Advanced
Construction
Information
Development Ltd.

BIM Management Course

Session 4

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Course Objective

- To train up participant with the capabilities to be eligible as a certified BIM Manager under the Scheme. On completion of the course, participant should have acquired the core competencies of a certified BIM Manager under the Scheme.

Course Outline

1 **BIM Initiation:** Ability to describe BIM concepts, BIM standards and guidelines in Hong Kong and global contexts.

- 1.1 BIM Concept
- 1.2 Local & Global Contexts, BIM Standards and Guidelines

2 **BIM Software and Technology Trend:** Ability to explain BIM software, the modelling process, and current and upcoming technology trend.

- 2.1 BIM Software
- 2.2 Technology Trend

3 **BIM Uses and Processes:** Ability to understand BIM uses and applications, and to design and manage the overall process of a BIM project.

- 3.1 Client BIM Strategic Stage
- 3.2 Client Pre-tender Project Stage
- 3.3 Definition & Design Stage
- 3.4 Construction Stage
- 3.5 Handover Stage
- 3.6 Operation & Maintenance Stage

Course Outline

4 **Digital Information Management, Collaboration and Integration:** Ability to plan and execute the setting-up of a common data environment and data quality control system for effective use and sharing of digital information in a BIM project.

- 4.1 Digital Information Management
- 4.2 Common Data Environment (CDE)
- 4.3 Data Quality Control & Assurance across various stages

5 **Commercial and Contractual Aspects:** Ability to describe commercial and financial issues of BIM as well as BIM-related contractual issues.

- 5.1 Commercial Issue
- 5.2 Contract Issue

Course Outline

	Core Subject		L1	L2	L3	L4
1. BIM Initiation	*1.1. BIM Concept*					
	1.1.1	BIM definitions and terminology	✓			
	1.1.2	The difference between 2D CAD, 3D CAD and BIM	✓			
	1.1.3	Concept of BIM as whole project & whole estate perspective	✓			
	1.1.4	Value and benefits of adopting BIM	✓			
	1.1.5	Value of BIM for AM & FM	✓			
	1.1.6	Collaborative working in BIM	✓			
	1.1.7	Limitation of BIM	✓			
	1.1.8	Challenges within existing working practices & how BIM addresses these		✓		
	1.1.9	How BIM affect the current practice in ACEO industry		✓		
	1.2. Local & Global Contexts, BIM standards and guidelines					
	1.2.1	Local BIM standards & resources		✓		
	1.2.1.1	CIC BIM Standards		✓		
	1.2.1.2	Government BIM standards & resources		✓		
	1.2.2	Global context in BIM development	✓			
	1.2.3	Global BIM standards & resources		✓		
	1.2.3.1	BSI PAS 1192		✓		
	1.2.3.2	BIM FORUM LOD Specification 2018		✓		
	1.2.3.3	OpenBIM		✓		

Course Outline

	Core Subject		L1	L2	L3	L4
2. BIM Software and Technology Trend	*2.1. BIM Software*					
	2.1.1	Overview of industry leading BIM software / applications		✓		
	2.1.2	Characteristic, strength and limitation of industry leading BIM software	✓			
	2.1.3	Versions and file formats	✓			
	2.1.4	Interoperability across industry leading BIM software	✓			
	2.2. Technology Trend					
	2.2.1	Cloud platform	✓			
	2.2.2	Laser scanning		✓		
	2.2.3	Photogrammetry		✓		
	2.2.4	GIS		✓		
	2.2.5	Application of smart devices		✓		
	2.2.6	VR/AR/MR		✓		
	2.2.7	VDC	✓			
	2.2.8	RFID		✓		
	2.2.9	Gaming technology in BIM	✓			
	2.2.10	Robotics	✓			
	2.2.11	Automation	✓			
	2.2.12	API	✓			
	2.2.13	MiC	✓			
	2.2.14	Indoor positioning	✓			

Course Outline

	Core Subject	L1	L2	L3	L4
	3.1. – Client BIM Strategic Stage				
3.1.1	BIM strategy, BIM uses, BIM processes	✓			
3.1.2	Key personnels in relation to BIM	✓			
3.1.3	Determine the info management & CDE strategy				✓
3.1.4	Determine the BIM / AIM / GIS strategy				✓
3.1.5	Determine level of development in the context of graphics and information				✓
3.1.6	Determine level of integration of digital information into asset & facility management				✓
3.1.7	Case study		✓		
	3.2. – Client Pre-tender Project Stage				
3.2.1	Determine & oversee the development of Client Information Model (CIM)				✓
	3.2.1.1 Organisational Information Requirements (OIRs)				✓
	3.2.1.2 Asset Information Requirements (AIRs)				✓
3.2.2	Employers Information Requirements (EIR)				✓
3.2.3	Determine project technology & systems requirement & integration				✓
3.2.4	Determine project delivery requirements				✓
3.2.5	Determine the soft landings approach				✓
3.2.6	Contract & consultancy requirement		✓		
3.2.7	Assessment on supply chain capability & capacity (Tender Assessment)				✓
3.2.8	Case study		✓		

Course Outline

3. BIM Uses and Processes	*3.3. – Definition & Design Stage*					
	3.3.1	BIM Execution Plan developed by supply chain				✓
		3.3.1.1 Pre-contract BIM Project Execution Plan				✓
		3.3.1.2 Post-contract BIM Project Execution Plan				✓
	3.3.2	Supervision in fulfilling BIM uses in planning & design stages listed in CIC BIM Standards				✓
	3.3.3	Project Information Model (PIM) data exchanges and validation				✓
	3.3.4	BIM PIM file setup				✓
		3.3.4.1 BIM origin point & orientation setup				✓
		3.3.4.2 Model division				✓
		3.3.4.3 Modelling methodology				✓
		3.3.4.4 Project-based industry and BIM standards				✓
	3.3.5	Direct BIM related meetings				✓
		3.3.5.1 Meeting with high level		✓		
		3.3.5.2 Meeting with supply chain level		✓		
		3.3.5.3 Internal meeting		✓		
		3.3.5.4 Multidiscipline collaboration meeting		✓		
	3.3.6	Case Study		✓		
	3.4. – Construction Stage					
	3.4.1	BIM Execution Plan developed by supply chain				✓
		3.4.1.1 Pre-contract BIM Project Execution Plan				✓
		3.4.1.2 Post-contract BIM Project Execution Plan				✓
	3.4.2	Supervision in fulfilling BIM uses in construction & handover stage listed in CIC BIM Standards				✓
	3.4.3	Project Information Model (PIM) data exchanges and validation				✓
	3.4.4	Direct BIM related meetings				✓
	3.4.5	Case study		✓		
	3.5. – Handover Stage					
	3.5.1	As-built information verification				✓
	3.5.2	Oversee data transfer from PIM to Asset Information Model (AIM)				✓
	3.5.3	Supervision in fulfilling BIM uses in handover stage listed in CIC BIM Standards				✓
	3.5.4	Case study		✓		
	3.6. – Operation & Maintenance Stage					
	3.6.1	Update Assets Information Model (AIM)		✓		
	3.6.2	Roles, responsibilities and authorities for maintaining the AIM		✓		
	3.6.3	Post occupancy evaluation		✓		
	3.6.4	Case Study		✓		

Course Outline

	Core Subject	L1	L2	L3	L4
4. Digital Information Management, Collaboration and Integ	*4.1. Digital Information Management*				
	4.1.1 Value of data & how it should be managed		✓		
	4.1.2 Interoperate data/information to facilitate cross-disciplinary and cross-BIM platform collaboration		✓		
	4.1.3 Limitation of BIM software in relation to information management		✓		
	4.1.4 Determine level of development in the context of graphics and information in different stages				✓
	4.1.5 Determine level of integration of digital information into asset & facility management				✓
	4.1.6 Oversee the process and quality of information exchange				✓
	4.1.6.1 IFC / BCF / XML…etc.		✓		
	4.1.6.2 COBie		✓		
	4.2. Common Data Environment (CDE)				
	4.2.1 Overview of CDE		✓		
	4.2.2 Overview of various CDE platform		✓		
	4.2.3 Setup of CDE			✓	
	4.2.4 Assessment of CDE			✓	
	4.2.5 Management of CDE				✓
	4.2.6 Limitation of CDE		✓		
	4.3 – Data Quality Control & Assurance across various stages				
	4.3.1 System checking				✓
	4.3.2 Model audit				✓
	4.3.3 Model checking				✓
	4.3.4 Audit reporting				✓

Course Outline

	Core Subject	L1	L2	L3	L4
5. Commercial and Contract	*5.1 Commercial Issue*				
	5.1.1 Establishing BIM ready Environment to support the corporate			✓	
	5.1.1.1 BIM strategy in organization level		✓		
	5.1.1.2 Challenges in BIM implementation		✓		
	5.1.1.3 Phases in BIM implementation				✓
	5.1.1.4 Hardware requirement for BIM		✓		
	5.1.1.5 Software requirement for BIM		✓		
	5.1.1.6 Manpower management for BIM				✓
	5.1.1.6.1 Staff plan				✓
	5.1.1.6.2 Staff recruitment				✓
	5.1.1.6.3 Staff training				✓
	5.1.2 Promotion of adopting BIM in office / to clients		✓		
	5.1.2.1 Value and benefit of adopting BIM	✓			
	5.1.2.2 Value and benefit of data and information from BIM	✓			
	5.1.2.3 Evaluating Return on Investments (ROI) of adopting BIM		✓		
	5.2. Contract Issue				
	5.2.1 Ownership of data	✓			
	5.2.2 Intellectual property right	✓			
	5.2.3 Legal implication and potential liability	✓			
	5.2.4 Professional indemnity	✓			
	5.2.5 Introducing NEC	✓			
	5.2.6 Commercial implications for contracts & insurances in relation to BIM	✓			

BIM Management Course

Session 1

1.1 Topic

- 1.1.1 Sub Topic

L1	Appreciation (A)
L2	Knowledge (K)
L3	Experience (E)
L4	Ability (B)

1.1 BIM Concept

- 1.1.1 BIM definitions and terminology

- Building information modeling (BIM) is a process involving the generation and management of **digital representations** of **physical** and **functional** characteristics of places.

- Building information models (BIMs) are files (often but not always in proprietary formats and containing proprietary data) which can be extracted, exchanged or networked to support decision-making regarding a building or other built asset. Current BIM software is used by individuals, businesses and government agencies who plan, design, construct, operate and maintain diverse physical infrastructures, such as water, refuse, electricity, gas, communication utilities, roads, railways, bridges, ports and tunnels.

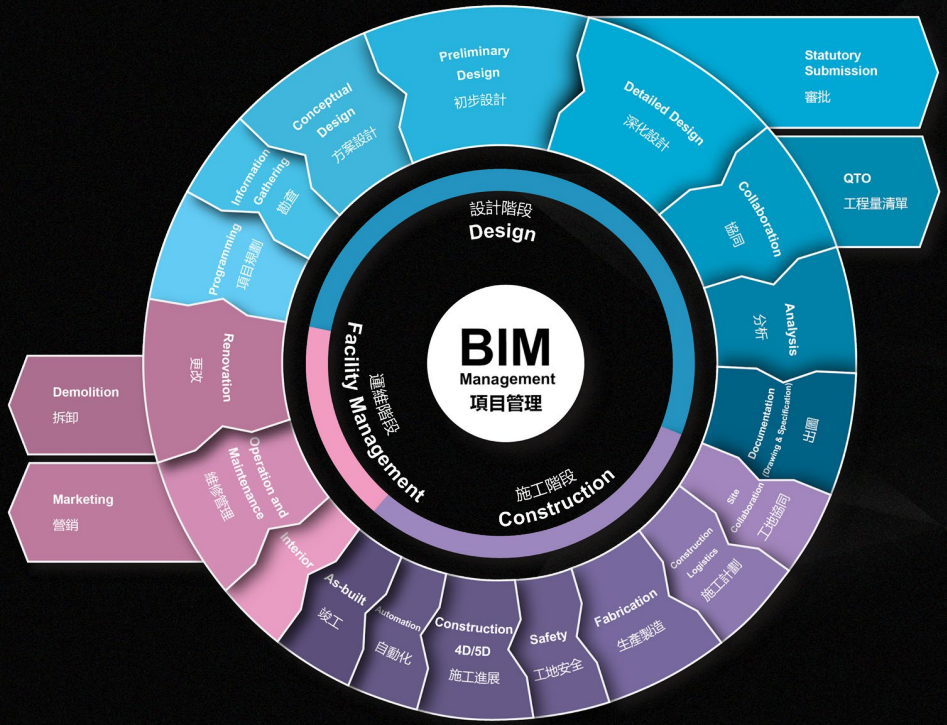
1.1 BIM Concept

- 1.1.1 BIM definitions and terminology

- In layman terms, BIM is a …. “Rehearsal” - putting real work objects into virtual world, test before you build.

1.1 BIM Concept

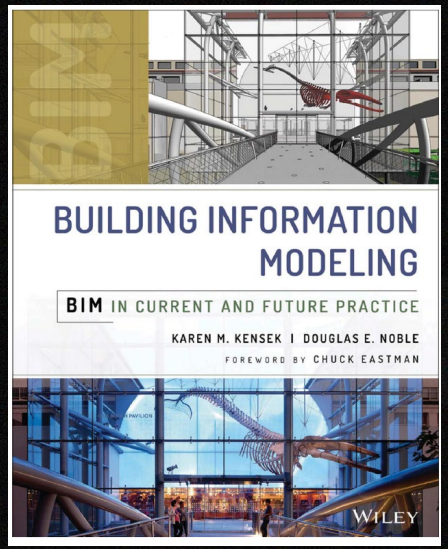
- 1.1.1 BIM definitions and terminology



BIM Project Life Cycle

L1

1.1 BIM Concept

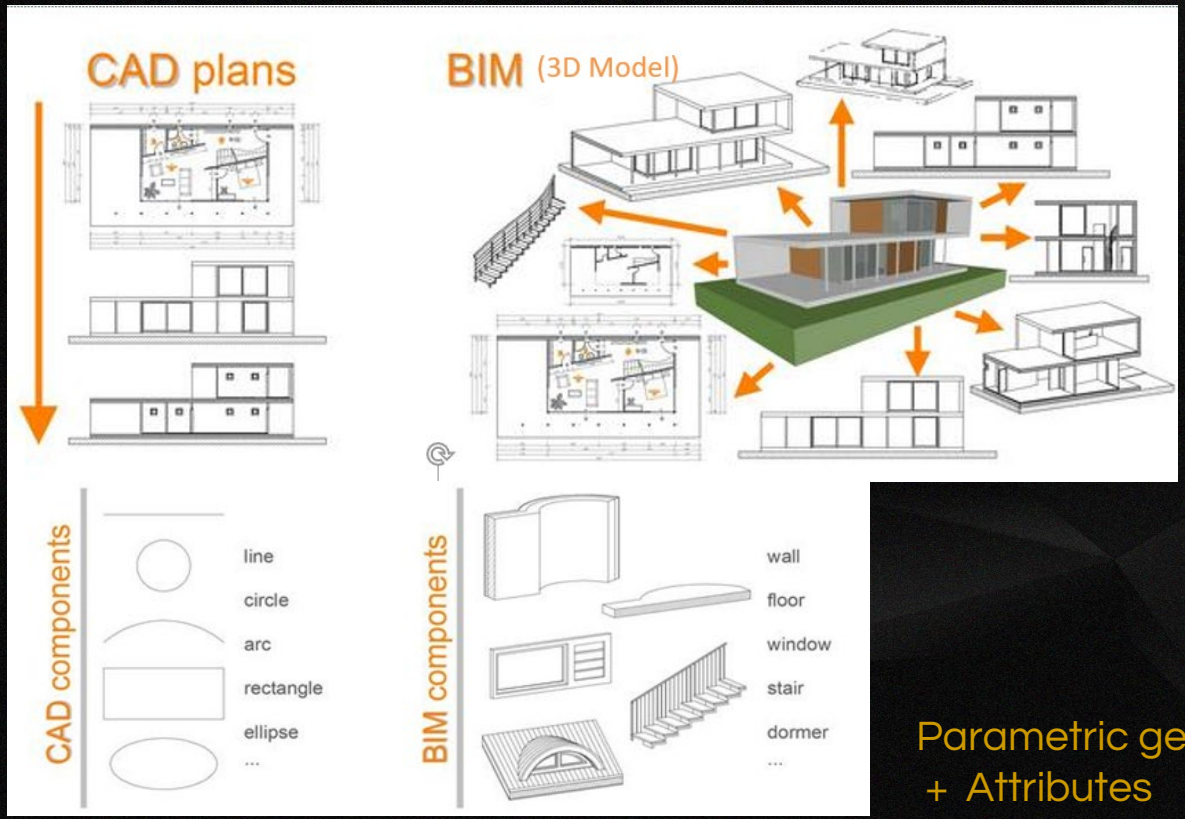


- Building Information Modeling (BIM) is fundamentally transforming modes of design practice and standards of building design, delivery, and operation.
- BIM is not CAD. In some respects BIM is a natural progression in the evolution of computer supported practice. However, much more so than CAD, BIM is revolutionizing the way the building partners practice and document their work, even changing the nature of the design process.

L1

1.1 BIM Concept

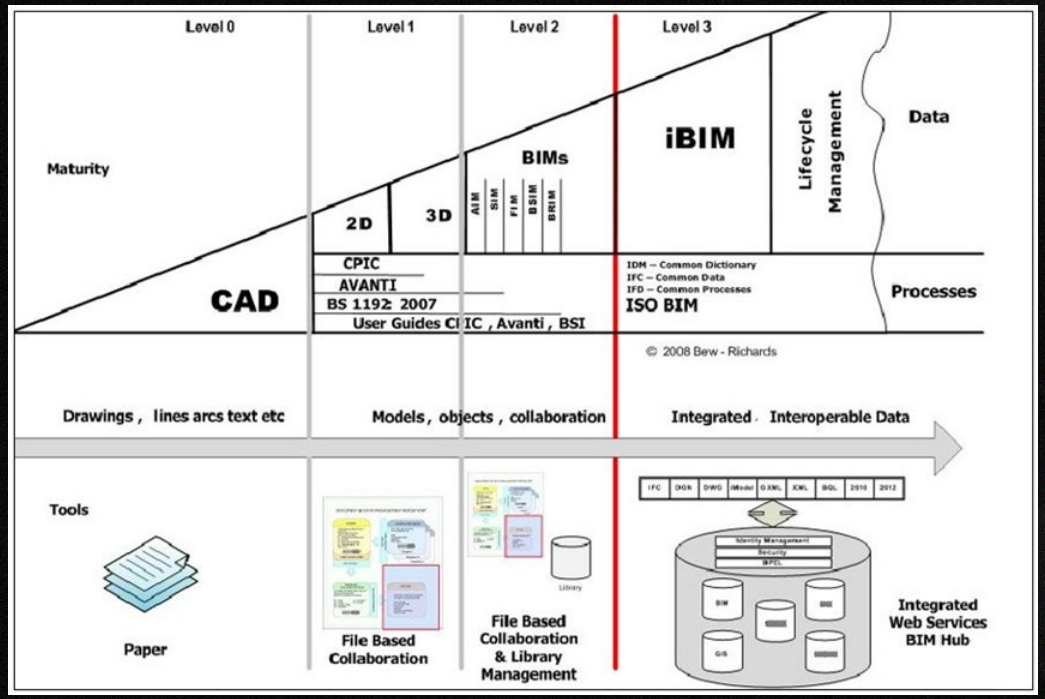
- 1.1.2 The difference between 2D CAD, 3D CAD and BIM



Parametric geometry
+ Attributes

1.1 BIM Concept

- 1.1.2 The difference between 2D CAD, 3D CAD and BIM

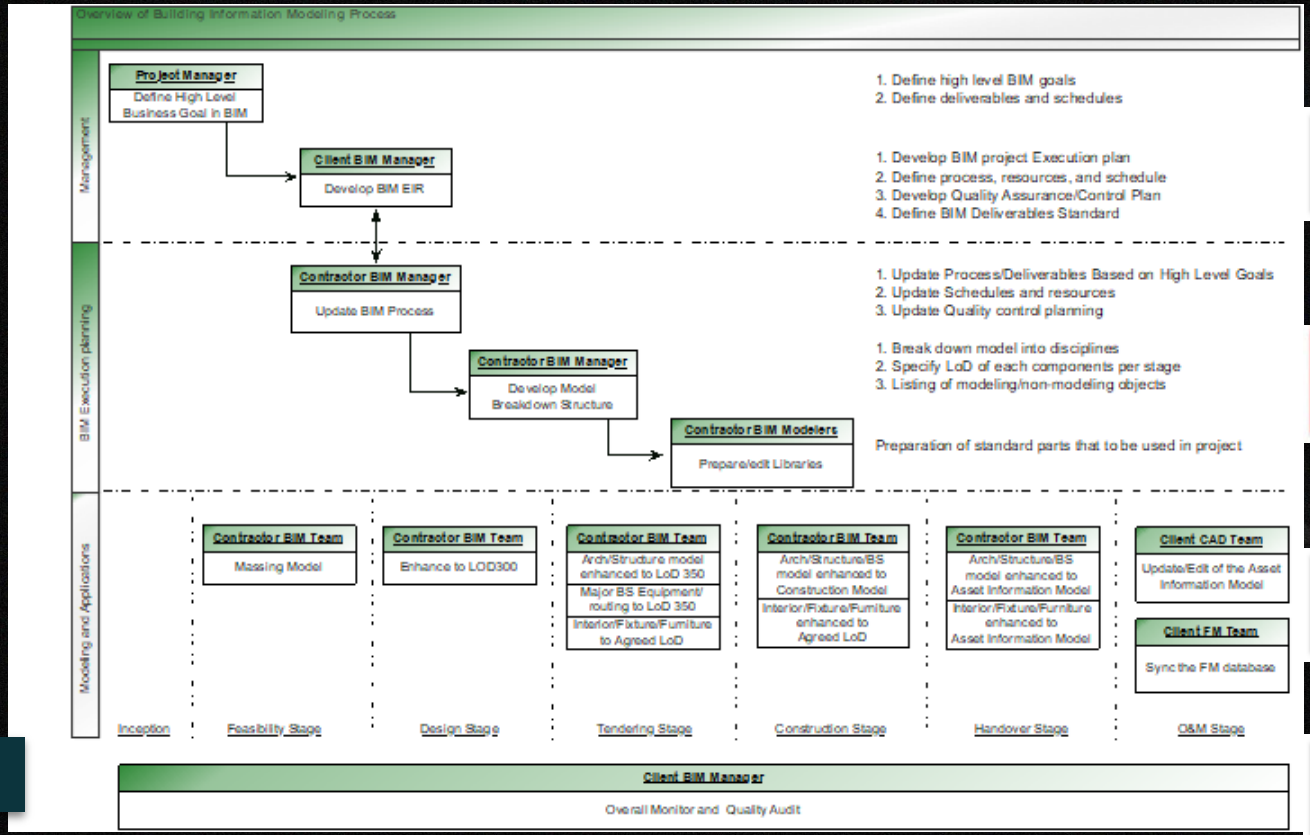


Level 2 – 2D & 3D models, objects, collaboration (Currently in 2019)

