



wDegrQBI

Handover to FM with openBIM - Marshal's Office, West Pomerania

Entrant details

| | | |
|---|--|---|
| Role or Job Title on the Project | | Head of Digital Transformation Department |
| Employer | | Mostostal Warszawa S.A. |
| Employer Role | | Construction, Fabrication or Supply Chain Company |
| Are you or your employer a member of buildingSMART? | | Yes - Chapter Member |

Entry details

Entry Details

By checking this box I understand and acknowledge that this awards program is to assess information about openBIM, and that openBIM is not only about the use of solutions. openBIM is about setting up an environment where every party in a team can work in the optimal way ("how they prefer") without putting limitations on others. It is about freedom to take control over your data and workflows, while keeping that freedom for others as well. Full use of open standards is not mandatory for this mission.

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Website

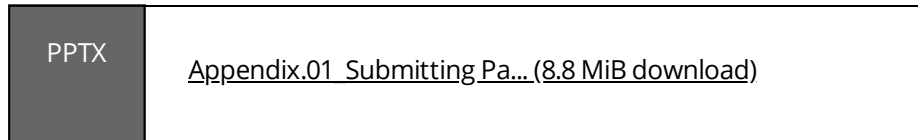
<https://www.mostostal.waw.pl/en/projects/eco-friendly/the-seat-of-the-west-pomeranian-voivodeship-marsha>

Location

Marszałka Józefa Piłsudskiego 40, 70-421 Szczecin, Poland

Google maps link: <https://goo.gl/maps/bfpR2xrbuAEfa31s7>

Submitting Party and Stakeholder Logos (compiled into one .ppt/pptx file for upload)



Entry Description

PROJECT OVERVIEW

Project Name:

The Marshal's Office of West Pomeranian Voivodeship

- Contract Type: Design&Build
- Building category: Office complex
- Project Type: Public
- Total budget: 44 mln Euro
- Total usable floor area: 10760m²
- Gross volume: 118330m³
- BREEAM certification rating- Very Good
- Certification of Passivehaus Institut in Darmstadt

PROJECT OBJECTIVES:

The project aim was to build a modern government office complex consisting of two buildings: Z1 and Z2.

- Building Z1 needed to be deeply renovated and thermo-modernised in order to minimise heat loss and significantly reduce operating costs in the long run. **Z1 was handed over to the Client in January, 2022.**
- Building Z2 is a new construction which needs to be built as a passive building.

In terms of BIM information requirements, the Client's main goal was to use as-built BIM models and implement a Facility Management (FM) platform to sustainably manage the entire office complex. **[Appendix.03/p.2-3][Appendix.06]**

As a general contractor, our job was to manage the project and information delivery from our supply chain (designers, subcontractors, manufacturers).

Our company's strategy for BIM implementation is built on openBIM and involves using this framework on every company project and by all project participants. (Strategy presented in a winning entry of buildingSMART Awards 2021 ("Make it easier with openBIM" [\[https://vimeo.com/645213730\]](https://vimeo.com/645213730)).

We have taken advantage of other projects in our company and incorporated best practices regarding working solely in an openBIM framework and extended that into the handover and facility management stage to create additional value for the Client.

Handover was redefined from a single event to a process encompassing the design, construction and commissioning stages. Rather than just handing over the information from the execution stage to the operation and maintenance stage, we aimed

to properly understand the Client's objectives. We wanted the Client to be able to use the collected information and documentation from the very first day of operation.

BEP and MOBILIZATION PHASE:

Although the Client did not require a Mobilization phase, we took into account all of our previous experiences and decided to carry one out with designers, site crew and the Client according to **ISO 19650-2 principles**. This phase helped us to test software, exchange procedures, develop an **Information Delivery Specification (IDS)** and deepen key project participants' understanding. *[Appendix.03/p.4]*

MULTIDISCIPLINARY COORDINATION, MODEL AND DATA QUALITY CONTROL:

We were not only responsible for design and construction but also for the quality of delivered BIM models and associated information. From the beginning of the project, we placed a strong emphasis on quality assurance and control of design, BIM models and data.

