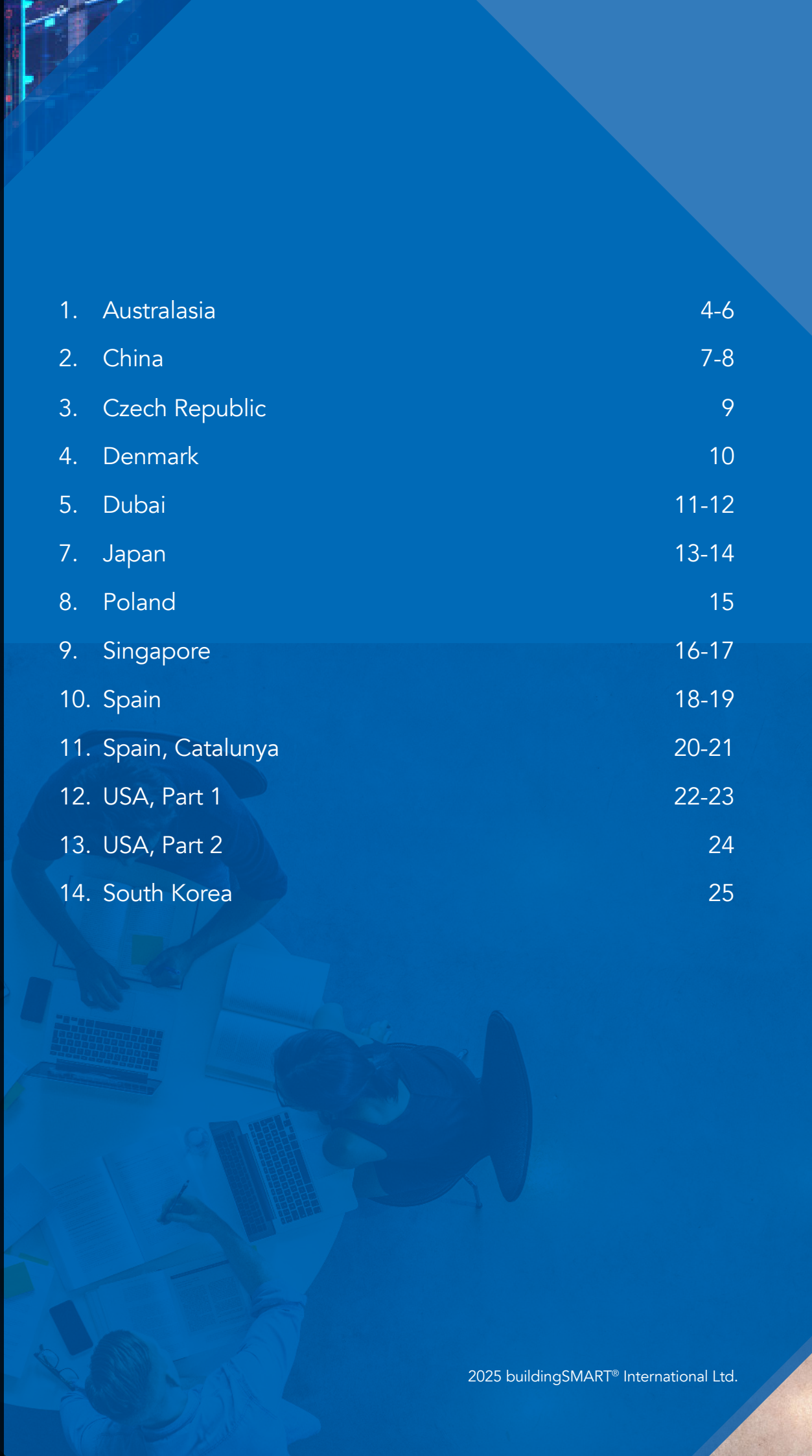
Global openBIM Mandates

2025 Edition

A playbook of IFC Mandates from around the world

CHAPTERS



Introduction

Mandating the adoption of openBIM® 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 IIndustry Foundation Classes (IFC) to encourage and support digital adoption. Mandating openBIM ensures data is open and available, and directives enable interoperable working methods. The benefits of mandating openBIM 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 openBIM 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 openBIM?

openBIM enables seamless data sharing and collaboration across platforms and stakeholders, while empowering you to maintain full flexibility in defining your own workflows.