L1

1.1 BIM Concept

- 1.1.3 Concept of BIM as whole project & whole estate perspective



High Level BIM Goal

Employer Information Requirement

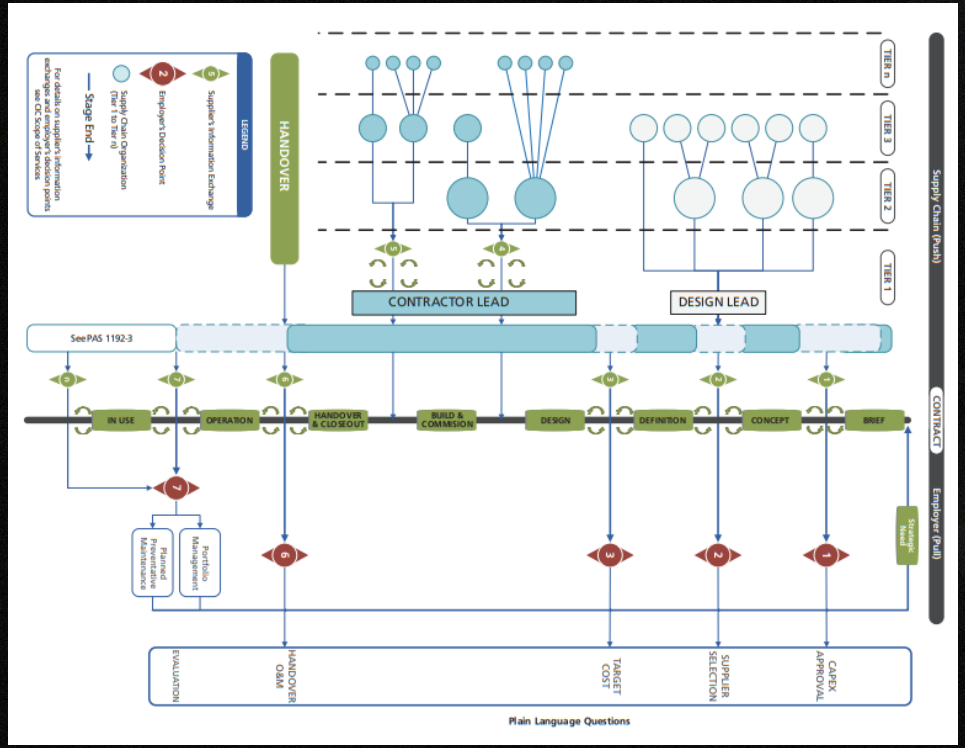
Process Re-engineering

Quality Audit

L1

1.1 BIM Concept

- 1.1.3 Concept of BIM as whole project & whole estate perspective

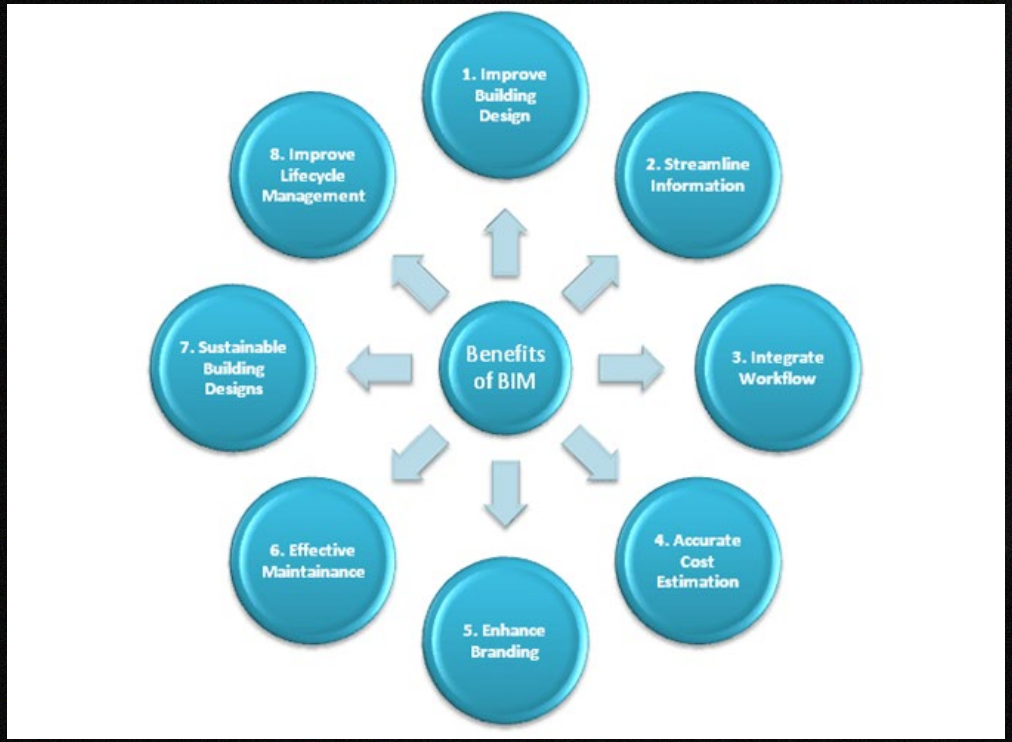


Seven steps in BIM use for a project

L1

1.1 BIM Concept

- 1.1.4 Value and benefits of adopting BIM



Eight Major Benefits of BIM

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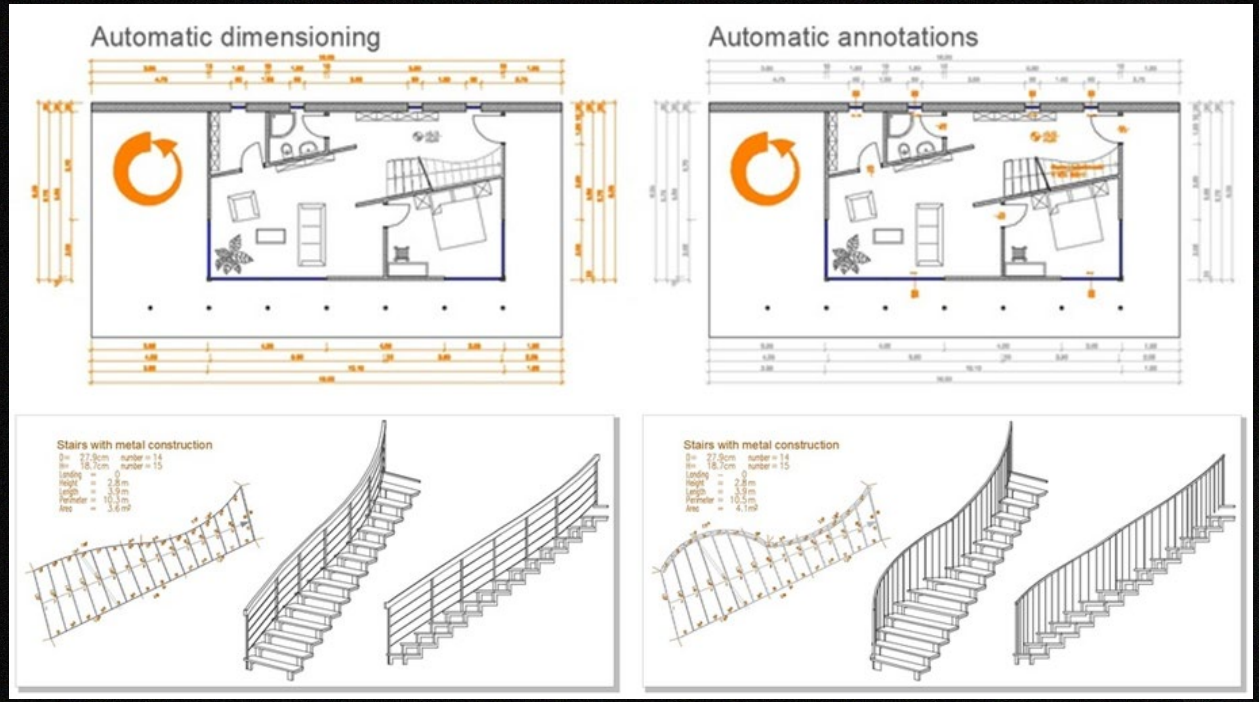
1.1 BIM Concept

- 1.1.4 Value and benefits of adopting BIM

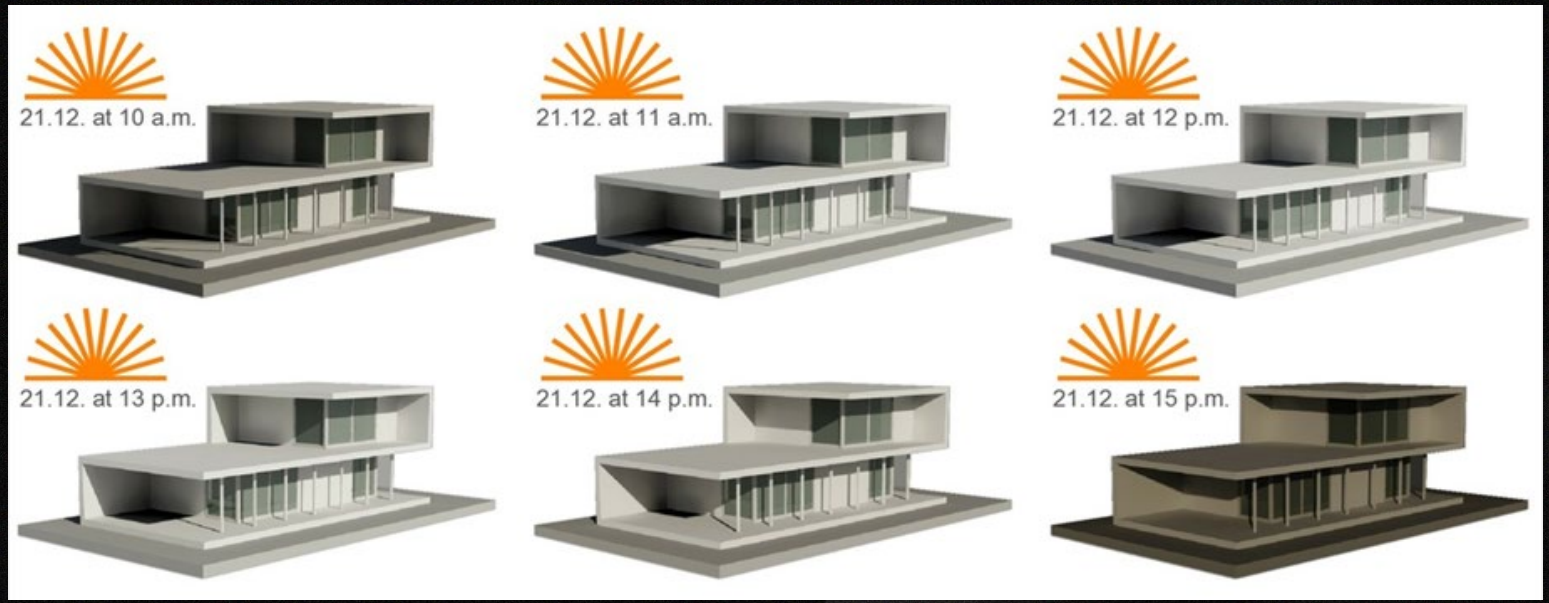


Model with Automation and Information

L1

1.1 BIM Concept

- 1.1.4 Value and benefits of adopting BIM



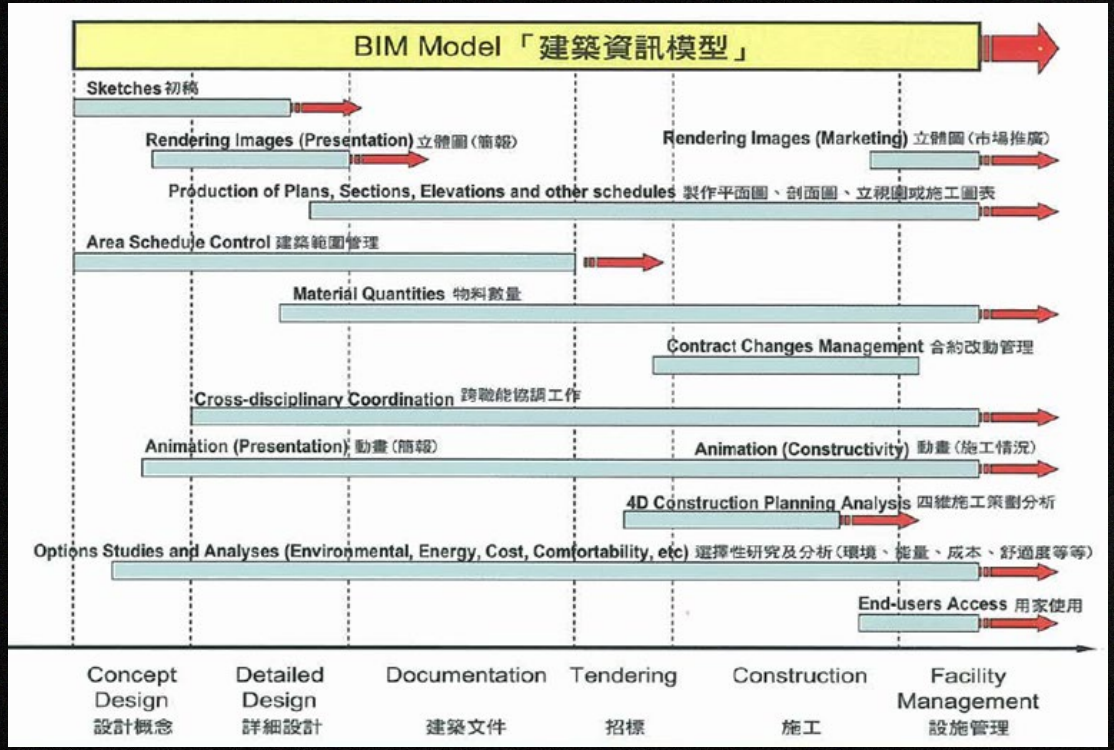
Simulation

- The location of model contained weather information
- Eg. Sunlight Analysis, Solar gain

L1

1.1 BIM Concept

- 1.1.5 Value of BIM for AM & FM

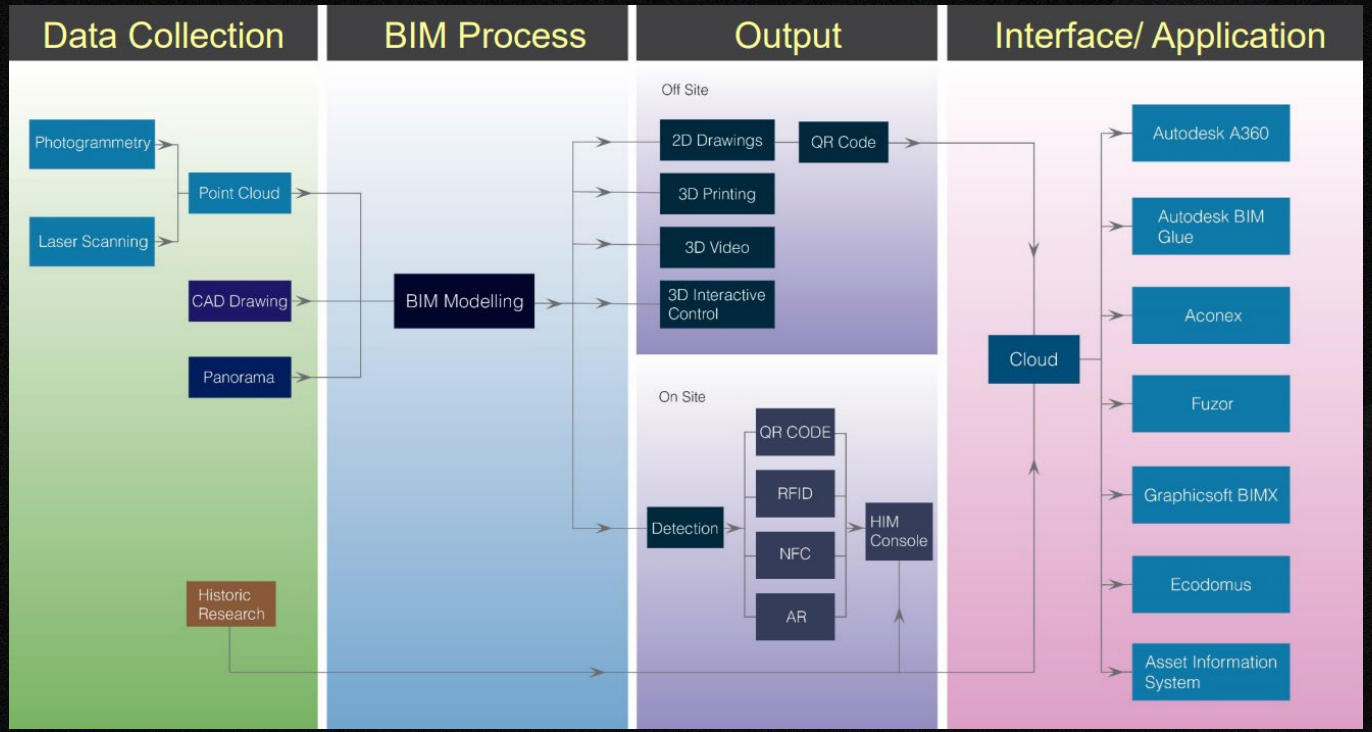


Advantages of making early decisions in the design process

L1

1.1 BIM Concept

- 1.1.5 Value of BIM for AM & FM



Stages of BIM deliverable to AM & FM

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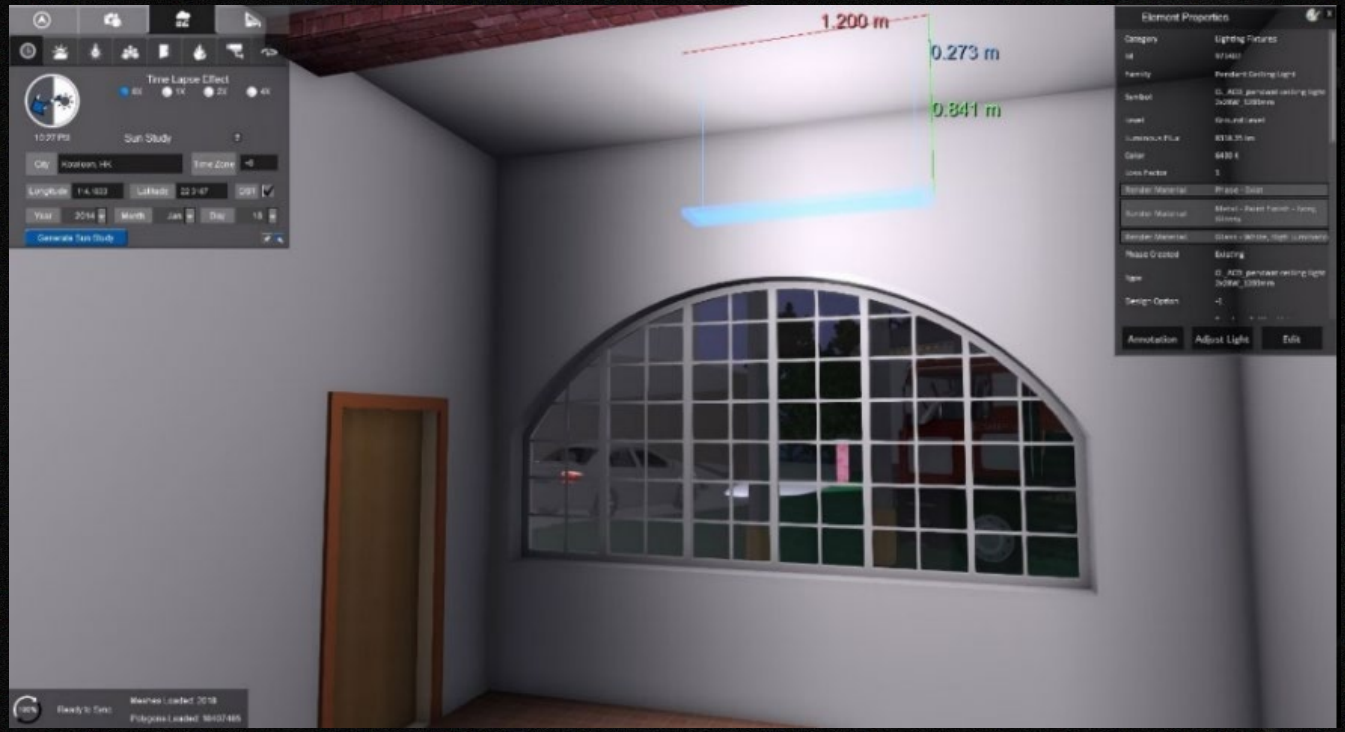
1.1 BIM Concept

- 1.1.5 Value of BIM for AM & FM



3D Interactive Control

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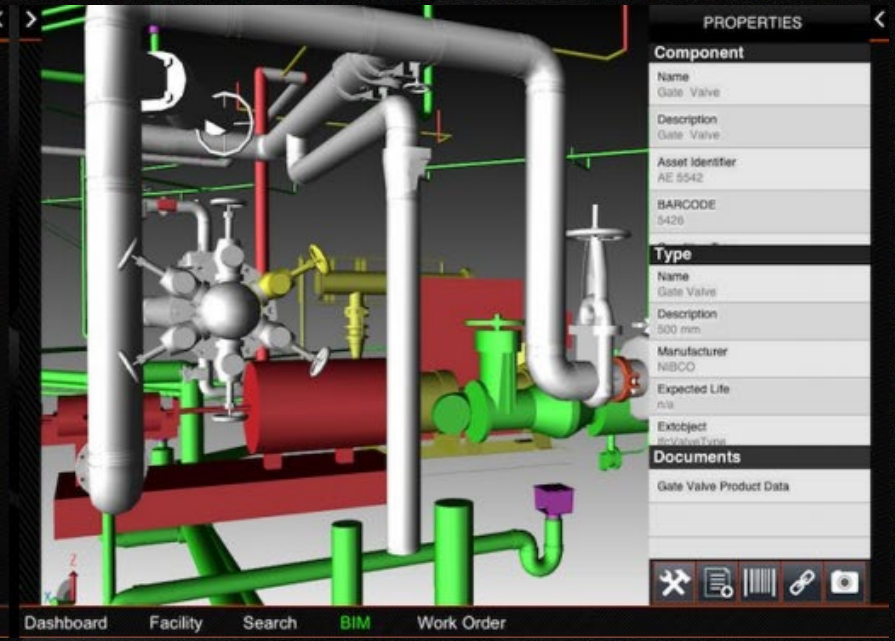
1.1 BIM Concept

- 1.1.5 Value of BIM for AM & FM



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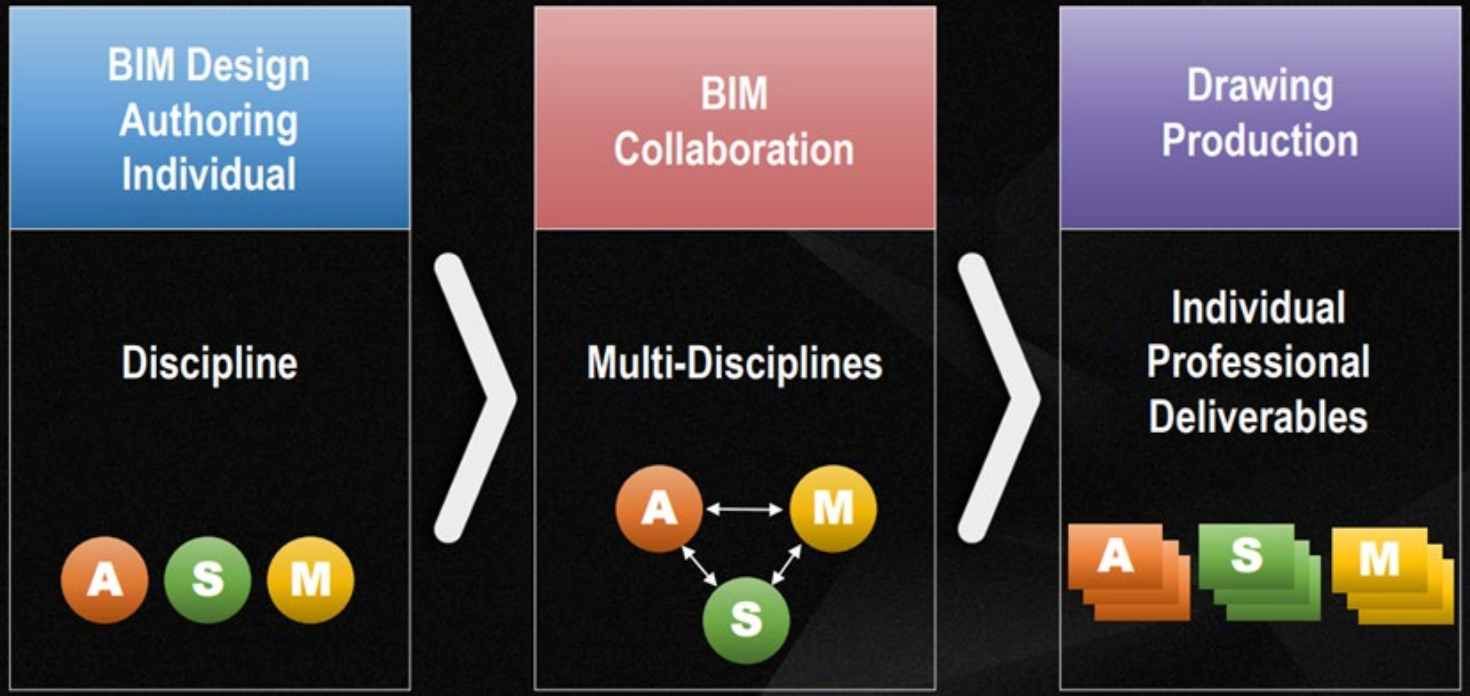
Information in AM & AM

1.1 BIM Concept

- 1.1.6 Collaborative working in BIM



BIM in Design Stage and Construction Stage

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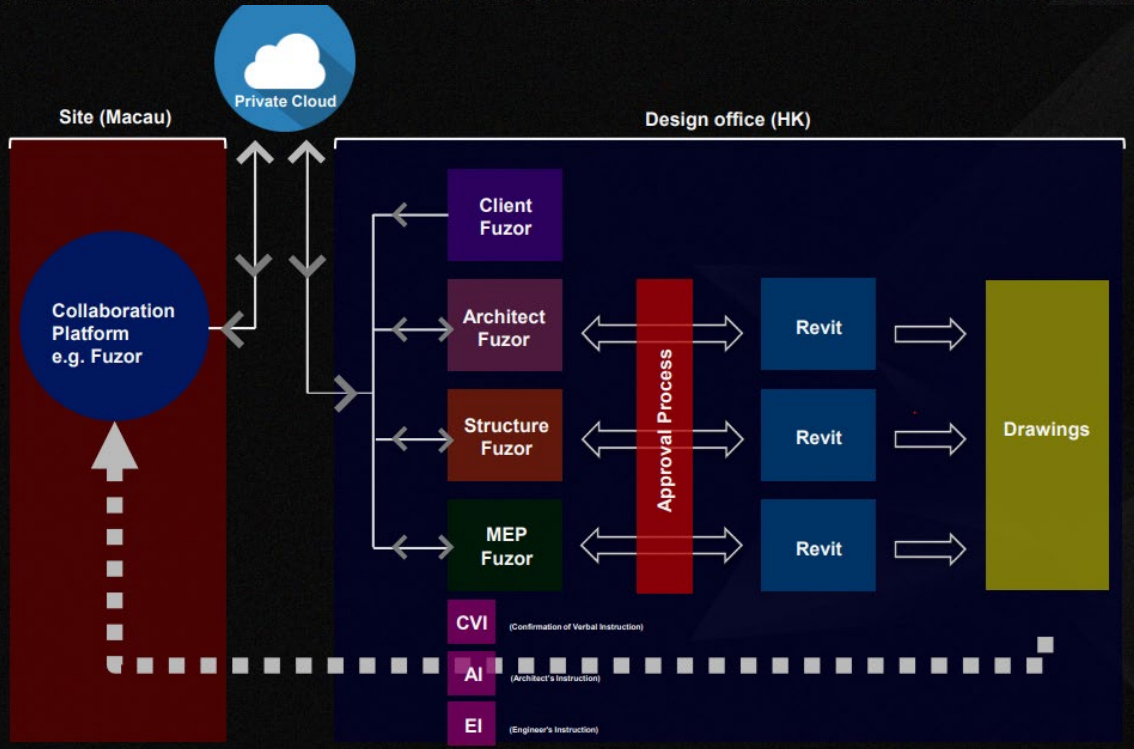
1.1 BIM Concept

