



Global IFC Mandates

2024 Edition

A playbook of IFC Mandates from around the world

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Introduction

Mandating the adoption of Industry Foundation Classes (IFC) at a national level promises to enhance standardization, interoperability, and operational efficiency within the construction sector, unlocking productivity and sustainability benefits across built asset lifecycles.

Many nations and organizations are leveraging IFC to encourage and support digital adoption. Mandating IFC ensures data is open and available, and directives enable interoperable working methods. The benefits of mandating IFC are clear: it provides clarity, consistency, and reliability, and it is a foundational framework that is open, non-proprietary, and vendor-neutral.

About this paper

This paper combines a collection of IFC and Building Information Modeling (BIM) mandates designed to improve the design, construction, operations and maintenance of buildings and infrastructure. These perspectives provide guidance and lessons on activities happening in different countries and some of the benefits these will bring. This playbook, derived from information provided by buildingSMART Chapters, is a living document that will be regularly updated and added to, ensuring you stay informed about the latest developments.

What is IFC?

IFC is a standardized, digital description of the built asset industry. It is an open, international standard (ISO 16739-1:2024) and promotes vendor-neutral, or agnostic, and usable capabilities across a wide range of hardware devices, software platforms, and interfaces for many different use cases.

IFC Requirements for Transport for New South Wales

Contributor: buildingSMART Australasia

Country: Australia



Introduction

IFC requirements have been included by Transport for NSW (TfNSW), the largest government transport agency in Australia which is responsible for Road, Rail and Marine transport in NSW.

TfNSW is responsible for some of the largest transport infrastructure projects in Australia. In 2018, TfNSW set up a dedicated team to develop a **Digital Engineering Framework** that would be applied to all future projects. Over time, various releases of the framework have been developed, and the requirements outlined in the framework are now seen as business as usual, so they can be scaled appropriately and used on all future projects.

Most recent Road and Rail projects have implemented the framework in full, which includes the requirement for the delivery of IFC design files, including custom TfNSW attributes delivered within the IFC. TfNSW and other agencies are also now involved in working groups testing IFC4.3 for future requirements.

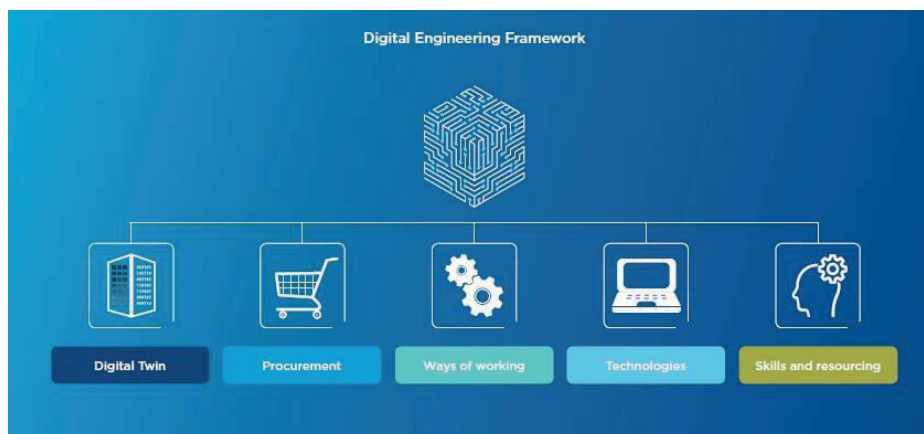


Image: Digital Engineering Framework from the State of NSW through Transport 2022

“The vision of the TfNSW DE (Digital Engineering) Framework is to minimise this complexity, by introducing consistent data structures and open data exchange protocols, while remaining software and technology agnostic.”

– TfNSW Digital Engineering Framework



Who should know:

Architects, Engineering Consultants, Contractors, Maintainers, Operators



What does this mean?

The supply chain must learn how to produce consistent IFC in line with the requirements. To support this, TfNSW developed training courses that all internal and industry staff working on a DE project must attend. Also, consistent industry engagement and support through showcasing best practice in regular Community of Practice events, industry roundtables, etc. have been critical from a change management perspective.



Why IFC?

The ability to federate design data in a consistent, repeatable and scalable way, regardless of how many designers or contractors are working on a project. Also, only requires TfNSW to build one set of validation rules for metadata

and geometry. IFC enables Transport better automation, eliminates double handling or transformation of data between systems, and ensures the data is always accessible into the future.

More benefits include:

- Provides TfNSW flexibility in commercial delivery strategies, as they can engage any suppliers with skillsets across any software package that can export or import IFC.
- Seamless federation of multiple design models for 3D integrated design review by project teams.
- TfNSW only requires developing and managing one set of parametric and metadata validation rules for IFC review.
- Information is more easily extracted and made available for other systems/applications, particularly for asset operations.
- Data is never locked away and will always be accessible in the future.
- More consistent reporting and greater insights across projects, particularly in areas such as design status, cost, sustain ability, etc.

You can see some of the BIM deliverables from TfNSW in the tables below.

6.5 BIM deliverables

6.5.1 Overview

The BIM deliverables are required to be submitted for appropriate CMF Baseline and Review Gates. The submission requirement for each CMF Review Gate is shown in Table 41.

Unless otherwise stated in the contract, each submission must include:

- string model(s)
- individual discipline BIM model(s)
- individual IFC models
- federated model(s)
- a clash detection report
- a Model Validation Certificate (DMS-FT-556)
- Model Property Check (DMS-FT-454)
- A contractor-facilitated model review workshop.

These requirements are further described in the following sections.