Multidisciplinary coordination, clash detection and model quality checks were based entirely on **IFC models** and the **IDS**. All issues were communicated with **BCFs** via issue management platform. *[Appendix.09/p.38-41]*

AS-BUILT CHANGES AND MODEL VALIDATION:

It is challenging to deliver an as-built model that is coherent with reality, but it was even more so on this site due to the fast pace of the project and the number of subcontractors involved.

In order to deliver an accurate as-built model, we implemented a series of methods:

- as-built changes registry on Dalux that allowed subcontractors to register any changes spotted on site,
- monthly recording of site conditions and works being covered using 360 photos
- fast laser scanning – initially for complicated spaces like: the ventilation services room, boiler room and then for the whole of building Z2.
- overlaying as-built models, 360 photos and point clouds for checking for any discrepancies.
- augmented reality: Dalux TwinBIM app and Hololens equipment for quick checks on site

[Appendix.09/p.3-14]

DESIGN AND IMPLEMENTATION OF THE FACILITY MANAGEMENT PLATFORM:

The Client required the design and implementation of an FM platform consisting of 4 modules: **AIM, CAFM, CMMS, EMS**. *[Appendix.03/p.3][Appendix.09/p.15-32]*

During the design and implementation of the platform, **15 representatives from all departments** of the Marshal's Office as well as the future Facility Manager were involved in the process. We worked in regular sprint sessions with the Client **that lasted 4 months**.

Each module sprint involved training the Client's staff on module functionalities, with staff testing the platform hands-on, validating the expected results and providing comments.

Working closely with future users of the FM platform and listening to their feedback allowed us to adjust Client information requirements and to change how we collect information from our supply chain. It also expedited the migration process of

asset information to the FM platform.

During this time, we developed an **AIM module with a BIM viewer and IFC importer** from scratch. The IFC importer that was created leveraged all of the built asset geometry and information gathered from the design and construction stages and brought them into the O&M stage.

DATA ACQUISITION:

We managed and supervised asset information delivery coming from multiple project participants: designers, subcontractors and manufacturers. **Hundreds of documents** including the information extracted from them as well as information coming straight from site, needed to be associated with BIM components, classifications, systems and types.

All this data was then imported into the FM platform straight from **IFC models** and **customized COBie files** that mapped documents and information to their proper location in the data structure. **[Appendix.09/p.33-37]**

DIGITAL COMMISSIONING:

We took the initiative and convinced the Client to conduct a digital commissioning process for building Z1. The Client could focus on inspection and quality control rather than on bureaucracy. Each defect was clearly communicated with its proper location, associated photos and description. Digital commissioning helped to register and manage all the defects and forward them to our subcontractors. **[Appendix.09/p.46-49]**

SUMMARY:

OpenBIM was essential to this project because it served as a basis for BIM implementation and data exchange.

This entry is competitive not only because of the above-mentioned innovative methods and solutions that were implemented, but also because of the strong focus placed on the Client in the delivery process, emphasizing the Client's requirements and feedback.

As a general contractor, we took full responsibility for leading and helping the Client through all stages of the project: from Design to Handover and O&M in order to bring value and quality to the constructed buildings and collected data.

What stage of completion is the entry content representing?

Building Z1 – Facility Management stage, Handed-over on January 5th, 2022.
Building Z2 – still in Construction

Stakeholder Statements

Client:

We cooperated closely with the contractor during the coordination of the design process, FM platform development, and digital commissioning of the building.

This provided a physical and digital product tailored to our needs.

The openBIM approach gave us the possibility of using BIM models at every stage of the project.

As a core component of the AIM module on the FM platform, BIM documentation prepared in the openBIM standard will ensure that the BIM models will be easy to use and manage throughout the course of facility operations.

Contract Director, Mostostal Warszawa:

We managed the whole project delivery process and decided to base it fully on an openBIM framework. The design and construction processes were entirely client-focused and based on their needs. This approach

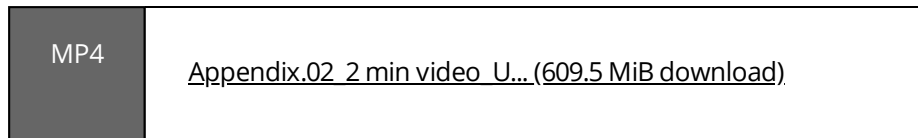
contributed to easier information transfer from the construction phase to the operation and maintenance phase of the building.