- 1.1.6 Collaborative working in BIM

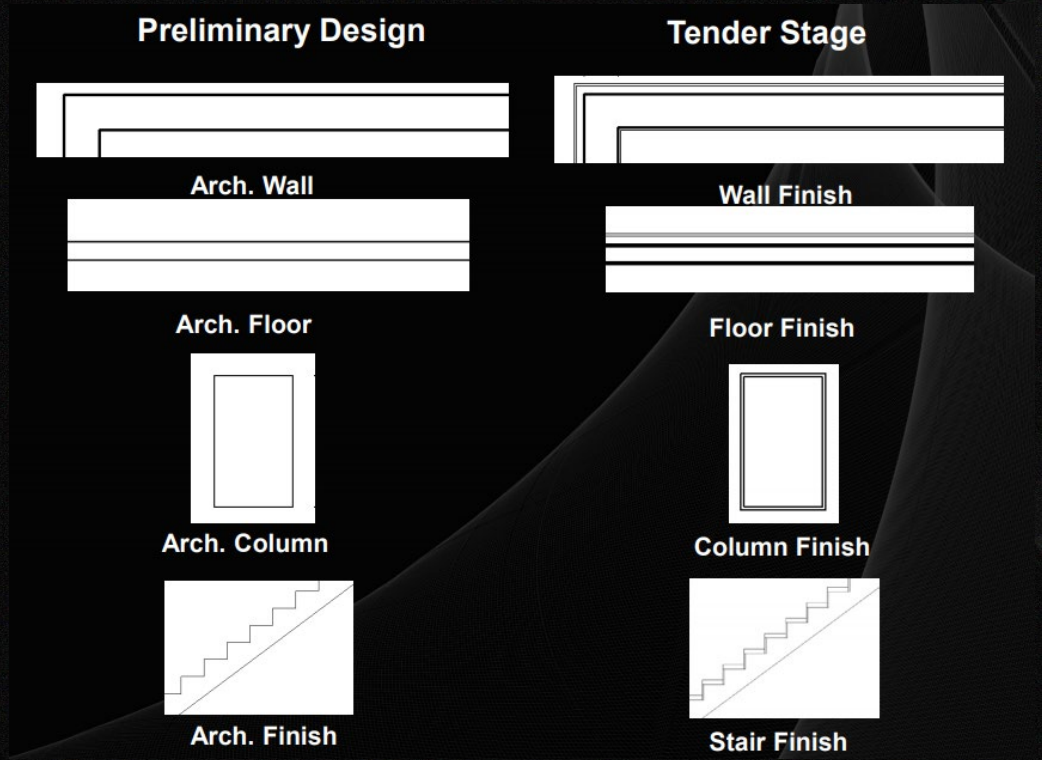


BIM Workflow

L1

1.1 BIM Concept

- 1.1.6 Collaborative working in BIM

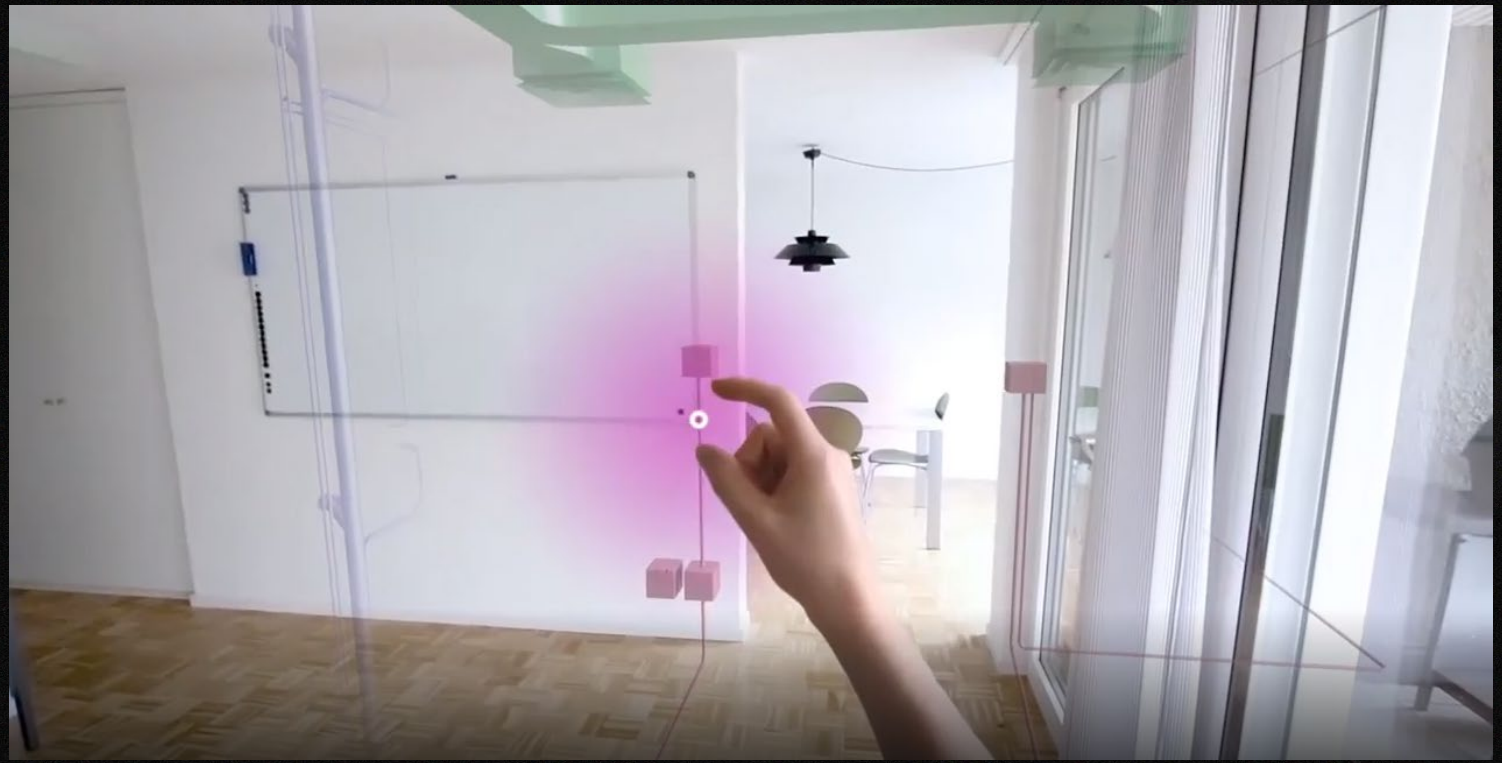


Example of Architectural & Structural Element collaboration

L1

1.1 BIM Concept

- 1.1.6 Collaborative working in BIM



AR to review design collaboration

L1

1.1 BIM Concept

- 1.1.7 Limitation of BIM

BIM DISADVANTAGES

1. To be effective you need all major members of design team on significantly earlier than is often the case.

1. BIM is more of a philosophy and not just a piece of software. Many people don't understand this. Construction is often slow to understand and embrace change.

L1

1.1 BIM Concept

- 1.1.7 Limitation of BIM

BIM DISADVANTAGES

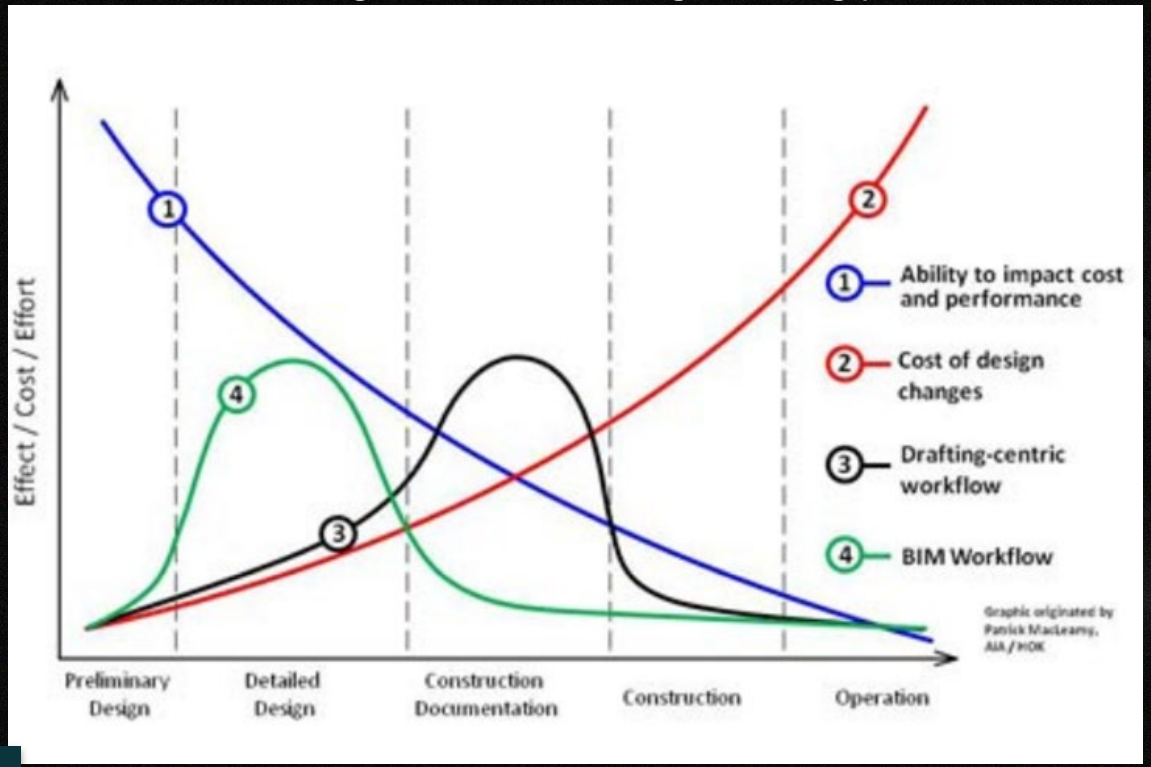
3. New protocols will be needed for managing information transfer and commenting, potentially new roles such as BIM Coordinators (much more than a document handler)

3. Problems over information ownership and design responsibility within the model.

L1

1.1 BIM Concept

- 1.1.8 Challenges within existing working practices & how BIM addresses these



MacLeamy Curve

In design stage, designer use BIM to build the model. In order to obtain the Information (Size, material, brand, etc..). The ability to impact cost and performance and effort in BIM workflow will be high at the beginning.

To transfer information model from design stage to construction stage, the effort of drafting-centric workflow will be high.

In construction stage, as the information of BIM model keep in changes, the cost of design changes is high.

L2

1.1 BIM Concept

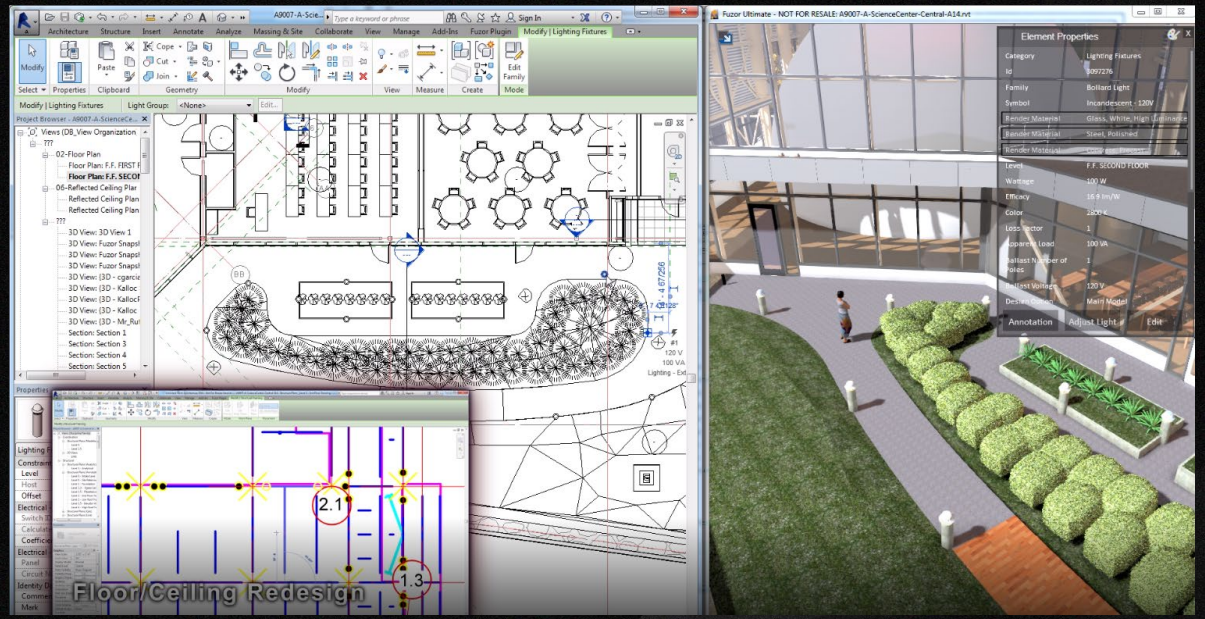
- 1.1.8 Challenges within existing working practices & how BIM addresses these

Design can be reviewed in the virtual world with any changes can be seen immediately

L2

1.1 BIM Concept

- 1.1.8 Challenges within existing working practices & how BIM addresses these



Platform for multiple users to review, update & record of information is provided

L2

1.1 BIM Concept

- 1.1.9 How BIM affect the current practice in ACEO industry

BIM ADVANTAGES

1. 3D collaboration with all members of the team with automated detection of clashes. e.g. Is the service void designed by the architect sufficient for the M&E services.

1. Visualization of projects to enable greater understanding of all members of the team. For example, it is far easier to schedule scaffolding requirements looking at a 3D model than in 2D.

1. 4D visualization i.e. linking the 3D model to the programme to explore logistics.

L2

1.1 BIM Concept

- 1.1.9 How BIM affect the current practice in ACEO industry

BIM ADVANTAGES

4. Faster to incorporate change into a Revit (3D) CAD layout as no need to update loads of individual drawings.

4. 5D potential introducing costs into elements of model e.g electronic drawing take-off.

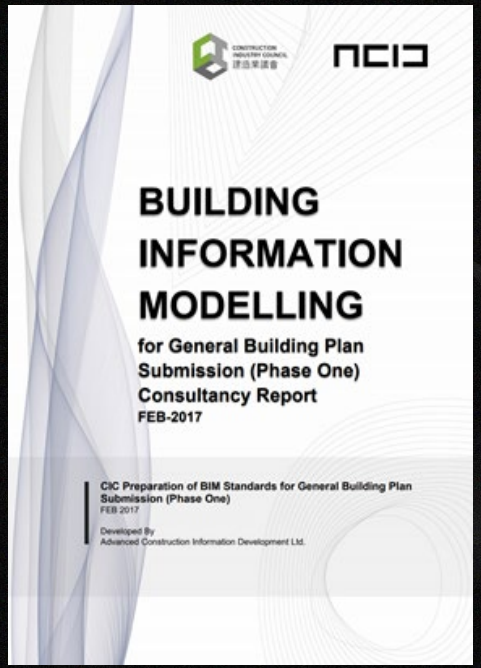
4. Ability to incorporate additional information into model elements e.g maintenance and life span information for Facilities Management or sustainability information, etc

L2

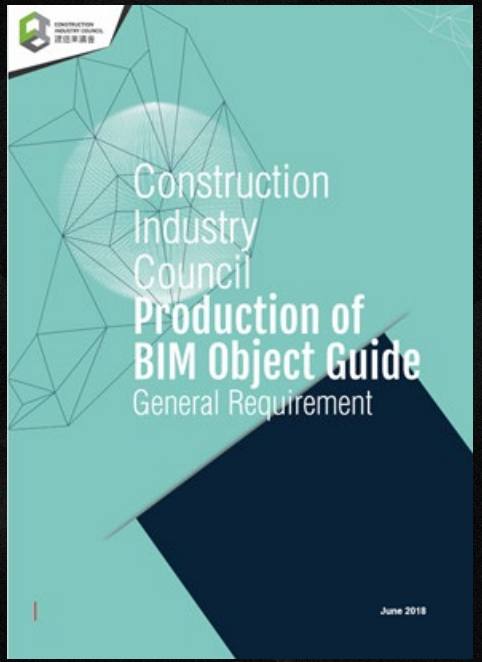
1.2 Local & Global Contexts, BIM standards and guidelines

- 1.2.1 Local BIM standards & resources
  - 1.2.1.1 CIC BIM Standards

CIC BIM Standard (Phase One)



CIC BIM for GBP Submission (Phase One)



CIC BIM Object Standard

L2

1.2 Local & Global Contexts, BIM standards and guidelines

- 1.2.1 Local BIM standards & resources
  - 1.2.1.1 CIC BIM Standards

Building Information Modelling (BIM) Guide for Facilities Upkeep

(Version 1.0)

Objective

The primary purpose of this Guide is to provide a common reference on the adoption of BIM in As-built Modelling for Facilities Upkeep in building projects including capital works projects, entrustment works, subvented capital works projects and works that are undertaken by private parties with project estimates more than $30 million and will be handed back to ArchSD for maintenance according to Development Bureau Technical Circular (Works) No. 7/2017 or the latest version.

Property Services Branch
Architectural Services Department

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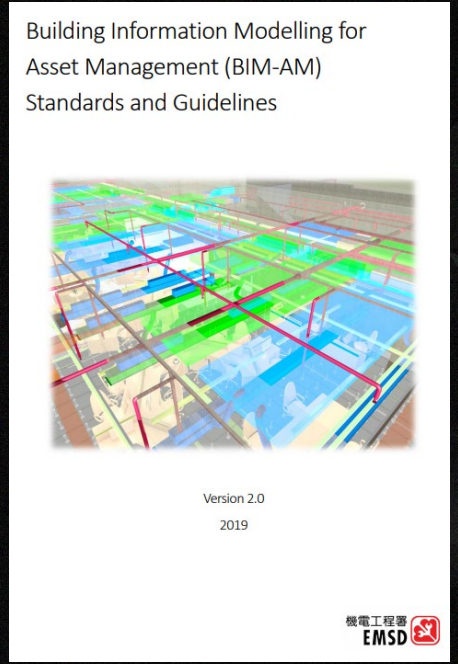
ASD BIM Guide for Facilities Upkeep



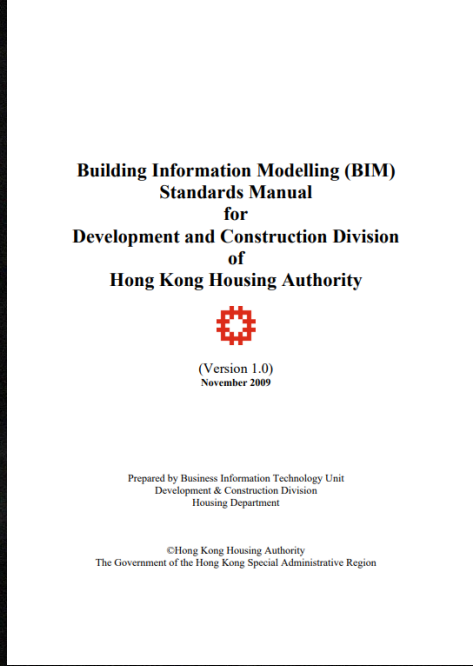
Building Information Modelling for Asset Management (BIM-AM) Standards and Guidelines

Version 2.0

2019

機電工程署 EMSD

EMSD for BIM - AM Standard and Guideline



Building Information Modelling (BIM) Standards Manual for Development and Construction Division of Hong Kong Housing Authority

(Version 1.0)
November 2009

Prepared by Business Information Technology Unit
Development & Construction Division
Housing Department

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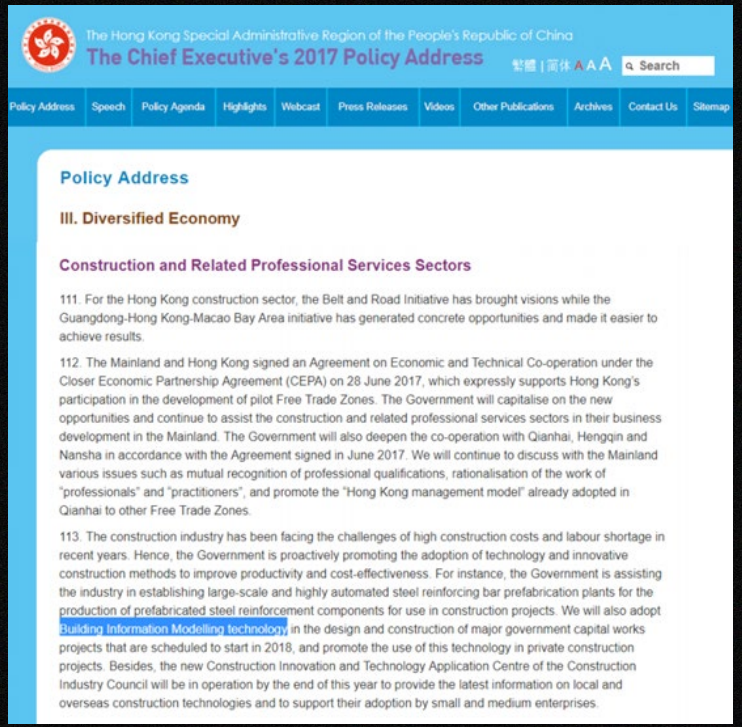
The Government of the Hong Kong Special Administrative Region

BIM Standards Manual for Development and Construction Division of HKHA

L2

1.2 Local & Global Contexts, BIM standards and guidelines

- 1.2.1 Local BIM standards & resources
  - 1.2.1.2 Government BIM standards & resources



The Hong Kong Special Administrative Region of the People's Republic of China

The Chief Executive's 2017 Policy Address

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Policy Address | Speech | Policy Agenda | Highlights | Webcast | Press Releases | Videos | Other Publications | Archives | Contact Us | Sitemap

Policy Address

III. Diversified Economy

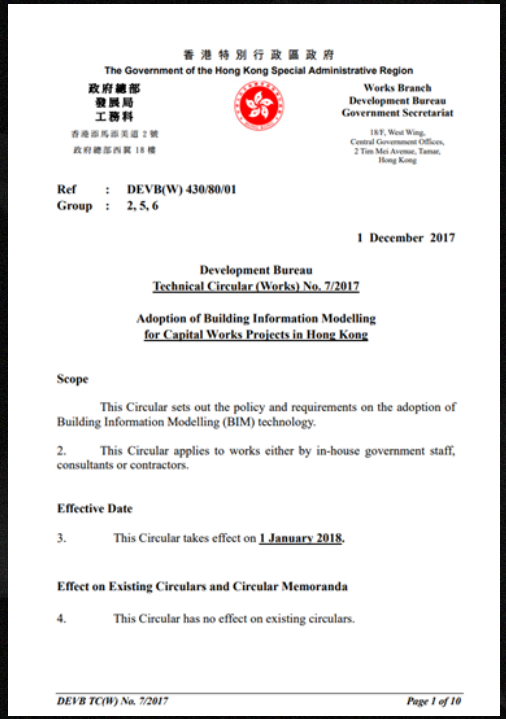
Construction and Related Professional Services Sectors

111. For the Hong Kong construction sector, the Belt and Road Initiative has brought visions while the Guangdong-Hong Kong-Macao Bay Area initiative has generated concrete opportunities and made it easier to achieve results.

112. The Mainland and Hong Kong signed an Agreement on Economic and Technical Co-operation under the Closer Economic Partnership Agreement (CEPA) on 28 June 2017, which expressly supports Hong Kong's participation in the development of pilot Free Trade Zones. The Government will capitalise on the new opportunities and continue to assist the construction and related professional services sectors in their business development in the Mainland. The Government will also deepen the co-operation with Qianhai, Hengqin and Nansha in accordance with the Agreement signed in June 2017. We will continue to discuss with the Mainland various issues such as mutual recognition of professional qualifications, rationalisation of the work of "professionals" and "practitioners", and promote the "Hong Kong management model" already adopted in Qianhai to other Free Trade Zones.

113. The construction industry has been facing the challenges of high construction costs and labour shortage in recent years. Hence, the Government is proactively promoting the adoption of technology and innovative construction methods to improve productivity and cost-effectiveness. For instance, the Government is assisting the industry in establishing large-scale and highly automated steel reinforcing bar prefabrication plants for the production of prefabricated steel reinforcement components for use in construction projects. We will also adopt Building Information Modelling technology in the design and construction of major government capital works projects that are scheduled to start in 2018, and promote the use of this technology in private construction projects. Besides, the new Construction Innovation and Technology Application Centre of the Construction Industry Council will be in operation by the end of this year to provide the latest information on local and overseas construction technologies and to support their adoption by small and medium enterprises.

Government policy



香港特別行政區政府

The Government of the Hong Kong Special Administrative Region

政府總部
發展局
工務科

Works Branch
Development Bureau
Government Secretariat

18/F, West Wing, Central Government Offices, 2 Tim Mei Avenue, Tamar, Hong Kong

Ref : DEVB(W) 430/80/01
Group : 2, 5, 6

1 December 2017

Development Bureau
Technical Circular (Works) No. 7/2017

Adoption of Building Information Modelling for Capital Works Projects in Hong Kong

Scope

This Circular sets out the policy and requirements on the adoption of Building Information Modelling (BIM) technology.

2. This Circular applies to works either by in-house government staff, consultants or contractors.

Effective Date

3. This Circular takes effect on 1 January 2018.

Effect on Existing Circulars and Circular Memoranda

4. This Circular has no effect on existing circulars.

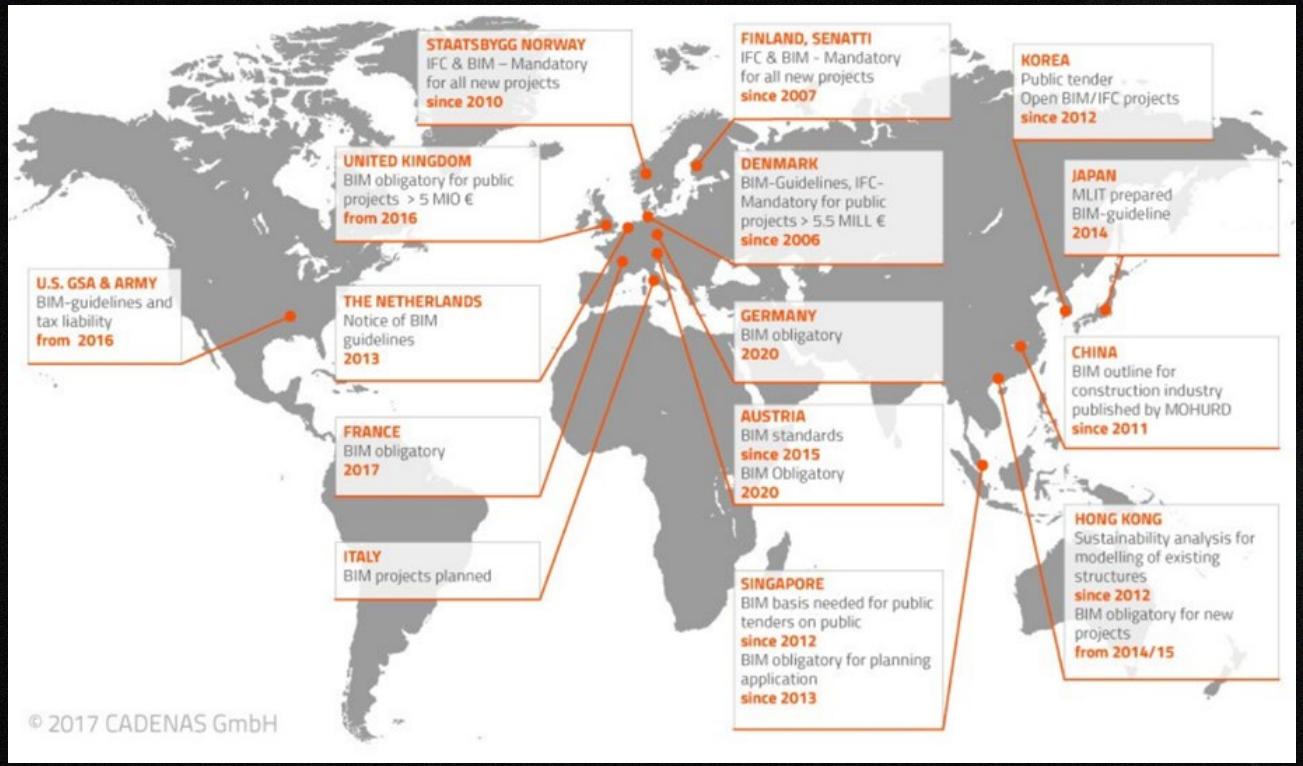
DEVB TC(W) No. 7/2017 *Page 1 of 10*

Technical Circular by Department Bureau

L2

1.2 Local & Global Contexts, BIM standards and guidelines

- 1.2.2 Global context in BIM development

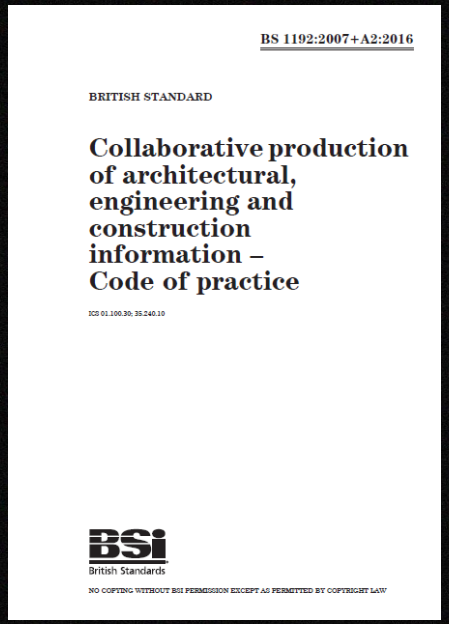


BIM development years in different countries

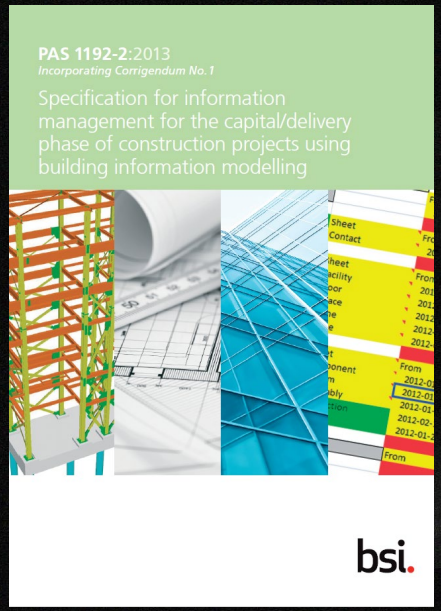
L1

1.2 Local & Global Contexts, BIM standards and guidelines

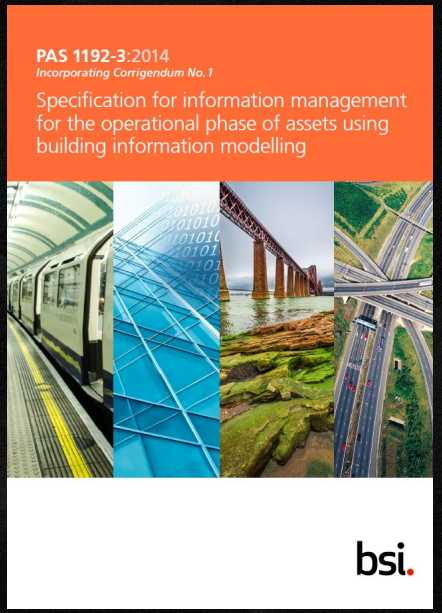
- 1.2.3 Global BIM standards & resources
  - 1.2.3.1 BSI PAS 1192