Digital Engineering Standard Part 2 Requirements
Version: DMS-FT-207 Version 4.1

Issued on 04 December 2022

Table 45 – Model properties requirements

Ref	Model or Object Property	Data Dictionary Field Name	Approved design/Statutory inclusion	IFC property set	Attribute Name
1	Model	Project And Contract Name	Mandatory	TfNSW_Project	TfNSW_ProjectAndContractName
2	Model	Project Contract Code	Mandatory	TfNSW_Project	TfNSW_ProjectContractCode
3	Model	Contracted Organisation Code	Mandatory	TfNSW_Project	TfNSW_ContractOrgCode
4	Model	Contracted Organisation Name	Mandatory	TfNSW_Project	TfNSW_ContractOrgName
5	Model	Design Campaign Code	Conditional	TfNSW_Project	NSWDesignCampCode
6	Model	Design Campaign Name	Conditional	TfNSW_Project	NSWDesignCampName
7	Model	Co-Ordinate System	Mandatory	TfNSW_Project	ISOCodeSys
8	Model	Project Milestone Description	Mandatory	TfNSW_Project	TfNSW_ProjectMilestoneDesc
9	Model	Topic Description	Mandatory	TfNSW_Project	TfNSW_TopicDesc
10	Model	Liability Description	Mandatory	TfNSW_Project	TfNSW_LiabilityDesc
11	Model	Document Number	Mandatory	TfNSW_Project	TfNSW_DocumentNo
12	Model	Document Title	Mandatory	TfNSW_Project	TfNSW_DocumentTitle
13	Model	Discipline Code	Mandatory	TfNSW_Project	TfNSW_DisciplineCode
14	Model	Data table Code	Conditional	TfNSW_Project	TfNSW_SubDisciplineCode
15	Object	TfNSW Asset Location ID	Conditional	TfNSW_Location	TfNSW_AssetLocationID
16	Object	TfNSW Parent Asset Location ID	Conditional	TfNSW_Location	TfNSW_ParentAssetLocationID
17	Object	TfNSW Project Asset Location ID	Mandatory	TfNSW_Location	TfNSW_ProjectAssetLocationID
18	Object	TfNSW Parent Project Asset Location ID	Conditional	TfNSW_Location	TfNSW_ParentProjectAssetLocationID
19	Object	Asset Location Code	Mandatory	TfNSW_Location	TfNSW_AssetLocationCode
20	Object	Parent Asset Location Code	Conditional	TfNSW_Location	TfNSW_ParentAssetLocationCode



IFC Facts

An assured IFC design file for all disciplines is now a required deliverable on all TfNSW projects. This has also extended to transport agencies in other jurisdictions, including:

- Queensland Transport and Main Roads (TMR)
- Office of Projects Victoria (OPV) – IFC is a requirement on most major projects
- Perth Transport Authority (PTA) – IFC is a requirement on many of their projects



References

1. The Digital Engineering Framework | Transport for NSW (<https://www.transport.nsw.gov.au/digital-engineering/digital-engineering-framework-0>)
2. Digital-Engineering-Standard-Part-2-requirements-v4.1 (<https://www.transport.nsw.gov.au/system/files/media/documents/2022/Digital-Engineering-Standard-Part-2-requirements-v4.1.pdf>)

IFC Standard Implemented in China for Data Exchange

Contributors: Lai WEI, Shuang HUANG, Ran TAO, Dashuang LI, Xinyi DU
Country: China

Introduction

At the national level, the Ministry of Housing and Urban-Rural Development of the People's Republic of China initiated the development of five national BIM standards in 2012. The five standards are:

- BIM Application Unified Standard
- BIM Classification and Coding Standard
- BIM Delivery Standard
- BIM Construction Application Standard
- BIM Storage Standard

Among them, the BIM Storage Standard (GB/T·51447-2021) refers to the buildingSMART IFC standard and was officially implemented in January 2022. It specifies that BIM data exchange and storage should be conducted in the IFC format.

At the local level, based on the buildingSMART IFC standard and the national BIM Storage Standard, the Shenzhen Government formulated the Shenzhen BIM Storage Standard (SZ-IFC, SJG114-2022) to meet the local needs. According to the Shenzhen government's regulations:

- Starting from January 1, 2023, all new construction projects (with an investment of over 10 million yuan and a building area of over 1,000 square meters) in the city must fully apply BIM.
- BIMs in the SZ-IFC format should be submitted at various approval stages, including planning permits, construction permits, and completion acceptance.
- Since its implementation in 2022, the SZ-IFC format has been used in over 400 new construction projects in Shenzhen, with over 10,000 high-quality IFC models submitted through the government BIM platform and subjected to automated quality inspections (as of December 2023).
- In over 700 existing building modeling projects, more than 14,000 high-quality IFC models have been collected and subjected to systematic quality inspections (as of August 2023), providing a data source for future BIM applications.

At the industry and enterprise level, in June 2022, more than a hundred units in the AEC industry jointly compiled the CN-IFC standard under the organization of buildingSMART China. CN-IFC is a translation of the buildingSMART IFC4.3 standard with necessary extension based on Chinese requirements, aiming to ensure and facilitate the application of IFC and buildingSMART Data Dictionary (bSDD) in mainland China.

In 2015, the China Railway BIM Alliance released the group standard "Railway Engineering Information Model Data Storage Standard (IFC)", recommending the use of IFC to describe the data structure of railway engineering projects.

In 2019, China Communications Construction Corporation (CCCC) issued its enterprise standard "Unified Standard for BIM Model in Port and Waterway Engineering", aiming to promote the use of IFC as the data exchange format for whole lifecycle management in CCCC's port and waterway projects. It requires the use of IFC to describe the data structure of port and waterway projects.

In 2020, the Civil Aviation Administration of China (CAAC) issued the industry standard "Unified Standard for Application of BIM in Civil Transport Airports (MH/T·5042-2020)", which requires BIM model files used for archiving in civil aviation projects to include both native files and IFC format files.

“IFC is like a bridge connecting the world of construction data, enabling the world to understand and communicate with each other by allowing data to cross freely. Based on IFC, China has extended CN-IFC to making IFC the most common data standard in the China AECO industry.”