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.

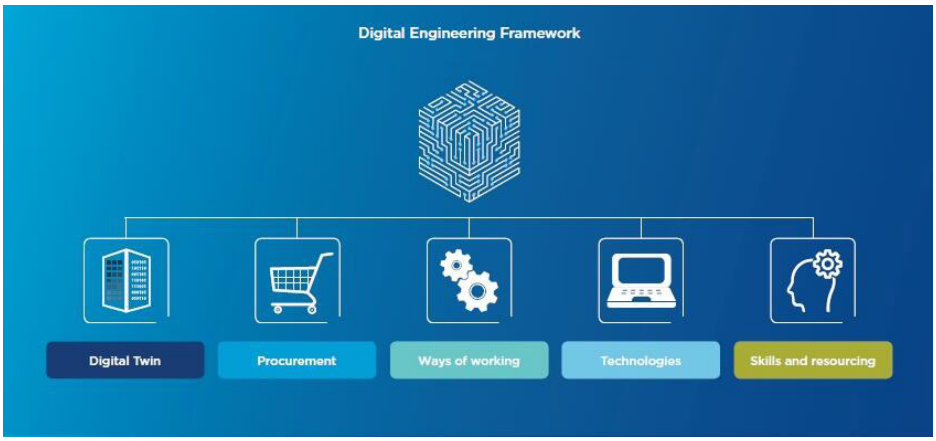


Image: Digital Engineering Framework from the State of NSW through Transport 2022

"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?

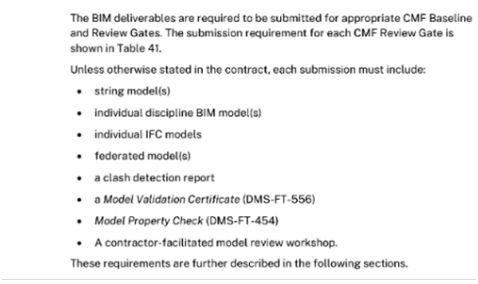
The ability to federate design data in a consistent, repeatable and scalable way, regardless of how many designers or contractors are working on a project. Also, only requires TfNSW to build one set of validation rules for metadata and geometry. IFC enables Transport better automation, eliminates double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

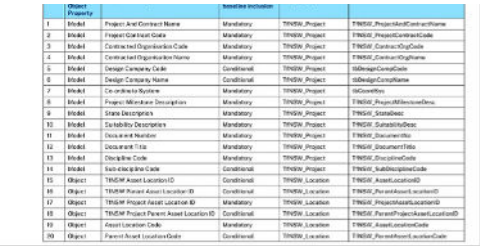


The BIM deliverables are required to be submitted for appropriate CMF Baseline and Review Gates. The submission requirement for each CMF Review Gate is shown in Table 41.

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.



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)

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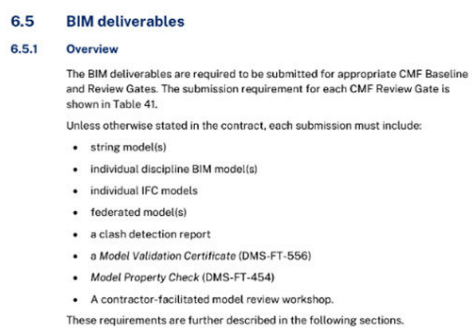

6.5 BIM deliverables

6.5.1 Overview

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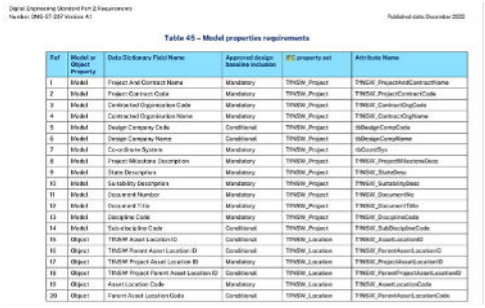