BS1192:2007



PAS1192-2:2013

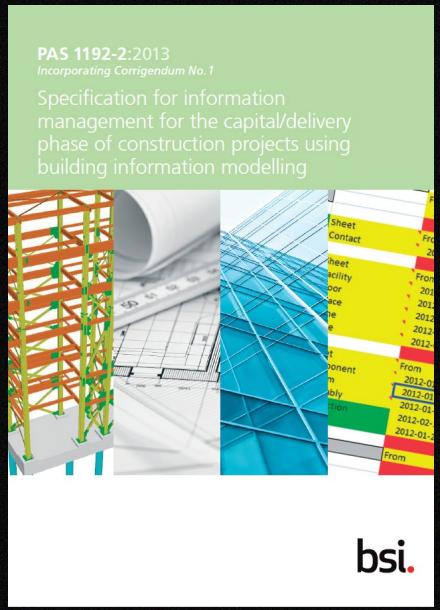


PAS1192-2:2014

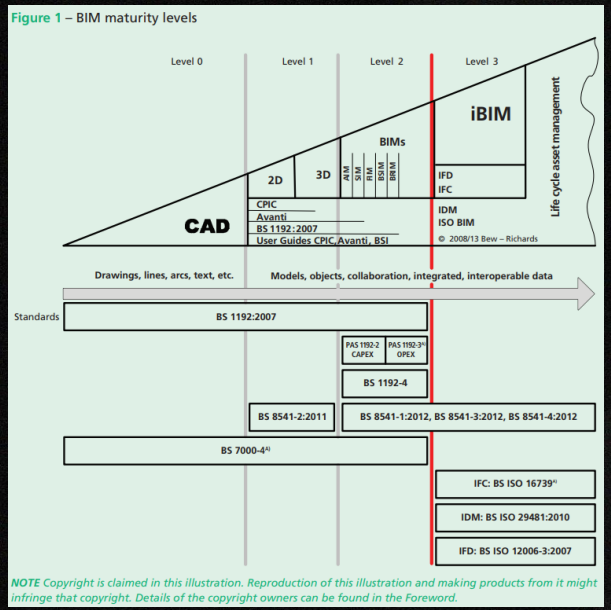
L2

1.2 Local & Global Contexts, BIM standards and guidelines

- 1.2.3 Global BIM standards & resources
  - 1.2.3.1 BSI PAS 1192



PAS1192-2:2013

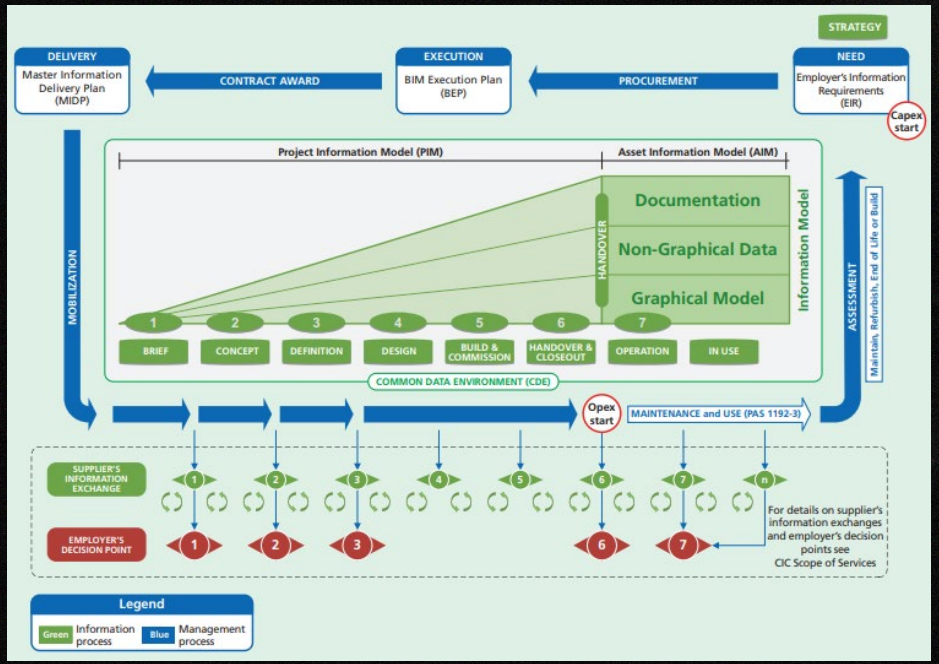


BIM Maturity Levels introduced

L2

1.2 Local & Global Contexts, BIM standards and guidelines

- 1.2.3 Global BIM standards & resources
  - 1.2.3.1 BSI PAS 1192

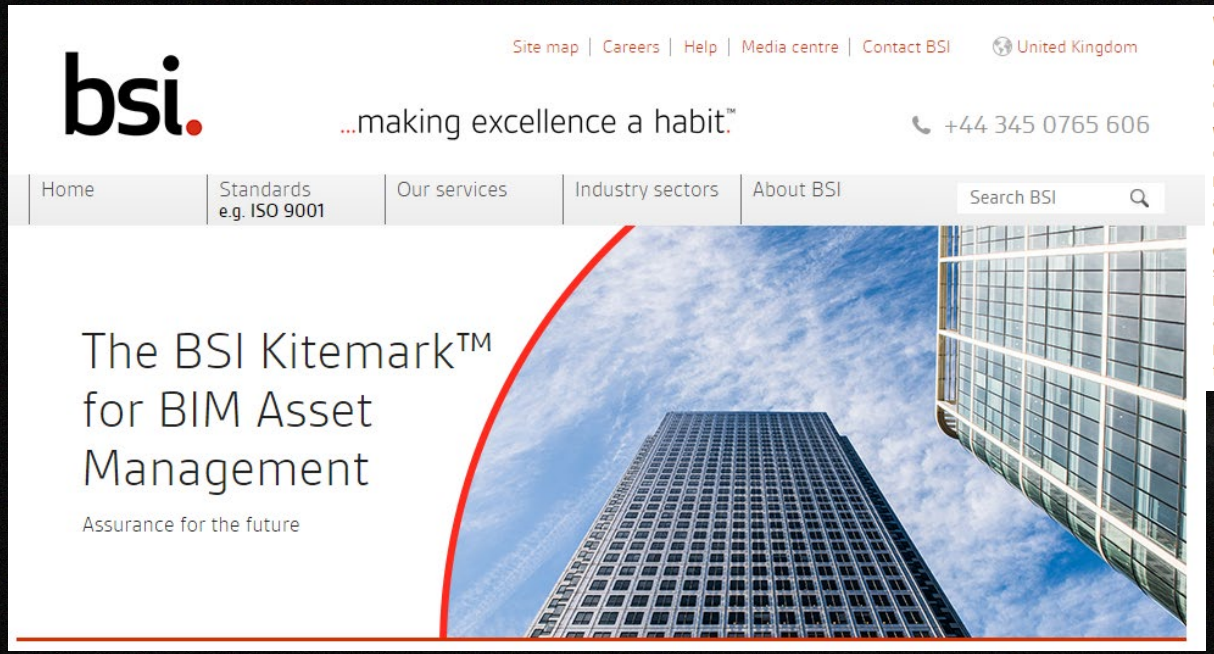


The Information Delivery Cycle

L2

1.2 Local & Global Contexts, BIM standards and guidelines

- 1.2.3 Global BIM standards & resources
  - 1.2.3.1 BSI PAS 1192



What are the benefits of BIM Asset Management Kitemark?

Customer satisfaction - by giving asset owners peace of mind and confirming that their asset has been effectively maintained, operates effectively, is safe and meets legal compliance (e.g. building regulations).

Win more business – opportunity to win more FM contracts through independent certification and proven performance.

Reduced operating costs – through more efficient service scheduling as a result of the automated transfer of accurate information at asset handover and during transfer of operation from one service provider to another.

Operational resilience – by embedding BIM processes and improving collaboration with suppliers to deliver more efficient ways of working.

Risk reduction and clarity of compliance – through preventative maintenance and better awareness of the operational and maintenance needs of assets.

Proven business credentials – by embracing new technology and adopting BIM as the future of best practice asset management.

BIM Asset Management

https://www.bsigroup.com/en-GB/Building-Information-Modelling-BIM/bim-asset-management/

L2

1.2 Local & Global Contexts, BIM standards and guidelines

- 1.2.3 Global BIM standards & resources
  - 1.2.3.1 ISO 19650

ISO 19650

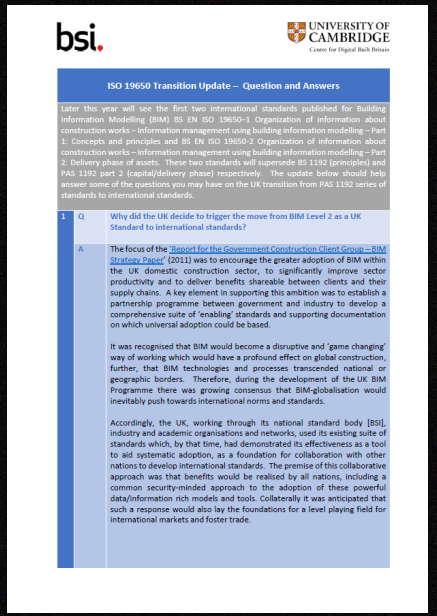
ISO 19650 has been built on the principles and high-level requirements as BIM Level 2 and is closely aligned with the current UK 1192 standards. Initially introduced to encourage a common language of BIM in the UK and influence built environment professionals to adopt BIM, the benefits of these standards have now been recognized more widely, having been adopted internationally from the Middle East to Australia.

BIM High Level 2 is closely aligned with UK 1192 Standard

L2

1.2 Local & Global Contexts, BIM standards and guidelines

- 1.2.3 Global BIM standards & resources
  - 1.2.3.1 ISO 19650



bsi.

UNIVERSITY OF CAMBRIDGE
Centre for Digital Built Britain

ISO 19650 Transition Update – Question and Answers

Later this year will see the first two international standards published for Building Information Modelling (BIM) BS EN ISO 19650–1 Organization of information about construction works – Information management using building information modelling – Part 1: Concepts and principles and BS EN ISO 19650-2 Organization of information about construction works – Information management using building information modelling – Part 2: Delivery phase of assets. These two standards will supersede BS 1192 (principles) and PAS 1192 part 2 (capital/delivery phase) respectively. The update below should help answer some of the questions you may have on the UK transition from PAS 1192 series of standards to international standards.

1	Q	Why did the UK decide to trigger the move from BIM Level 2 as a UK Standard to international standards?
	A	The focus of the 'Report for the Government Construction Client Group – BIM Strategy Paper' (2011) was to encourage the greater adoption of BIM within the UK domestic construction sector, to significantly improve sector productivity and to deliver benefits shareable between clients and their supply chains. A key element in supporting this ambition was to establish a partnership programme between government and industry to develop a comprehensive suite of 'enabling' standards and supporting documentation on which universal adoption could be based. It was recognised that BIM would become a disruptive and 'game changing' way of working which would have a profound effect on global construction, further, that BIM technologies and processes transcended national or geographic borders. Therefore, during the development of the UK BIM Programme there was growing consensus that BIM-globalisation would inevitably push towards international norms and standards. Accordingly, the UK, working through its national standard body [BSI], industry and academic organisations and networks, used its existing suite of standards which, by that time, had demonstrated its effectiveness as a tool to aid systematic adoption, as a foundation for collaboration with other nations to develop international standards. The premise of this collaborative approach was that benefits would be realised by all nations, including a common security-minded approach to the adoption of these powerful data/information rich models and tools. Collaterally it was anticipated that such a response would also lay the foundations for a level playing field for international markets and foster trade.

ISO 19650

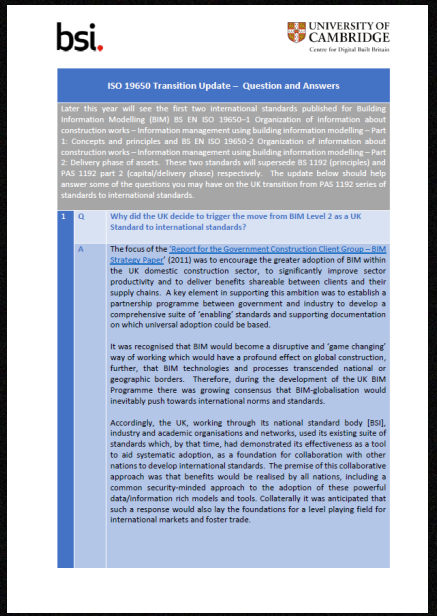
Q	What is the proposed time-line for the ISO 19650 transition?
A	It is anticipated that the following documents will be published concurrently around the end of 2018: BS EN ISO 19650-1: Organization of information about construction works — Information management using building information modelling: Concepts and principles BS EN ISO 19650-2: Organization of information about construction works — Information management using building information modelling: Delivery phase of the assets UK National Annex to ISO 19650 [to aid implementation in the UK and ensure BIM Level 2 within the ISO framework] UK Transition Guidance [**Note:** *During the summer of 2018 the UK Annex will be issued for public consultation.*]

BIM High Level 2 is closely aligned with UK 1192 Standard

L2

1.2 Local & Global Contexts, BIM standards and guidelines

- 1.2.3 Global BIM standards & resources
  - 1.2.3.1 ISO 19650



bsi.

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ISO 19650

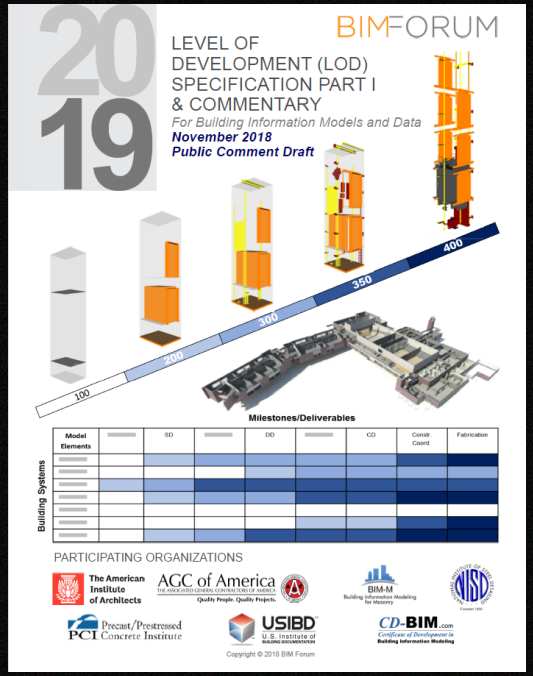
Q	We have already started to implement a BIM Level 2 project using the current suite of documents [as per http://bim-level2.org/en/standards/]; will we need to adopt the ISO19650s to remain BIM Level 2 compliant as it is a contract requirement?
A	It is anticipated that if you are already using the existing BIM Level 2 BS / PAS suite of standards on your projects no changes will be required as there should be no inconsistency with those projects using the ISO 19650 documents. [**Note**: *The legal position on this is being checked prior to the ISO publication*]

BIM High Level 2 is closely aligned with UK 1192 Standard

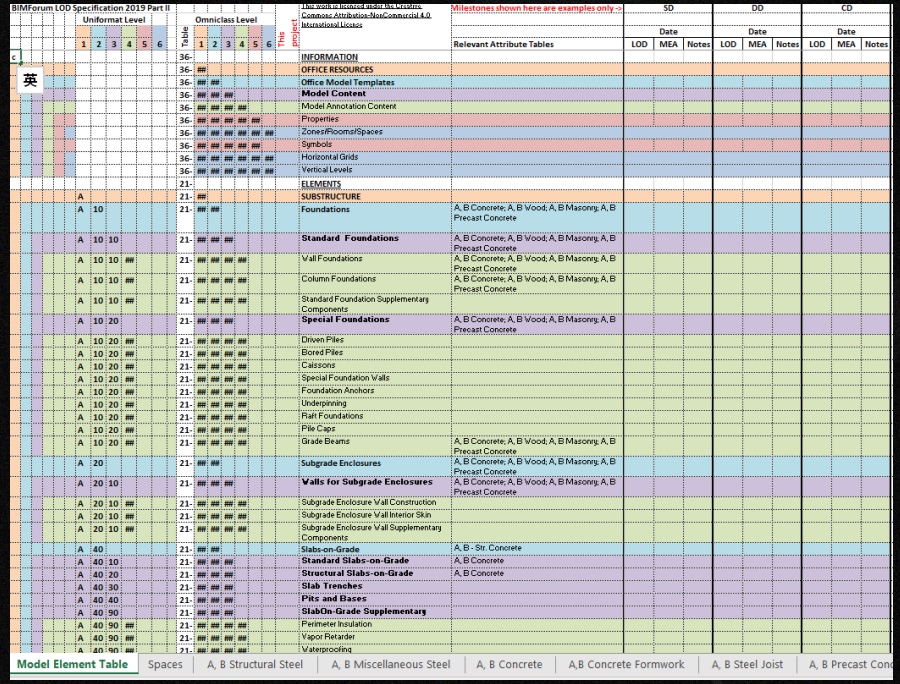
L2

1.2 Local & Global Contexts, BIM standards and guidelines

- 1.2.3 Global BIM standards & resources
  - 1.2.3.2 BIM FORUM LOD Specification 2019



LOD Specification Part I 2019



LOD Specification Part II 2019

L2

1.2 Local & Global Contexts, BIM standards and guidelines

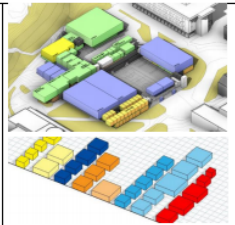
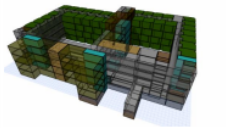
- 1.2.3 Global BIM standards & resources
  - 1.2.3.2 BIM FORUM LOD Specification 2019

PART I – ELEMENT GEOMETRY

N/A 36-51 OFFICE RESOURCES

N/A 36-51 73 11 13 11 19 SPACES

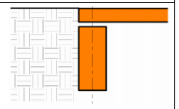
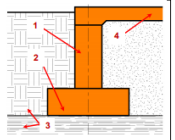
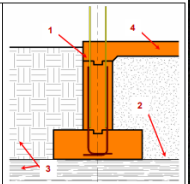
Associated Masterformat Sections: N/A

100	Spaces are modeled as generic objects with approximate size, shape and location. This level is typically appropriate for design of spatial requirements where space objects are placed in a model either in a random manner for quantification or in a "blocking and stacking" process. Bounding elements are not required, but may be needed if specific dimensions are desired. Element modeling to include: • Space object based on area required by program or brief. •	 From http://revitaddons.blogspot.com/2014/02/free-space-planning-massing-from-excel.html
200	Spaces are modeled or placed with bounding elements such as walls and columns that are at a minimum of LOD200. Perimeter and area of spaces are calculated with respect to the bounding elements. LOD of spaces shall not exceed the LOD of the bounding elements. For example, if interior partitions are defined at LOD200, the space objects for the project cannot be delivered at LOD300. Element modeling to include: • Vertical bounding elements at LOD200 • Space objects that automatically associate with vertical bounding elements	 From http://cad-3d.blogspot.com/2012/06/improve-usage-of-bim-during-early.html
300	Spaces are modeled or placed with bounding elements that are at a minimum of LOD300. Perimeter and area of spaces are calculated with respect to the bounding elements. Element modeling to include: 1) Vertical bounding elements at LOD300	

LOD Element Geometry list

A1010.10 21-01 10 10 10 Wall Foundations (Shallow Foundations)

Associated Masterformat Sections: 03 30 00 / 03 40 00 / 04 20 00 / 06 14 00

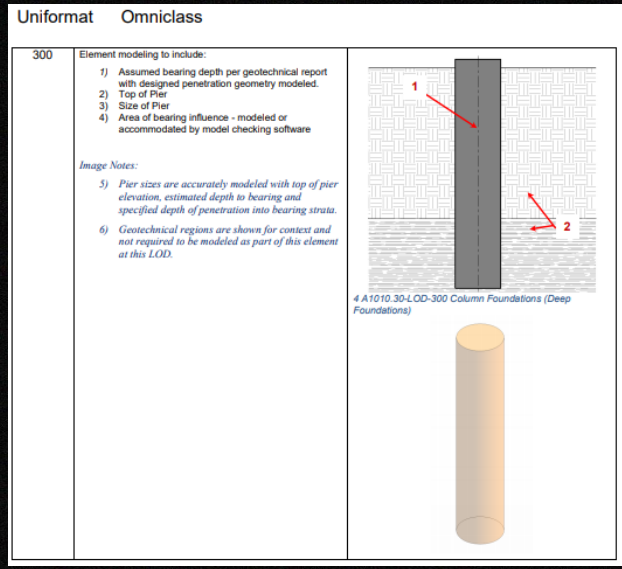
100	See A10	
200	See A10 *Image Notes:* • *Generic wall foundation is modeled.* • *Site is generically modeled from geotechnical information in geotechnical report.*	 *1 A1010.10-LOD-200 Wall Foundation*
300	Element modeling to include: 1) Overall size and geometry of the foundation element 2) Sloping surfaces. 3) External dimensions of the members 4) Geotechnical bearing strata elevation is modeled from geotechnical report. 5) Area of bearing influence – modeled or accommodated by model checking software *Image Notes:* *6) Wall foundation sizes are accurately modeled with footings where applicable.* *7) Bearing elevation is modeled from the geotechnical report.* *8) Geotechnical regions are shown for context and not required to be modeled as part of this element at this LOD.* *9) See slab on grade for related conditions at this LOD.*	 *2 A1010.10-LOD-300 Wall Foundation*
350	Element modeling to include: 1) Location of sleeve penetrations 2) Pour joints 3) Chamfer 4) Moisture retarder 5) Dowels 6) All exposed embeds or reinforcement such as lintels 7) Expansion joints 8) Geotechnical Bearing Strata is modeled from geotechnical report estimates. *Image Notes:* *9) Grade beam sizes are modeled with interfaces to other systems such as but not limited to slab turn downs, key-ways between concrete pours, construction joints and reinforcing dowels into adjacent pours.* *10) Bearing elevation is modeled from the geotechnical report with the addition on interface elements such as void boxes where applicable.* *11) Geotechnical regions are shown for context and not required to be modeled as part of this element at this LOD.* *12) See slab on grade for related conditions at this LOD.*	 *3 A1010.10-LOD-350 Wall Foundations (Shallow Foundations)*
400	Element modeling to include: • Rebar including hooks and lap splices • Dowels • Coursing for unit masonry defined • Waterproofing	

LOD 100 - 500 Requirement

L2

1.2 Local & Global Contexts, BIM standards and guidelines

- 1.2.3 Global BIM standards & resources
  - 1.2.3.2 BIM FORUM LOD Specification 2019



Uniformat Omniclass

300

Element modeling to include:

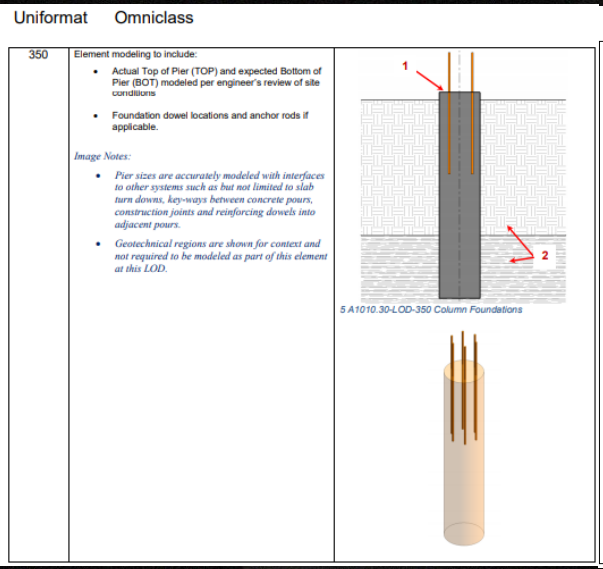
1) Assumed bearing depth per geotechnical report with designed penetration geometry modeled.
2) Top of Pier
3) Size of Pier
4) Area of bearing influence - modeled or accommodated by model checking software

Image Notes:

5) *Pier sizes are accurately modeled with top of pier elevation, estimated depth to bearing and specified depth of penetration into bearing strata.*
6) *Geotechnical regions are shown for context and not required to be modeled as part of this element at this LOD.*

4 A1010.30-LOD-300 Column Foundations (Deep Foundations)

LOD 300



Uniformat Omniclass

350

Element modeling to include:

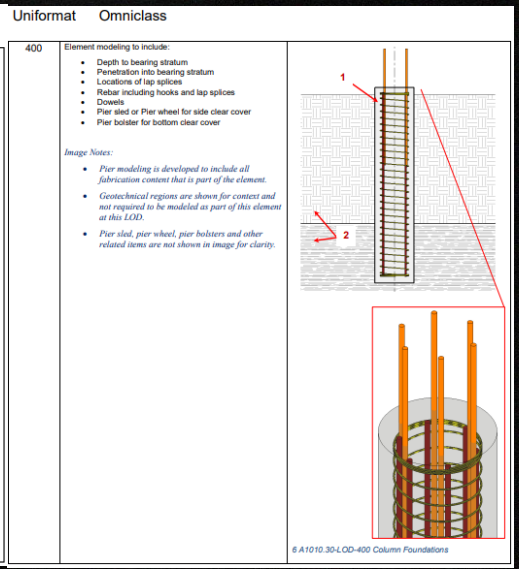
- Actual Top of Pier (TOP) and expected Bottom of Pier (BOT) modeled per engineer's review of site conditions
- Foundation dowel locations and anchor rods if applicable.