- Lai Wei, China Institute of Building Standard Design & Research (bSC)



Who should know:

Government, Building Owners, Developers, Architects, Engineers, Surveyors and Contractors



What does this mean?

The BIM standard system in mainland China is gradually improving and aligning with international standards. Meanwhile, some cities, such as Shenzhen, are exploring digital approval and regulation processes for construction projects to enhance the quality and efficiency.



Why IFC?

Because of the neutrality, openness, comprehensiveness, and international compatibility of IFC. The IFC standard promotes collaboration and data sharing among multiple parties, supports innovation and technological development, is applicable to different types of projects, and aligns with the global construction industry.

Taking SZ-IFC as an example:

- It unifies the format and requirements for submitting and storing models in the approval and regulatory processes based on BIM.
- It covers various stages such as scheme review, planning approval, construction drawing inspection, and completion acceptance.
- It provides consistent data sources for various intelligent applications and platforms based on BIM for regulatory authorities, reducing redundant modelling and data inconsistency.
- It supports the construction of data assets, data infrastructure, and digital twin cities in smart cities.
- It guides and promotes data sharing in BIM applications among various stakeholders in construction projects in Shenzhen.



IFC Facts

- The city of Shenzhen in China has mandatorily adopted the IFC standard at the government level.
- In mainland China, there is no unified mandatory adoption of the IFC standard at the national level.
- The IFC standard is widely recognized in mainland China as an important standard for data exchange in the industry.

IFC Enabled Better Workflows in Czech Republic

Contributors: Tomáš Slovík

Country: Czech Republic



Introduction

Since IFC was introduced in the Czech Republic, it has become one of the most required file formats for all categories of projects. For instance, IFC now enables the correct exchange of information and data management, particularly within the infrastructure and the public sectors of the built environment.

The national data standard, which has been in work for many years, is now supporting the use of IFC, which provides the form of dataset requirements for all elements upon project delivery as it contributes to simplifying communication without software dependency.

In every tender, a CDE has become a criterion that helps to optimise the project collaboration between all appointed and appointed parties. This adds a platform for spatial coordination where IFC is an essential aspect of successful teamwork and its interoperability with the spatial data. For the project, it makes it possible to provide accurate, reliable and trustworthy information on the properties of building elements.



Who should know:

Building Owners, Developers, Architects, Engineers, Surveyors and Contractors



What does this mean?

Within the Digital Czech Republic concept and the new construction law, an electronic construction permit process will emerge based on a digitalization method supported by IFC, leading to an improved, standard process. Currently, many workplaces still use different applications that are old and incompatible.



Why IFC?

It permits dataset transparency and meets the technical characteristics of a global information standard. A standard where all elements inside the projects will be described and categorized in a common form.

IFC not only now support faster 3D collaboration on a project scale, but it is more often the domain file format for 4D/5D estimating and utilized for 6D or 7D. The life cycle of products, materials, processes and other measurable activities will be easier to access.

With the use of a common data language, in the form of IFC, this collaboration is significantly improved at the local level and at an international scale.



IFC Facts

- IFC will be used for all construction projects and new upcoming IFC versions will meet the needs for infrastructure projects such as roads, railways, bridges, ports which opens up new opportunities and wider coordination.

ICT Regulations in Denmark Require IFC

Contributors: Ole Berard, Peter Bo Olsen

Country: Denmark



Introduction

The Danish national ICT regulations 118 and 119, both from February 7th, 2023, are similar but respectively cover public funded projects and public funded housing projects.

The Danish national ICT regulations states regarding IFC that:

- In the Use of digital construction models as part of the competitive element of competition-based bidding rounds, the Client must ensure that object-based construction models are provided in IFC format.
- In the Use of digital construction models during project design and execution the Client must require that that the models are made available in IFC format.
- In the Digital invitations to tender and bids the Client must ensure that models are made available to the bidder in IFC format.
- In the Digital delivery on handing over the construction project the Client must ensure that object-based construction models are provided in IFC format.

“The Danish Building and Property Agency have gathered considerable practical experience with BIM in construction projects in the past 10 years. First and foremost it is recognizable that the ICT regulations actually has changed the industry. BIM has become part of the daily work routine for many consultants and contractors. open standards are the absolute foundation for usable data, now and in the future”. [1]



Who should know:

Architects, Engineers, Contractors, Material Producers, Surveyors, Authorities, Clients, and Operation and Maintenance Organizations



What does this mean?

Companies that want to bid on government, municipal, regional or general construction jobs over certain amount limits in Denmark must meet the requirements in the ICT regulations.



Why IFC?

The Danish Building and Property Agency have stated that “open standards are the absolute foundation for useable data, now and in the future. It has been documented how the use of IFC within the framing of digital collaboration according to the Danish national ICT regulations 118 and 119 contributes with 45% higher design quality compared with non-IFC projects in Denmark.” [2].



IFC Facts

The Danish national ICT regulations are not locked into specific versions of IFC, which precisely provides the opportunity to gain value from the development of IFC and the other openBIM-standards, -tools and -services, such as IFC Validation and the Benefits Capture Platform from buildingSMART International and will improve the value of IFC in building and infrastructure projects in Denmark. The Danish Chapter will be there to help deliver and support end-users.



References

1. <https://en.bygst.dk/construction/digital-construction> (<https://en.bygst.dk/construction/digital-construction>)
2. <https://mth.com/Knowledge/Value-drivers-in-the-Danish-ICT-regulations> (<https://mth.com/Knowledge/Value-drivers-in-the-Danish-ICT-regulations>)

IFC to Be Used for BIM-based Checks in Japan

Contributors: Yoshinubi Adachu
Country: Japan

Introduction

The Ministry of Land, Infrastructure, Transport, and Tourism (MLIT) in Japan will conduct a trial of BIM-based building code checking processes starting in 2025. This trial involves the submission of IFC data and 2D PDF drawings generated from BIM data for building code checks. The goal is to implement the new BIM-oriented process nationwide by 2027, starting with selected inspection agencies.

