The buildingSMART Awards Yearbook

Winners, Finalists and Special Mentions 2024

Extraordinary projects from the buildingSMART International openBIM Awards Program 2024

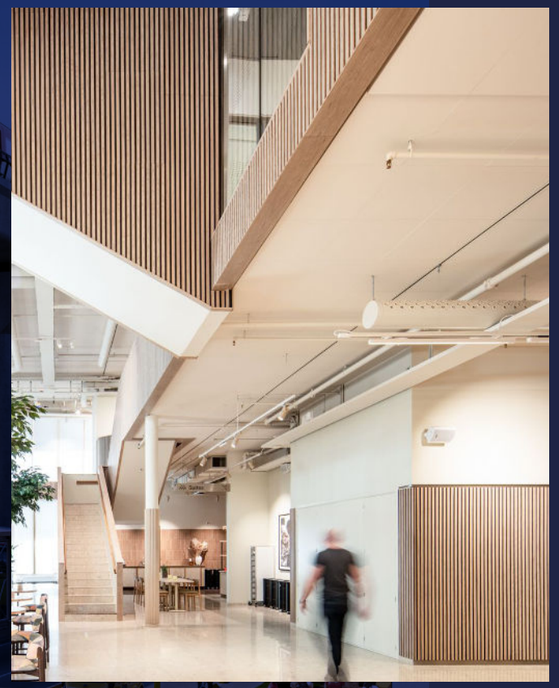
buildingSMART International

About buildingSMART

buildingSMART is the worldwide industry body driving the digital transformation of the built asset industry, committed to delivering improvement by the creation and adoption of open, international standards and solutions for infrastructure and buildings. buildingSMART is the community for visionaries working to transform the design, construction, operation and maintenance of built assets and is an open, neutral and international not-for-profit organization.

The buildingSMART Awards program was created to recognize outstanding projects that have leveraged openBIM to successfully tackle interoperability challenges.

The program continues to grow with incorporating more projects, a larger panel of jurors and growing number of expert teams which incorporated Technical Expert Teams, Sustainability Expert Team and Business Value Advisory Team. These expert teams played a pivotal role in evaluating the finalists in evaluation excellence in Sustainability, BIM + GIS, Project Delivery and Operational Excellence.



2024 Highlights

Categories

This program was divided into four broad categories: Project Delivery, Operations, Research and Technology. Each category has sub-categories, which provide the basis for the awards program.

Jurors

This awards program saw a total of 210 jurors across 30 Chapters. The role of the juror includes grading project submissions against strict criteria, designed to ensure the highest quality of submissions elevate to the finalist stages. There continues to be expert teams, and an elite jury that grades the finalists during the summit.

Submissions

There were 164 submissions, 50 passed through triage and 22 finalists. The breakdown for those who passed triage is outlined below:

- Construction for Buildings: 5
- Construction for Infrastructure: 7
- Design for Buildings: 7
- Design for Infrastructure: 5
- Facilities Management: 1
- Handover: 1
- Professional Research: 7
- Student Research: 5
- Technology: 12

Special Mentions

Due to the high quality of submissions, there were a number of projects deemed of a high enough standard to warrant a special mention. These projects scored exceedingly high but fell slightly short of the required number to become a finalist. These projects, therefore, qualified as a “Special mention” and were duly awarded this during the ceremony.

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Winner

Optimising Super Prison Delivery: Kier's Collaboration with the MoJ Using Open Standards

by Kier Construction, United Kingdom

Project Overview

The HMP Millsike project, led by Kier Construction, is a £400 million initiative focused on delivering a high-security custodial facility for the UK Ministry of Justice (MoJ) using openBIM methodologies. The project builds upon insights gained from HMP Five Wells, applying advanced digital construction processes and open standards to ensure improved efficiency, interoperability, and collaboration.

With a mandate from the Ministry of Justice to use IFC-SPF for all exchange models and derive COBie directly from these files, Kier has successfully managed 14 large-scale custodial assets, covering both buildings and infrastructure. openBIM has played a pivotal role in overcoming interoperability challenges, streamlining workflows, and reducing reliance on proprietary software solutions.

A critical innovation was the introduction of an automated data quality pipeline, utilizing Python, IfcOpenShell, and Power BI, which significantly improved data accuracy, compliance, and validation against the MoJ's asset data requirements. This allowed for progressive data checks, ensuring high-quality COBie outputs and enhancing decision-making across project stages.

With 96 models and 415,000 assets managed at the technical design stage, Kier performed automated data checks on 21 million rows of IFC data every two weeks. This rigorous data management approach enabled seamless coordination, enhanced construction planning (via 4D BIM), and facilitated digital twin technology for real-time tracking of off-site prefabricated components.

The project's success has set new benchmarks in digital construction, offering enhanced quality assurance, improved communication between stakeholders, and streamlined delivery of high-security prison facilities.

Core Objectives

- Enhance digital collaboration through openBIM and open standards (IFC-SPF, COBie, Uniclass2015) to improve interoperability and data exchange.
- Automate data quality validation using Python, IfcOpenShell, and Power BI, ensuring compliance with MoJ's asset data requirements.
- Implement real-time tracking of prefabricated components through digital twin technology, optimizing supply chain management and reducing delays.
- Integrate 4D BIM scheduling to improve construction planning and coordination, reducing risks and optimizing resource allocation.
- Embed sustainability tracking within IFC models, measuring Global Warming Potential, Embodied Energy, and Volatile Organic Compounds to meet environmental goals.

openBIM Solutions Used

- IFC 2x3
- bcfAPI
- COBie
- Uniclass2015

Result

Through the adoption of openBIM and digital twin technologies, the project achieved real-time construction tracking, seamless design interrogation, and automated progress monitoring. The implementation of a data quality pipeline improved data integrity, ensuring 100% compliance with the MoJ's COBie and information management standards. Kier conducted automated bi-weekly checks on 21 million rows of IFC data, minimizing errors before critical construction phases. The use of IFC and Uniclass2015 enabled standardized asset classification, streamlining design coordination, procurement, and facilities management.

Real-time tracking of prefabricated components via the Ynomia digital twin platform resulted in savings of 4,500 hours and a reduction of 208 tonnes of CO emissions, equivalent to 4.7 million miles travelled. openBIM principles allowed Kier to create repeatable and consistent digital workflows, ensuring smooth data exchange, reduced risks, and enhanced efficiency. The integration of automated quality validation, BIM-driven site coordination, and sustainability monitoring has set a new benchmark for high-security custodial construction in the UK.

Highlights

- £400M high-security prison project for the UK Ministry of Justice.
- First MoJ project to mandate full IFC-SPF and COBie compliance.
- Automated data validation pipeline using Python and IfcOpenShell to improve data integrity.
- 21 million IFC data rows checked bi-weekly for progressive data assurance.
- Digital twin technology used for off-site component tracking, reducing carbon emissions and increasing efficiency.
- Real-time construction progress tracking through platforms like Revizto and Dalux.
- Integration of Uniclass2015 for standardized asset classification, improving procurement and facility management.
- 4D BIM scheduling optimized project planning and site coordination.
- Innovative dashboard developed to automate progress tracking and digital handover.

Software Used

Dalux, GliderBIM, IfcOpenShell, NBS Chorus, Power BI, Python, Revizto, Ynomia

> "We have demonstrated that openBIM can be successfully implemented on large, complex projects. IFC has served as the conduit for hosting consistent data and enabling innovation. Through automation for quality checking, we've gained confidence in utilizing supplied data within our digital platforms.

Thomas Crossley,
Senior Digital Construction Manager

Explore the full submission >>

Finalist

Kai Tak Sports Park: Constructing a Multipurpose Sports Complex with Open and Interoperable Processes

by Hip Hing Engineering Company Limited, Hong Kong, China

Project Overview

The Kai Tak Sports Park (KTSP) is Hong Kong's largest and most ambitious sports infrastructure project, spanning a 28-hectare site at the former Kai Tak Airport. This state-of-the-art multipurpose complex is designed to support Hong Kong's vision of becoming an international sports hub. With a distinctive pearl shell design symbolizing Hong Kong as the "Pearl of the Orient," the main stadium can accommodate up to 50,000 spectators, featuring a retractable roof and flexible pitch system. Other key facilities include a 10,000-seat indoor sports arena, a 5,000-seat public sports ground, outdoor recreational spaces, and a range of commercial amenities.

The Hong Kong Government, through Kai Tak Sports Park Limited, has entrusted Hip Hing Engineering with the design and construction of this world-class facility. Over 140 companies from eight different geographical regions are collaborated on the project, leveraging openBIM methodologies to ensure seamless interdisciplinary coordination. By utilizing IFC-based workflows, QR code tracking, and real-time issue management platforms, the project team optimized procurement, construction sequencing, and logistics.

BIM-enabled technologies played a crucial role in risk mitigation, construction detailing, and real-time coordination across diverse disciplines, from steelwork fabrication to façade panel installation. Through an openBIM-driven approach, Kai Tak Sports Park is setting a new benchmark for large-scale, digitally coordinated construction projects in Hong Kong and beyond.

Software Used

3ds Max, ArcGIS, BIM Track (Newforma Konekt), Cyclone 3DR, Dalux, Fuzor, Power BI, Recap Pro, Revit, Solibri Model Checker, Solidworks, Synchro, Tekla Structures, Twinmotion

Core Objectives

- Implement openBIM methodologies to enhance collaboration, interoperability, and efficiency across the project lifecycle.
- Ensure seamless data exchange among multiple stakeholders through digital workflows.
- Improve sustainability by integrating digital fabrication techniques to minimize material waste and optimize labor.
- Utilize real-time BIM monitoring and quality control to mitigate construction risks and improve project scheduling.
- Leverage openBIM solutions for long-term facility management, ensuring the seamless transition from construction to operation.
- Set a new standard for sports infrastructure development, aligning with Hong Kong's ambition to become a global sports hub.

Result

The implementation of openBIM has significantly improved the efficiency and accuracy of design and construction at KTSP. Multi-disciplinary coordination was enhanced through IFC-based workflows, ensuring seamless interoperability between different software platforms. Advanced BIM applications facilitated detailed fabrication-level modelling for complex stadium components such as the retractable roof, stadium seating, and façade panels. QR code tracking was integrated into the procurement process, allowing real-time monitoring of façade panel production and delivery. The use of construction sequencing tools, such as Synchro and Fuzor, optimized the logistics of truss assembly and major structural installations. Additionally, the project benefited from rule-based validation through Solibri Model Checker, reducing errors and rework. The implementation of an Integrated Information Management Platform (IIMP) enabled real-time progress tracking and issue resolution, leading to improved decision-making and streamlined construction workflows. By leveraging openBIM, KTSP successfully minimized construction risks, improved material efficiency, and ensured long-term digital asset management for facility operations.

Highlights

- One of Hong Kong's largest sports infrastructure projects, covering 28 hectares.
- Designed for multiple international and local sporting events, with a 50,000-seat stadium.
- Use of openBIM ensured seamless collaboration across 140+ companies from eight regions.
- QR code-enabled procurement tracking system enhanced supply chain efficiency.
- Digital fabrication reduced material waste and minimized on-site labor requirements.
- Real-time BIM-based issue management significantly improved construction coordination.

openBIM Solutions Used

- IFC 2x3
- IFC 4
- BCF

"

openBIM has been instrumental in the success of the Kai Tak Sports Park project, enabling seamless collaboration among specialists despite tight timelines and pandemic challenges. By fostering early engagement and digital interconnection, openBIM ensures continuous virtual validation of the built asset, translating design intention into constructible action and reinforcing sustainable development.