Image Notes:

- *Pier sizes are accurately modeled with interfaces to other systems such as but not limited to slab turn downs, key-ways between concrete pours, construction joints and reinforcing dowels into adjacent pours.*
- *Geotechnical regions are shown for context and not required to be modeled as part of this element at this LOD.*

5 A1010.30-LOD-350 Column Foundations

LOD 350



Uniformat Omniclass

400

Element modeling to include:

- Depth to bearing stratum
- Penetration into bearing stratum
- Locations of lap splices
- Rebar including hooks and lap splices
- Dowels
- Pier sled or Pier wheel for side clear cover
- Pier bolster for bottom clear cover

Image Notes:

- *Pier modeling is developed to include all fabrication content that is part of the element.*
- *Geotechnical regions are shown for context and not required to be modeled as part of this element at this LOD.*
- *Pier sled, pier wheel, pier bolsters and other related items are not shown in image for clarity.*

6 A1010.30-LOD-400 Column Foundations

LOD 400

L2

1.2 Local & Global Contexts, BIM standards and guidelines

- 1.2.3 Global BIM standards & resources
  - 1.2.3.3 OpenBIM

At some stage we want to share our model with the project team. If we issue the native model, the receiving party must have the same or compatible software to view it. They can also make changes to the model without our knowing. However, if we publish the model in an open exchange format, like IFC, the model data is freely viewable – measurable and usable. But the model content is protected. Changes cannot be made in an IFC file. They are made back in the original modelling software.

L2

https://bimconnect.org/en/wiki/what-is-openbim/

1.2 Local & Global Contexts, BIM standards and guidelines

- 1.2.3 Global BIM standards & resources
  - 1.2.3.3 OpenBIM

Why should my organization join OPEN BIM?

Organizations all over the world have been encountering the collaboration issues detailed above. Different collaboration strategies have been used to address them, including in many cases open collaboration workflow. At the same time, open collaboration practices were used more as a necessity in a plural AEC environment rather then an intentional strategy to deliver better-coordinated projects.
The OPEN BIM movement elevates open collaboration to a strategic level where like-minded AEC professionals build upon their plurality to deliver better coordinated building projects, with less errors and in higher quality.

Should you or your organization share these values, joining the OPEN BIM movement not only provides you with guidelines and best practices but also with common branding and international visibility to leverage and maximize the value of your projects. OPEN COLLABORATION → BETTER BIM!

OPEN BIM™

L2

https://www.graphisoft.com/archicad/open_bim/open_bim_program/

1.2 Local & Global Contexts, BIM standards and guidelines

- 1.2.3 Global BIM standards & resources
  - 1.2.3.3 OpenBIM

Creating model data in a native format is called nativeBIM. If we exchange this model data with an open standard, such as IFC, then we are in openBIM.

L2

https://bimconnect.org/en/wiki/what-is-openbim/

BIM Management Course

Session 2

2.1 BIM Software

2.1.1 Overview of industry leading BIM software / applications

- Autodesk Revit, Civil 3D
- Gaphisoft ArchiCAD
- Tekla Structures
- Bentley Architecture / Aecosim Building Designer
- Nemetschek Vectorks
- Gehry Technologies - Digital Project Designer
- Cost X

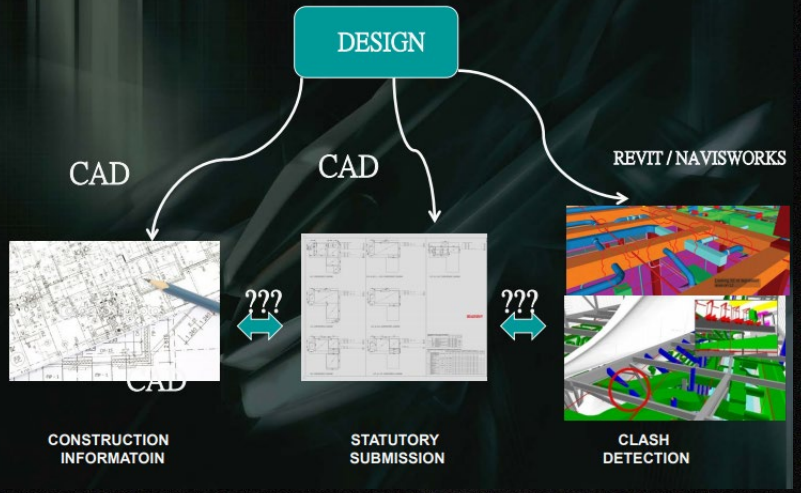
L2

2.1 BIM Software

- 2.1.2 Characteristic, strength and limitation of industry leading BIM software

Limitation: Some of the BIM Consultant misunderstand the BIM and appear the situation of Half BIM and Fake BIM.

Fake BIM



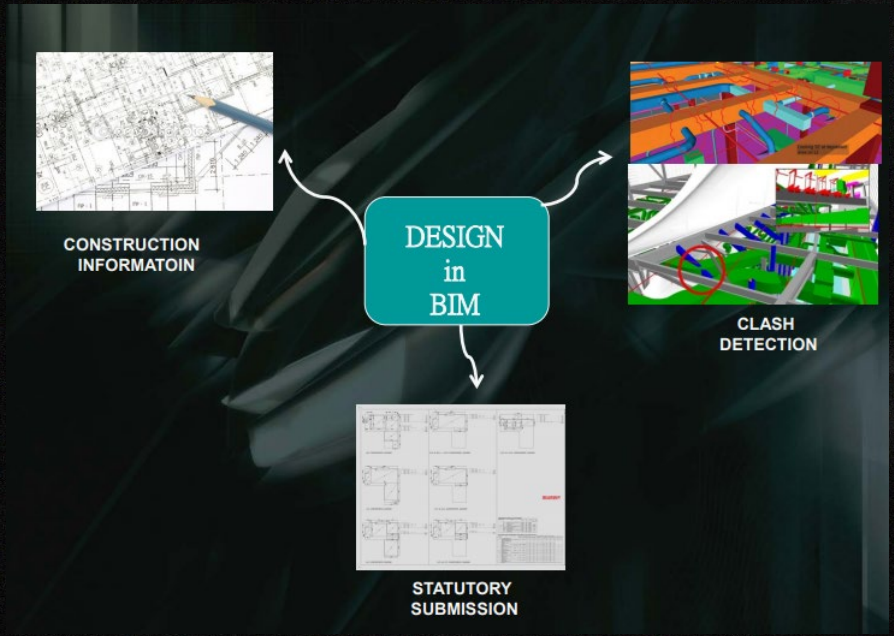
Half BIM

L1

2.1 BIM Software

- 2.1.2 Characteristic, strength and limitation of industry leading BIM software

Characteristic, strength: If the designer know design in BIM, True BIM is used and BIM use can improve the design and construction workflow.



True BIM

2.1 BIM Software

- 2.1.3 Versions and file formats

	C3D	RVT	ORD	ABD	Open Format	Shared Format	Related Tools
Alignment-based Road Model	Y		Y		IFC	XML	
Topography-related Site formation Model	Y		Y			XML	
Strata Models (Plugins)	GEO		GINT			XML	HolebaseSI
Utilities Model	Y	Y	SSU	Y	IFC	XML	
Bridge Segment Model	Y		OBD		IFC		
Bridge Substructure/Superstructure		G		G	IFC		
Tunnel Model	Y				IFC		Sub Assem composer
Retaining Wall Model	Y	G	Y	G	IFC		
4DMS						MP4	NWD/ Sychro
Drawings/Site Sketches	*	*	*	*	DXF	PDF	
3DVR						EXE	3DS/LRT
Asset Information (COBie)		Y		Y		COBIE	

IFC 4.0

- Latest Version support ALG
- XML-based Text file

COBie

- BIM/FM Standard
- PAS 1192-4
- XLS file 13 tables

XML

- Terrain and alignments
- XML-base Text files

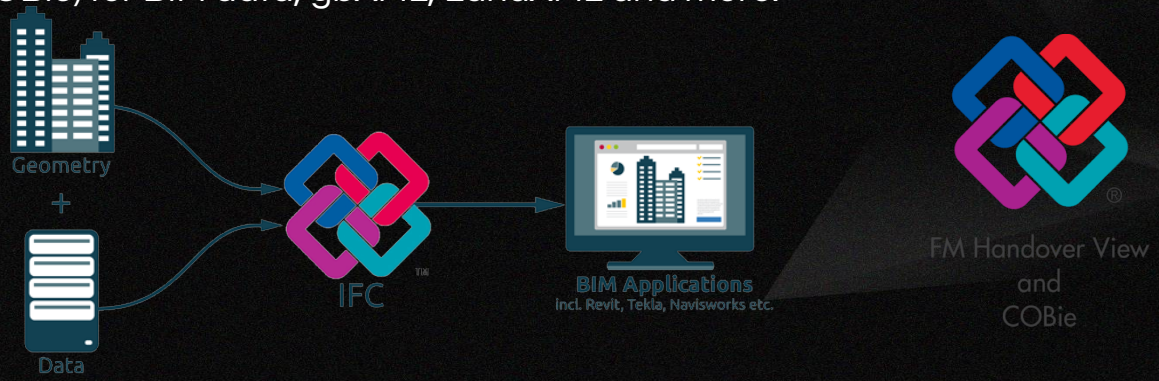
L1

2.1 BIM Software

2.1.4 Interoperability across industry leading BIM software

To have collaborative BIM processes, there are multiple open file formats to maximise the transformation.

To maximise the transformation by supporting Interoperability, reliable data exchange is critical to project collaboration. Some common interoperable software including the .ifc open file format and other openBIM data formats, including Construction Operations Building Information Exchange (COBie) for BIM data, gbXML, LandXML and more.

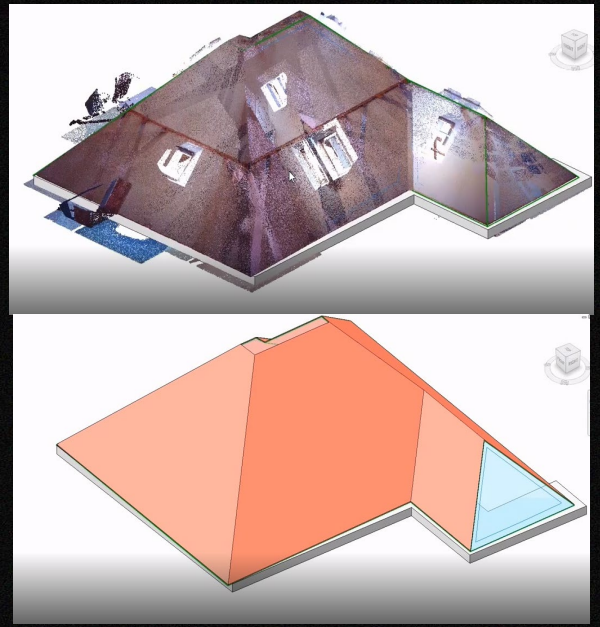


L2

https://bimconnect.org/en/wiki/what-is-openbim/

2.2 Technology Trend

- 2.2.1 Cloud platform



Point Cloud to BIM

Scan to BIM

A software is Scan to BIM for Revit., creating native Revit geometry from a point cloud.

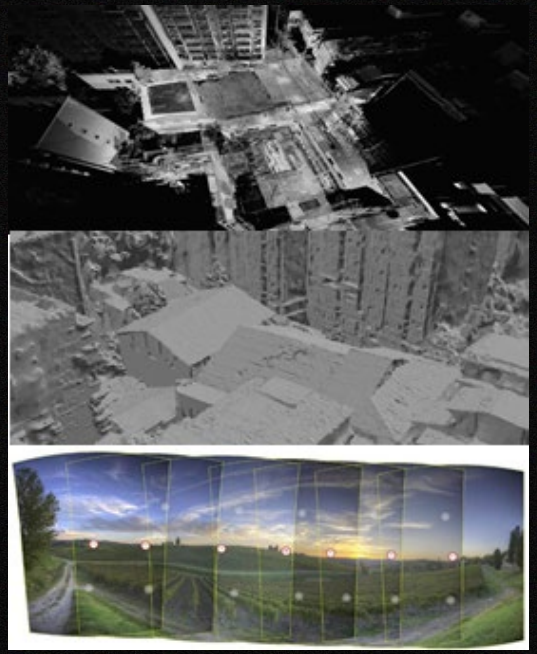
It does this with a capacity to recognize and place various architectural elements ranging from walls and columns to pipes and ductwork.

L1

https://www.engineering.com/BIM/ArticleID/11127/How-to-Create-Revit-Models-from-Point-Clouds.aspx

2.2 Technology Trend

- 2.2.1 Cloud platform



Point Cloud

Point clouds

Point clouds are the product of 3D laser scanning, is useful for scanning large areas quickly and effectively, but specialized software is required to turn them into information.

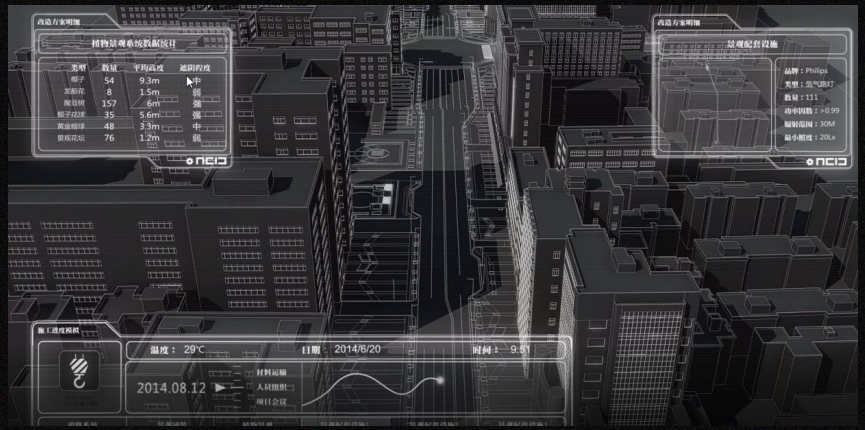
L1

https://www.engineering.com/BIM/ArticleID/11127/How-to-Create-Revit-Models-from-Point-Clouds.aspx

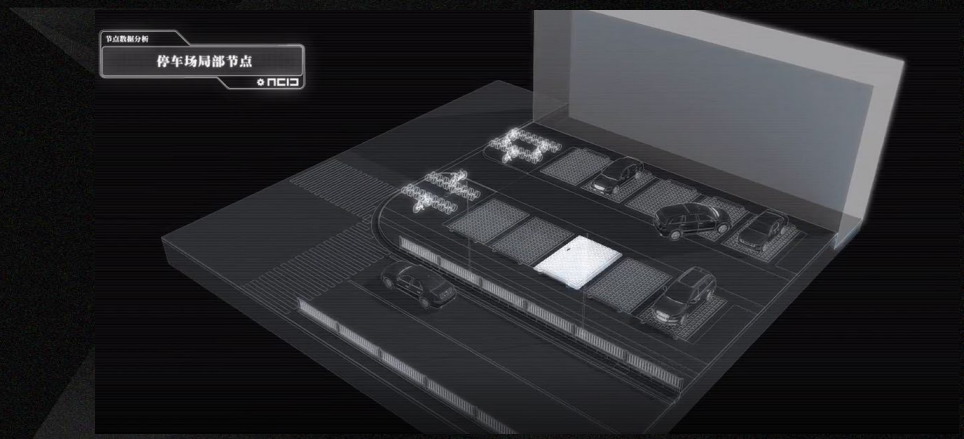
2.2 Technology Trend

2.2.2 Laser scanning

Laser scanning is used as a precise survey instrument which has best solution for measuring as-built conditions inside buildings.



Analysis by laser scanning



Detail of Car park

L2

http://www.landairsurveying.com/3d-laser-scanning/

2.2 Technology Trend

- 2.2.2 Laser scanning

This technology collects survey data points at a rate of 50,000 points per second. It has an effective range of 400’ to 500’. With several “scan” setups inside a room or of a building, a complete 3D model can be made of the existing conditions.

Laser scan Car park

Laser scan Car park

http://www.landairsurveying.com/3d-laser-scanning/

L2

2.2 Technology Trend

2.2.3 Photogrammetry

Photogrammetry can be classified several ways but one standard method is to split the field based on camera location during photography.

L2

http://www.photogrammetry.com/

2.2 Technology Trend

2.2.3 Photogrammetry

Photogrammetry can estimate the three-dimensional coordinates of surface points using pictures of a single physical object taken from different angles.

L2

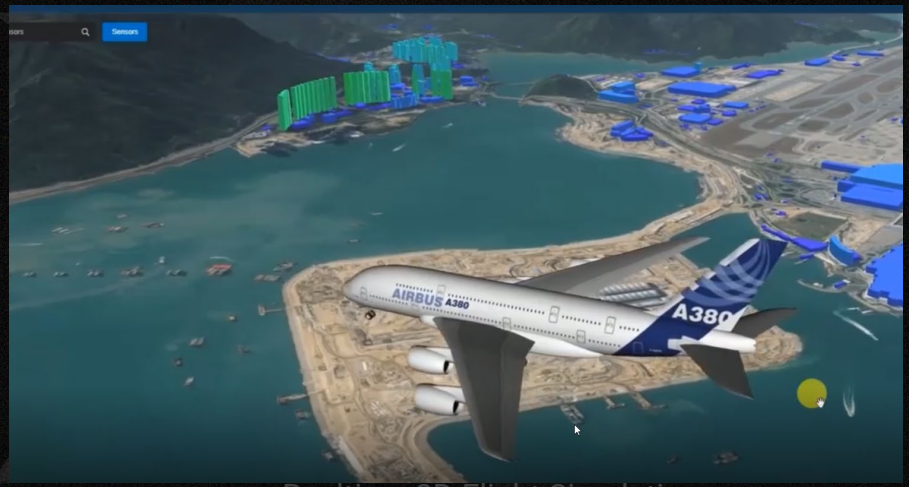
https://www.prusaprinters.org/photogrammetry-3d-scanning-just-phone-camera/

2.2 Technology Trend

- 2.2.4 GIS (Geographical information system/science)

Geographical information system/science (GIS) has visualization and analysis of geospatial data on a regional level to support applications such as road alignment, water system management and civil engineering applications.

Schematic Design in 3D



Realtime 3D Flight Simulation

L2

http://sections.asce.org/hongkong/flyers/ASCE_BIMGIS_Symposium_9June2017.pdf

2.2 Technology Trend

- 2.2.4 GIS (Geographical information system/science)

Both BIM and GIS can help capture and manage information of the built environment, from the microscopic and macroscopic perspectives, respectively.

Display and view Mobile Mapping display

Outdoor and Indoor Integration

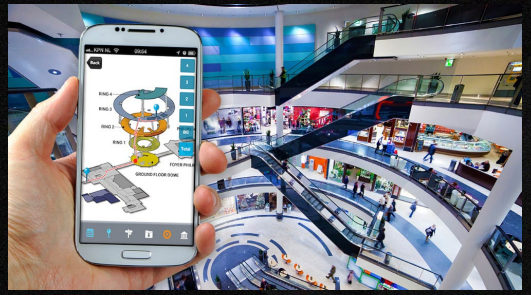
L2

http://sections.asce.org/hongkong/flyers/ASCE_BIMGIS_Symposium_9June2017.pdf

2.2 Technology Trend

- 2.2.5 Application of smart devices

Indoor positioning



Wayfinding

Mobile Device for Construction Quality Management System (CQMS)

Laser pointer

L2

2.2 Technology Trend

- 2.2.5 Application of smart devices

Mobile Device for Construction
Quality Management System (CQMS)

L2

2.2 Technology Trend

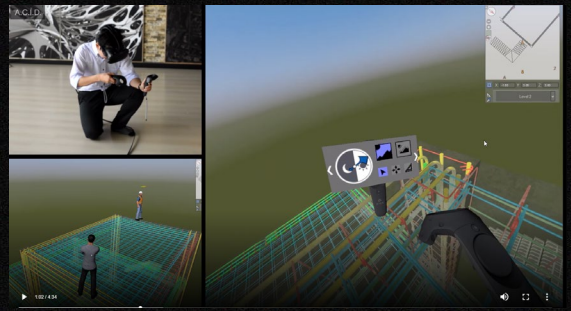
- 2.2.5 Application of smart devices

Mobile Device for Construction
Quality Management System (CQMS)

L2

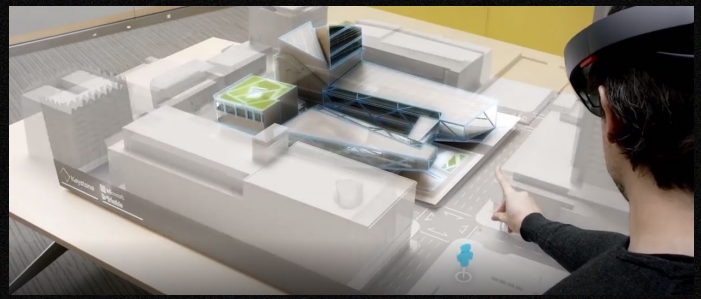
2.2 Technology Trend

- 2.2.6 VR (Virtual Reality)/ AR (Augmented Reality)/ MR (Mixed Reality)



VR

MR



AR

AR glasses by Apple

L2

https://mp.weixin.qq.com/s/pH7y9H4yuTuQK-SBnJPCIw

2.2 Technology Trend

- 2.2.6 VR (Virtual Reality)

https://www.youtube.com/watch?v=xpjhsOneeQQ

2.2 Technology Trend

- 2.2.6 AR (Augmented Reality)

L2

https://www.youtube.com/watch?v=8lY4qaVvR8c

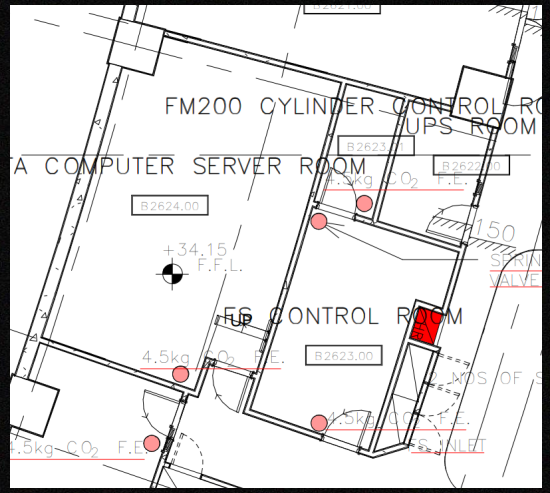
2.2 Technology Trend

- 2.2.6 MR (Mixed Reality)

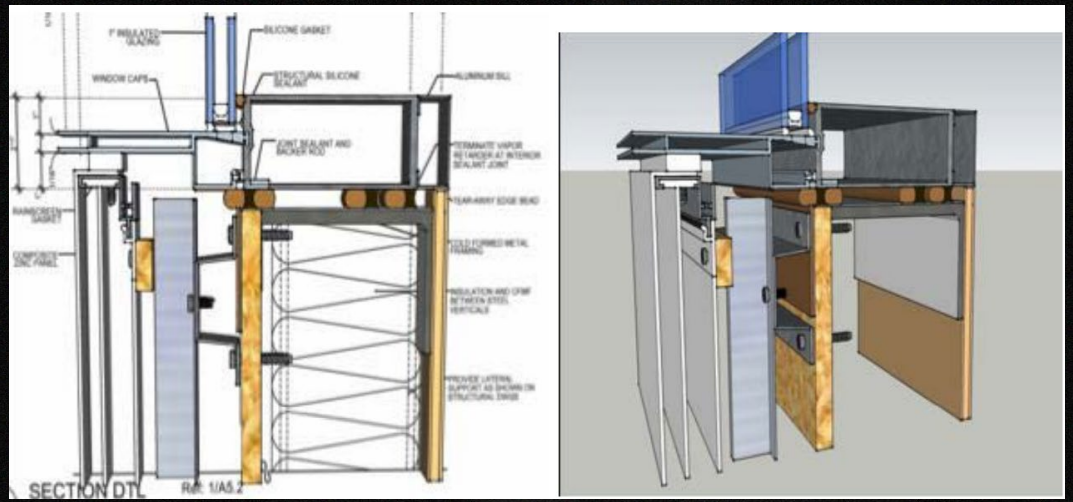
https://www.youtube.com/watch?v=2MqGrF6JaOM

2.2 Technology Trend

- 2.2.7 VDC (Virtual Design and Construction)



Design



Construction

Revit was used to convey many design ideas from renderings, program layout to constructability studies.

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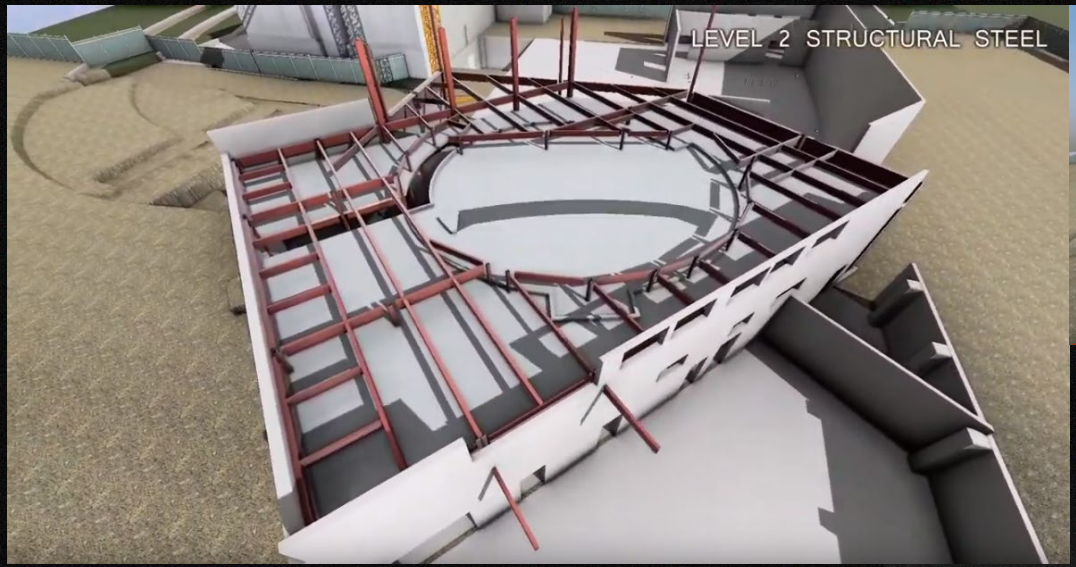
2.2 Technology Trend

- 2.2.7 VDC (Virtual Design and Construction)



Additional Software to do Virtual Design and Construction (VDC) base on BIM Model.