The “BIM-based Drawing Check” in 2025 aims to eliminate manual cross-checking of drawings by allowing the submission of IFC data and PDFs, thereby reducing the time required for the checking process. Following nationwide implementation, MLIT plans to introduce “BIM Data Check” using IFC data, aiming to enhance efficiency and further reduce building code check time.

buildingSMART Japan intends to collaborate with buildingSMART International to exchange information on successful practices with countries such as Singapore and the Nordic countries. This collaboration will help promote the use of open BIM standards for building code checking.

“In 2025, ‘BIM-based Drawing Check’ by MLIT seeks to streamline processes, enabling faster building code checks through IFC data and PDF submissions.” - Yoshinubi Adachi.

Who should know:

Building Owners, Developers, Architects, BIM Consultants

What does this mean?

The use of BIM in building code check is positioned as an important first step in the Digital Transformation of architecture and urban development.




Realization of high-quality and high-precision building production and operation & maintenance	Realization of highly efficient life cycle use	Expanding the value of buildings as social assets
<p>High Quality</p>  <ul style="list-style-type: none"> ▶ Images can be shared even with non-architectural professionals by means of reviewing spaces using 3D models and attribute information ▶ Efficient quality management of architectural production can be realized by centrally controlling the design and construction information ▶ Optimal operation & maintenance, asset management, and energy management are supported by the data that can be continuously used after project completion 	<p>Efficient and Quick</p>  <ul style="list-style-type: none"> ▶ Quick decision making through visualization of cost effectiveness (cost management) ▶ Efficient building life cycle use is achieved through smooth communication of information during the design, construction, and operation & maintenance stages ▶ Streamlining of work in each design and construction process ▶ Reduce labor costs for operation & maintenance ▶ Establishment of BIM as a common ground to share and compete internationally 	<p>Add value to Buildings and Data</p>  <ul style="list-style-type: none"> ▶ Realization of appropriate and real-time asset evaluation and management ▶ Expansion of services for buildings through coordination with centers, etc. ▶ Creation of new industries with buildings as their origin through the use of big data and AI ▶ Realization of optimal risk management through integration with infrastructural platforms

Image: The benefits of BIM according to MLIT



Why IFC?

- IFC presents an open, neutral data schema of BIM data for building checking.
- IFC enables digital description for required information in building checking.
- IFC clarifies the boundary between native and data exchange environments for BIM data submissions to checking agencies.
- By submitting IFC data and BIM-based PDF drawings exported from BIM software, we aim to eliminate the need for consistency checks between drawings and shorten the review period.

After the “BIM-based Drawing Check” phase, which is scheduled to commence in 2025, gets on track, the plan is to transition to a phase where the BIM properties information contained in IFC data is utilized for BIM data-based building code check process.

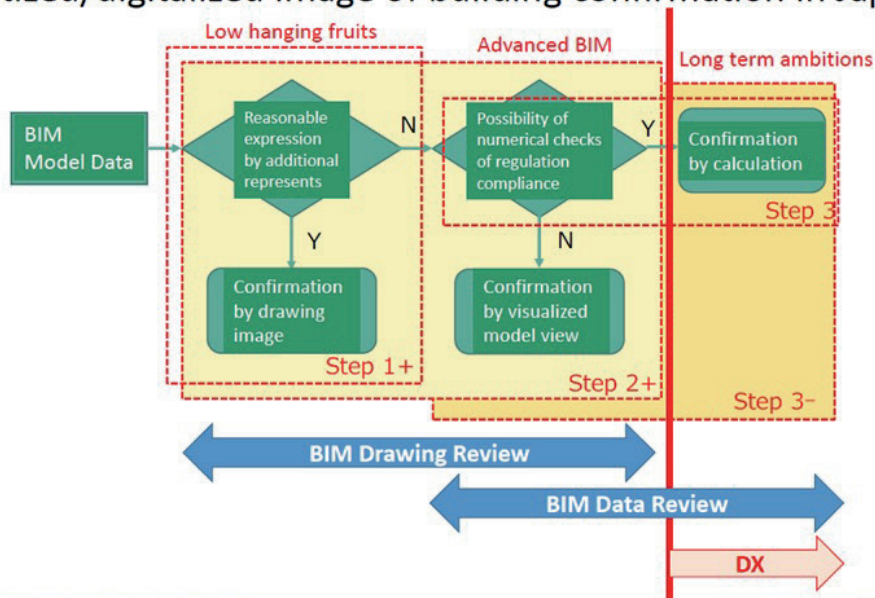


IFC Facts

The IFC standard is increasingly recognized for its effective use in the BIM coordination process in architectural projects. Recently there has been growing attention on IFC utilizations in areas such as BIM for 3D City Model CityGML, BIM for Infrastructure and civil engineering, its cost estimation, and digital twins for smart buildings. In the civil engineering field of MLIT, the BIM utilization principle has been a rule since 2023.

Below is an image from the Building Research Institute.

The digitized/digitalized image of building confirmation in Japan



Public and Commercial Tenders Require IFC in Poland

Contributors: Anna Rydzy, Dawid Fedko

Country: Poland



Introduction

In public and commercial tenders in Poland, there is a requirement to provide models in the IFC standard, although there are no regulations or requirements governing the form in which the models should be provided. Taking into account the last few years of using the BIM methodology in Poland, we can see a growing tendency to realise investments using open standards. There is also a significant increase in awareness of the benefits of using open standards.