Table 45 – Model properties requirements

Ref	Model or Object Property	Data Dictionary Field Name	Approved design baseline 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 Company Code	Conditional	TfNSW_Project	tbDesignCompCode
6	Model	Design Company Name	Conditional	TfNSW_Project	tbDesignCompName
7	Model	Co-ordinate System	Mandatory	TfNSW_Project	tbCoordSys
8	Model	Project Milestone Description	Mandatory	TfNSW_Project	TfNSW_ProjectMilestoneDesc
9	Model	State Description	Mandatory	TfNSW_Project	TfNSW_StateDesc
10	Model	Suitability Description	Mandatory	TfNSW_Project	TfNSW_SuitabilityDesc
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	Sub-discipline 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 Project Parent 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

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References

1. The Digital Engineering Framework for NSW (https://www.transport.nsw.gov.au/digital-engineering/digital-engineering-framework-0)
2. Digital Engineering Standard (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 Slovik
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)

Dubai Municipality BIM mandate for digital building permit based on openBIM

Contributors: Ali Ismail, Ibrahim Fahdah
Country: United Arab Emirates

Introduction

The journey of openBIM mandate in Dubai commenced in 2013 with the introduction of the first inaugural BIM mandate through the circular No. 196 issued by Dubai Municipality, it was extended in 2015 by the circular No. 207 which mandated the utilization of BIM for the architectural and mechanical work. Although the mandate was initially a soft mandate without standards, it established the requirement for BIM integration during the design and construction phases of all significant projects in the city.

In 2020, the committee for Building Permit Procedures Development initiated a project focused on developing and executing Dubai BIM Roadmap [1] and associated BIM standards and tools based on openBIM standards to improve the quality of building design, automate checking building regulation and empowering Dubai Digital Twin with 3D digital building information. The incorporation of openBIM standards and establishment of buildingSMART UAE chapter was a crucial element of the Dubai BIM Roadmap. In October 2023, the circular 9-1-2 mandated BIM model submissions for new building permits starting from 01/01/2024.

"As a public sector authority, Dubai Municipality has embraced international and openBIM standards, such as ISO19650, Industry Foundation Classes (IFC), Information Delivery Specification (IDS), and BIM Collaboration Format (BCF) in order to facilitate long-term information accessibility and enhance building permit and inspection services".

– Eng. Maryam Obaid Almheiri | Dubai Municipality- CEO of Building Regulation and Permit Agency& UAE chapter chairperson.

Who should know:

Consultants and Contractors, Building Owners, Developers, Governments entities.

What does this mean?

The BIM mandate is a step forward in the journey to move from 2D CAD submission and manual review process using closed and non-interoperable formats to a 3D model-based approach based on open standards to support automating various building permit review tasks, including the automated code compliance checking for the regulation rules of the Dubai building code. This step brought to building permit process in terms quality and efficiency. The BIM models received as part of the permitting process can subsequently serve other purposes such as BIM and GIS integration.

Why IFC?

IFC is an internationally recognised open standard facilitating the exchange of building information throughout the entirety of a project's life cycle, as well as archiving this data for long-term preservation. The inherent openness and maturity of IFC give a high degree of flexibility, enabling the development of customised solutions to process and convert building information for various purposes, all while minimising operational costs.

Image: The Dubai mandate for digital permits with openBIM

IFC Facts

- IFC Adopting is expected to facilitate up to 70% of common manual review tasks for building permits engineers.
- Permitted IFC models contribute to the realisation of Dubai's Digital Twin through enabling various use cases that necessitate building information at the city scale level.
- The scope of current IFC mandate includes government projects, buildings exceed twenty floors, projects exceeding 20,000 square meters, and any specialized buildings such as hospitals and universities.
- The BIM submission at moment is an additional requirement. Permit applicants are still required to submit CAD drawings generated from the BIM models.
- BIM information requirements and quality checks are published as Excel spreadsheets, IDS file and bsDD data dictionary.

References

1. Dubai BIM standard (https://buildingsmartuae.ae/en/Documents/DuabiBIMStandard.zip)
2. Dubai BIM Roadmap (https://buildingsmartuae.ae/en/Documents/DubaiBIMRoadmap.pdf)
3. Dubai Municipality's BIM mandate Circular (in Arabic) (https://www.dm.gov.ae/documents/circular-9-1-2/)
4. Dubai Municipality BIM requirements as bsDD data dictionary: https://search.bsdd.buildingsmart.org/uri/dm/DMBIMInfo

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.