Billy Wong,
General Manager (ConTech & Innovation)

Explore the full submission >>

Winner

Successful Information Management Innovations based on openBIM for Bogotá Metro Line 1—Construction

by China Communication Construction Company, Colombia

Project Overview

The Bogotá Metro Line 1 project is one of Latin America's largest infrastructure developments and a transformative step in improving the mobility of over two million residents. This 23.86 km elevated metro line includes 16 metro stations, 13 Bus Rapid Transit (BRT) stations, a depot with 16 buildings, and comprehensive urban redevelopment along the metro corridor. With a total estimated investment of $5.75 billion USD, the project is critical for the city's sustainable transportation development.

Given its complexity, the project was designed and executed using openBIM methodologies across all phases—design, construction, operation, and maintenance. The goal was to integrate multiple disciplines and teams across different countries, ensuring seamless interoperability and collaboration. To achieve this, openBIM strategies were implemented, including the adoption of IFC-based data exchange, centralized model collaboration in a Common Data Environment (CDE), and enhanced visualization through Power BI dashboards.

Through this structured BIM approach, the project team was able to manage a highly complex interface consisting of nine design sub-projects, 33 system professions, 250 sub-systems, and 597 execution units. openBIM facilitated better coordination among software platforms such as Autodesk, Tekla, and Bentley, reducing errors and inefficiencies during construction. The implementation also leveraged BCF (BIM Collaboration Format) to track and resolve over 13,470 project issues across different platforms.

By adopting openBIM principles, Bogotá Metro Line 1 achieved significant efficiency gains in design accuracy, reduced clashes in construction, and optimized digital project management, setting a benchmark for large-scale infrastructure projects in Latin America.

Core Objectives

- Implement openBIM methodologies throughout the entire project lifecycle to ensure seamless collaboration and data exchange across multiple disciplines.
- Improve project efficiency by reducing design clashes and optimizing coordination between stakeholders using open standards such as IFC and BCF.
- Develop a digital twin approach with as-built BIM models to enhance long-term maintenance and operational capabilities.
- Improve decision-making processes through data analytics and visualization tools like Power BI, providing stakeholders with real-time insights.
- Ensure sustainability by integrating BIM with environmental performance analysis tools, optimizing energy efficiency, daylight autonomy, and climate resilience.
- Create a robust digital workflow that enhances transparency, reduces risks, and maximizes efficiency throughout construction and operation.

Result

The application of openBIM led to significant improvements across the entire project lifecycle. The use of IFC ensured seamless interoperability between different software platforms, allowing the exchange of over 1,900 models and improving collaboration between 39 subcontractors from six countries. The adoption of BCF streamlined issue tracking, helping resolve more than 13,470 project issues across platforms such as ACC, Aconex, and BIM Track. One of the most notable achievements was the complete elimination of hard clashes in design before construction began, mitigating risks and reducing rework. Additionally, the project saw an 80% improvement in quantity accuracy, resulting in substantial cost and time savings. The implementation of a customized BIM-based progress-tracking platform using ACC API and Revit API automated data collection from the construction site, improving schedule management and stakeholder transparency. Furthermore, BIM and GIS integration enabled more efficient spatial analysis, supporting better decision-making in construction logistics and urban planning. The project also achieved key sustainability goals, leveraging gbXML integration in DesignBuilder to optimize energy efficiency, daylight autonomy, and thermal comfort, ultimately leading to energy savings of 40-80% in various depot buildings.

These outcomes demonstrate the substantial impact of openBIM on project efficiency, cost management, sustainability, and collaboration.

Highlights

- One of the largest infrastructure projects in Latin America, valued at $5.75 billion USD.
- Seamless collaboration between 39 subcontractors across six countries.
- Zero hard clashes in the design phase, reducing construction risks.
- Improved quantity accuracy by 80%, enhancing cost and time efficiency.
- Automated BIM-based progress tracking, saving significant coordination time.
- Integration of BIM and GIS for improved decision-making in urban planning.
- Energy efficiency improvements between 40-80% through BIM-supported sustainability analysis.

Software Used

Aconex, Autodesk Construction Cloud (ACC), Autodesk Civil 3D, Autodesk Revit, Bentley Systems, BIM 360, BIM Track, Dynamo, Power BI, Tekla

openBIM Solutions Used

- IFC 2x3
- BCF
- IDS

> "openBIM has delivered tangible benefits to stakeholders in the infrastructure industry, enhancing communication, coordination, and collaboration. Its interoperability across multiple platforms has streamlined project processes and amplified BIM's potential for project control and management.

Chaojun Cai,
BIM Manager

Explore the full submission >>

Finalist

openBIM Practice and Intelligent Construction in Phase III Expansion Construction of Guangzhou Baiyun International Airport

by Guangdong Airport Authority, China

Project Overview

The Guangzhou Baiyun International Airport is one of China's three major aviation hubs, ranking among the world's top 10 in passenger and cargo throughput. To enhance its role as a global air transportation hub, the Phase III expansion project commenced in 2022, with a total investment of 53.77 billion RMB (€7.64 billion). The project involved constructing two 4E-class runways, a 422,000-square-meter T3 terminal, and supporting infrastructure. Upon completion, Baiyun Airport will have five runways and two terminals, with a total terminal area of approximately 1.8 million square meters, capable of handling an annual passenger throughput of 120 million, with a long-term goal of reaching 140 million.

As the largest airport reconstruction and expansion project currently underway in China, this development is the country's first large-scale hub construction project to fully adopt smart construction technologies and openBIM methodologies. Given the scale and complexity—encompassing 38 on-site participating companies and multiple disciplines, including airport runways, underground tunnels, and terminal buildings—collaboration and efficient workflow management were critical. To address these challenges, the project leveraged openBIM principles to establish a unified Common Data Environment (CDE), automate construction processes, improve stakeholder communication, and drive digital innovation across all phases of design and construction.

Core Objectives

- Enhance collaboration among all 38 stakeholders using openBIM to facilitate seamless data exchange and transparent workflows.
- Improve construction efficiency and safety through intelligent construction methods such as digital simulations, automated site monitoring, and real-time tracking.
- Establish a robust Common Data Environment (CDE) to support project management, improve coordination, and enable data-driven decision-making.
- Optimize sustainability by utilizing openBIM to reduce material waste, improve resource utilization, and lower the project's carbon footprint.
- Ensure uninterrupted airport operations during construction by implementing risk mitigation strategies and IFC-based simulations to analyze and prevent potential disruptions.

Highlights

- Largest airport expansion in China to fully adopt openBIM and smart construction.
- Seamless cross-disciplinary collaboration among 38 stakeholders using IFC.
- Integration of 45+ software solutions for project-wide BIM coordination.
- 50% reduction in material waste and 60% reduction in labor demand due to BIM-driven efficiencies.
- Enhanced safety planning using digital simulations and risk assessments.
- 100%+ improvement in airfield pavement construction efficiency due to model-driven workflows.
- Carbon tracking and sustainability measures integrated into the project's material selection and monitoring.

Result

The implementation of openBIM methodologies has significantly improved project efficiency, quality control, and sustainability. A Construction Management Platform (CMP) was developed as the Common Data Environment (CDE), facilitating real-time material tracking using QR codes and RFID technology, digital contract approvals, and supplier verification. Advanced digital assembly techniques and virtual simulations enhanced component production and assembly, improving overall quality and safety. Since construction took place while the airport remained operational, non-suspend flight construction planning was critical. The project utilized IFC-based model simulations to analyze potential disruptions, leading to enhanced risk mitigation strategies such as electronic fencing to secure construction zones. The integration of Inspection Units (IUs) with engineering documentation using bSDD and IDS methodologies streamlined compliance and project tracking. The use of automated construction robots and digital material tracking significantly increased efficiency, resolving over 2,700 issues through BCF tracking and minimizing communication costs. 80% of steel components were prefabricated digitally, reducing material waste, while optimized crane installation using IFC led to a 30-day reduction in construction time. Overall, the project is projected to save €15.6 million upon completion through enhanced coordination, workflow optimization, and process automation. Additionally, material waste was cut by 50%, labor demand reduced by 60%, and airfield pavement construction efficiency improved by over 100%.

These results underscore the power of openBIM in driving digital transformation in large-scale infrastructure projects. By embracing openBIM principles, smart construction technologies, and digital collaboration, the Phase III expansion of Guangzhou Baiyun International Airport has set a new benchmark for intelligent infrastructure development in China. The project has demonstrated how data-driven decision-making, automated workflows, and an integrated digital ecosystem can enhance sustainability, improve safety, and optimize efficiency in complex infrastructure projects. The success of this openBIM-driven approach provides a scalable model for future airport and megaprojects worldwide, proving the transformative impact of openBIM in modern construction.

Software Used

Autodesk Revit, Bentley Systems, Construction Management Platform – CMP, Dalux, Dynamo, Microsoft OneDrive, Navisworks, Tekla Structures

openBIM Solutions Used

- IFC 2x3
- IFC 4
- bSDD
- IDS
- BCF
- ISO 19650
- ISO 29481

Explore the full submission >>

Finalist

PORR's Practical openBIM Approach for TransCarpathian Motorway in Romania: Sibiu – Pitești Section, Lot 4: Tigveni – Curtea de Argeș

by PORR Construct Romania, Romania

Project Overview

The Sibiu-Pitești Motorway is a crucial infrastructure project and the first highway in Romania to cross the Carpathian Mountains, spanning 122 km as part of the Pan-European Corridor IV. This vital route will connect Germany to Turkey, linking the Port of Constanța to Romania's western border. The project was awarded to PORR Construct Romania, responsible for designing and constructing Lot 4, a 9.86 km stretch of the motorway.

This contract, valued at €337 million, includes five years of execution (16 months for design and 44 months for construction). The segment requires the construction of ten bridges and viaducts, including structures up to 630 meters long, as well as Romania's first twin motorway tunnel, which spans 1.35 km through the Momaia Mountain. The New Austrian Tunnelling Method (NATM) is being used for this tunnel, which will feature two galleries connected by three passageways.

Although there were no mandatory BIM requirements, PORR proactively implemented openBIM methodologies, leveraging IFC-based workflows to enhance data exchange, coordination, and efficiency throughout the project. The company transitioned from IFC 2x3 to IFC 4 and IFC 4x3, enabling better interoperability between various disciplines and project phases.

By focusing on data-driven decision-making, automation, and real-time monitoring, PORR is setting new digital standards in Romania's infrastructure sector. Their openBIM strategy aims to reduce execution errors, enhance collaboration, and improve efficiency, making this a flagship digitalization project for PORR Romania.

Software Used

Autodesk Revit, BlenderBIM, Dynamo, PowerBI, Trimble Business Center

Core Objectives

- Implement openBIM methodologies despite the absence of national BIM regulations to ensure seamless coordination and data exchange between disciplines.
- Optimize workflows and improve efficiency using IFC-based models for design, execution, and management.
- Reduce execution errors through advanced 3D modeling, LiDAR scanning, and automated clash detection.
- Enhance resource management by integrating 4D phase planning and real-time project tracking using PowerBI dashboards.
- Enable BIM-to-field and field-to-BIM workflows, using machine-controlled excavation, augmented reality (AR) tools, and digital surveying techniques.
- Promote sustainability and energy efficiency by reducing waste, optimizing material usage, and aligning with ISO 50001 standards.
- Lay the foundation for future Romanian infrastructure projects by demonstrating the efficiency and benefits of digital construction workflows.

openBIM Solutions Used

- IFC 2x3
- IFC 4
- IFC 4x3
- bSDD
- IDS

Result

The implementation of openBIM on this project led to significant improvements in interoperability, coordination, and project efficiency. Seamless data exchange was ensured between design, site operations, and project management through the adoption of IFC 4 and IFC 4x3 schemas. The use of LiDAR technology for modeling existing conditions minimized execution errors by providing highly accurate pre-construction data. OpenBIM also facilitated precise quantity take-offs by extracting reliable data directly from IFC models, which optimized material usage and reduced waste.

Furthermore, 4D phase planning was successfully integrated, enhancing scheduling accuracy and enabling better project forecasting through PowerBI dashboards. Site progress monitoring was streamlined using real-time data collection, with BIM-fed dashboards offering up-to-date insights on project performance and resource allocation. By utilizing machine control systems and augmented reality devices, BIM data was brought directly to the construction site, improving execution accuracy and reducing rework.