In order to develop a strategy for the implementation of BIM in Poland, the Ministry of Development and Technology established the BIM Working Group, which included a technical subgroup on open standards. Subgroup members included Artur Tomczak and Dawid Fedko. It dealt with the description of the open standards ecosystem including Industry Foundation Classes (IFC), Information Delivery Specification (IDS), BIM Collaboration Format (BCF), buildingSMART Data Dictionary (bSDD), and openCDE API. It is hoped that, despite the change of government, work in this area will continue.

In addition, the Polish Chamber of Civil Engineers published a strategy in December 2023 in which the pursuit of recognition of the BIM model (communicated in the IFC standard) as a fully-fledged construction documentation and the corresponding legal empowerment are among its key points.

“In all my activities, the idea of openBIM and the buildingSMART Poland Chapter have always been and still are present. Open standards are also enshrined in the Chamber’s strategy.”

- Tomasz Piotrowski, Secretary General of the Polish Chamber of Civil Engineers



Who should know:

Building Owners, Developers, Architects, Engineers, Registered Surveyors and Contractors, Public Administrators



What does this mean?

Within the national market, further work is needed to legitimise BIM requirements with open standards. It is necessary that organisations like ours in cooperation with other industry organisations as well as technical universities continue to promote and disseminate theoretical and practical knowledge about open standards.



Why IFC?

Participants in the Polish construction sector are increasingly aware that open standards can improve management and information exchange. Projects can be implemented more efficiently, with fewer errors, and more transparently. And most importantly, the costs of implementing BIM can be significantly reduced. We should also not forget about the still hidden potential contained in open standards to support sustainable construction.



IFC Facts

In addition to the facts mentioned above, the activities of buildingSMART Poland to raise awareness and promote not only the IFC, but also other standards, should be mentioned. Certainly, the first openBIM Poland 2023 conference should be mentioned here as it was a great success and showed a huge interest regarding openBIM in Poland. Its next edition has taken place on 16th of May 2024. bS Poland organises events to promote open standards on a daily basis, e.g. members of Construction Domain have prepared a series of manuals on exporting to IFC from specific native programmes, and in January 2024 they held a series of free and open training webinars on this topic.

CORENET X Submission Platform uses IFC in Singapore

Contributors: Vanessa Tang
Country: Singapore

Introduction

Singapore is transforming her regulatory landscape and Built Environment practices by implementing CORENET X, a new submission platform that requires the industry to collaborate and coordinate their designs upfront, in the openBIM format, before submission to the regulatory agencies.

CORENET X leverages digital technologies to enable pre-submission checks and allows regulatory agencies to collectively review the submission and issue coordinated responses to the project team.

The implementation of CORENET X streamlines over 20 approval touchpoints into three key submission gateways, requiring project teams to consolidate critical requirements for regulatory approval. This streamlined process minimises abortive works later by ensuring that key parameters associated with each gateway are jointly reviewed by the regulatory agencies before works proceed.

To support this new process, the Building and Related Works (Miscellaneous Amendments) was passed by the Parliament of Singapore in July 2023.

CORENET X complements the ongoing efforts in Singapore to implement Integrated Digital Delivery (IDD) on Built Environment projects. IDD is a key component of Singapore's Built Environment Industry Transformation Map and is aligned to Singapore's efforts to transform her built environment sector by creating a highly skilled workforce trained to use the latest technologies.

"An openBIM submission format allows the models to be read by different BIM-based software, which essentially creates a "digital spine" that links stakeholders throughout the project's lifecycle."

- Desmond Lee, Minister for National Development of Singapore

Who should know:

Building Owners, Developers Architects, Engineers, Registered Surveyors, Contractors

What does this mean?

Submissions of coordinated BIM models through CORENET X are required to adopt openBIM standards. New regulatory approval processes under CORENET X require the industry to collaborate and coordinate their designs in IFC-SG format before submission to regulatory agencies.

Submissions for projects with Gross Floor Area over 5,000 sqm has been mandatory in Singapore since 2015. Going forward, these projects will transition into using the openBIM standard for submissions to CORENET X. Regulatory agencies will issue written directions and approvals based on the submitted IFC model.

The extension "IFC-SG" was developed to include data that complies to local regulatory requirements into the IFC model. The development of IFC-SG is based on the IFC4 Reference View.

The guiding principles on the development of IFC-SG is to use what was defined in the IFC schema without making modifications to it. This was done by using the closest and/or most appropriate IFC representation to capture the information required. If IFC's predefined lists of object types and properties are insufficient, IFC's user defined features were used to incorporate localized information without changing the schema.



Why IFC?

- CORENET X's development, alongside its intended Automated Model Checking capabilities, requires a common format for validating submissions and facilitating agency reviews on the Collaboration Platform.
- The IFC standard was chosen for its open, vendor-neutral qualities, supporting various software platforms and acting as a common language for improved information exchange and collaboration.
- IFC also serves as data preservation against obsolescence of software versions, allowing consistent data structures for future analysis and development.
- CORENET allows separate submissions to various agencies for regulatory approval based on project progress. However, this approach may also lead to fragmented reviews and multiple sets of feedback, complicating design adjustments. The emergence of BIM and new technologies offers an opportunity to transform the current regulatory approval process. CORENET X will replace individual submissions with a collaborative approach, enabling the project team to create and submit a coordinated model for compliance review.
- Agencies will then collectively review the submission and provide consolidated feedback to the project team, enhancing regulatory governance, and creating a streamlined One-Stop Integrated Digital Shopfront experience.

The collaborative approach taken with the implementation of CORENET X improves the practice of Qualified Persons dealing separately with multiple regulatory agencies and having to reconcile the requirements thereafter. This integrated process, which uses openBIM as the platform for collaboration, enhances regulatory governance and streamlines Singapore's regulatory approval process.