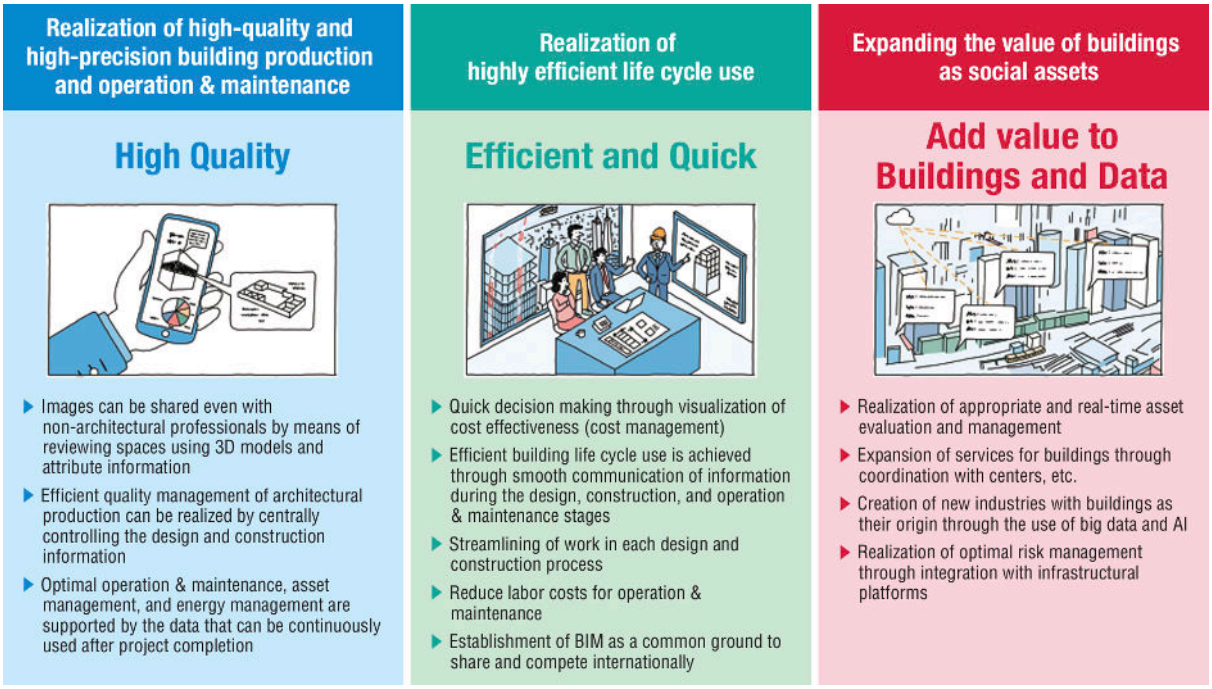


Image: The benefits of BIM according to MLIT

Why IFC?