Another key result was the introduction of Field-to-BIM workflows, allowing as-built information to be captured using laser scanning and total station measurements. This ensured that ongoing adjustments were properly reflected in BIM models, reducing discrepancies between the digital and physical construction process. By aligning openBIM processes with ISO 19650 standards, PORR streamlined workflows, reduced costs, and enhanced overall project efficiency, setting a benchmark for future Romanian infrastructure projects.

The Sibiu-Pitești Motorway, Lot 4 represents a pioneering openBIM initiative in Romanian infrastructure. PORR has demonstrated that digital workflows, automation, and open standards can optimize project efficiency, sustainability, and decision-making. By bridging the gap between design and execution, this project sets a benchmark for future large-scale infrastructure projects, proving the transformative power of openBIM in civil engineering.

Highlights

- First Romanian motorway to apply openBIM on a large scale.
- Use of IFC 4 and transition to IFC 4x3 for infrastructure projects.
- Romania's first twin motorway tunnel built with openBIM methodology.
- Advanced 3D coordination and 4D phase planning for improved scheduling.
- Automated data validation using IDS and bSDD standards.
- Custom PowerBI dashboards for real-time site progress monitoring.
- Implementation of BIM-to-field workflows using AR and machine control.
- Improved data accuracy, reducing rework and increasing efficiency.

Explore the full submission >>

Winner

Kai Tak Sports Park: Delivering a state-of-the-art design of a multipurpose sports complex with open and interoperable processes

by Hip Hing Engineering Company Limited, Hong Kong, China

Project Overview

The Kai Tak Sports Park (KTSP) is Hong Kong's largest and most advanced multipurpose sports complex, designed to serve as a world-class venue for sports, entertainment, and community events. Situated on a 28-hectare site at the former Kai Tak Airport, the complex features a 50,000-seat main stadium with a retractable roof, a 10,000-seat indoor sports arena, a 5,000-seat public sports ground, and extensive public open spaces with fitness stations, outdoor courts, and green areas.

KTSP is a major initiative under the Hong Kong SAR Government's strategic plan to establish the city as a premier international sports hub. The HKD 30 billion design-build-operate (DBO) project spans 25 years and brings together leading design, engineering, and construction firms, including Populous, Arup, Hip Hing Engineering, and ASM Global. The project integrates advanced digital workflows, leveraging openBIM and interoperability to optimize design coordination and project execution.

With participation from over 140 companies across eight geographical regions, KTSP employed a wide range of BIM and openBIM-compatible software to develop architectural, structural, and MEP models. openBIM enabled seamless collaboration between disciplines, reducing design submission times by 80% and increasing project information exchange speed by 50%. The use of parametric and computational design methods optimized the stadium's complex geometry, improving sightline analysis, crowd flow simulation, and structural integrity.

Core Objectives

- Establish KTSP as a world-class sports and entertainment venue supporting Hong Kong's ambition to become a global sports hub.
- Implement openBIM methodologies to enhance collaboration, interoperability, and efficiency across multidisciplinary teams.
- Optimize design coordination, reduce errors, and ensure seamless communication between different stakeholders.
- Improve sustainability by incorporating Design for Manufacture and Assembly (DfMA) principles to streamline construction, reduce waste, and optimize resource usage.
- Ensure compliance with regulatory standards and statutory requirements through intelligent model coordination and rule-based checking.
- Develop a hybrid Common Data Environment (CDE) ecosystem to facilitate efficient data exchange throughout the project lifecycle.

Software Used

Autodesk Revit, BIM Track (Newforma Konekt), CATIA, MassMotion, Navisworks, Radiance, Rhinoceros + Grasshopper, Solibri, STAR-CCM+ & ANSYS, Tekla

Result

The implementation of openBIM methodologies resulted in significant efficiencies throughout the design phase, which was completed in under three years. The integration of BIM Track (Newforma Konekt) for BCF-based communication enhanced issue tracking and resolution across teams, while parametric modeling and computational tools such as Grasshopper and Dynamo optimized stadium sightlines and crowd flow. Open formats such as IFC, bSDD, and BCF enabled seamless collaboration across multiple disciplines, ensuring that project stakeholders could work in their preferred software environments without compromising data integrity. The adoption of Design for Manufacture and Assembly (DfMA) strategies resulted in significant material savings, reducing steel structure waste by 6.3% and optimizing the number of façade panel types by 81.8%. Advanced simulations for air ventilation, pedestrian comfort, and solar reflectivity ensured compliance with BEAM Plus Neighbourhood sustainability standards, enhancing the project's environmental performance. These improvements demonstrated the power of openBIM in facilitating data-driven decision-making, streamlining workflows, and ensuring long-term sustainability for a major public infrastructure project.

Highlights

- Hong Kong's largest sports infrastructure project, covering 28 hectares.
- A 50,000-seat stadium with a retractable roof and a flexible pitch system.
- 140+ companies from 8 regions collaborated using openBIM.
- Design completion in under three years, with a 50% increase in project information exchange speed.
- BIM-enabled clash detection, reducing rework and delays.
- DfMA adoption led to significant material savings and construction efficiency.
- Achieved compliance with BEAM Plus sustainability standards.

openBIM Solutions Used

- IFC 2x3
- IFC 4
- bSDD
- BCF
- CDE

> "openBIM has been instrumental in the success of the Kai Tak Sports Park project, enabling seamless global collaboration despite tight timeframes and pandemic challenges. By fostering early engagement and digital interconnection, openBIM ensures continuous virtual validation of the built asset, aligning it with design intent and promoting sustainable development.

Kenneth Ma,
Director - Design & Build

Explore the full submission >>

Finalist

Origo – Office of the Future

by Kontrast AB, Sweden

Project Overview

Origo is a state-of-the-art commercial building located in Stockholm, Sweden, spanning 30,000 m² over ten floors. Developed by Humlegården Fastigheter, with Forsen AB overseeing project/construction management and Kontrast AB leading design and BIM coordination, the project was envisioned as a smart, flexible workspace offering modern amenities such as restaurants, a gym, and a cinema.

With a focus on digitalization from the outset, Origo highlights the significance of open standards in the construction industry and the management of extensive project data. Initially operating across multiple platforms, the project transitioned to a unified Common Data Environment (CDE), with Dalux selected for its user-friendly interface, advanced 3D viewer, and compatibility with openBIM tools.

The implementation of a dual IFC model workflow, one for design and another for construction ensured clarity in communication and control throughout the project. The integration of openBIM BCF standards allowed for seamless documentation and communication, streamlining processes such as budgeting, procurement, and sustainability analysis. The ability to customize BCF templates facilitated efficient delegation of work and tracking of project progress.

By centralizing data and using a structured verification process, Origo successfully demonstrated the power of openBIM to enhance interdisciplinary collaboration, minimize errors, and optimize workflow efficiency across the entire project lifecycle.

Software Used

Autodesk Revit, Dalux, Solibri, Tekla

Core Objectives

- Establish a fully digitalized, openBIM-driven workflow that enhances collaboration and optimizes lifecycle operations.
- Implement a structured dual-model approach that separates design data from validated construction data to improve accuracy and traceability.
- Integrate a centralized Common Data Environment (CDE) to improve data accessibility, reduce communication gaps, and minimize errors.
- Align with the Swedish Green Building Council's Miljöbyggnad Gold certification by incorporating sustainable design strategies.
- Optimize cost estimation, procurement, and interdisciplinary coordination using openBIM methodologies.

Result

The Origo project successfully transitioned to a fully digitalized workflow, significantly reducing reliance on email communication and third-party tools. The implementation of IFC-based models for both design and construction improved traceability, minimized design errors, and enhanced interdisciplinary coordination. The use of the BCF standard streamlined issue tracking, work orders, and defect documentation, which improved quality control and efficiency. Advanced digital tools such as real-time sun shading simulations, GIS-based point cloud integration, and VR visualization enhanced decision-making processes for all stakeholders. Sustainability remained a core focus, with green building initiatives such as rooftop vegetation, solar energy analysis, and material reuse tracking contributing to the successful achievement of Miljöbyggnad Gold certification. Furthermore, the shift to a centralized digital workflow facilitated more accurate cost estimation and contractor bidding, resulting in improved project competitiveness and streamlined procurement processes.

Highlights

- Successful integration of a fully digitalized workflow across all project phases.
- Implementation of a dual-model approach for better communication and quality assurance.
- Reduced reliance on traditional communication methods through BCF standardization.
- Sustainability initiatives, including green infrastructure, solar energy feasibility, and material reuse strategies.
- Achievement of Miljöbyggnad Gold certification through rigorous energy and environmental performance criteria.
- Improved collaboration efficiency and reduced project errors through centralized data management.

openBIM Solutions Used

- IFC
- bSDD
- IDS
- bcfXML
- bcfAPI

"openBIM enables seamless communication between software, creating a centralized platform for better control and traceability. It ensures equal access to information for all participants, fostering engagement and improving collaboration throughout the project.

Hanif Pourghazian,
CEO

Explore the full submission >>

Finalist

Empowering Interoperability and Collaboration in a Project of 4 Hospitals

by TPF Consultores, Angola

Project Overview

The development of four provincial hospitals in Angola marks a significant step toward improving healthcare services in a country that faces persistent public health challenges, including malaria, cholera, Zika, and yellow fever. These hospitals will enhance medical infrastructure in underserved regions, addressing pressing healthcare needs and contributing to better health outcomes.

The project comprises one multi-story hospital of approximately 17,500 m², featuring a three-story main building and 11 satellite buildings, totalling 958 compartments. Additionally, three single-story hospitals, each covering around 15,600 m², consist of a main building and 10 peripheral structures, summing up to 851 compartments per hospital. Despite similarities in the design of the three single-story hospitals, their positioning was adjusted according to local site conditions.

As the lead appointing party, TPF Consultores leveraged openBIM methodologies to enhance design efficiency and prevent redundancy across the multiple hospital projects. A comprehensive BIM Execution Plan (BEP) was established to guide all project stakeholders, regardless of their BIM expertise. Open standards were used throughout the process to ensure seamless collaboration among multidisciplinary teams.

A key aspect of the design phase was the integration of IFC models provided by the appointing party. These models originated from a different authoring tool than those used by the design team, allowing parallel modeling efforts while minimizing delays. Periodic IFC exchanges and quality control using Information Delivery Specification (IDS) ensured compliance with project requirements. Furthermore, the use of BIM Collaboration Format (BCF) enabled effective communication and issue tracking within a cloud-based platform.

The project also introduced automation via Python scripts, which facilitated the merging of multiple IFC models into a single, well-structured file per discipline. Additionally, Power BI dashboards extracted data from the Common Data Environment (CDE) to streamline deliverables management and reduce manual errors.

Through these innovative approaches, the project exemplifies the benefits of openBIM in improving interoperability, efficiency, and collaboration in large-scale healthcare infrastructure projects.

Core Objectives

- Establish a structured openBIM-driven workflow to enhance design collaboration and efficiency.
- Utilize IFC-based processes to ensure interoperability and seamless data exchange across disciplines.
- Automate IFC model processing and document management to minimize manual intervention and errors.
- Implement a structured Common Data Environment (CDE) for streamlined project coordination and document sharing.
- Enable real-time issue tracking and clash detection using BCF to improve coordination.
- Enhance data-driven decision-making through Power BI dashboards for better deliverable tracking and compliance.
- Reduce design redundancies by standardizing processes across the four hospitals while allowing site-specific adjustments.

Result

The adoption of openBIM in this project has significantly optimized design production, coordination, and document management. IFC-based workflows enabled real-time data exchange and streamlined the design process, reducing redundancies and increasing efficiency.

Python scripts played a crucial role in IFC model manipulation, allowing the merging of multiple hospital models into a single structured file per discipline. This not only complied with appointing party requirements but also optimized design consistency and delivery.