IFC Facts

- The changes required to regulatory approval processes to effect industry-wide collaboration and communication using IFC have been drafted into law in Singapore.
- IFC is the basis for issuance of regulatory approvals in Singapore.
- IFC4 Reference View is the format supported for CORENET X submissions, and includes local regulatory requirements called IFC-SG. BIM authoring tools that can generate IFC4 models can be used to support the submission.
- Technical specialists from software platforms Archicad, OpenBuildings, Tekla and Revit have supported users in this process by creating IFC-SG configuration files.

Spanish Government Mandates BIM in Public Projects

Contributors: Sergio Muñoz
Country: Spain

Introduction

There are two main goals behind incorporating BIM in public procurement in Spain:

- To improve the efficiency of public spending.
- To facilitate the Spanish construction sector's digital transformation.


























The Spanish Government has approved, in 2023, the compulsory use of BIM based on three variables:

- It only applies to public contracts above a certain estimated contract value.
- It is designed as a progressive milestones calendar, from 2024 to 2030.
- It requires 5 increasing levels of BIM implementation, clearly defined by the BIM Plan for Public Procurement, to be reached in the progressive calendar milestones.

Estimated contract value thresholds	Compulsory application date			
	1 April 2024	1 October 2025	1 October 2027	1 April 2030
Equal to or greater than €5.538.000*	Early level	Intermediate level	Advanced level	Integrated level
Less than €5.538.000* and equal to or greater than €2.000.000	Recommended early level	Early level	Intermediate level	Advanced level

Image: Compulsory use of BIM in the Spanish Government Public Procurement

The BIM maturity levels define the minimum requirements as is summarized in the following table.

DEFINITION OF BIM LEVELS				
MINIMUM REQUIREMENTS				
STRATEGY	PROCESSES	TECHNOLOGY	PEOPLE	
 Strategy No strategy for using BIM in contracts.	 Work procedures required under the contract. No procedures required for contract information management.	 Common data environment (CDE) No common repositories for contract information management.	 Contracting authority training No staff with knowledge of BIM required.	 Tenderer training No staff with experience in contracts with BIM is required.
1 PRE/NON-BIM	 Based on quality management systems (UNE-EN ISO 9000 or equivalent). No need to be carried out through CDE.	 Access controlled common repository. Rules for standardized file and folder naming.	 Formats based on open standards, IFC according to UNE-EN ISO 15926 or equivalent for BIM models. Proprietary formats may also be required.	 At least one person is trained on BIM and acts as BIM contract manager. Human resources with experience in BIM requirements for contracts are required.
2 EARLY	 Based on quality management systems (UNE-EN ISO 9000 or equivalent). This is carried out through CDE.	 Access controlled common repository. Rules for standardized file and folder naming. Information Workflows and Information Sites defined, aligned with UNE-BI-ISO 18550.	 Formats based on open standards, IFC according to UNE-EN ISO 15926 or equivalent for BIM models. Proprietary formats may also be required.	 All staff involved in the contract are trained in BIM. A BIM contract manager is defined. Human resources with experience in BIM requirements for contracts are required.
3 INTERMEDIATE	 Based on information organization and digitization systems (UNE-EN ISO 15926 or equivalent). Specific BIM guides or manuals from CBIM and recognized organizations.	 BIM models for use in obtaining plans, 3D coordination, measurements, communication and operation and asset management. BIM object libraries are managed and used. Related CAD information or drawings not obtained from the model can be used.	 Technological solution specifically designed as a CDE according to UNE-EN ISO 15926 with various features. Rules for standardized file and folder naming.	 Formats based on open standards, IFC according to UNE-EN ISO 15926 or equivalent for BIM models. For IFC model related communications, use IFC format or equivalent. Proprietary formats may also be required.
4 ADVANCED	 Procedures certified under UNE-EN ISO 9000 or equivalent. Specific BIM guides or manuals from CBIM and recognized organizations.	 BIM models for any use. BIM object libraries are managed and used. CAD information or drawings not obtained from the model can be used regularly.	 Technological solution specifically designed as a CDE according to UNE-EN ISO 15926 with various features. Rules for standardized file and folder naming. Data access through web services.	 All staff involved in the contract are trained in BIM in compliance with UNE-BI-ISO 18550. Previous experience in BIM managed contracts. A BIM contract manager is defined.
5 INTEGRATED	 This must be carried out through CDE only, with simulations and validation. Specific BIM guides or manuals from CBIM and recognized organizations.	 Information delivery manual based on UNE-EN ISO 78481 or equivalent.	 Open standards-based formats or a single use, IFC according to UNE-EN ISO 15926 or equivalent for BIM models. For IFC model related communications, use IFC format or equivalent.	 All staff involved in the contract are trained in BIM in compliance with UNE-BI-ISO 18550. Previous experience in BIM managed contracts. BIM contract manager with 3 years of experience managing contracts with BIM is identified.

In order to guarantee technological independence and not to discriminate against appointed parties, the use of open standards will be requested for the different types of files that will form part of the contract.

In particular, the following standards will be requested:

- IFC data model, as defined by the UNE-EN ISO 16739-1 standard, shall be used for the exchange of graphical information and related data. IFC is required from Early Level.
- BCF, defined by buildingSMART International, shall be used for the exchange of issues related to the BIM Models. BCF is required from Advanced Level.

“Spain will mandate the use of IFC to guarantee technological independence across the construction sector.”

- Sergio Muñoz, buildingSMART Spain



Who should know:

Building Owners, Developers, Architects, Engineers, Surveyors and Contractors



What does this mean?

New requirements for construction work public procurement



Why IFC?

- Future BIM submissions from April 1st, 2024 need to be in an IFC format.
- As a result of the IFC mandate, the government in Spain is expecting to save 10-20% of cost due to more efficiency and productivity.
- Other benefits include optimization of asset management and meeting sustainability goals.

This policy is an internal instruction, mandatory for the contracting authorities of the National Public Administration and its dependent bodies, and a recommendation for contracting authorities in the rest of the National public sector entities (regional and local level).