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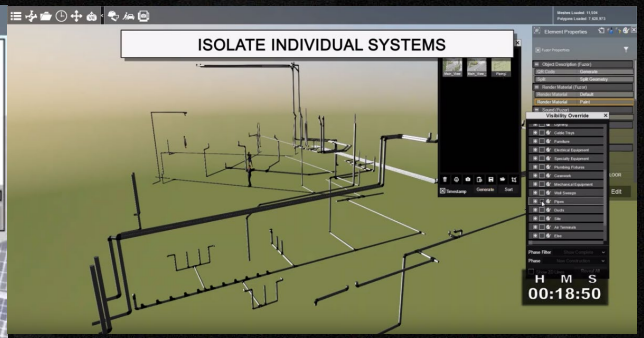
https://www.youtube.com/watch?v=sZ1XxGXFZrk

2.2 Technology Trend

- 2.2.7 VDC (Virtual Design and Construction)



Example : Fuzor VDC

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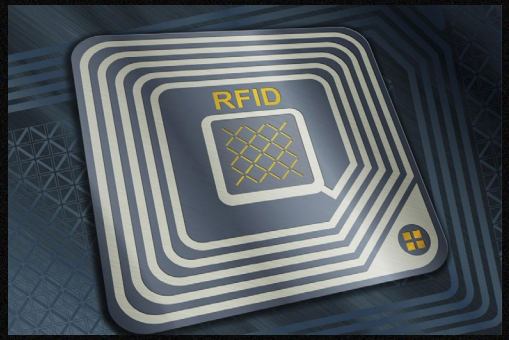
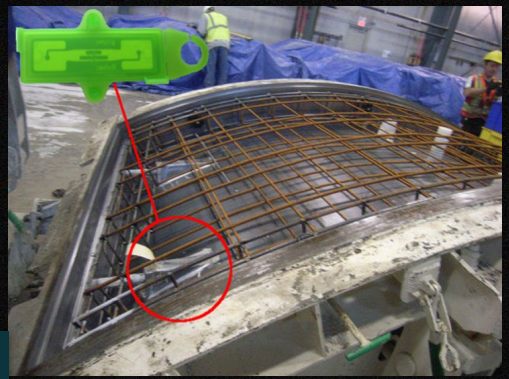
https://www.youtube.com/watch?v=sZ1XxGXFZrk

2.2 Technology Trend

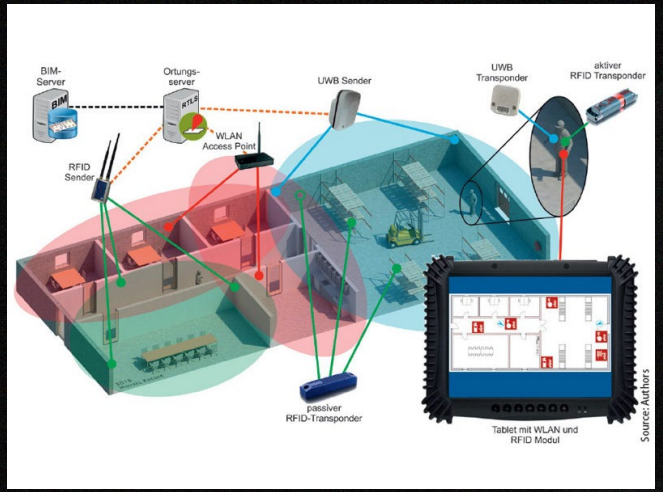
- 2.2.8 RFID



RFID Chips



RFID in site

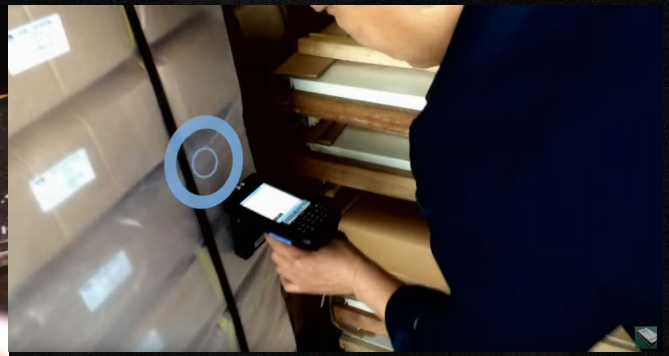


RFID chips are located in different location. The tablet can show the floor plan and the location RID. Through the equipment including BIM Server, LWB Sensor,etc..,information of element.

L2

2.2 Technology Trend

- 2.2.8 RFID



Code to read Information

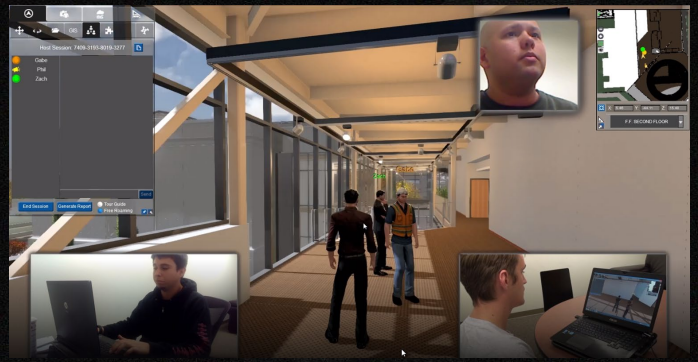
L2

https://www.youtube.com/watch?v=5Nj9wKagRks

2.2 Technology Trend

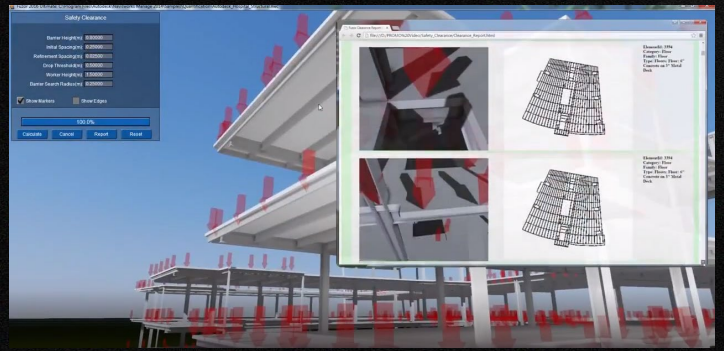
- 2.2.9 Gaming technology in BIM

Design changes in Fuzor



Real time collaboration in Fuzor

Sketchup Integration in Fuzor



Safety clearance in Fuzor

2.2 Technology Trend

- 2.2.9 Gaming technology in BIM

Collaboration in the Virtual World

L1

2.2 Technology Trend

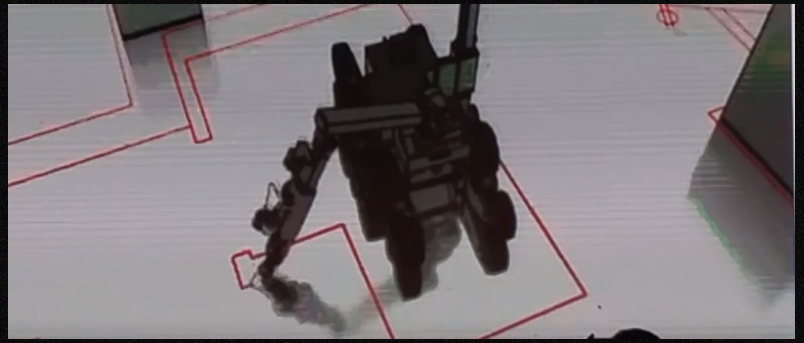
- 2.2.9 Gaming technology in BIM

Collaboration in the Virtual World

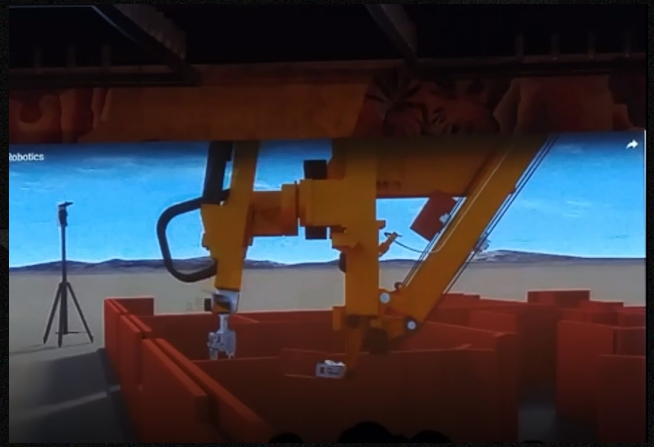
L1

2.2 Technology Trend

- 2.2.10 Robotics



Automate Site Setting



Automate Brick Laying

Folding of Ahu Panels

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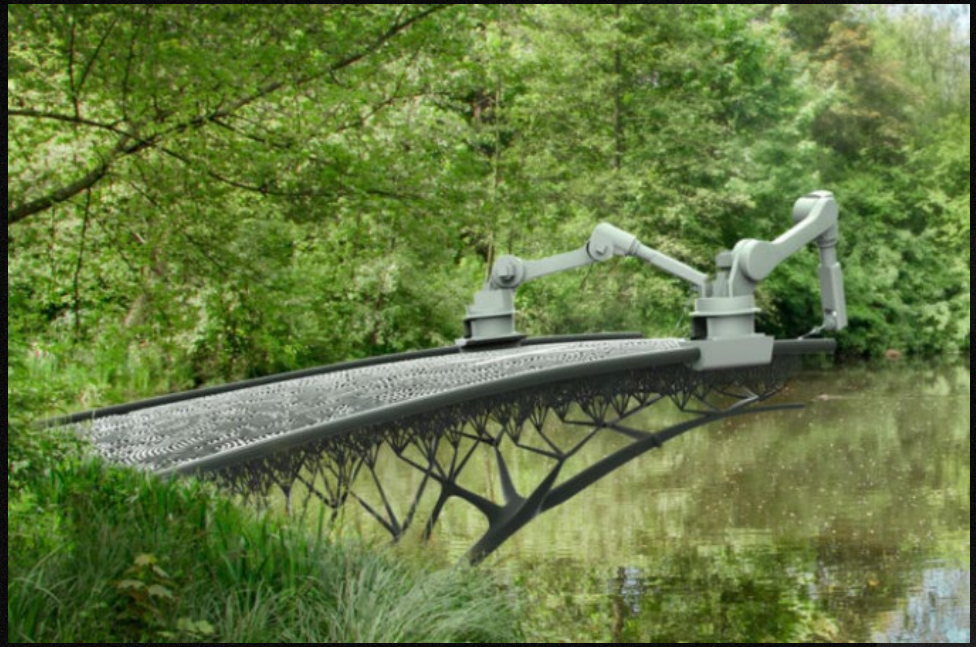
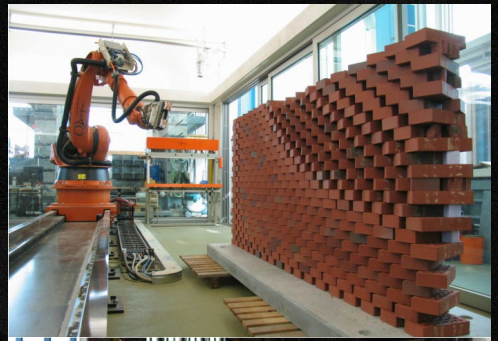
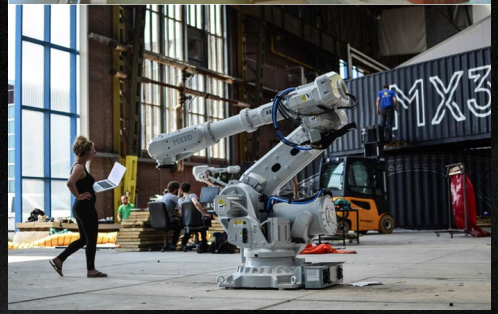
2.2 Technology Trend

- 2.2.10 Robotics







3D-Printed Steel Bridge

https://www.arch2o.com/robotization-bim-robots-improve-bim-workflow/

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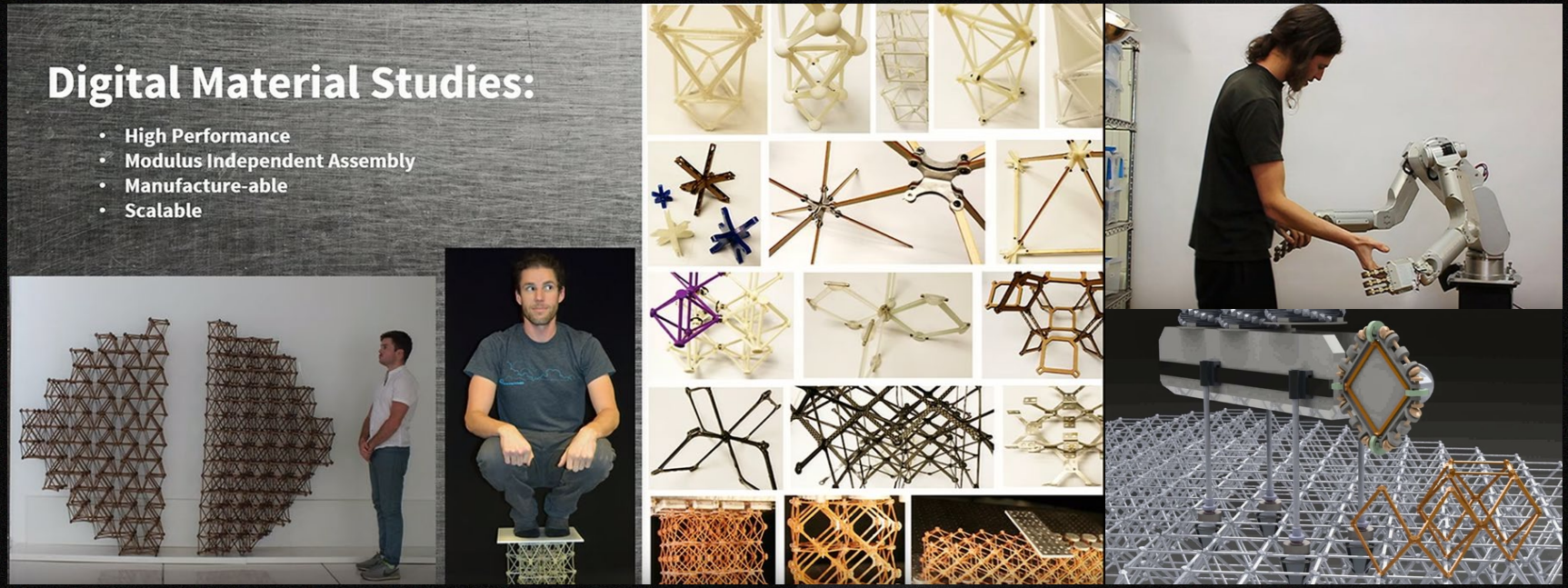
2.2 Technology Trend

- 2.2.10 Robotics



Digital Material Development

https://www.youtube.com/watch?v=JcSpM0k-MZo

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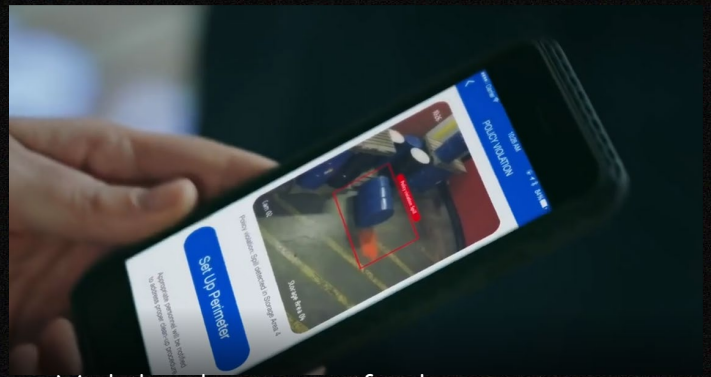
2.2 Technology Trend

- 2.2.11 Automation

CCTV monitor the site

Barrel collapse



Mobile phone notify the engineer

Engineer solve the problem

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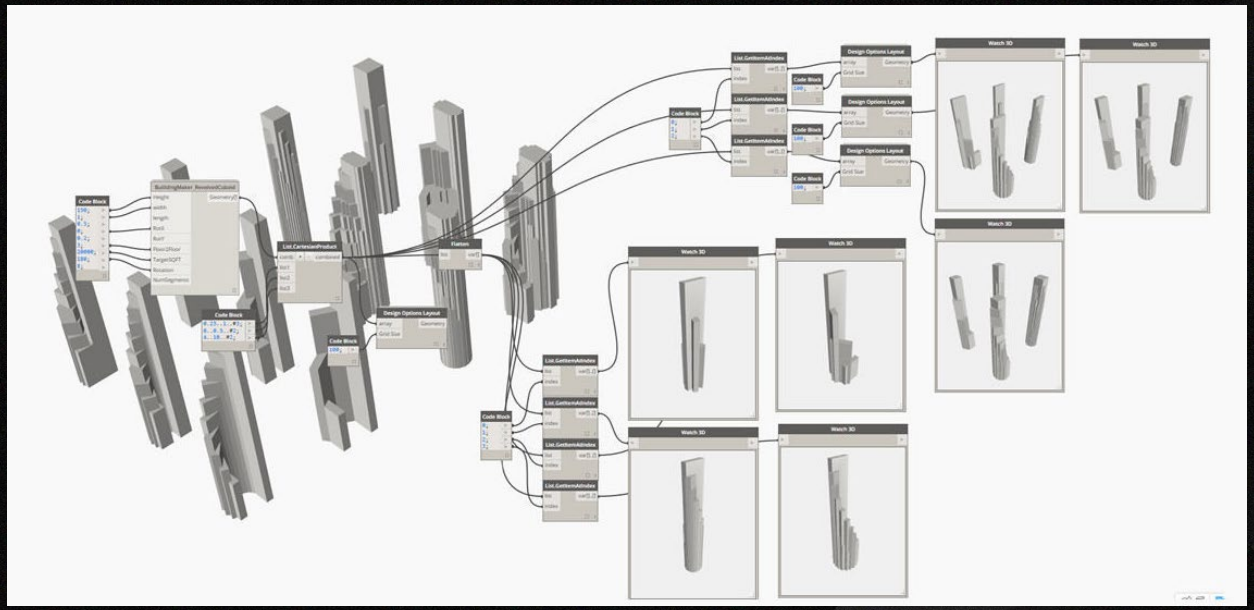
2.2 Technology Trend

- 2.2.11 Automation



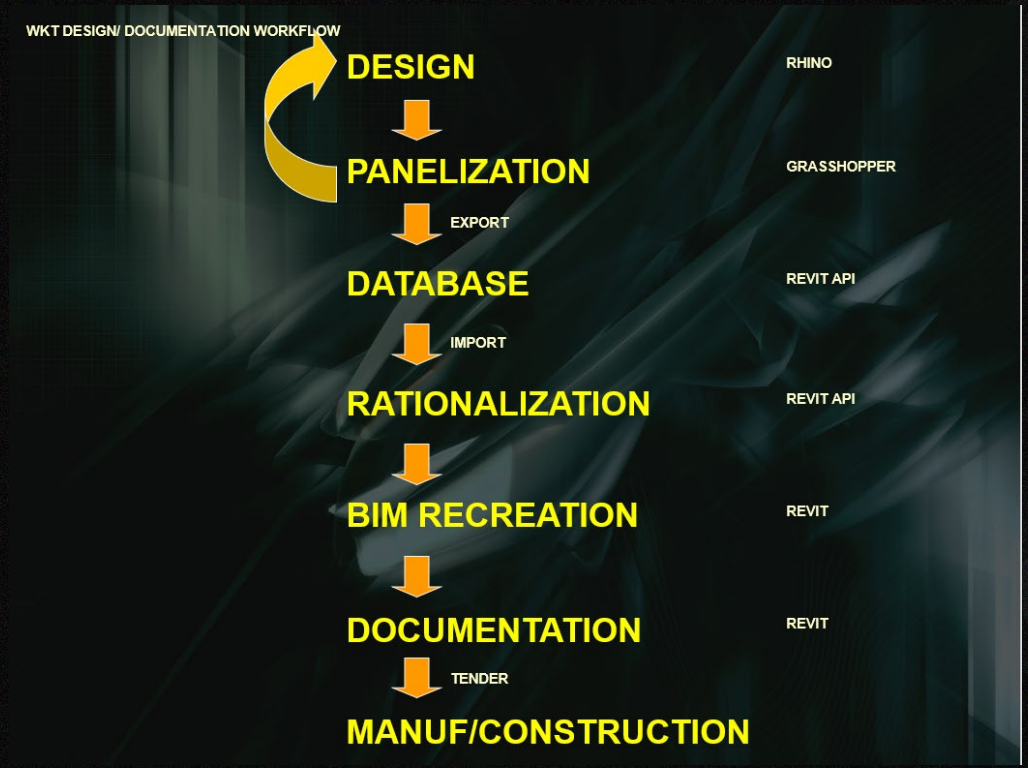
Automation Development (Dynamo)

http://www.archiexpo.com/prod/autodesk/product-1773-1611949.html

L1

2.2 Technology Trend

- 2.2.12 API



BIM Workflow (Design/ Documentation Stage)

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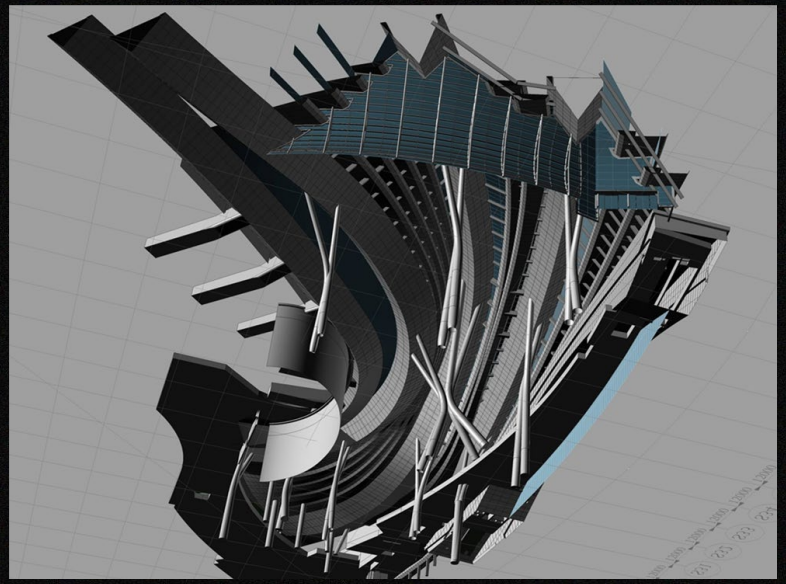
2.2 Technology Trend

- 2.2.12 API



Architectural Design by BIM

2.2 Technology Trend

- 2.2.12 API

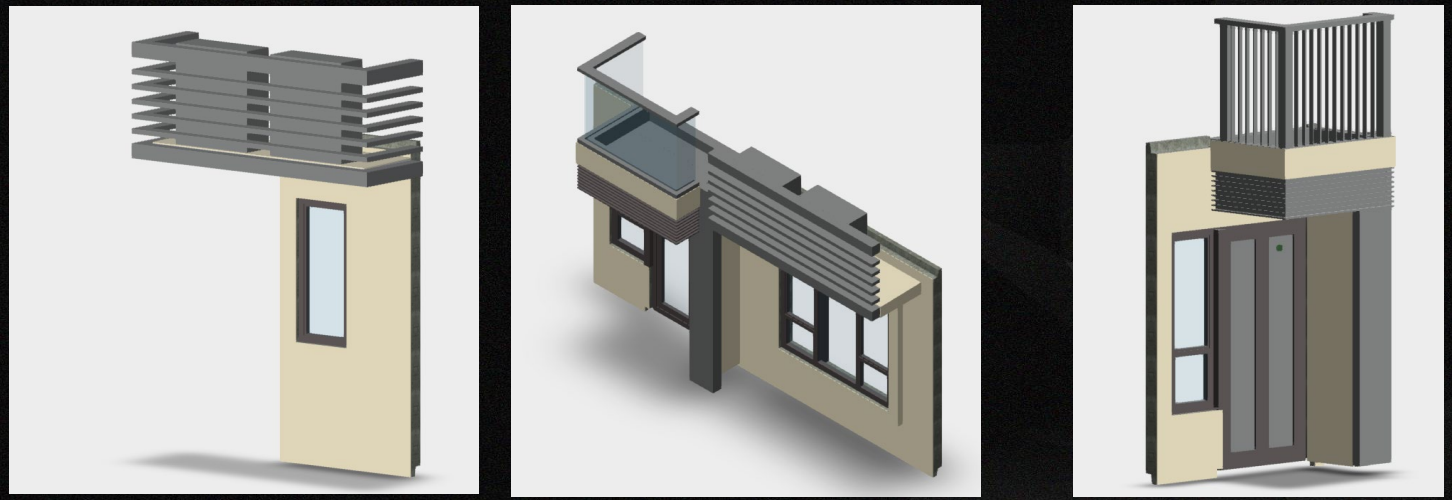
```
                {
                    case 'x':
                        p[index].x = System.Convert.ToDouble(para.AsValueString());
                        break;
                    case 'y':
                        p[index].y = System.Convert.ToDouble(para.AsValueString());
                        break;
                    case 'z':
                        p[index].z = System.Convert.ToDouble(para.AsValueString());
                        break;
                    default:
                        MessageBox.Show("Wrong format of parameter name");
                        break;
                }
            }
        }
    }
    CladdingPanel c1 = new CladdingPanel(p, PanelCounter); // new panel created from list of points.
    double Area_m2 = c1.PanelArea / 1000000; // division by 1000000 to get area in m2 from mm2

    //current family type parameter is updated with value of Area_m2 ;
    document.BeginTransaction();
    if( symbol.ParametersMap["Area"].Set(Area_m2) == false )
    {
        MessageBox.Show("Wrong parameter type");
    }
    document.EndTransaction();

    ArrayOfPanels.Add(c1); // new panel inserted into the array of panels

    output += c1.UniqueNumber + "                " + Area_m2 + "  " + c1.T_edge[0] + "  " + c1.T_edge[1] + "  " + c1.T_edge[2] + "  " + c1.T_edge[3

    // creating panel objects in space
    document.BeginTransaction();
    FamilyInstance instance = document.Create.NewFamilyInstance(location, symbol, StructuralType.NonStructural);
    document.EndTransaction();
}
//MessageBox.Show(output);
```

```
        public bool CanBeGroupedWith(CladdingPanel nextPanel, double tolerance)
        {
            if
            (
                Math.Abs(nextPanel.G_edge[0] - G_edge[0]) <= tolerance
                &&
                Math.Abs(nextPanel.G_edge[1] - G_edge[1]) <= tolerance
                &&
                Math.Abs(nextPanel.G_edge[2] - G_edge[2]) <= tolerance
                &&
                Math.Abs(nextPanel.G_edge[3] - G_edge[3]) <= tolerance
                &&
                Math.Abs(nextPanel.G_diagonal_1 - G_diagonal_1) <= tolerance * Math.Sqrt(2)
            )
            { return true; }
            else
            { return false; }

        }

    }
    #endregion

    public class Group
    {
        public int GroupNumber;
        public double[] Edge; //array of lengths of groups's edges.
        public double Diagonal; //length of group's diagonal.
        public double Area; //area of a groupped panel;
    }

    double toFeet(double value) //convertion of linear sizes for family instances
    {
        return value * FACTOR_MMtoFT;
    }

    double toSqFeet(double value) //convertion of areal sizes for family instances
    {
```