Coordination was enhanced through cloud-based BCF issue tracking, ensuring prompt identification and resolution of clashes. The structured use of IDS improved data quality control, facilitating seamless collaboration across teams.

Document management inside the CDE was greatly improved by automated workflows, reducing the time required for deliverable tracking and approval. Power BI dashboards provided real-time insights into project progress and compliance, contributing to more informed decision-making.

Overall, the implementation of openBIM methodologies resulted in greater project transparency, efficiency, and interoperability. The success of this approach has set a precedent for future projects within TPF Consultores, encouraging wider adoption of openBIM principles beyond mandated requirements.

Software Used

Autodesk Revit, BIMCollab, Power BI, Python

openBIM Solutions Used

- IFC 2x3
- IFC 4
- IDS
- BCF
- CDE

Highlights

This project represents a major milestone as the first large-scale healthcare infrastructure initiative in Angola to fully integrate openBIM principles. By standardizing design across four hospitals while allowing site-specific adjustments, the project achieved consistency while optimizing efficiency. The use of automation, particularly through Python scripts, significantly streamlined IFC model processing, reducing manual workload and enhancing precision. Advanced BIM coordination was made possible through real-time clash detection and issue tracking via BCF in a cloud-based platform, ensuring smooth interdisciplinary collaboration. Document management was enhanced using a CDE, with Power BI dashboards offering detailed insights into deliverable tracking and compliance. The project also successfully demonstrated the advantages of openBIM in improving workflows, fostering collaboration, and optimizing resource allocation across a complex, multi-hospital development.

Explore the full submission >>

Winner

openBIM Integration and Data Validation in Conceptual Design Phase for the New M5 Metro Line

by Copenhagen Metro, Denmark

Project Overview

The M5 Metro Line is a new metro expansion project in Copenhagen, Denmark, designed to enhance urban mobility with a sustainable and interconnected transport system. The metro line will include 10 stations, covering approximately 12-14 km of double tunnel, 5 km of elevated tracks, and 1 km of ramp infrastructure. The project aims to connect key areas of the city, such as Copenhagen Central Station, Islands Brygge, and Østerport, with future potential extensions.

To ensure long-term sustainability and efficiency, Copenhagen Metro prioritized openBIM methodologies from the conceptual design phase. A primary objective was to establish a standardized data schema through IFC 4.3, ensuring seamless interoperability and eliminating dependency on specific software. The use of openBIM was essential in overcoming past challenges related to inconsistent object classification, data accessibility, and maintenance inefficiencies seen in previous metro projects.

The openBIM Standardization Project was launched to address these issues, consisting of key initiatives such as IFC 4.3 research, integration with an Object Identification System (OIS), and the implementation of the buildingSMART Data Dictionary (bSDD). The project also employed automated data validation processes, reducing manual errors and improving design consistency. Advanced data analytics and visualization tools were developed to monitor model accuracy, enhance collaboration, and streamline decision-making processes.

By integrating openBIM practices, the Copenhagen Metro is paving the way for digital transformation in infrastructure projects, ensuring improved data quality, optimized workflows, and long-term asset management efficiency.

Core Objectives

- Standardize the openBIM approach from the conceptual design phase to ensure interoperability and data consistency.
- Implement IFC 4.3 as the primary data schema to enhance classification and accessibility across project phases.
- Integrate an Object Identification System (OIS) to create a structured classification for assets and components.
- Automate data validation processes using Information Delivery Specifications (IDS) to improve accuracy and efficiency.
- Enhance collaboration and interoperability among project stakeholders through openBIM methodologies.
- Support sustainable development by integrating carbon tracking and lifecycle asset management into the BIM workflow.
- Enable data-driven decision-making by leveraging structured and validated data for optimized project execution.
- Ensure long-term asset management efficiency by aligning BIM data with Denmark's environmental and infrastructure policies.

Result

The implementation of openBIM strategies in the M5 Metro project has led to significant advancements in project execution, data management, and collaboration. By standardizing the use of IFC 4.3 and integrating an Object Identification System (OIS), the project ensured consistency in data classification and accessibility across all phases. The introduction of an Information Delivery Specification (IDS) framework enabled automated data validation, reducing manual verification efforts and improving model accuracy. The adoption of the Autodesk Construction Cloud (ACC) as the Common Data Environment (CDE) streamlined collaboration between multiple stakeholders, improving data exchange and reducing inconsistencies. The structured approach facilitated real-time data analysis, which enhanced sustainability tracking, carbon footprint monitoring, and lifecycle asset management, aligning with Denmark's environmental objectives. The integration of clash detection and early design validation resulted in more efficient workflows, reducing project risks and improving overall design quality. By leveraging a data-driven approach, Copenhagen Metro has optimized the long-term sustainability of the metro system while ensuring efficient operation and maintenance throughout its lifecycle.

Highlights

- First infrastructure project in Denmark to implement IFC 4.3.
- Standardized BIM workflows and data validation from the conceptual phase.
- Automated data verification reduced manual errors and improved model accuracy.
- openBIM methodology enabled seamless collaboration between stakeholders.
- Improved design consistency and interoperability across different software platforms.
- Reduced project risks through enhanced clash detection and early error identification.
- Integrated sustainability metrics into BIM processes for long-term carbon tracking.

Software Used

Autodesk Construction Cloud (ACC), BlenderBIM, Neo4j

openBIM Solutions Used

- IFC 4.3
- bSDD
- IDS
- BCF

"

Metro has enhanced collaboration and data management by adopting openBIM principles, integrating disciplines into a unified platform with standardized data and workflows. Using IFC 4.3 and other open standards from the project's initial stage ensures interoperability, scalability, and adaptability for future phases.

Esther De Brito,
BIM Manager

Explore the full submission >>

Finalist

Application of openBIM in the Design and Delivery of Guiyang-Nanning High-Speed RailwayMetro Line

by China Railway Eryuan Engineering Group Co., Ltd., China

Project Overview

The Guiyang-Nanning High-Speed Railway is a critical component of China's "Eight Vertical and Eight Horizontal" high-speed railway network, connecting Guizhou Province and Guangxi Province. Spanning 482.132 km with a design speed of 350 km/h, the project represents a key transportation infrastructure in southwest China. With a total investment of $10.4 billion, construction began in 2016, and the railway was operational by 2023.

The project faced extreme geographical challenges, being constructed through mountainous terrain and watercourses. To ensure high standards in quality, safety, environmental sustainability, and efficiency, openBIM technologies were extensively integrated. The project leveraged a range of openBIM solutions, including IFC, IDM, IDS, BCF, bSDD, MVD, and COBie, while strictly following ISO 19650 for lifecycle information management.

Through the integration of openBIM and intelligent railway technology, the project established an innovative collaborative digital environment, streamlining communication across multiple domains and software platforms. This enabled efficient interoperability, data synchronization, and seamless collaboration among stakeholders, resulting in optimized design, improved construction processes, and enhanced sustainability.

Core Objectives

- Interoperability: Establish a unified Common Data Environment (CDE) to facilitate multi-domain collaboration and real-time data exchange.
- Reliability: Implement ISO 19650 and China Railway BIM Alliance standards to guide the entire BIM lifecycle from design to operation.
- Traceability: Utilize BCF-based workflows for efficient tracking and resolution of design and construction issues.
- Sustainability: Develop a digital delivery platform based on Railworks for paperless documentation and integrate BIM+GIS intelligent alignment selection to optimize railway routes for environmental impact reduction.

openBIM Solutions Used

- IFC 2x3
- IFC 4
- IFC 4.3
- BCF
- bSDD
- COBie
- IDM
- IDS
- MVD

Result

The implementation of openBIM technology led to significant improvements in cost, efficiency, and quality. The number of design alterations was reduced by 50 times, saving $2.75 million, while construction time was shortened by 35 days. The adoption of parametric modeling, automatic attribute addition, and quantity take-off tools increased BIM modeling efficiency by 30%, while project communication improved by 50% due to better information sharing across teams. Real-time data synchronization on the CDE platform minimized errors, omissions, and design collisions, leading to a higher-quality project with fewer construction reworks. The project also played a key role in advancing openBIM standardization, particularly by validating and contributing to the IFC 4.3 railway infrastructure modeling standards. Sustainability was another major success, with the BIM+GIS system enabling low-carbon route selection, while the Railworks digital delivery platform eliminated paper-based documentation and allowed for seamless electronic archiving, significantly reducing environmental impact.

Highlights

- One of the first high-speed railway projects in China to implement openBIM at scale.
- Developed a cloud-based BIM component library to promote digital collaboration and reduce modeling redundancy.
- Created an intelligent alignment selection system for environmentally conscious railway route planning.
- Established a paperless digital delivery platform, improving efficiency and reducing waste.
- Validated IFC 4.3 standards for railway engineering and contributed to bSI's ongoing standardization efforts.

Software Used

Bentley openRail Designer, BIMRDS, GIS-based visualization tools, Railworks, Simulation software

Explore the full submission >>

Special Mention

KEJD Dataportal: Towards Next-Gen IFC

by Københavns Ejendomme (KEJD), Denmark

Project Overview

KEJD, the Facilities Management (FM) organization within Copenhagen Municipality, is responsible for operating, maintaining, and servicing a building portfolio of 2.8 million square meters. The organization has long embraced openBIM principles, receiving and managing IFC models from approximately 250 active construction projects while also digitalizing non-BIM-enabled assets. This approach has resulted in over 1,900 BIM models covering more than 83,000 rooms.

Despite significant progress in digitalization, KEJD faced challenges in managing FM data efficiently due to inconsistencies across various software systems. Many of these systems lacked support for open formats, leading to fragmented and redundant data. To address these challenges, KEJD initiated the Dataportal project, a strategic effort to create a centralized, openBIM-based data model. The objective is to use IFC not merely as a file format but as a standard "language" for seamless data exchange across KEJD's software ecosystem.

The Dataportal integrates data from multiple sources including BIM models, commercial FM systems, and public datasets into a vendor-neutral, standardized framework. This allows KEJD to provide a "golden record" of its assets, ensuring reliable master data distribution while reducing inefficiencies and costs associated with data migration and system integrations. The project leverages cutting-edge technologies, such as IfcOpenShell, to transform IFC files into tabular database formats and utilizes API-based distribution to ensure interoperability.

By pioneering this openBIM-driven approach, KEJD aims to enhance data governance, facilitate lifecycle cost analysis, and eliminate vendor lock-in, ultimately establishing a sustainable and scalable FM digital infrastructure.

Core Objectives

- Develop a standardized, openBIM-based data model that improves data governance and interoperability across KEJD's FM software landscape.
- Utilize IFC as a dynamic exchange standard rather than a static file format, ensuring seamless integration and data distribution through API-driven workflows.
- Establish a centralized DataHub to facilitate efficient master data management, providing a unified platform for validation, governance, and enrichment.
- Encourage industry-wide standardization by collaborating with stakeholders and promoting the practical benefits of openBIM.
- Support sustainability initiatives and lifecycle cost analysis (LCA) by structuring and storing FM-related data to enhance operational efficiency.
- Reduce reliance on proprietary systems and avoid vendor lock-in by adopting openBIM principles for flexible and scalable FM solutions.

openBIM Solutions Used

- IFC 4x3
- bSDD
- IDS

Software Used

Apache Parquet, Autodesk Revit, BBR, CCS/CCI, IfcOpenShell, JSON, Microsoft Azure Cloud

Result

The KEJD Dataportal project has successfully created a standardized, openBIM-driven data management system that enables seamless data governance, validation, and distribution across KEJD's extensive FM portfolio. The implementation of a centralized DataHub has allowed KEJD to consolidate fragmented data from multiple systems, ensuring consistency and eliminating inefficiencies caused by redundant and proprietary data formats. By leveraging a standardized REST API, the project has facilitated seamless data exchange across different software applications, reducing costs associated with data migration and system integration.