BIM Manager, Mostostal Warszawa:

The handover process of the first building did not only end with BIM model and information delivery. We allowed the Client to use the collected information from the very first day of operation.

Along with the future facility manager and users we designed an FM platform. This allowed us to better understand the Appointing Party's information requirements and improve the process of gathering information from designers, subcontractors, and manufacturers.

Upload a 2 minute video to show the scope of the entry.



openBIM Claim

Detailed description of openBIM used on the project or initiative

HOW WAS OPENBIM USED?

The openBIM framework was used at every stage of the project throughout our supply chain.

File exchange relied on **IFC models** while communication was based on **BCFs**. The **Information Delivery Specification** combined with the principles of **COBie** provided clear validation criteria and a solid data structure that was gradually built upon from the design to the facility management stage. **Information Delivery Manuals (IDM)** helped to document processes in a way comprehensible to anyone. **[Appendix.05,06,08,09]**

The software ecosystem that we used, based on openBIM, created an open environment that increased the accessibility and reusability of information and streamlined processes. **[Appendix.04]**

BENEFITS OF USING OPENBIM:

- All the Client's sustainability and energy performance goals were met by using the openBIM framework in the design and construction process. **[Appendix.10.2]** The estimated **decrease in greenhouse gas emissions** will reach **401 MgCO2/year** and **overall energy consumption (EK)** will **decrease by 3 842 GJ/year**.
- Handing over all the crucial asset information in open formats as well as managing the buildings using the **developed FM platform** and **IFC-based asset register** will further increase sustainability by lowering the costs of maintenance and effective energy management.
- Every project participant could contribute **without additional costs** by working in openBIM and the CDE open environment. This removed BIM implementation roadblocks for all project participants, especially the ones taking their first steps in BIM methodology, including the Client.
- Without the openBIM framework **it would not be possible to generate a profit on this project**, which would lead to increasing the overall cost for the Client.
- A combined **IFC** and **COBie** approach standardized the data structure during the design, construction, handover, and eventually the facility management stage. It helped to organize project data through various dimensions: buildings, storeys, spaces, systems, multiple classifications.
- More than **800 significant clashes** were found and resolved during the design stage and **more than 2100 issues** were resolved overall.

OPENBIM ACHIEVEMENTS:

- We set up a common machine-readable **Information Delivery Specification** that was later used for model setup and quality control. The approach based on IDS can help us in the future to work with any Client and any authoring software.
- We verified that openBIM can be used from a project's start to its completion (O&M).
- We met the Client's requirements by designing and developing an **FM platform leveraging the IFC models and their data** in order to create an asset register and enhance facility management.
- The developed product (FM platform) will be accessible to **more than 100 organisations** from both the private and public sector managing **more than 2500 buildings** countrywide.
- We have convinced the Client to switch from traditional to Digital Commissioning, **decreasing the time for defect management by 75%**.

HIGHLIGHTS OF USING OPENBIM:

- Building Z1 has **achieved the target energy performance indicators** and received an Energy Performance Certificate. **[Appendix. 10.2]**
- Building Z1 underwent preliminary **BREEAM** inspection and is on its way to receive a **"Very Good" rating**.
- Building Z1 has already **started using the developed FM platform** with all built asset information available.

"We were able to innovate using openBIM."

DEVELOPMENT OF AN FM PLATFORM TAILORED TO THE CLIENT'S NEEDS

Our Facility Management platform is a new product that was designed and developed **in close cooperation with the Client and future users of the platform**.

We developed a BIM viewer and an **asset register based on imported IFC models**, data from which forms the core module (AIM) that communicates with the other modules of the FM platform and Building Management System (BMS). This allows the facility manager to **get real-time data about energy usage, critical equipment work hours and connect this information to a specific BIM element serving as a digital twin**.