Architectural Design by using database and programming

2.2 Technology Trend

- 2.2.13 MIC (Modular Integrated Construction)



Example of Precast Facade

Source of MIC - BIM models with accurate shape, dimensions, material, joints and construction sequence

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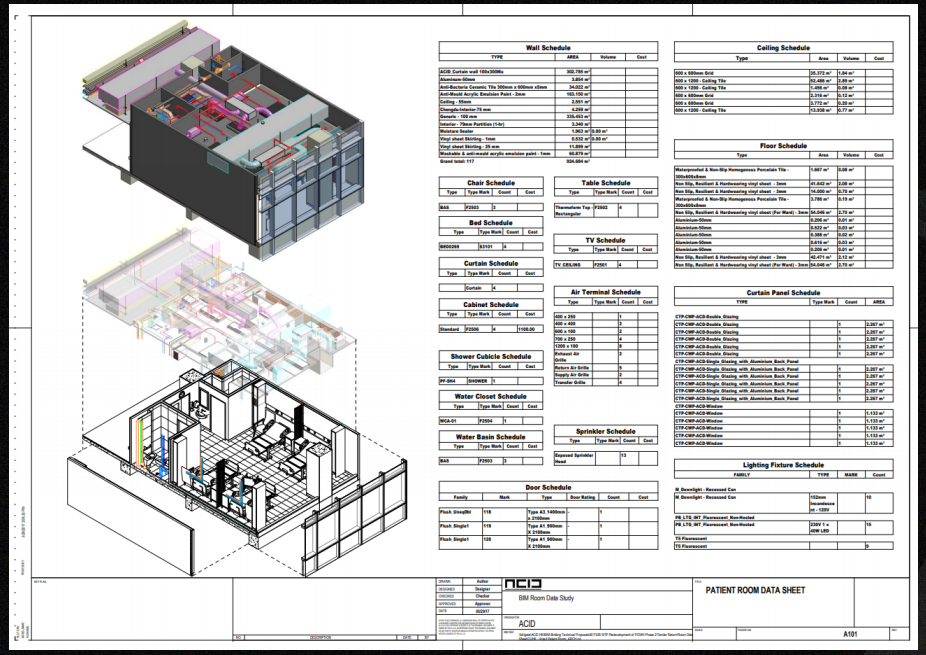
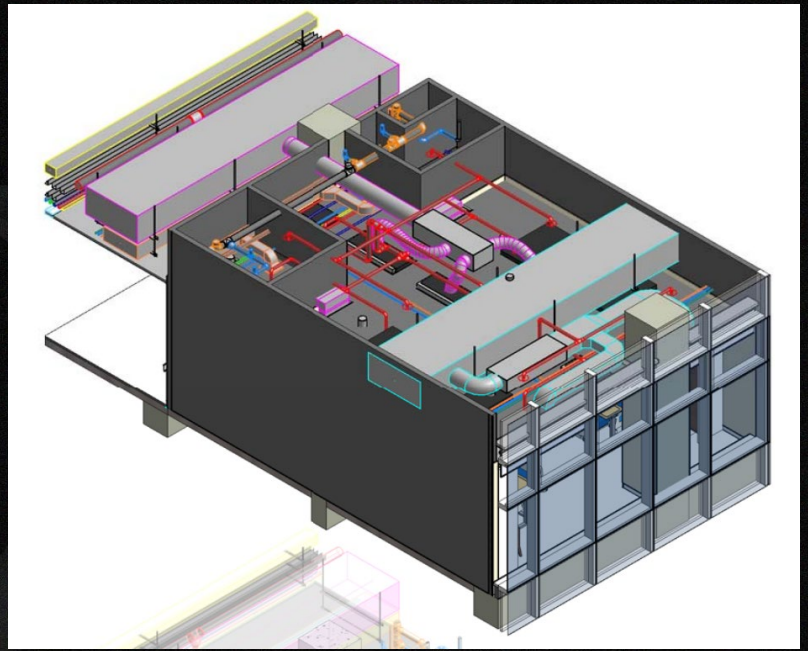
2.2 Technology Trend

- 2.2.13 MIC (Modular Integrated Construction)



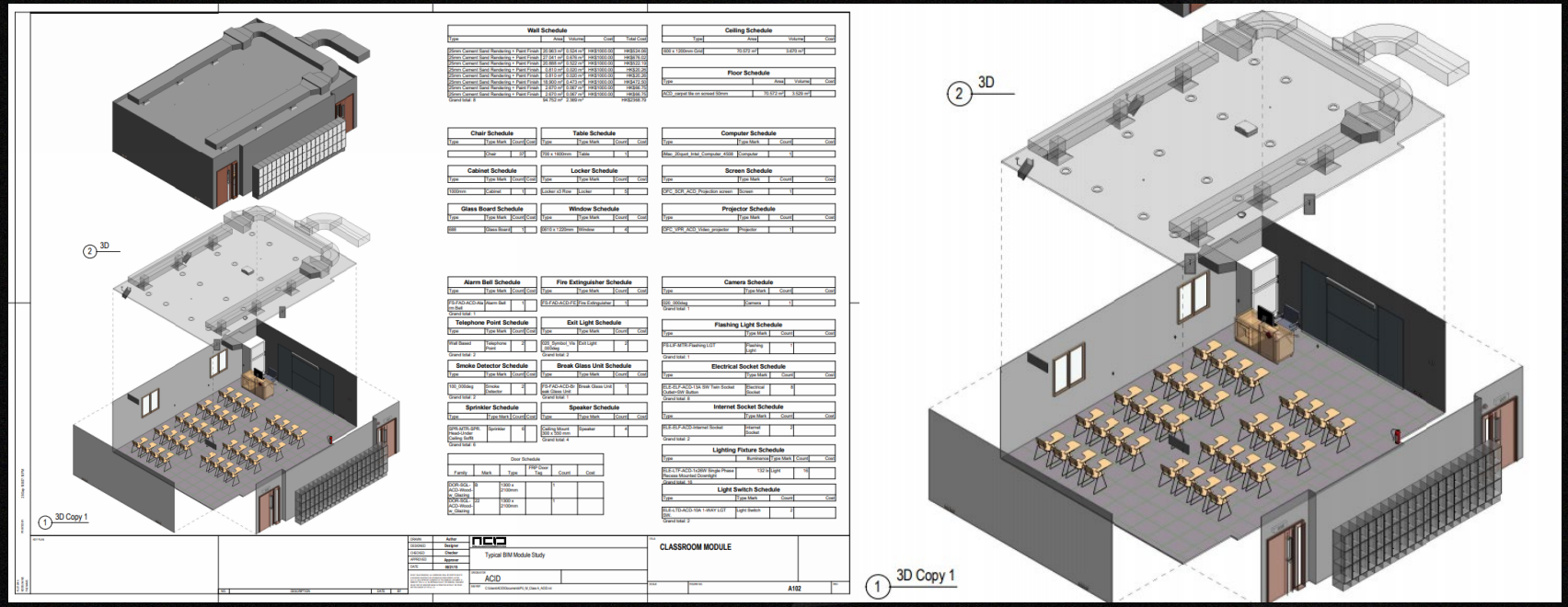


Modular Classroom

L1 An Example of Modular Classroom with Architecture, Structure & MEP discipline

2.2 Technology Trend

- 2.2.13 MIC (Modular Integrated Construction)

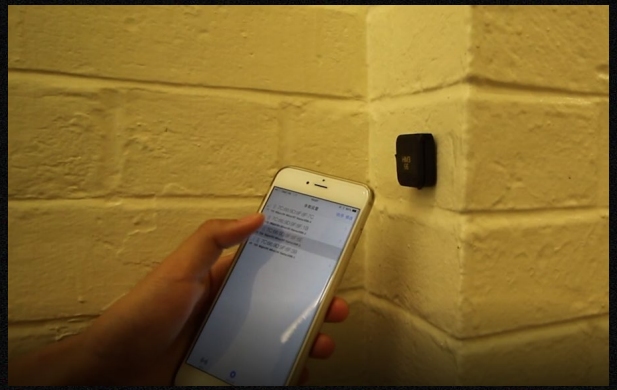


Modular Classroom

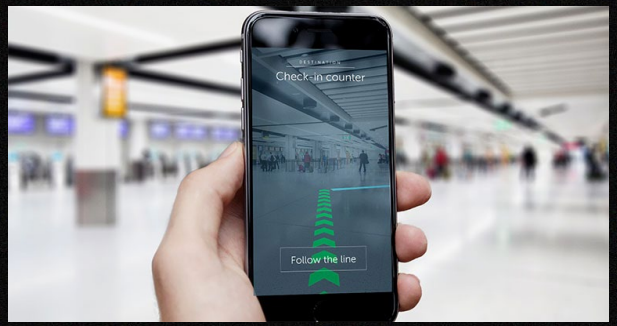
L1 An Example of Modular Classroom with Architecture, Structure & MEP discipline

2.2 Technology Trend

- 2.2.14 Indoor positioning



Indoor positioning



Wayfinding

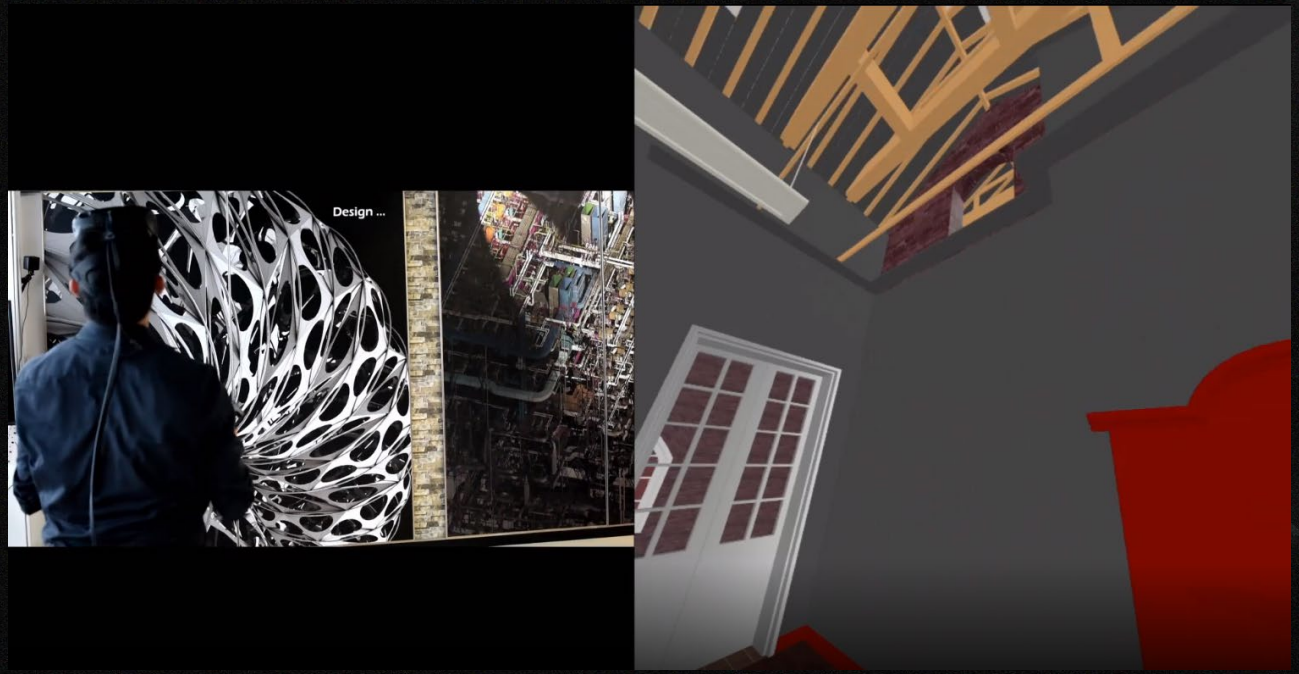
Location finding

Senor technology interacts with mobile devices and overlap onto BIM model.

L1

2.2 Technology Trend

- 2.2.14 Indoor positioning



Virtual Reality

L1 BIM with VR

BIM Management Course

Session 3

3.1 Client BIM Strategic Stage

- 3.1.1 BIM strategy, BIM uses, BIM processes

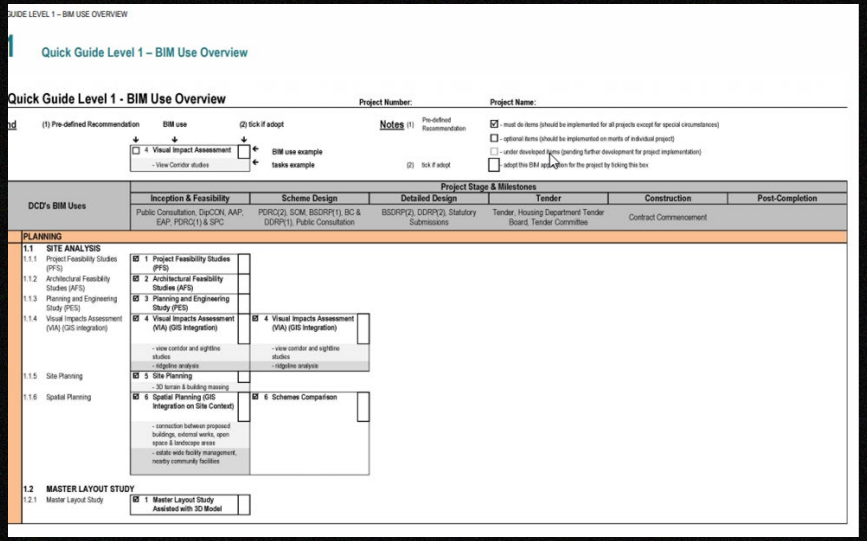
BIM Use Purpose			BIM Use Objective	Synonyms
01	**Gather**		**to collect or organize facility information**	administer, collect, manage, acquire
	01	Capture	to represent or preserve the current status of the facility and facility elements	collect
	02	Quantify	to express or measure the amount of a facility element	quantity takeoff
	03	Monitor	to collect information regarding the performance of facility elements and systems	observe, measure
	04	Qualify	to characterize or identify facility elements' status	follow, track, identify
02	**Generate**		**to create or author information about the facility**	create, author, model
	01	Prescribe	to determine the need for and select specific facility elements	program, specify
	02	Arrange	to determine location and placement of facility elements	configure, lay out, locate, place
	03	Size	to determine the magnitude and scale of facility elements	scale, engineer
03	**Analyze**		**to examine elements of the facility to gain a better understanding of it**	examine, evaluate
	01	Coordinate	to ensure the efficiency and harmony of the relationship of facility elements	detect, avoid
	02	Forecast	to predict the future performance of the facility and facility elements	simulate, predict
	03	Validate	to check or prove accuracy of facility information and that is logical and reasonable	check, confirm
04	**Communicate**		**to present information about a facility in a method in which it can be shared or exchanged**	exchange
	01	Visualize	to form a realistic representation of a facility or facility elements	review
	02	Transform	to modify information and translate it to be received by another process	translate
	03	Draw	to make a symbolic representation of the facility and facility elements	draft, annotate, detail
	04	Document	to create a record of facility information including the information necessary to precisely specify facility elements	specify, submit, schedule, report.
05	**Realize**		**to make or control a physical element using facility information**	implement, perform, execute,
	01	Fabricate	to use facility information to manufacture the elements of a facility	manufacture
	02	Assemble	to use facility information to bring together the separate elements of a facility	prefabricate
	03	Control	to use facility information to physically manipulate the operation of executing equipment	manipulate
	04	Regulate	to use facility information to inform the operation of a facility element	direct

https://www.bim.psu.edu/download/the_uses_of_bim.pdf

L1

3.1 Client BIM Strategic Stage

- 3.1.1 BIM strategy, BIM uses, BIM processes



Quick Guide Level 1 – BIM Use Overview

Quick Guide Level 1 - BIM Use Overview

Project Number:

Project Name:

(1) Pre-defined Recommendation

BIM use

(2) tick if adopt

Notes (1) Pre-defined Recommendation

- must de items (should be implemented for all projects except for special circumstances)
- optional items (should be implemented on meets of individual project)
- under developed items (pending further development for project implementation)

(2) tick if adopt

- adopt this BIM application for the project by ticking this box

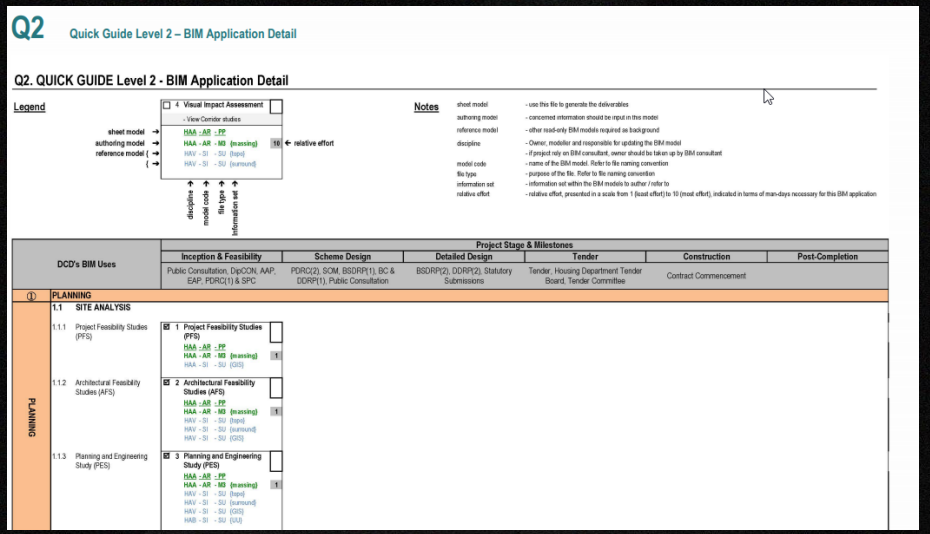
4 Visual Impact Assessment
- View Corridor studies

BIM use example

tasks example

DCD's BIM Uses	Project Stage & Milestones					
	Inception & Feasibility	Scheme Design	Detailed Design	Tender	Construction	Post-Completion
	Public Consultation, DipCON, AAP, EAP, PDRC(1) & SPC	PDRC(2), SOM, BSDRP(1), BC & DDRP(1), Public Consultation	BSDRP(2), DDRP(2), Statutory Submissions	Tender, Housing Department Tender Board, Tender Committee	Contract Commencement	
PLANNING						
1.1 SITE ANALYSIS						
1.1.1 Project Feasibility Studies (PFS)	☑ 1 Project Feasibility Studies (PFS)					
1.1.2 Architectural Feasibility Studies (AFS)	☑ 2 Architectural Feasibility Studies (AFS)					
1.1.3 Planning and Engineering Study (PES)	☑ 3 Planning and Engineering Study (PES)					
1.1.4 Visual Impacts Assessment (VIA) (GIS integration)	☑ 4 Visual Impacts Assessment (VIA) (GIS Integration) - view corridor and sightline studies - ridgeline analysis	☑ 4 Visual Impacts Assessment (VIA) (GIS Integration) - view corridor and sightline studies - ridgeline analysis				
1.1.5 Site Planning	☑ 5 Site Planning - 3D terrain & building massing					
1.1.6 Spatial Planning	☑ 6 Spatial Planning (GIS Integration on Site Context) - connection between proposed buildings, external works, open space & townscape areas - estate wide facility management, nearby community facilities	☑ 6 Schemes Comparison				
1.2 MASTER LAYOUT STUDY						
1.2.1 Master Layout Study	☑ 1 Master Layout Study Assisted with 3D Model					

Level 1 -BIM Use Overview from HA Standard



Q2 Quick Guide Level 2 – BIM Application Detail

Q2. QUICK GUIDE Level 2 - BIM Application Detail

Legend

4 Visual Impact Assessment
- View Corridor studies

sheet model → HAA - AR - PP
authoring model → HAA - AR - M3 (massing) 10 ← relative effort
reference model (→ HAV - SI - SU (topo)
(→ HAV - SI - SU (surround)

discipline → model code → file type → Information set →

Notes

sheet model	- use this file to generate the deliverables
authoring model	- concerned information should be input in this model
reference model	- other read-only BIM models required as background
discipline	- Owner, modeller and responsible for updating the BIM model - if project rely on BIM consultant, owner should be taken up by BIM consultant
model code	- name of the BIM model. Refer to file naming convention
file type	- purpose of the file. Refer to file naming convention
information set	- information set within the BIM models to author / refer to
relative effort	- relative effort, presented in a scale from 1 (least effort) to 10 (most effort), indicated in terms of man-days necessary for this BIM application

DCD's BIM Uses	Project Stage & Milestones					
	Inception & Feasibility	Scheme Design	Detailed Design	Tender	Construction	Post-Completion
	Public Consultation, DipCON, AAP, EAP, PDRC(1) & SPC	PDRC(2), SOM, BSDRP(1), BC & DDRP(1), Public Consultation	BSDRP(2), DDRP(2), Statutory Submissions	Tender, Housing Department Tender Board, Tender Committee	Contract Commencement	
① PLANNING						
1.1 SITE ANALYSIS						
1.1.1 Project Feasibility Studies (PFS)	☑ 1 Project Feasibility Studies (PFS) HAA - AR - PP HAA - AR - M3 (massing) 1 HAA - SI - SU (GIS)					
1.1.2 Architectural Feasibility Studies (AFS)	☑ 2 Architectural Feasibility Studies (AFS) HAA - AR - PP HAA - AR - M3 (massing) 1 HAV - SI - SU (topo) HAV - SI - SU (surround) HAV - SI - SU (GIS)					
1.1.3 Planning and Engineering Study (PES)	☑ 3 Planning and Engineering Study (PES) HAA - AR - PP HAA - AR - M3 (massing) 1 HAV - SI - SU (topo) HAV - SI - SU (surround) HAV - SI - SU (GIS) HAB - SI - SU (UU)					

PLANNING

Level 2-BIM Application Detail from HA Standard

L1

3.1 Client BIM Strategic Stage

- 3.1.1 BIM strategy, BIM uses, BIM processes

Q3 Index

	Index Number	File Description: Model		File Description: File Type	File Code: Model Code		File Code: File Type
Modelling	Q3-01	Architectural	-	Modelling	AR	-	M3
	Q3-02	Modular Flat	-	Modelling	MF	-	M3
	Q3-03	Interior Design		Modelling	IN	-	M3
	Q3-04	Ceiling	-	Modelling	CL	-	M3
	Q3-05	Site / External	-	Modelling	SI	-	M3
	Q3-06	Drainage	-	Modelling	DD	-	M3
	Q3-07	Foundation	-	Modelling	FD	-	M3
	Q3-08	Lateral Support	-	Modelling	LS	-	M3
	Q3-09	Superstructure	-	Modelling	SS	-	M3
	Q3-10	Building Services	-	Modelling	BS	-	M3
	Q3-11	MVAC	-	Modelling	MV	-	M3
	Q3-12	Plumbing	-	Modelling	PB	-	M3
	Q3-13	Fire Services	-	Modelling	FS	-	M3
	Q3-14	Electrical	-	Modelling	EE	-	M3
	Q3-15	Gas	-	Modelling	TG	-	M3
	Q3-16	Building Services Miscellaneous	-	Modelling	MI	-	M3
	Q3-17	Landscape	-	Modelling	LA	-	M3
Survey	Q3-18	Architectural	-	Survey	AR	-	SU
	Q3-19	Site / External	-	Survey	SI	-	SU
	Q3-20	Drainage	-	Survey	DD	-	SU
	Q3-21	Superstructure	-	Survey	SS	-	SU
	Q3-22	Building Services	-	Survey	BS	-	SU
Miscellaneous Model	Q3-23	Building Services	-	Combined Model	BS	-	CM
	Q3-24	Architectural	-	Computer Fluid Dynamic	AR	-	CF
	Q3-25	Architectural	-	Daylight Analysis	AR	-	DL
	Q3-26	Electrical	-	Lighting Analysis	EE	-	LI
	Q3-27	Architectural	-	Visualization	AR	-	VS
Method Statement	Q3-28	Site / External	-	Method Statement	SI	-	MS
	Q3-29	Foundation	-	Method Statement	FD	-	MS
	Q3-30	Lateral Support	-	Method Statement	LS	-	MS
	Q3-31	Superstructure	-	Method Statement	SS	-	MS
Drawing Production	Q3-32			Presentation	_ _	-	PP
	Q3-33			ICU Submission	_ _	-	IC
	Q3-34			Drawing	_ _	-	DR
	Q3-35			Bills of Quantities	_ _	-	BQ

3 LEVEL OF DEVELOPMENT (LOD)

D.LOD-1 Adoption

The latest version of Level of Development Specification (current version October 19, 2016) ("LOD Spec) shall be adopted whenever "Level of Development" or "LOD" are mentioned in this Guide. Users may download the specification from their website www.bimforum.org/lod for their latest version.

D.LOD-1.1 What is LOD?[1]

Level of Development is the degree to which the element's geometry and attached information has been thought through – the degree to which project team members may rely on the information when using the model.

When BIM is a communication tool among team members, LOD definition is the language to communicate between upstream (model authors) and downstream BIM users. It allows model authors to define what their model elements can be relied on, and allows downstream users to clearly understand the usability and the limitations of models they are receiving.

LOD should only be used to describe model elements and not models as a whole. There is no such thing as an "LOD ### model." Project models at any stage of delivery will invariably contain elements and assemblies at various levels of development.

Therefore, the LODs are not defined by design phases and not necessarily in line with deliverables. The definition of LOD required indicated in this Guide should only be taken as communication among BIM users when referencing other disciplines' upstream model elements for input and should not be considered to be additional requirements for professional deliverables.

Team members should use this LOD guide as a starting point for model exchange and, as projects progress, should continue to develop this Guide by identifying the need for an LOD that would define model elements sufficiently developed to enable detailed coordination between disciplines.

D.LOD-1.2 Fundamental LOD Definitions[2]

LOD 100

LOD 100 elements are **not geometric representations**. Examples are information attached to other model elements or symbols showing the existence of a component but not its shape, size, or precise location. Any information derived from LOD 100 elements must be considered approximate.

LOD 200

At this LOD elements are **generic placeholders**. They may be recognizable as the components they represent, or they may be volumes for space reservation. Any information derived from LOD 200 elements must be considered approximate.

LOD 300

The **quantity, size, shape, location, and orientation** of the element as designed can be measured directly from the model without referring to non-modelled information such as notes or dimension call-outs. The project origin is defined and the element is located accurately with respect to the project origin.

LOD 350

Parts necessary for coordination of the element with nearby or attached elements are modelled. These parts will include such items as supports and connections. The quantity, size, shape, location, and orientation of the element as designed can be measured directly from the model without referring to non-modelled information such as notes or dimension call-outs.

LOD 400

An LOD 400 element is modelled at sufficient detail and accuracy for **fabrication** of the represented component. The quantity, size, shape, location, and orientation of the element as designed can be measured directly from the model without referring to non-modelled information such as notes or dimension call-outs.