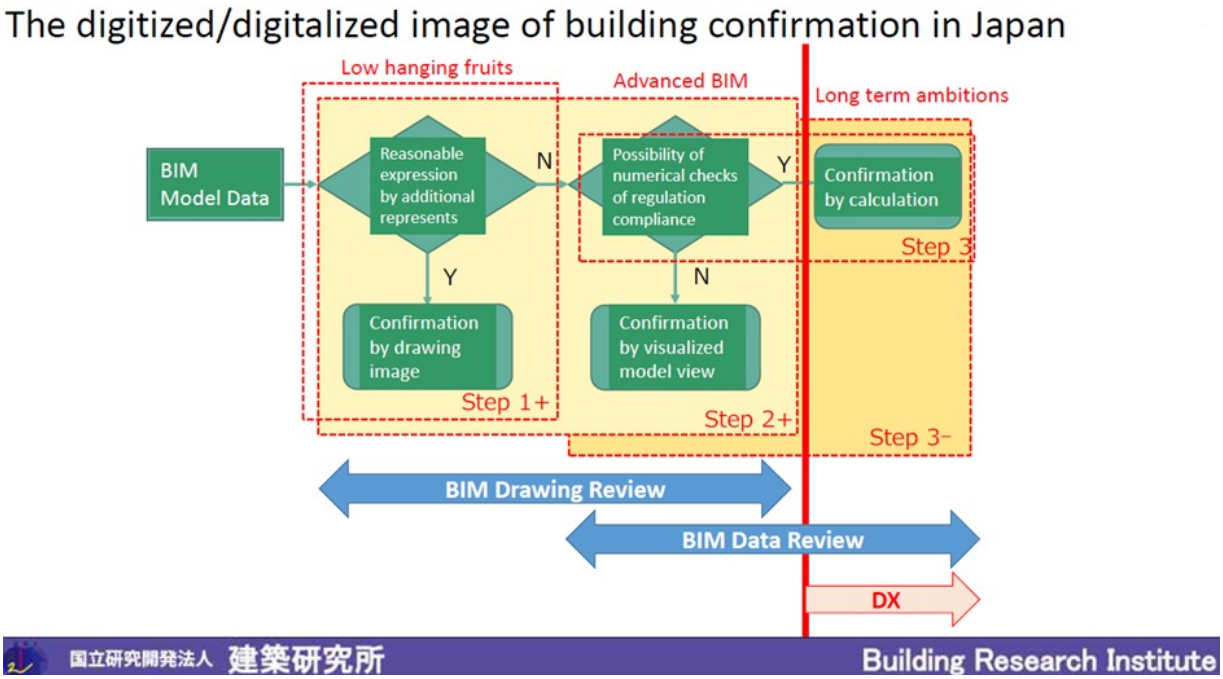
- IFC presents an open, neutral data schema of BIM data for building checking.
- IFC enables digital description for required information in building checking.
- IFC clarifies the boundary between native and data exchange environments for BIM data submissions to checking agencies.
- By submitting IFC 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.



Public and Commerical 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:

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

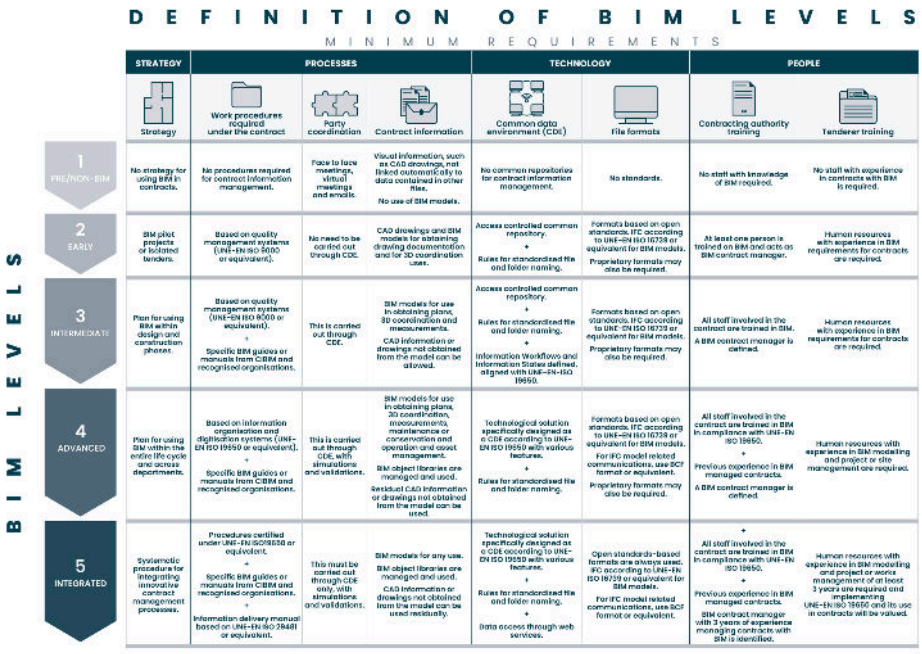
The Spanish Government has approved, in 2023, the compulsory use of BIM based on three variables:

- 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.



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: Spain
Region: Catalunya

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.

Building on this foundation, the Generalitat has recently approved the 2030 BIM Strategy after a participatory approach involving both public and AECO private sectors. This comprehensive strategy aims to strengthen the methodological change in planning, design, construction, and management of engineering works while advancing digitalization and sustainability in construction processes.