IFC Facts

- IFC will be enshrined in law for building and infrastructure projects.



Reference

1. <https://cibim.mitma.es/>

The Catalan Government Prioritizes IFC for Large Projects

Contributors: David Delgado Vendrell

Country: Catalunya, Spain



Introduction

On April 6, 2023, the Catalan Government, through the DOGC, announced Government Agreement 81/2023. This directive focuses on two key objectives:

- Enhancing the efficiency and effectiveness of public construction projects.
- Accelerating the digital transformation of the construction sector in Catalonia.

The agreement mandates the use of BIM in certain public contracts, with specific criteria:

- BIM is required for civil and building construction contracts related to new constructions, rehabilitations, or restorations, initiated by the Generalitat de Catalunya and its public sector, with an estimated value of 2 million euros or more.
- This requirement also extends to all service contracts for Design projects and Construction management, irrespective of their estimated value.

This new policy updates the previous BIM requirements set by the Government Agreement of December 11, 2018, in which IFC 2x3 or superior was already required as main deliverable. It aims to standardize the use of BIM across a broad range of public civil and building works, specifying that BIM can be included as a technical specification in tender documents or as an execution condition in administrative clause.

“In 2023, Catalonia’s government updates its 2018 openBIM policy, continuing to prioritize IFC for projects above €2 million, strengthening the construction sector’s digital evolution.”

- David Delgado Vendrell, buildingSMART Spain



Who should know:

Building Owners, Developers, Architects, Engineers, Surveyors and Contractors



What does this mean?

Updated openBIM requirements for a new level and wider construction works public procurement spectrum.



Why IFC

It was already mandated in 2018, and it keeps being necessary for the specified public contracts since 2023. The Generalitat requests open-format IFC models to ensure structured information transfer throughout the project’s lifecycle among stakeholders and ensure interoperability between various software applications that may be used. The Generalitat’s intention is to regularly use this in different types of actions and to increase the level of use and quality of IFC exchange models as the detailed definition of the IFC schema and other related openBIM standards and services evolve.

- The mandate highlights the importance of IFC-based deliverables in the implementation of BIM methodology, emphasizing object-based modeling for enhanced project management. It underlines the significance of graphical representation through various project phases and the necessity of effective communication, monitoring, and information transfer among stakeholders. The approach is adaptable to different project types and focuses on geospatial accuracy for model objects, essential for spatial coordination and visual management.
- The manual also stresses the need to detail both graphical and non-graphical properties in IFC models, ensuring compliance with minimum standards while accommodating project-specific requirements, thereby facilitating a comprehensive and efficient BIM application.



IFC Facts

- IFC models must include standard property sets for each entity and truthful, coherent property values. Custom sets as per the Generalitat's requirements ensure all necessary properties are visible, regardless of the software used. The manual specifies naming conventions and mandates only including properties outlined in the project's BIM Execution Plan.
- Furthermore, the mandate outlines the specifications for IFC entities, stating that objects from native models should be exported to the most suitable IFC entities (Classes and PredefinedType enums) available in the current schema (2x3 or superior). This approach aims to optimize the use of IFC entities in BIM models, ensuring they are accurately represented and compliant with current standards.

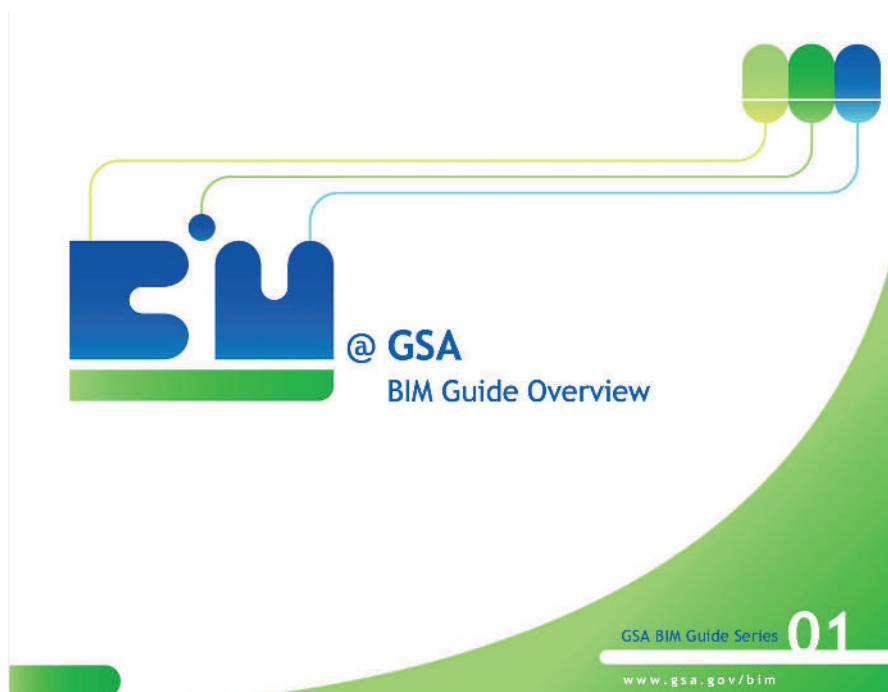
GSA Requires Model-based IFC Files for Projects

Contributors: Tony Rinella
Country: USA

Introduction

In 2003, the General Services Administration, through its Public Buildings Service established the National 3D-4D-BIM Program. Since then, this program has evolved into a collaboration between the Public Buildings Information Technology Services (PB-ITS) and PBS, through its Governance Board. The program supports BIM uses across all PBS business lines.

Below you can find an example of the BIM Guide provided by GSA.



Who should know:

All GSA Regions and the entire GSA supply chain

What does this mean?