Through IfcOpenShell, KEJD has been able to convert IFC models into structured database formats (such as Apache Parquet and JSON) and visualization formats (SVG and GLB), improving accessibility and usability for various stakeholders. The project has also played a crucial role in supporting lifecycle cost analysis (LCA) by integrating structured FM data into KEJD's operational workflows.

Additionally, the adoption of openBIM principles has enabled KEJD to break free from vendor lock-in, providing greater flexibility in selecting and integrating specialized FM software solutions. Ultimately, the Dataportal project represents a major step toward achieving the IFC 5 vision of transactional data management and has established a benchmark for openBIM-driven facility management in the public sector.

Highlights

- Over 1,900 BIM models managed, covering 83,000+ rooms.
- Standardized openBIM-based data governance implemented.
- Development of a centralized DataHub to integrate and distribute master data.
- Reduced reliance on proprietary software by utilizing openBIM tools.
- Facilitated LCA (Lifecycle Cost Analysis) through structured data collection.
- Adoption of IfcOpenShell for IFC file transformation into tabular and visualization formats.

> "The value of using an openBIM-based standard lies in the ability to share data with all stakeholders in open formats. This approach ensures standardized data control, distribution, and validation, reducing costs associated with data transition and migration while avoiding software vendor lock-in.

Michael Friis Ørsted,
Head of Sustainability and Property Data

Explore the full submission >>

Winner

Transforming MEP Project Handover Practices: Embracing BCF, bSDD, IDS, IFC, and openBIM into BIM Asset Management Life Cycle

by Electrical and Mechanical Services Department (EMSD), The Government of the Hong Kong SAR, China

Project Overview

The Electrical and Mechanical Services Department (EMSD) of the Hong Kong SAR Government initiated a technical study and proof-of-concept tools to assess the feasibility of transforming MEP project handover workflows from a Revit-centric approach to an openBIM-based methodology. This initiative aimed to optimize BIM submission workflows and demonstrate how migrating to openBIM could be more efficient and beneficial for both project teams and property owners.

Prior to this initiative, EMSD had been developing BIM automation tools and standards since 2016, primarily relying on Revit-based workflows. However, the limited adoption of openBIM within the industry created challenges, particularly concerning IFC exports and information loss. To address this, EMSD proposed an enriched workflow that incorporated bSDD, IDS, IFC, and BCF standards to enhance data enrichment and quality assurance (QAQC) for asset management.

A key innovation was the introduction of the "Attributes Requirement Repository" (ARR), a central repository managing a single source of truth for Asset Information Requirements (AIR). ARR facilitates data transformation into various formats, including bSDD for openBIM workflows, ensuring accessibility and consistency. Additionally, EMSD developed tools such as a Batch Attribute Creator, IDS Checker, and IFC Export Guidelines to streamline BIM data preparation, validation, and conversion processes.

Through extensive trials and technical studies, EMSD successfully demonstrated that openBIM methodologies could improve interoperability, reduce data loss, and enhance efficiency in asset management. This project has significant implications for future BIM implementation in government projects, setting a new standard for digital transformation in the built environment.

Core Objectives

- Facilitate the transition from a Revit-centric workflow to an openBIM-based methodology, ensuring greater interoperability and efficiency.
- Develop tools and guidelines to enable systematic and comprehensive data validation, reducing errors in asset handover.
- Create a structured IFC-based submission process to empower industry stakeholders in adopting openBIM workflows while maintaining compliance with international standards.
- Optimize BIM data preparation and ensure enriched asset information management for better long-term maintenance and operational efficiency.
- Modernize digital asset management and foster a more sustainable and collaborative built environment.

Result

The project successfully demonstrated the feasibility of openBIM-based asset management, leading to significant advancements in workflow optimization and data validation. EMSD developed an IFC Export Guideline to ensure high-quality, standardized BIM submissions with minimal data loss. The implementation of the Attributes Requirement Repository (ARR) allowed for centralized management of Asset Information Requirements, streamlining the transformation of data into various openBIM formats, including bSDD and IDS. The Batch Attribute Creator plugin automated asset attribute input in BIM models, significantly reducing manual effort and ensuring consistency across projects.

Additionally, the IDS Checker enabled a systematic and comprehensive quality assurance process, improving the accuracy of IFC submissions and enhancing interoperability across different software platforms. EMSD also collaborated with the buildingSMART International (bSI) technical team to refine global openBIM standards, ensuring continuous improvement of the openBIM framework. Through stakeholder engagement and training, the project facilitated a smoother transition from proprietary BIM workflows to openBIM adoption, enhancing interdisciplinary collaboration and efficiency. These outcomes showcase how openBIM methodologies can lead to more effective asset management practices and drive digital transformation in government projects.

Highlights

- Successfully transitioned MEP project handover workflows from Revit-centric to openBIM methodologies.
- Developed comprehensive IFC Export Guidelines to ensure high-quality BIM submissions.
- Implemented the Attributes Requirement Repository (ARR) to centralize asset information management.
- Created and deployed tools for automated BIM data validation and enrichment.
- Established a Single Source of Truth for Asset Information Requirements using bSDD.
- Strengthened industry adoption of openBIM methodologies through training and collaboration.
- Collaborated with buildingSMART International to refine global openBIM standards.

Software Used

Autodesk Revit, Common Data Environment (CDE), Python scripts, Solibri, usBIM.IDS

openBIM Solutions Used

- IFC 4
- BCF
- bSDD
- IDS

"

Using openBIM in project handover enhances communication between project and O&M teams. While openBIM adoption in Hong Kong is still in its early stages, toolkits based on bSDD, IDS, BCF, and IFC help overcome key hurdles. This project demonstrates that the openBIM workflow is both feasible and as effective as conventional BIM workflows.

Hor Yin Chan,
Chief Engineer / Digitalisation and Technology

Explore the full submission >>

Winner

Assist-IoT: Smart Safety on Construction Site - IoT platform utilising openBIM and AI for automatic OSH monitoring and incident location with use of an IFC model

by Mostostal Warszawa S.A., Poland

Project Overview

The Assist-IoT project aimed to enhance construction site safety by integrating openBIM technology with an advanced Internet of Things (IoT) platform. With a growing need for digital solutions to address occupational safety and health (OSH) concerns in the construction industry, this project introduced a proactive, real-time monitoring system utilizing AI, IoT devices, and IFC-based BIM models.

The innovative platform enabled the automatic detection and localization of hazardous events such as workers entering danger zones, falls, lack of personal protective equipment (PPE), unauthorized site access, and abnormal health indicators like irregular heart rates. By leveraging BIM models as the core information structure, the project demonstrated how openBIM could facilitate real-time hazard detection and communication between smart IoT devices, edge computing, and safety officers.

A significant aspect of the project was the development of an Ultra-Wide Band (UWB)-based location tracking system integrated with the IFC model. This system precisely identified and communicated the location of incidents, enabling faster response times. Additionally, machine learning algorithms processed data from wearable devices to detect falls and alert safety personnel in real-time.

The pilot was conducted at the University of Warsaw's Faculty of Psychology construction site, where 11 distinct hazardous scenarios were tested, and the system's effectiveness was evaluated using 44 key performance indicators (KPIs). The results demonstrated reduced response times and improved safety outcomes, with latency times averaging under one second for both worker and safety officer alerts.

Core Objectives

- Integrate openBIM and IoT technologies to revolutionize real-time occupational safety monitoring on construction sites.
- Shift from reactive safety supervision to proactive hazard detection through automated and AI-driven monitoring systems.
- Enhance construction site supervision by facilitating real-time monitoring of workers' health and safety, PPE compliance, and unauthorized site access.
- Develop a scalable and privacy-sensitive monitoring system that protects workers' personal data while ensuring emergency intervention when needed.
- Demonstrate the feasibility of an AI-driven, UWB-based location tracking system adaptable for various construction environments.
- Reduce accident response times and improve safety compliance by integrating hazard detection into construction workflows.

Result

The Assist-IoT project successfully demonstrated the feasibility of integrating BIM-based hazard detection with real-time IoT monitoring on a construction site. During a two-week validation phase, the system generated 704 safety alerts with a false positive rate of only 3.98%, proving its accuracy and efficiency.

The use of the IFC model allowed the automatic recognition of unsafe scenarios, such as unauthorized site entry and failure to wear PPE, significantly improving safety compliance. Real-time monitoring also facilitated the detection of falls, ensuring rapid intervention for workers in distress. The AI-powered system demonstrated its ability to predict potential hazards, reducing the likelihood of accidents.

Additionally, the Assist-IoT platform improved construction site communication and coordination by integrating data across multiple stakeholders. The openBIM-based approach ensured the system's scalability and interoperability, making it adaptable for various construction environments.

Despite these successes, areas for improvement were identified, such as refining the precision of the UWB location system and enhancing hardware usability. Future implementations will focus on scaling the solution for larger construction projects.

Highlights

- First-of-its-kind integration of openBIM and IoT for real-time construction safety monitoring.
- Developed an AI-driven hazard detection system utilizing BIM and UWB-based tracking.
- Achieved a response time of under one second for safety alerts.
- Validated across 11 hazardous scenarios at an active construction site.
- Demonstrated successful automation of safety compliance monitoring.
- Utilized machine learning to detect falls and prevent safety incidents.
- Ensured worker privacy by limiting personal data visibility to emergency situations.
- Proved the scalability of the system through openBIM standards and IoT integration.

Software Used

ABIMcollab, BlenderBIM, Custom AI and IoT software, Dalux, IDS Maker, Solibri, usBIM. bSDDeditor

openBIM Solutions Used

- IFC
- bSDD
- CDE
- IDS

> "To develop a custom-built Internet of Things with a construction site model at its center, we used IFC models for quick and easy data processing. IDS was applied to validate these models and ensure compliance with requirements in bSDD, enhancing data quality and reliability.

Piotr Dymarski,
Director of Digitalization and Innovation Office

Explore the full submission >>

Special Mention

IFC COST: Redefining Cost Efficiency and Transparency in the AEC Industry

by Polytechnic of Milan, Italy

Project Overview

The IFC COST research project aims to redefine how cost data is structured and integrated within the AEC industry using openBIM principles. Currently, cost data in construction projects is represented as natural language text, making it unstructured and difficult for digital tools to analyze or validate. This research proposes a novel approach by structuring cost items in the IFC data model (IfcCostItem), enabling them to be treated as relational data rather than mere attributes. This integration fosters better interoperability, ensuring cost entities can directly relate to geometric objects within a BIM model.

By establishing a structured cost ontology, the research demonstrates how cost elements can be queried, analyzed, and updated automatically, rather than relying on manual and error-prone methods. The project explores how this structured cost data can facilitate automated validation, improve cost estimation accuracy, and enhance project budgeting through data-driven decision-making.

The methodology involves breaking down cost data into specific attributes, aligning them with IFC entities such as IfcCostItem, IfcCostValue, IfcConstructionResource, and IfcProduct. Additionally, by utilizing Information Delivery Specifications (IDS), the research ensures that BIM models contain all necessary information for accurate cost validation. The prototype, developed using Python and IfcOpenShell, demonstrates the feasibility of this structured cost model by enabling semi-automated cost validation, reducing manual verification efforts, and enhancing transparency across the construction industry.

The IFC COST research represents a significant step towards a more digitalized and standardized approach to cost management in AEC projects, providing a foundation for further innovation in cost estimation and financial planning within BIM workflows.

Core Objectives

- Develop a structured cost ontology in the IFC format to enable machine-readable cost data and improve data interoperability.
- Link cost data directly to geometric elements to eliminate errors caused by unstructured data and ensure accuracy.
- Enable automated validation methods for cost estimation, reducing manual verification and enhancing transparency.
- Facilitate dynamic querying, analyzing, and updating of cost information within BIM models.
- Establish a new cost domain within openBIM, ensuring seamless integration with other disciplines and reducing inconsistencies.
- Improve collaboration across project stakeholders by making cost data more structured and accessible.