> "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, as well as all stakeholders involved in the seventeen strategic lines deployed by the 2030 BIM Strategy across the Generalitat's departments and public sector.

What does this mean?

Updated openBIM requirements for a new level and wider construction works public procurement spectrum. The 2030 BIM Strategy establishes a framework where different departments must define implementation plans with specific BIM goals, actions, resources, and assessment indicators. The BIM Technical Committee will ensure coordination and monitoring of these plans.

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. This aligns with the 2030 BIM Strategy's focus on fostering cooperation and information exchange culture.

More information about the mandate

The 2030 BIM Strategy consists of four main areas: Value (improving service to citizens through internal digitalization), Push-Pull strategy (promoting sector digitalization through regulatory frameworks), Collaboration (fostering cooperation and information exchange), and People (providing necessary skills for new technologies). These areas are deployed through seventeen strategic lines with specific indicators to assess goal fulfillment. Each department must develop implementation plans detailing actions, resources, and assessment methodologies within specified timeframes.

Benefits

The implementation of the 2030 BIM Strategy represents a significant advancement in Catalonia's approach to digital construction. By optimizing investments and improving asset management in public works, the strategy ensures more efficient use of public resources. The regulatory framework established will boost a more technologically advanced building sector, increasing competitiveness and innovation. Through enhanced cooperation and information exchange protocols, project stakeholders will experience improved collaboration and reduced conflicts. The strategy's focus on skills development ensures the workforce is prepared for technological integration, creating new job opportunities and specializations. The coordinated approach across government departments eliminates silos and creates a unified vision for BIM implementation, while defined assessment indicators provide measurable outcomes that can guide continuous improvement.

IFC Facts

The IFC standard remains the cornerstone of Catalonia's BIM implementation strategy, providing the technical foundation for interoperability across the construction lifecycle. With the 2030 BIM Strategy, the Generalitat reinforces the importance of open standards for ensuring vendor-neutral data exchange and long-term data accessibility. As departments develop their implementation plans, IFC usage will become further standardized across different project types and scales. The strategy specifically promotes increasing the quality of IFC exchange models as the standards evolve, ensuring that Catalonia stays at the forefront of BIM implementation. By facilitating the collaboration culture emphasized in the strategy's third main area, IFC enables the seamless information flow necessary for truly integrated project delivery and asset management..

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, Trisha Stefanski, Will Sharp
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 ofthe 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.

Key milestones

- State DOT's and FHWA Start TPF-5(372) BIM for Bridges and Structures Phase 1 to develop a standard way of exchanging 3D models and other digital data using an open, non-proprietary format. (2018)
- AASHTO Board of Directors Adopts IFC Schema as national standard (2019)
- AASHTO forms JStan (Joint Subcommittee on Data Standardization) to champion and coordinate efficient information flow throughout the lifecycle of all assets and related information that comprise our transportation systems. This will be achieved through open data standards, data governance, schema development, and collaborative public and private partnerships. (2020)
- AASHTO joins buildingSMART International as a Principal Member – (2023)
- AASHTO Committee on Bridges and Structures adopts and publishes Information Delivery Specification (IDS) for the Design to Construction Data Exchange for Highway Bridges, Version 1.0 (2023)
- State DOT's and FHWA start TPF-5(372) BIM for Bridges and Structures Phase 2 to expand data standards for exchanging 3D models and other digital data using an open, non-proprietary format.
- State DOT's and FHWA start TPF-5(480) BIM for Infrastructure to provide technical guidance for leveraging the concepts of BIM and open data standards to create a guide for information management across all phases of the asset life cycle of the build environment in the transportation infrastructure context. (2023)
- Pennsylvania DOT is awarded an ADCMS Grant from FHWA for Advancing Standardized Open-Data As-Built Information Models for Bridges. This effort builds upon the efforts of the TPF-5(372) BIM for Bridges and Structures Transportation Pooled Fund (to develop the first open data standards for the digital exchange of 3D models for conventional workhorse bridges in the U.S. using the Industry Foundation Classes (IFC) standard). (2023)
- US Transportation Construction Industry Groups ARTBA and AGC publish policy statements in support of open data standards and model as legal documents for construction of transportation projects. (2021,2024)

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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