Aside from **importing data straight from IFC models**, we enriched the AIM using **customized COBie** files that properly map both documents and extracted information to the data structure. **[Appendix.09/p.15-32]**

AS-BUILT MODEL QUALITY ASSURANCE AND CONTROL

We have taken an innovative approach for delivering an accurate as-built model in terms of geometry and information. The combination of **as-built IFC models, 360 photos and fast point clouds** gave us a solid base for as-built geometry quality checks. These data, leveraged by the capabilities of Dalux CDE, enabled us to show our designers and subcontractors the actual state of the site in a visually clear manner and communicate discrepancies through the CDE. **[Appendix.09/p.3-14]**

Additionally, we are implementing augmented reality solutions like Dalux Twin App and Hololens that **use IFC models as a base** for projecting the model onto the real site. **[Appendix.09/p.13-14]**

openBIM methods used

- ✓ IFC 2x3
- ✓ BCF
- ✓ IDM
- ✓ IDS

✓ mvdXML

✓ COBie

Have you used bSDD to add additional extensions on top of IFC?

No

Were there other regional or open standards used other than those listed above?

External:

- Uniclass 2015 (Systems, Products, Entities, Spaces, Roles tables)
- ISO 19650-1:2018
- ISO 19650-2:2018
- ISO 9001 –framework for Construction QA company standards which we digitalized and used
- PennState “BIM Project Execution Planning Guide” for initial meetings with PMs & site engineers for setting up BIM Goals and uses (during mobilization phase)
- BREEAM (Building Research Establishment Environmental Assessment Method)
- Passive House Certification Darmstadt

Internal:

- Internal Mostostal Warszawa classification
- Internal Information Delivery Specification (IDS)

File based:

- CSV, TXT, XML
- LandXML
- .e57 (point clouds)
- DWG
- PDF

Level of Collaboration

- ✓ One individual
- ✓ One domain within an organization
- ✓ Several domains within an organization
- ✓ One domain in two or more organizations
- ✓ Multi-domain in two or more organizations

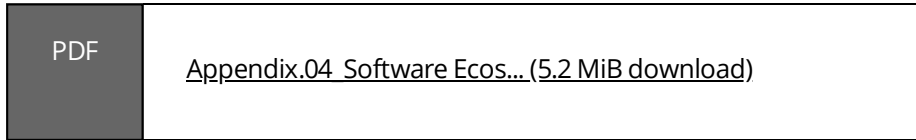
Information Requirements

PDF

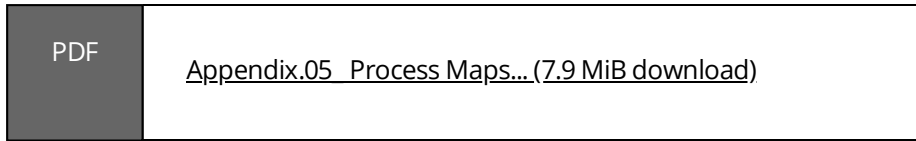
[Appendix.03 Information R... \(3.3 MiB download\)](#)

openBIM Evidence

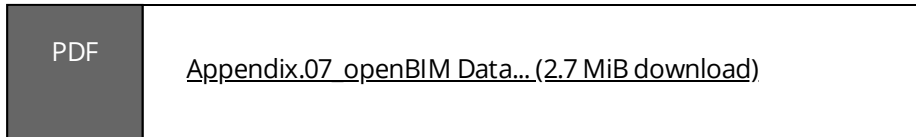
Software Ecosystem Map



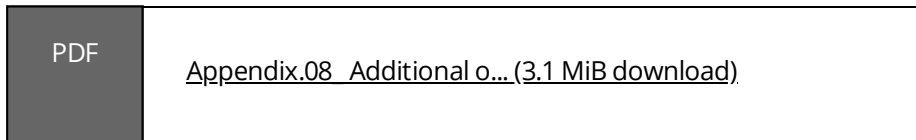
Process Maps



openBIM Data Metrics Summary



Additional openBIM Supporting Evidence



Lessons Learned

We tested and verified the use of the openBIM framework at the Handover stage, finding that it is possible to completely base project delivery on openBIM formats and processes.

We prepared several guidelines on how to successfully prepare for and manage the handover process using openBIM.

START WITH COBIE AND RELATE ALL STANDARDS TO DATA STRUCTURE

COBie was treated as a final deliverable rather than a format to start the project with.

On future projects we would implement a COBie structure into the project from day one to bring a better understanding to all project participants and show how it relates to Information Delivery Specification, project work breakdown structure, document naming convention, classifications and IFC structure.

INVOLVE CLIENT AND BUILDING END USERS EARLY IN THE PROJECT

Working with the Client and their staff during the design and implementation of the FM platform provided valuable feedback on the Client's requirements.

