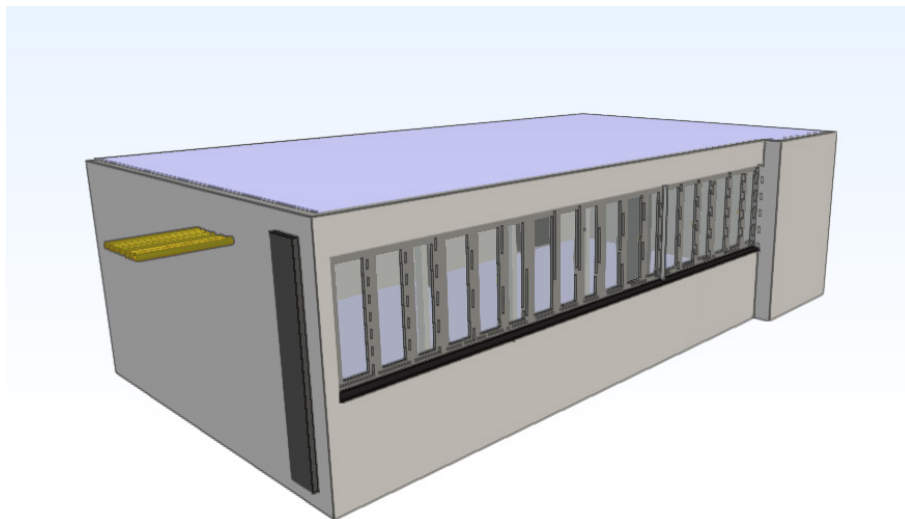


Figure 5 Visualization of Robot laboratory at ZHAW in Winterthur, Switzerland