Result

The research has already demonstrated several key benefits in cost structuring and validation, despite being an ongoing development. The introduction of a structured cost domain has enabled better standardization of cost data, reducing ambiguity and ensuring consistency across construction projects. By implementing a more granular cost breakdown, the research has established clear relationships between geometric objects and cost elements, enabling greater accuracy in cost estimation. Additionally, the project introduced IFC-based cost schedules (IfcCostSchedule), allowing cost breakdowns to be categorized more efficiently across different phases of a project. The structured cost data also facilitated automated validation processes, significantly reducing manual intervention and the risk of human error.

By utilizing IfcOpenShell and Python, the research successfully developed a prototype demonstrating the practical application of linking cost entities with geometric models. This semi-automated approach streamlines cost validation, making the process more efficient, transparent, and accurate. However, challenges remain, such as the need for user-friendly tools to facilitate structured cost data creation and the necessity of expanding IFC attributes to accommodate more detailed cost information. Despite these limitations, the research lays the foundation for future advancements in cost structuring and validation within openBIM frameworks, setting a precedent for industry-wide adoption.

This research represents a major step forward in achieving standardized, structured, and machine-readable cost data within the AEC industry. By leveraging openBIM principles, IFC COST is pioneering a new approach to cost estimation, enhancing efficiency, transparency, and interoperability across construction projects.

Highlights

- Developed a structured IFC-based cost ontology to improve cost data management.
- Enhanced interoperability between cost data and geometric objects in BIM models.
- Enabled automated cost validation, reducing manual verification errors.
- Created a prototype using Python and IfcOpenShell to demonstrate the feasibility of the approach.
- Introduced IFC-based cost schedules (IfcCostSchedule) for flexible cost estimation.
- Improved transparency and accuracy in project budgeting and financial planning.
- Identified the need for expanding IFC attributes to better support cost structuring.

Software Used

Custom IFC-based cost structuring tools, IfcOpenShell, Python

openBIM Solutions Used

- IFC
- IDS

> "This project introduces an innovative approach to cost management by structuring cost data based on IFC, making it machine-readable and improving estimation accuracy. By linking cost entities with geometric objects and enabling validation procedures, it enhances data interoperability, collaboration, and scalable cost management in BIM projects.

Jacopo Cassandro,
M.Sc., Civil Engineer, PhD Candidate

Explore the full submission >>

Winner

CarbonSmart: Automated Knowledge Graph-based Carbon Assessment and Tracking throughout the Construction Life Cycle using openBIM, openGIS, and Blockchain

by The Hong Kong University of Science and Technology, Hong Kong, China

Project Overview

The CarbonSmart project focuses on revolutionizing Life Cycle Assessment (LCA) for the construction industry using openBIM, openGIS, and blockchain technology. Traditional BIM-based LCA processes are inefficient, time-consuming, and prone to errors, primarily due to challenges in collecting vast amounts of carbon data and exchanging this information between stakeholders. The research aimed to develop an automated system to quantify embodied carbon and estimate operational carbon while enabling efficient carbon footprint tracking throughout the construction life cycle.

This innovative framework integrates multiple data sources to facilitate automated LCA carbon assessments. Key developments include:

- A Dynamo plug-in tool that quantifies embodied carbon automatically based on openBIM Model View Definitions (MVD).
- Collaborative model enrichment using IFC extensions and automated validation with Information Delivery Specification (IDS) to ensure data quality.
- A knowledge graph-based operational carbon modeling framework using thermal zoning for better energy simulations.
- An openBIM-openGIS integrated platform that combines LCA carbon assessment and tracking for real-time monitoring.

The framework has been successfully implemented in the Organic Resources Recovery Centre Phase 2 (O·PARK2) project, the first carbon-neutral construction project in China. The research has also been recognized with multiple industry awards, including the Autodesk Hong Kong BIM Awards 2023 (Outstanding Student category) and the Grand Award of the Hong Kong openBIM/openGIS Awards 2024 (Student Research Category).

Core Objectives

- Automate Life Cycle Assessment (LCA) by developing tools for precise and efficient quantification of embodied carbon and operational carbon.
- Enhance data exchange and stakeholder collaboration by integrating openBIM, openGIS, and blockchain technologies to improve interoperability.
- Develop an automated framework for tracking carbon footprints and streamlining data validation processes.
- Reduce manual efforts in carbon assessment while promoting transparency and traceability through blockchain technology.
- Validate and deploy the framework on real-world construction projects to demonstrate its effectiveness and encourage industry adoption.

Result

The CarbonSmart framework successfully achieved automation in both embodied and operational carbon assessments, improving efficiency and data accuracy. The developed Dynamo plug-in enabled automated embodied carbon quantification, reducing time consumption by 90% compared to traditional methods. A collaborative model enrichment approach was implemented using IFC extensions and automated checking through IDS, ensuring high-quality carbon data with a 98.4% compliance rate in material attributes. The knowledge graph-based operational carbon modeling introduced a new way of integrating data from BIM, weather stations, and building management systems (BMS), enabling automated thermal zoning and more accurate operational carbon estimation. Furthermore, the openBIM-openGIS integrated platform facilitated real-time tracking of embodied and operational carbon, incorporating blockchain for enhanced transparency and traceability in carbon footprint management. The research was validated through its application in O·PARK2, achieving China's first carbon-neutral construction phase, and received significant industry recognition, including multiple awards.

This research sets a new benchmark for integrating digital technologies in sustainable construction and openBIM workflows, paving the way for automated, data-driven carbon assessment and tracking solutions.

Highlights

- Developed an automated BIM-based carbon assessment framework integrating openBIM, openGIS, and blockchain.
- Successfully deployed in the O·PARK2 project, achieving China's first carbon-neutral construction phase.
- Reduced embodied carbon quantification time by 90%, improving efficiency and accuracy.
- Enabled seamless data exchange between designers, contractors, and suppliers using openBIM standards.
- Validated accuracy and reliability through industry case studies and awards.
- Recognized at multiple industry awards, including Autodesk Hong Kong BIM Awards and Hong Kong openBIM/openGIS Awards.

Software Used

Autodesk Revit, Blender, Blockchain platform for carbon tracking, Dynamo, EnergyPlus, IfcOpenShell, OpenStreetMap

openBIM Solutions Used

- IFC
- IDM
- MVD
- IDS

> "Our project leverages openBIM technology for automated carbon assessment and tracking throughout the construction lifecycle. By enabling high-quality collaboration in quantifying embodied carbon and simulating operational emissions via a digital twin, openBIM enhances interoperability and supports a common data environment for carbon management.

Yuqing Xu,
PhD Candidate

Explore the full submission >>

Special Mention

Development and Implementation of a Use Case-Based IDS Catalogue for Manufacturers Augmented by the bSDD

by Ecole de Technologie Supérieure de Montréal, Canada

Project Overview

This research project aims to facilitate the adoption and implementation of openBIM concepts, specifically Use Case Management (UCM), Information Delivery Specification (IDS), and the buildingSMART Data Dictionary (bSDD), by manufacturers. Despite growing industry interest, there has been limited practical feedback and structured methodologies available to guide manufacturers in implementing IDS and bSDD within real-world workflows. To address this, the project developed a structured approach to integrate these concepts into manufacturing processes, improving information management and standardization.

Manufacturers were selected as the focus group due to their substantial role in generating information and the associated challenges of maintaining data accuracy, interoperability, and completeness. The study identified key issues, including lack of standardization, inaccuracies in information exchange, and data loss, and proposed solutions by developing a proof of concept.

Key outcomes included the identification of 20 manufacturer-specific use cases, the development of a standardized use case template incorporating IDS requirements, the creation of a use case catalogue with 17 documented cases, and an IDS catalogue covering 103 requirements for bolts, plates, and beam elements. Additionally, the study explored the synergy between IDS and bSDD and demonstrated how bSDD can enrich IFC models.

By offering a structured implementation process, the project provides manufacturers with a reference for improving data management, aligning their practices with openBIM principles, and enhancing interoperability within the BIM ecosystem.

Core Objectives

- Develop a structured, practical approach for implementing UCM, IDS, and bSDD in manufacturing processes.
- Address key challenges in data management, including lack of standardization, accuracy issues, and information loss.
- Provide manufacturers with concrete methodologies, templates, and catalogues to facilitate the adoption of openBIM concepts.
- Explore the synergy between IDS and bSDD and their impact on enriching IFC models.
- Enhance interoperability across BIM ecosystems to streamline workflows and improve data accuracy.

openBIM Solutions Used

- IFC
- IDS
- bSDD
- UCM

Software Used

ACCA Software, BIMworks, Plannerly

Result

The project successfully demonstrated the feasibility of integrating IDS and bSDD into manufacturing workflows. Through iterative testing and validation, the study enriched 54 data properties in IFC models, developed over 3,700 IDS rules, and provided best-practice recommendations for their implementation.

Key findings included improved visualization of BIM benefits through use case documentation, the establishment of a common reference language among stakeholders, and enhanced standardization of information. While the bSDD offered valuable enrichment capabilities, its syntax inconsistencies with IFC posed challenges for direct verification of IDS specifications. Furthermore, IDS integration facilitated better quality control, reducing rework and increasing efficiency in model validation.

The project also highlighted limitations, such as the evolving nature of IDS and bSDD concepts, software constraints, and the need for further refinement in the integration process. Despite these challenges, the study provided a comprehensive roadmap for manufacturers, offering actionable insights into implementing openBIM methodologies and enhancing interoperability across BIM ecosystems.

Highlights

- Developed a structured process for implementing UCM, IDS, and bSDD in manufacturing.
- Identified 20 manufacturer-specific use cases and documented 17 in a structured catalog.
- Created an IDS catalog with 103 requirements for bolt, plate, and beam elements.
- Enriched 54 data properties in IFC models using bSDD.
- Developed over 3,700 IDS rules to improve quality control and information validation.
- Established a reference framework for manufacturers to improve BIM integration and interoperability.

> "openBIM has been crucial in improving project understanding and demonstrating its value to our partner's employees. By optimizing and automating quality assurance and control, it has strengthened the validity of manufacturing product information. This highlights the critical role of information quality in the asset production chain.

Cloé Arnould,
BIM Manager

Explore the full submission >>

Special Mention

A Methodology for Integrating Life Cycle Assessment Data within the IFC Schema through openBIM Workflows

by Technical University of Denmark, Denmark

Project Overview

The construction industry must significantly reduce its environmental impact to achieve climate neutrality by 2050. This research project explores how Whole Building Life Cycle Assessment (WBLCA) data can be integrated into the IFC schema and openBIM tools to streamline sustainable design processes. The study identifies several challenges in current WBLCA workflows, such as fragmented communication, complexity in LCA data management, and the inefficiencies of handling Environmental Product Declarations (EPDs).

The research develops a structured methodology for embedding LCA data within openBIM workflows, focusing on improving accessibility, interoperability, and long-term usability of sustainability data. The study proposes a novel data model that incorporates environmental Product Data Templates (PDTs) aligned with EN ISO 22057 standards into IFC. It also examines how Construction Object Data View (CODview2), as defined in EN 17549-2, can facilitate product catalogues within IFC for better environmental product data management.

The methodology is validated by implementing IFC STEP format models using IfcOpenShell and testing with BlenderBIM software. The results demonstrate the feasibility of integrating WBLCA data into IFC today while highlighting areas for further development, such as improved federated model support and compliance-checking automation.

Core Objectives

- Develop a structured methodology for integrating WBLCA data into IFC schema and openBIM workflows.
- Simplify and automate the management of Environmental Product Declarations (EPDs) to reduce manual effort.
- Ensure compliance with European sustainability standards while improving interoperability across disciplines.
- Improve data longevity, machine-readability, and verification processes to support efficient sustainability assessments.
- Validate the methodology through IFC-based implementations and assess its feasibility for industry-wide adoption.