On future projects we would try to engage the Client and their key employees as soon as possible.

MODEL QUALITY CONTROL IN SMALL INCREMENTS

Model quality control took more time than expected. In order to be able to validate the models, we developed a step-by-step approach for quality checks, starting from general checks to more detailed ones.

It is preferable to divide the Information Delivery Specification into substages in order to bring crucial information to the site at the right moment and to gradually increase the maturity of model data.

RECORD SITE CONDITIONS MORE OFTEN

The site crew was at first sceptical about implementing 360 photos and laser scans but soon realised all the benefits of these solutions, especially for as-built model validation and quality control of works.

We plan to use 360 photos regularly on this and future projects and perform fast laser scans at key points during construction.

GIVE SUBCONTRACTORS TOOLS TO SYSTEMATICALLY CHECK COHERENCE

360 photos and point clouds combined with IFC models in the open environment of the CDE, can increase the overall quality of our projects but only when shared with other project participants. We plan to give subcontractors full access to these resources during phase Z2 and on future projects.

We also intend to use more Augmented Reality solutions during construction and share them with our subcontractors as well. This will move more of our attention to quality assurance rather than to issue management later.

ADD INFORMATION TO MODELS ONLINE

Throughout this dynamic design-built project it was difficult to enrich native or IFC models with information from the site and multiple subcontractors. Modifying models using offline applications is error-prone and can cause significant delays.

In future projects we plan to collect data via online services like Dalux Handover. More project participants would be able to share information in a controlled manner without disrupting the data collection process.

KEEP THE DOCUMENT CODING RIGHT

FM-related documentation from subcontractors was often not properly coded.

We will be focus on document control in order to be able to more effectively map documentation to data structure in bulk.

"We were able to identify where we need openBIM to develop further."

COBIE UNDERSTANDING

The COBie format is not living up to its full potential due to it commonly being misinterpreted or not properly understood. COBie should be more integrated into the design and serve as a cornerstone for setting up a proper project data structure and later manage the Client's asset information requirements.

A short and concise COBie guide is needed that would shed more light on the process of delivering asset information. This guide should be further translated and aligned with local regulations.

IFC and COBie exports

There should be a more uniform and simplified approach to exporting IFC models and COBie data in authoring applications with guides on how to set the exports right. The model properties could also be checked automatically against the Information Delivery Specification before exporting.

ENRICHING PROJECT INFORMATION MODEL

There should be more focus placed on creating a framework for streamlining the information from manufacturers, subcontractors, and designers and connecting them to BIM models and project data structure both on desktop, mobile and online applications. This can transition BIM from being a static to a more dynamic process.

BSDD

The IDS and internal classification of model elements that we used on the project served us well and brought multiple benefits. We see a significant potential in the development of bsDD service and solutions like usBIM for enriching models with classifications and information. We plan to test bsDD in order to further standardize information, check data for validity and build our company's Information Delivery Specification repository.

Upload .ifc file(s) or other technical files
to support validation of the research
results.

<https://service.usbim.com/link/629e27c68df9e63d7ce5bedd>

Share any instructions for accessing the .ifc or other technical files for review.

Link is for viewing federated IFC models only:

<https://service.usbim.com/link/629e27c68df9e63d7ce5bedd>

For access to other technical files please log in first as user:

<http://cloud.usbim.com/>

login: bsawards2022@gmail.com

password: BSawards2022

On the left panel you go to "**Shared with me**" panel.

There you will have access to all the technical files

Use Cases

BIM Uses were defined on the project | ✓

BIM Uses formed an integral part to
how the project was delivered | ✓

I agree to be contacted for more
information about the project BIM
uses outside of this awards program. | ✓

Documentation on use case(s) as a single file upload

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| PDF | Appendix.09_Documentation... (13.0 MiB download) |
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Log in to awards.buildingsmart.org to see complete entry attachments.

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| PDF |
| Type of attachment Technical Documentation |
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| PDF |
| Type of attachment Technical Documentation |
| Appendix.10.2 E... 2.3 MiB |

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| Appendix.10.3 I... 4.6 MiB |

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| Attachment name Construction stage - Z1 a... |
| https://www.youtube.co... |

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| https://www.youtube.co... |