GSA requires model-based design, including native and IFC BIM deliverables at all project milestones, with any required supplementary 2D deliverables to be derived from the model. GSA also requires open-standard facility management data as a project deliverable at all project milestones. At the same time, all GSA projects are encouraged to deploy mature 3D, 4D, and BIM technologies to the maximum extent practicable to support specific project challenges and to continue to lead industry in the development and adoption of BIM as a building lifecycle tool.



Why IFC?

- The power of visualization, coordination, simulation, and optimization from 3D, 4D, and BIM computer technologies allows GSA to more effectively meet customer, design, construction, asset management, facility management, and program requirements. GSA is committed to a strategic and incremental adoption of 3D, 4D, and BIM technologies.
- There is a progression from 2D to 3D, 4D, and BIM. While 3D models make valuable contributions to communications, not all 3D models qualify as BIM models since a 3D geometric representation is only part of the BIM concept.
- Critical to successful integration of computer models into project coordination, simulation, and optimization, as well as asset and facility management, is the inclusion of information—the “I” in BIM. As a shared knowledge resource, BIM can serve as a reliable basis for decision making and reduce the need for re-gathering or re-formatting information. GSA is currently exploring the use of BIM technology throughout a building’s lifecycle.

The following are highlights of the GSA National 3D-4D-BIM Program:

- Establishing policy to require BIM adoption for all major projects and across GSA business lines
- Providing expert support and resources for ongoing capital projects to incorporate 3D, 4D, and BIM technologies
- Providing guidance for continued use of BIM data in asset and facility management
- Assessing industry readiness and technology maturity
- Developing solicitation and contractual language for 3D-4D-BIM services (for GSA Internal Use only)
- Partnering with BIM vendors, other federal agencies, professional associations, open standard organizations, and academic/research institutions
- Building a community of BIM Champions within GSA



References

1. 3D-4D building information modeling (<https://www.gsa.gov/real-estate/design-and-construction/3d4d-building-information-modeling>)
2. Facilities Standards (P100) overview, (<https://www.gsa.gov/system/files/P100%20Submittal%20Matrix%20v10.pdf>)

AASHTO Recommends Adoption of IFC

Contributors: Tony Rinella

Country: USA



Introduction

American Association of State Highway and Transportation (AASHTO) Officials published a resolution in 2019 to adopt the IFC schema for the exchange of electronic engineering data. The mandate resolved:

- That the AASHTO Board of Directors recommends the adoption of the IFC Schema as the national standard for AASHTO States;
- That an internal, cross-committee, multi-disciplined group within AASHTO should be formed to coordinate schema development, identify gaps, resolve any conflicts, and avoid duplication of efforts; and
- That possible AASHTO membership in buildingSMART International should be investigated to provide representation and participation for the state DOTs in schema development.



Why IFC?

- Transportation agencies need to implement asset management more efficiently throughout the lifecycle of the asset, which requires the ability to exchange data seamlessly;
- Transportation agencies are progressing toward Building Information Models as the successor to the standard plan set for highway infrastructure projects;
- Transportation agencies are utilizing a variety of tools and equipment from multiple vendors and manufacturers to gather, display, and work with the data necessary for infrastructure project development, and interoperability of the models is a critical feature so that the agencies have the ability to transfer data seamlessly across these platforms;
- Seamless data transfer necessitates a single data schema that is recognized as the industry standard, otherwise there is a potential loss of data when translated from one device or one application to another; however, there has been a lack of consensus for adoption of a single schema;
- Historically, efforts to establish a national standard data schema have not been successful, in large part due to the inability to identify an agency or entity capable of providing ongoing development, support, and maintenance of the schema, so it would be advantageous to move toward a schema where that support mechanism already exists;
- There is an international effort underway, led by buildingSMART International, to extend their existing IFC standard data schema to incorporate infrastructure projects including IFC Bridge and IFC Road;
- Adoption of a single data schema by transportation agencies would give vendors and manufacturers the standard needed to facilitate collaboration within their communities and supply chains;
- The AASHTO Committee on Bridges and Structures already has several efforts underway to facilitate the adoption of IFC Bridge as the standard data schema for their discipline, and it would be essential in order to ensure and maintain interoperability between these two disciplines that we adopt IFC Road for highway infrastructure projects; and
- There are other AASHTO committees with interest in this effort, including but not limited to the Committee on Data Management and Analytics, the Committee on Bridges and Structures, and AASHTOWare.



Reference

1. <https://transportation.org/data/wp-content/uploads/sites/45/2023/12/AR-1-19-IFC-Schema-Resolution-Board-Adopted-FINAL.pdf>

South Korea Drives a BIM Approach

Contributors: Min Song

Country: South Korea



Introduction

The government agency driving the BIM adoption in Korea is the Ministry of Land, Infrastructure and Transport (MOLIT). MOLIT is responsible for developing the overarching vision, mission, roadmap, and guidelines for BIM adoption on a national level.



About the Mandate

- Legislation in Korea does not directly mandate BIM or IFC on a national level. However, the Public Notice on Large-scale Construction issued in 2023 recommends the review of BIM adoption for public projects over a certain size (>100 billion KRW project).
- Individual government agencies may have their own mandate. For instance, the Public Procurement Service (PPS)—an agency tasked with the purchasing, supply and management of materials required for public works—requires the use of BIM/IFC on all of its public projects as of today with minor exceptions. The Korea Land and Housing Corporation (LH)—a government-owned corporation responsible for the development and management of land and housing—also mandates the use of BIM/IFC with few exceptions.
- The private sector also has a plan for mandating BIM. Starting from 2024, BIM is required for private projects with gross floor area (GFA) of 10,000 m² or greater. Applicable projects will be expanded in the future.



References

1. MOLIT's BIM Roadmap (https://www.molit.go.kr/USR/NEWS/m_71/dtl.jsp?id=95084979)
2. Public Notice on Large-scale Construction, (<https://www.law.go.kr/LSW//admRulInfoP.do?admRulSeq=2100000224502&chrClsCd=010201>)

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