Result

The research successfully demonstrates that WBLCA data can be integrated into IFC models today, significantly reducing manual workload and improving transparency in sustainability reporting. A structured data model was developed to support machine-readable sustainability data storage within IFC, allowing EPDs to be implemented as IFC-compliant product data templates (PDTs) for automated documentation and verification of materials. Validation of the methodology was achieved through IFC-based implementations using IfcOpenShell and BlenderBIM, proving its feasibility and highlighting areas for further standardization. The study also identified CODview2 as an effective solution for storing environmental product data within IFC, aligning with new industry standards. Additionally, recommendations were made for improving LCA data integration in future openBIM developments, such as automation of compliance checks and better handling of federated models. While existing BIM software lacks support for some advanced IFC features, this research provides a strong foundation for industry adoption and underscores the importance of openBIM in enabling transparent, long-term, and interoperable sustainability data management.

This research highlights the crucial role of openBIM in driving sustainability within the built environment, offering a scalable and transparent solution for integrating environmental data into BIM processes.

openBIM Solutions Used

- IFC
- IDS
- CODview2

Highlights

- Developed a methodology for integrating WBLCA data into IFC and openBIM workflows.
- Proposed a structured approach for storing EPD data using IFC-compliant PDTs.
- Demonstrated feasibility through implementation and validation using openBIM tools.
- Identified CODview2 as a viable solution for environmental product data in IFC.
- Provided recommendations for future enhancements, including automated compliance checking.
- Improved accessibility and long-term usability of sustainability data within openBIM.

Software Used

bSI Validation Service, BlenderBIM, GitHub, IfcOpenShell, Python

> "openBIM and open data exchange are not just valuable for collaboration today but essential for governance and long-term data usability. Democratising built environment information means providing it in a way that is accessible for all while maintaining its quality and relevance over time.

Martina Jakubowska,
Student

Explore the full submission >>

Winner

Use, Reuse but Do Not Abuse Resources: An openBIM Approach to Standardising Terminology, Data, and Processes for Circular Construction Information Management and Exchange

by Eindhoven University of Technology (TU/e), Netherlands

Project Overview

The project focuses on integrating openBIM principles to enhance circularity in the construction industry, aligning with the EU's Circular Economy Action Plan. The research led by Eindhoven University of Technology (TU/e) proposes the Decommissioning and Reuse (DOR) Ontology and the buildingSMART Data Dictionary (bSDD) as a standardized framework for managing and exchanging circular economy information.

The research addresses the significant material waste generated by the construction industry, where 40% of reusable construction waste remains unrecovered. By developing a data dictionary and ontology, the project creates a systematic approach to linking decommissioned materials with new construction projects, ensuring effective material identification, management, and recertification. This solution enhances interoperability and communication across various BIM software platforms.

The bSDD serves as a common reference for data exchange, enabling stakeholders such as designers, material banks, and regulatory bodies to efficiently track and manage reusable materials throughout their lifecycle. The system integrates with BIM models, facilitating end-to-end reuse across the construction supply chain. The project is part of the larger Eco-CONstruction for Sustainable Development (ECON4SD) initiative, emphasizing sustainability and innovation in circular construction.

Core Objectives

- Establish a standardized digital framework that enables the reuse of construction materials using openBIM principles.
- Bridge the gap between material banks and BIM models, enabling seamless data exchange.
- Improve visibility, traceability, and interoperability of reusable materials across different BIM platforms.
- Provide an open and structured vocabulary to ensure consistent terminology across all stakeholders.
- Reduce construction waste and promote sustainability by embedding circular economy principles into BIM workflows.
- Facilitate better decision-making through structured data integration for designers, contractors, and material suppliers.

Software Used

Autodesk Revit, BIM-based sustainability assessment tools, BIMCollab ZOOM, BlenderBIM, bSDD, openAEC plug-in for Revit, Python

Result

The project successfully developed a comprehensive data dictionary and ontology that standardizes circular economy data within BIM workflows. The Decommissioning and Reuse (DOR) Ontology was translated into a bSDD entry, enabling BIM models to exchange data with material banks in an open format. This innovation was validated through two case studies. The first employed a semantic web/linked data methodology, demonstrating the feasibility of a structured ontology for circularity within the built environment. The second utilized an openBIM-based approach incorporating IFC standards and the bSDD service, proving its applicability within existing AEC software solutions. As a result, interoperability between BIM tools and reusable material databases was significantly improved, facilitating better digital documentation and compliance with sustainability standards. Additionally, the project enhanced decision-making for stakeholders by providing detailed lifecycle data, improving material traceability and circular economy workflows. The project aligns with key industry standards, including ISO 19650-1, ISO 20887, and the future ISO 59040, ensuring widespread industry applicability.

Highlights

- Development of the first comprehensive bSDD for circular construction materials.
- Successful validation through real-world case studies, ensuring practical application.
- Collaboration with international stakeholders and sustainability initiatives.
- Standardized terminology and processes for managing reusable building materials.
- Facilitated creation of digital material banks, supporting a marketplace for reused materials.
- Addressed a major gap in BIM workflows by integrating structured circularity data.

openBIM Solutions Used

- IFC
- bSDD
- UCM
- BCF
- IDS

"Using UCM and bSDD to publish our results has allowed us to structure our work to showcase how circular economy solutions can be aligned with best openBIM practices. By sharing our work, we have set a standard for others to follow, which helps in elevating both knowledge and operational efficiency across the construction industry.

Arghavan Akbarieh,
Post-doc researcher

Explore the full submission >>

Winner

BIM & Scan® OpenOp: An openBIM Life-Cycle Management Platform - Validation and Reconstruction Tools

by BIM & Scan Ltd, Ireland

Project Overview

OpenOp (short for Open (standards) Operations) is a cyber-physical openBIM enterprise management system that bridges real and virtual worlds. Designed for lifecycle management, it caters to a broad range of sectors, including buildings, telecommunications, wind farms, ports, railroads, and tunnels. OpenOp's primary function is to enable lifecycle data setup, delivery, capture, and validation on built environment projects, ensuring interoperability by utilizing ISO 16739 IFC-compliant schemas.

Over the last four years, OpenOp has been extensively tested through the development of the Ericsson Site Digital Twin (ESDT), a globally deployed system with over 25,000 IFC-based models. OpenOp offers three main solutions: customizable enterprise applications, a subscription-based platform with tools like AutoCorr and AutoGen, and APIs that integrate with third-party tools, including a Revit AutoCorr plugin. The system streamlines data exchange and validation processes, making the management of openBIM data more efficient and precise.

A distinguishing feature of OpenOp is its ability to automatically generate 100% IFC-based site installation schematics in seconds, reducing what traditionally took weeks. Additionally, OpenOp enforces strict adherence to IDM > MVD = IFC methodologies, ensuring accurate, standardized, and reusable data for engineering and lifecycle processes. OpenOp has also introduced novel tools such as AutoCorr for model validation and AutoGen for architectural and structural IFC model generation.

Core Objectives

- Enable seamless lifecycle data management by ensuring standardized and validated information exchange across all project phases.
- Automate validation, documentation, and coordination to reduce human errors and improve efficiency.
- Support various industries such as telecommunications, infrastructure, and energy with a scalable openBIM platform.
- Integrate digital twin technology for real-time synchronization between virtual and physical assets.
- Enhance sustainability through optimized material usage, reduced waste, and improved energy efficiency.
- Ensure interoperability by enforcing IDM > MVD = IFC methodologies for accurate and reusable engineering data.

Software Used

Revit AutoCorr Plugin, AutoGen, AutoCorr, BIMworks, OpenOp Field Client, OpenOp Query Builder, OpenOp Task Scheduler, Microsoft Azure, PostgreSQL

Result

The deployment of OpenOp has delivered significant improvements in efficiency, accuracy, and interoperability across multiple industries. By automating IFC-based site installation schematics, OpenOp has eliminated manual errors and reduced weeks of work into seconds. The AutoCorr tool has transformed model validation, ensuring precise verification of as-built data and reducing construction-related discrepancies. OpenOp's openBIM-driven API integration has allowed seamless data exchange between enterprise applications, making it an essential component of digital transformation for major clients like Ericsson. Scalability has been a key success factor, with OpenOp managing millions of IFC-based site models, demonstrating its ability to handle large-scale projects worldwide. Additionally, the platform contributes to sustainability goals by minimizing material waste, optimizing procurement through automated Bill of Materials (AutoBOM), and enabling real-time energy assessments. OpenOp has played a pivotal role in ensuring industry-wide adoption of structured data workflows, delivering a comprehensive, flexible, and standards-driven lifecycle management platform.

This project represents a paradigm shift in lifecycle data management using openBIM, with a strong emphasis on automation, accuracy, and interoperability.

Highlights

- Developed a fully openBIM-compliant lifecycle management platform.
- Supports diverse industries, including telecommunications, wind farms, and civil infrastructure.
- Enabled automatic IFC-based schematic generation and model validation.
- Integrated with digital twins for real-time monitoring and management.
- Provides a customizable and scalable solution with global adoption.
- Reduces errors and inefficiencies in data validation and project coordination.
- Implemented IDM > MVD = IFC methodologies to standardize data exchange.

openBIM Solutions Used

- IFC 2x3
- IFC 4
- BCF
- bSDD
- COBie
- IDM
- IDS
- ifcXML
- ISO 12006 taxonomies (Omniclass, UniClass)
- mvdXML
- openCDE

> "The expanding range of openBIM standards allows us to meet major needs with a minimal yet powerful set of tools like IFC, BCF, and openCDE. Their flexibility is endless, and success depends only on our ability to maximize the value of openBIM standards

Dr. Shawn E. O'Keeffe,
CTO, Chief Scientist, and Co-founder

Explore the full submission >>

Finalist

usBIM.IDS: IDS for EVERYONE

by ACCA Software S.p.A., Italy

Project Overview

usBIM.IDS is an advanced cloud-based solution designed to facilitate the widespread use of the Information Delivery Specification (IDS) standard developed by buildingSMART. As part of ACCA Software's broader usBIM platform, this tool simplifies the creation, management, and validation of IDS documents, ensuring compliance with openBIM workflows. The core objective of usBIM.IDS is to make IDS accessible not only to experts but also to non-specialists, democratizing the adoption of structured data exchange in the construction industry.

usBIM.IDS integrates AI-driven tools, multi-language support, and seamless cloud-based collaboration, making IDS implementation significantly easier and more intuitive. The platform enables automated compliance verification, real-time collaboration, and continuous validation of IFC models against IDS requirements.

With its intuitive user interface, AI-assisted functionalities, and direct integration with the buildingSMART Data Dictionary (bSDD), usBIM.IDS ensures high-quality information management across projects of all scales, from small residential developments to large infrastructure projects. The platform is designed to bridge gaps in interoperability, reducing errors, enhancing efficiency, and promoting transparency in project workflows.

Key achievements include its role in streamlining compliance for public sector projects, such as those managed by ANAS S.p.A., a major Italian infrastructure organization, by replacing outdated Excel-based workflows with standardized IDS validation processes. The solution has proven its ability to drastically reduce validation times, eliminate data inconsistencies, and enhance collaboration between contractors and project stakeholders.

Core Objectives

- Simplify IDS adoption by making it accessible to all stakeholders, regardless of technical expertise.
- Improve compliance with openBIM standards through AI-driven automation and cloud-based collaboration.
- Provide a robust and scalable platform for managing IDS documents efficiently in small and large-scale projects.
- Ensure continuous validation of IDS specifications against IFC models to maintain interoperability.
- Enhance coordination and communication among project teams by integrating standardized openBIM workflows.

Software Used

AI-driven Copilot, bSDD Integration, IDS Audit Tool, Validator & Compliance Checker, usBIM.IDS, usBIM Platform

openBIM Solutions Used

- IFC 2x3
- IFC 4
- IFC 4x3
- BCF
- bSDD
- IDS
- openCDE

Result

The implementation of usBIM.IDS has yielded significant improvements in openBIM adoption and IDS compliance, making the process more efficient and user-friendly. Notably, ANAS S.p.A. leveraged the platform to digitize their Exchange Requirements, ensuring automated, standardized validation of large-scale infrastructure models. This shift from manual Excel-based processes to a fully digital, cloud-based workflow eliminated human errors, improved data integrity, and drastically reduced validation times.

usBIM.IDS has demonstrated practical benefits in real-world scenarios, such as smart city initiatives, where it was used to manage IDS documents across multiple interconnected projects. It facilitated seamless data exchange, improving collaboration and ensuring all stakeholders had access to up-to-date project information.

Through AI-driven tools like Copilot, users can automate compliance checks and receive real-time feedback on model accuracy. The integration of continuous validation features ensures that IDS specifications remain aligned with evolving project requirements, significantly reducing the risk of data inconsistencies.

The tool's adoption has led to improved efficiency, better project coordination, and enhanced compliance with industry standards. By making IDS management more intuitive and automating complex verification tasks, usBIM.IDS has set a new benchmark for how openBIM workflows should function in practice.

This project represents a significant advancement in simplifying and democratizing the use of openBIM standards, setting a new precedent for how IDS can be effectively implemented across diverse construction projects.

Highlights

- User-friendly IDS adoption: Simplifies the creation and validation of IDS documents for experts and non-experts alike.
- AI-driven automation: Copilot AI assists in IDS specification creation, compliance verification, and error correction.
- Cloud-based platform: Enables real-time collaboration and seamless data exchange across project stakeholders.
- Integration with bSDD and IFC standards: Ensures standardized classification and accurate data validation.
- Multi-language support: Available in six languages, enhancing accessibility for international users.
- Optimized for large-scale projects: Proven success in managing IDS for infrastructure giants like ANAS S.p.A.
- Real-time compliance checks: Reduces errors and ensures that models meet IDS specifications throughout the project lifecycle.

"

A well-structured BIM tender requires smooth model governance aligned with project objectives. With usBIM.IDS, which implements the buildingSMART IDS standard, clients can accurately define their Level of Information Need (LOIN) within the Employer Information Requirement (EIR) and BIM Execution Plan (BEP).

Michelangelo Cianciulli, openBIM & IFC expert

Explore the full submission >>

Finalist

OpenAEC - openBIM Solution Packages - “Realisation of openBIM Workflows Starting with bSDD & IDS”

by ONESTRUCTION Inc., Japan

Project Overview

The OpenAEC project is a comprehensive openBIM solution package designed to streamline and enhance BIM workflows through an open and collaborative approach. Developed by ONESTRUCTION Inc., OpenAEC provides an integrated suite of tools that facilitate seamless data exchange and project coordination within the Architecture, Engineering, and Construction (AEC) industry. The primary goal of OpenAEC is to make openBIM more accessible by connecting desktop solutions with web applications, ensuring interoperability, data consistency, and compliance with international openBIM standards.

The OpenAEC solution consists of three main components:

1. OpenAEC for bSDD – A plug-in for BIM authoring tools that enables integration with the buildingSMART Data Dictionary (bSDD) to enrich BIM models with standardized information.
2. OpenAEC SaaS – A web-based application that manages IFC data, ensuring correct information structuring and validation against Information Delivery Specifications (IDS).
3. OpenAEC for CDE – A tool for integrating with Common Data Environments (CDE), enabling secure IFC data management and streamlined delivery.

The project aims to address common challenges in the BIM industry, such as interoperability issues, inefficient workflows, and lack of standardized information management. Through its unique integration with bSDD and IDS, OpenAEC facilitates a structured, automated, and transparent exchange of BIM data, reducing errors, improving compliance, and enhancing collaboration between stakeholders.

Core Objectives

- Develop a robust openBIM solution that enables seamless collaboration across different platforms and stakeholders.
- Bridge the gap between desktop BIM solutions and web applications, ensuring smooth transitions between tools while maintaining data integrity.
- Optimize IFC-based information structuring, validation, and delivery through bSDD and IDS.
- Reduce errors and inefficiencies in BIM workflows by automating information validation and standardization.
- Provide an intuitive and efficient BIM management tool that adheres to global openBIM standards.
- Enhance the digitalization of project workflows and contribute to the broader adoption of openBIM.
- Improve accessibility and affordability of openBIM solutions, particularly in markets where BIM adoption is challenging.

Software Used

AI-driven Copilot, bSDD Integration, IDS Audit Tool, Validator & Compliance Checker, usBIM.IDS, usBIM Platform

Result

The OpenAEC solution package has demonstrated significant improvements in BIM workflows and project efficiency. The automation of IDS integration into BIM models has drastically reduced human error and improved compliance with project requirements. For example, in a 10km road design project, the implementation of OpenAEC led to a 50% reduction in time and labor costs, ensuring quicker project execution with fewer errors.

Similarly, the dashboard functionality of OpenAEC has been widely adopted by contractors, allowing them to visualize and interpret IFC data with ease. This resulted in a 30% reduction in labor costs related to information processing and construction management. Additionally, improved coordination through OpenAEC’s integration with CDEs facilitated streamlined data sharing and compliance verification, reducing the risk of contractual disputes and ensuring adherence to project specifications.

The scalability and flexibility of OpenAEC have positioned it as a valuable tool for BIM professionals, improving project sustainability, reducing lifecycle costs, and enhancing asset value. The solution has gained traction in 30 countries, proving its accessibility and effectiveness across different construction environments.

This openBIM entry presents a compelling case for the integration of standardized BIM workflows, making significant strides in efficiency, compliance, and accessibility across the global construction industry.

Highlights

- Successfully bridges the gap between desktop BIM solutions and web applications.
- Uses bSDD and IDS to enhance information structuring and compliance.
- Achieved a 50% reduction in time and labor costs in large-scale infrastructure projects.
- Improved contractor efficiency with a 30% reduction in labor costs for IFC management.
- Ensured seamless integration with multiple CDE platforms, enhancing project coordination.
- Facilitated a broader adoption of openBIM, making it more accessible to professionals worldwide.
- Offers a cost-effective solution at €50 per user per month, making it widely affordable.

openBIM Solutions Used

- IFC 2x3
- IFC 4
- BCF
- bSDD
- CityGML
- COBie
- IDS
- LandXML
- mvdXML

> “By following the openBIM workflow, we can provide clients with sustainability, and business value.

Yoshiyuki Miyauchi,
Chief Technology Officer

Explore the full submission >>

Finalist

ZWING openBIM - An Independent openBIM Auditing Platform for the Whole Project Lifecycle Featuring IDS, bSDD, BCF, openCDE, openGIS, and AI Chat on IDS Powered by RAG"

by ZWING INNOVATION LIMITED, Hong Kong, China

Project Overview

ZWING openBIM is a pioneering software platform designed to transform Building Information Modeling (BIM) compliance checking and validation by leveraging openBIM methodologies. This web-based platform automates the auditing of BIM files across the entire project lifecycle, ensuring high-quality data integrity while streamlining processes for construction professionals.

By integrating Industry Foundation Classes (IFC) and Information Delivery Specifications (IDS), ZWING openBIM provides advanced model validation based on internationally recognized BIM standards, including those set by the Hong Kong Construction Industry Council (HK CIC). A key feature of the tool is its openCDE API, which facilitates seamless data exchange from multiple Common Data Environments (CDEs) and BIM software platforms, ensuring interoperability and efficiency.

A standout innovation of ZWING openBIM is its AI-powered Retrieval Augmented Generation (RAG) chat system, which allows users to query Asset Information Requirements (AIR) in natural language, simplifying compliance interpretation. Additionally, its GIS-enabled capability overlays BIM models on maps using openGIS data from Open3DHK, enhancing spatial awareness and enabling real-time monitoring of project progress.

The platform ensures compliance with industry standards through automated checking of non-geometrical data, which is often a challenge in BIM workflows. Its openBIM approach eliminates vendor lock-in, fostering better collaboration between stakeholders using different BIM tools, including Revit, Tekla Structures, and Graphisoft Archicad.

Core Objectives

- Automate compliance auditing for BIM workflows, ensuring data accuracy and reliability across the project lifecycle.
- Streamline data validation processes by integrating openCDE API standards for seamless information exchange.
- Reduce manual errors using AI-powered RAG-based AI Chat, which enables users to query IDS and AIR requirements effortlessly.
- Enhance spatial awareness and decision-making through GIS-enabled BIM data visualization, allowing teams to overlay BIM models on maps for improved monitoring.
- Promote widespread adoption of openBIM methodologies, fostering long-term interoperability and sustainability in the construction industry.

Software Used

AI Chat (RAG-based natural language processing), Autodesk Revit, Graphisoft Archicad, openGIS (Open3DHK), Tekla Structures, ZWING openBIM Web Platform

Result

ZWING openBIM has successfully demonstrated the transformative impact of openBIM in streamlining compliance checks and improving efficiency across construction projects. By leveraging IFC, IDS, bSDD, and openCDE APIs, the platform enables smooth data interoperability, significantly reducing manual errors and rework in BIM workflows. The automation of compliance checking ensures accuracy and efficiency, saving valuable time for BIM professionals and reducing the risk of errors in project data. The platform's AI-powered RAG-based chat system further simplifies IDS compliance interpretation, making complex data more accessible to users. The openGIS integration enhances spatial analysis by enabling real-time visualization of BIM models on maps, providing better insights into project performance. Additionally, ZWING openBIM's vendor-neutral approach supports IFC models from multiple software platforms, allowing teams to collaborate seamlessly without software restrictions.
The successful implementation in large-scale infrastructure projects, including power stations, highways, and drainage designs, underscores its effectiveness in real-world applications. By automating traditionally manual BIM validation tasks, ZWING openBIM has improved productivity, accuracy, and cost-efficiency in project delivery, reinforcing its value as a cutting-edge compliance solution.

Highlights

- AI-powered BIM auditing platform utilizing RAG-based AI Chat for IDS queries.
- Integration with openGIS for geospatial BIM data visualization.
- Automated compliance checks for non-geometrical data across the whole project lifecycle.
- Vendor-neutral openBIM approach supporting IFC-based interoperability.
- Enhanced collaboration through openCDE API data exchange.
- Reduction in manual errors, improving efficiency and project outcomes.
- Successfully implemented in large-scale infrastructure projects, including power stations, highways, and drainage systems.

openBIM Solutions Used

- IFC 2x3
- IFC 4
- bSDD
- BCF
- IDS
- openCDE API
- openGIS

"

ZWING openBIM leverages standards like bSDD, IDS, IFC, and BCF to revolutionize BIM compliance checking and validation. By enabling open data exchange and seamless interoperability, it enhances efficiency across the project lifecycle. The integration of AI and GIS further makes BIM data more accessible and understandable, driving the adoption of openBIM principles.

York Tang,
Head of R&D

Explore the full submission >>

buildingSMART International Awards Jury

We extend our gratitude to the esteemed jury members of the buildingSMART International Awards, whose expertise, dedication, and commitment to excellence have been instrumental in recognizing and celebrating innovation in the digital transformation of the built environment.

Australasia Chapter

Don Cameron, Nathan Hildebrandt, Gabor Gulyas, Rosemarie Rusch, Scott Beazley, Sandra Lang, Russell Bunn, Armin Taklif

Austria Chapter

Alfred Waschl, Christoph Eichler, Junghwo Park, Julian Hierschläger, Frank Mettendorf, Michael Hallinger

Benelux Chapter

Lex Ransijn, Aydemir Cetin, Fred Kloet, Pepijn van der Vooren, Louis Casteleyn, Menno Mekes, Robbert Evers, Ruud van der Meer, Christian Friedrich, Pim van Meer, Sebastiaan Berns, Abe Reurings, Koerd de Jongh, Thomas de Groot, Arghavan Akbarieh, Amir Hakim, Jorden Schuit

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