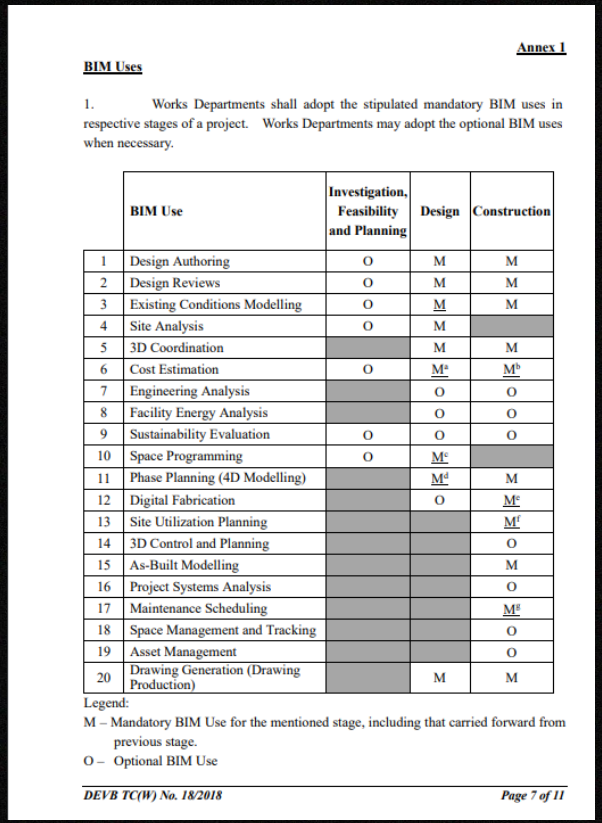
LOD 500

LOD 500 relates to **field verification** and is not an indication of progression to a higher level of model element geometry or non-graphic information.

Specification for LOD500 was intentionally left out in LOD Spec. In this Guide, various field verification methods are mentioned and results of which may be feedback for necessary adjustment to the LOD 400 model, and thus achieving LOD 500.

3.1 Client BIM Strategic Stage

- 3.1.1 BIM strategy, BIM uses, BIM processes



Annex 1

BIM Uses

1. Works Departments shall adopt the stipulated mandatory BIM uses in respective stages of a project. Works Departments may adopt the optional BIM uses when necessary.

	BIM Use	Investigation, Feasibility and Planning	Design	Construction
1	Design Authoring	O	M	M
2	Design Reviews	O	M	M
3	Existing Conditions Modelling	O	M	M
4	Site Analysis	O	M	
5	3D Coordination		M	M
6	Cost Estimation	O	M[a]	M[b]
7	Engineering Analysis		O	O
8	Facility Energy Analysis		O	O
9	Sustainability Evaluation	O	O	O
10	Space Programming	O	M[c]	
11	Phase Planning (4D Modelling)		M[d]	M
12	Digital Fabrication		O	M[e]
13	Site Utilization Planning			M[f]
14	3D Control and Planning			O
15	As-Built Modelling			M
16	Project Systems Analysis			O
17	Maintenance Scheduling			M[g]
18	Space Management and Tracking			O
19	Asset Management			O
20	Drawing Generation (Drawing Production)		M	M

Legend:

M – Mandatory BIM Use for the mentioned stage, including that carried forward from previous stage.

O – Optional BIM Use

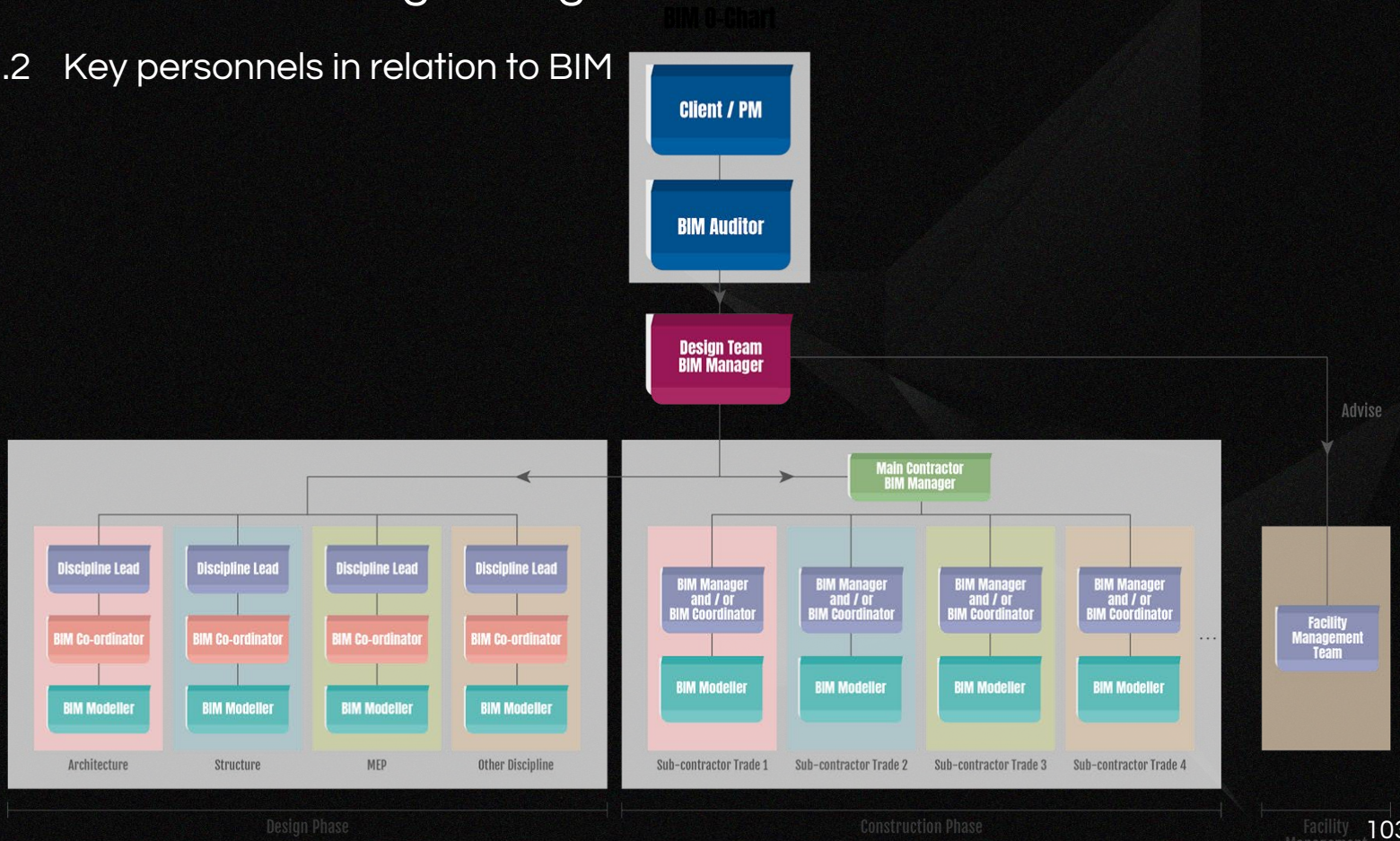
DEVB TC(W) No. 18/2018 *Page 7 of 11*

Technical Circular listed out twenty BIM Use and shows the mandatory and optional BIM Uses respectively.

L1

3.1 Client BIM Strategic Stage

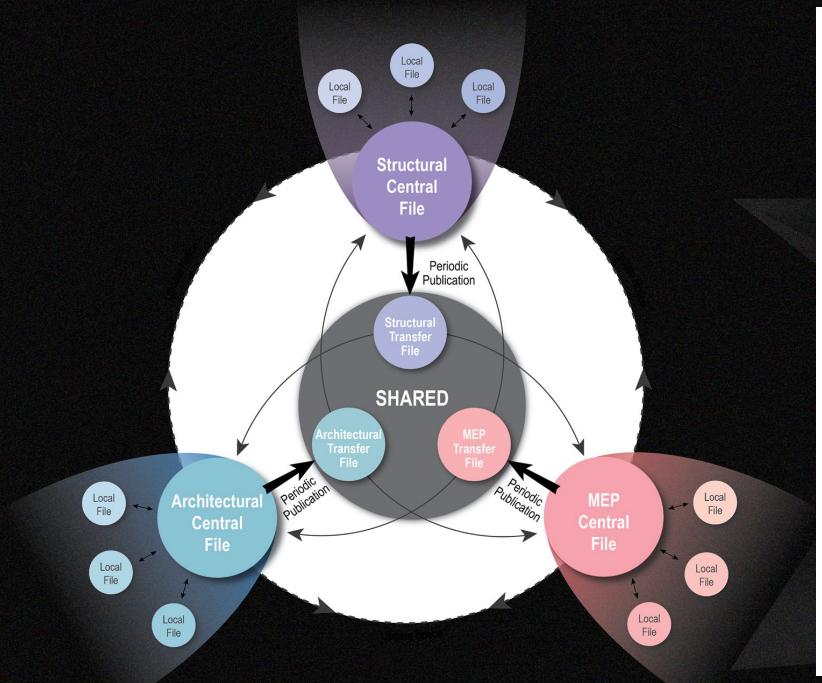
- 3.1.2 Key personnels in relation to BIM

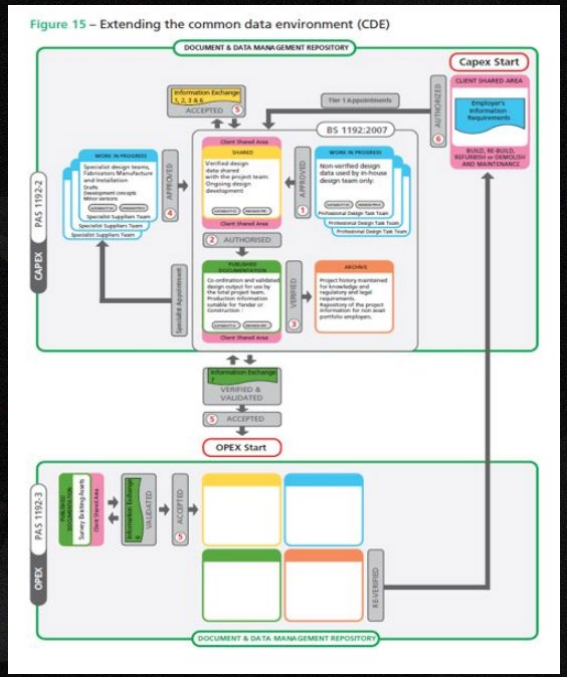


L1

3.1 Client BIM Strategic Stage

- 3.1.3 Determine the info management & CDE strategy



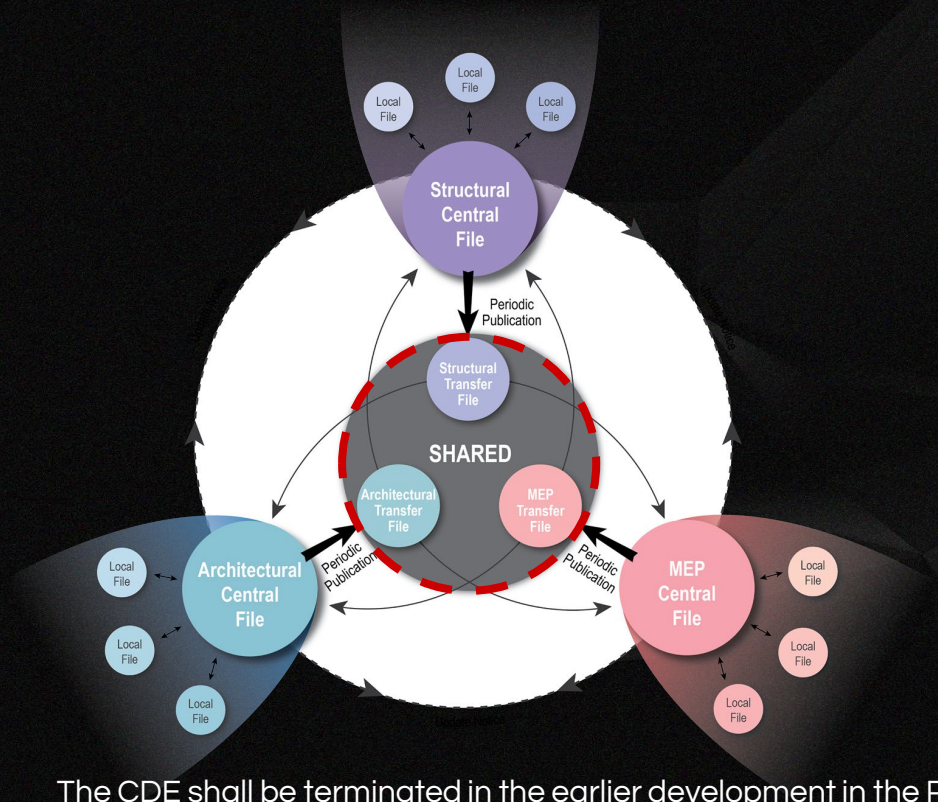


At the heart of the CDE as defined in BS1192:2007 are four functional areas with “gates”, or sign-off procedures, that allow data/information to pass between the sections.

L4

3.1 Client BIM Strategic Stage

- 3.1.3 Determine the info management & CDE strategy

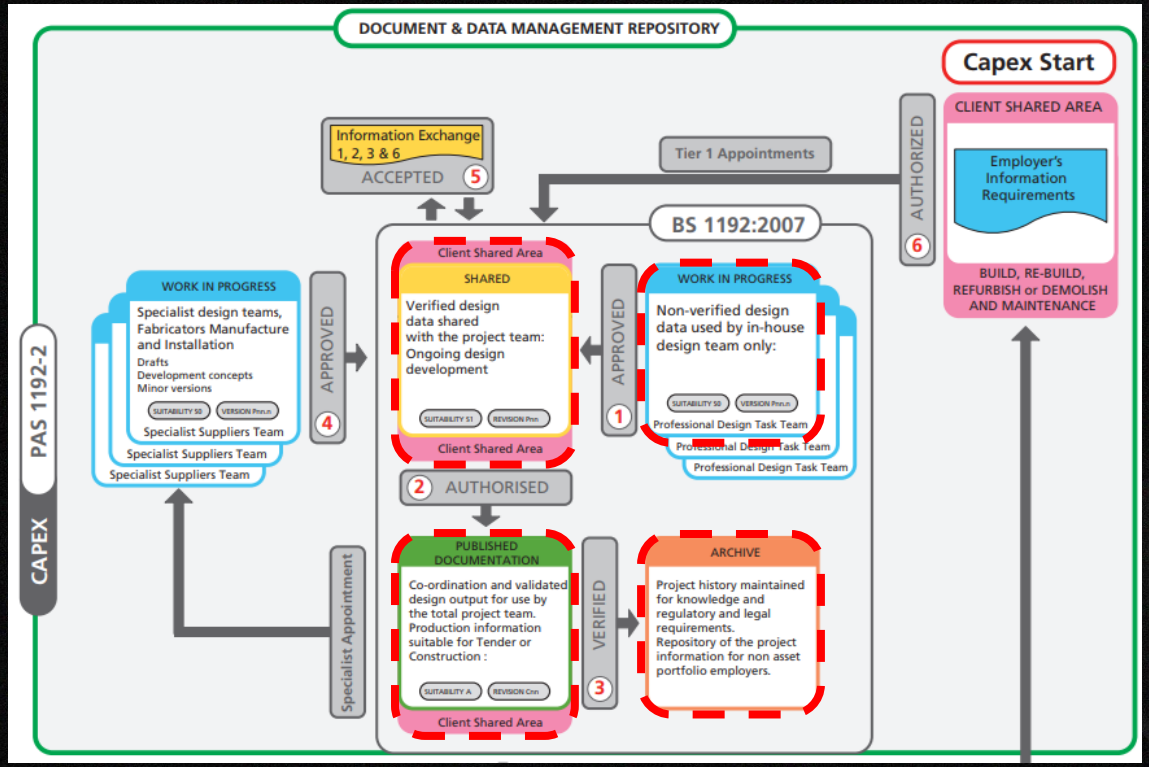


L4

The CDE shall be terminated in the earlier development in the PXP.
The extent of CDE might be held by the Employer or Consultant with accessibility by all parties.

3.1 Client BIM Strategic Stage

- 3.1.3 Determine the info management & CDE strategy

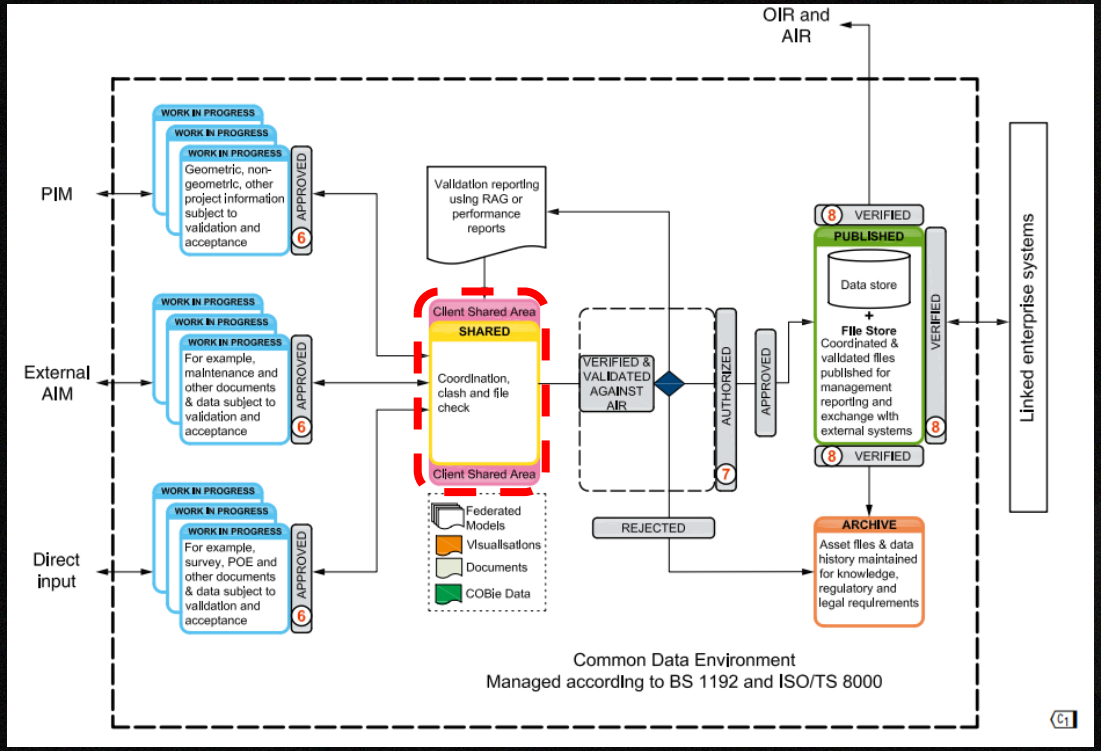


The CDE also served as a shared platform for ongoing design with record.

L4

3.1 Client BIM Strategic Stage

- 3.1.4 Determine the BIM / AIM / GIS strategy

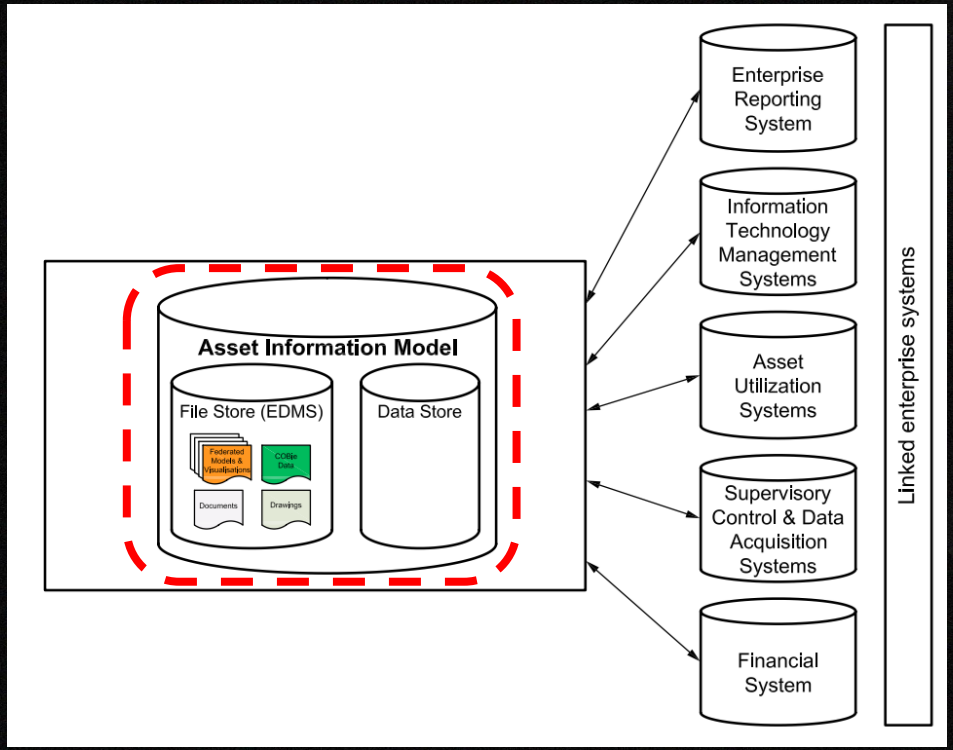


BIM, Asset Information Model & Geographic Information System
(Refer to PAS 1192:3)

L4

3.1 Client BIM Strategic Stage

- 3.1.4 Determine the BIM / AIM / GIS strategy



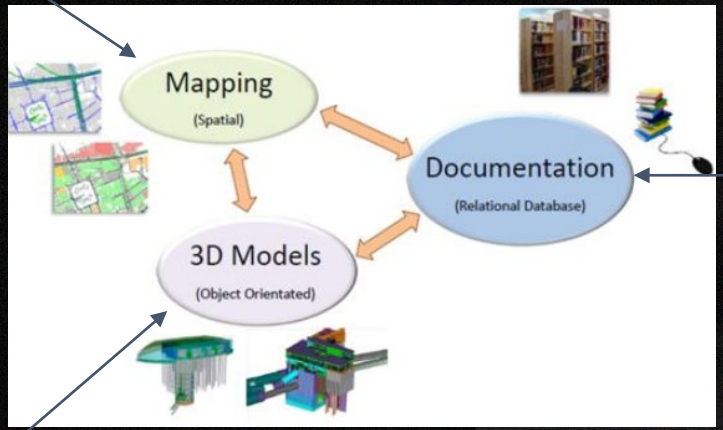
BIM, Asset Information Model & Geographic Information System
(Refer to PAS 1192:3)

L4

3.1 Client BIM Strategic Stage

- 3.1.4 Determine the BIM / AIM / GIS strategy

Geographic Information System (GIS):
GIS to provide detailed and accurate real-world data for the location of the site.

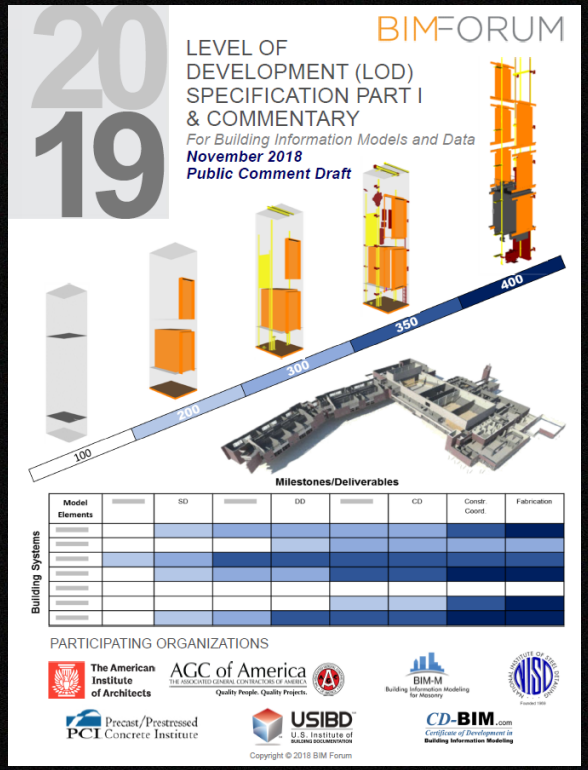


Asset Information Model (AIM):
Client to understand AIM data sources and information for project assets, building maintenance system and registers.

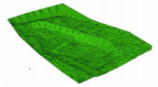
Building Information Modeling (BIM):
Information base Building Model from Design, Collaboration and Construction.

3.1 Client BIM Strategic Stage

- 3.1.5 Determine level of development in the context of graphics and information



Topography (Site Formation)

LOD	Description	Data	Example Image
100	Diagrammatic or schematic model		
200	The planned site formation shall be represented as a 3D surface to show the approximate levels for excavation, cut and fill, blinding layers, backfill and site grading. The model may include the approximate size, shape and location of new:- – Foundations and retaining walls; – Slope improvement works; – Access roads. The site boundary shall be marked based on the surveyors setting out information.	N/A	
300	The site formation shall be represented as complete and accurate 3D surfaces or objects to show the specific levels for excavation and site grading. The model shall include the site infrastructure for roads, curbs, pavements, car parking, access, hard landscaping and planter boxes. Models of trees may be included.		
350	For hard landscaped or paved areas, the model shall be modelled to falls and coordinated with the planned surface drainage model.		
400	N/A		
500	The model elements shall be verified and updated based on as-built site surveys.		

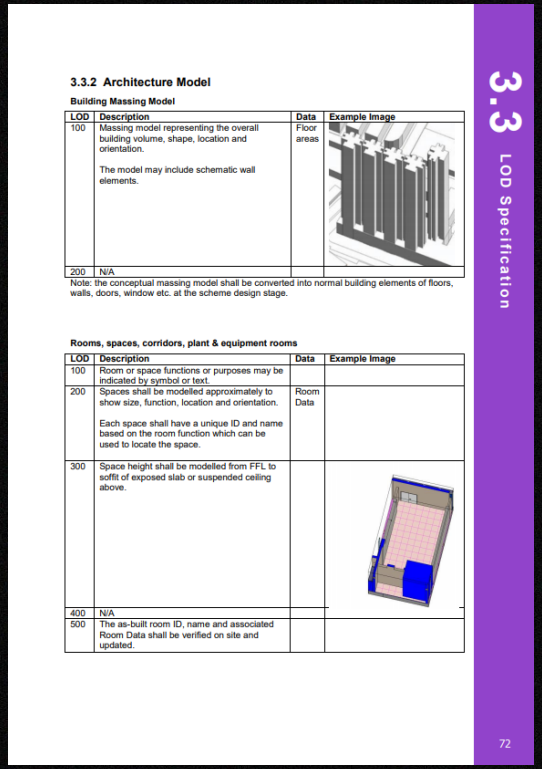
3.3 LOD Specification

LOD 2019 Specification and CIC BIM Standard are contained level of development in the context of graphics and information

L4

3.1 Client BIM Strategic Stage

- 3.1.5 Determine level of development in the context of graphics and information



3.3 LOD Specification

3.3.2 Architecture Model

Building Massing Model

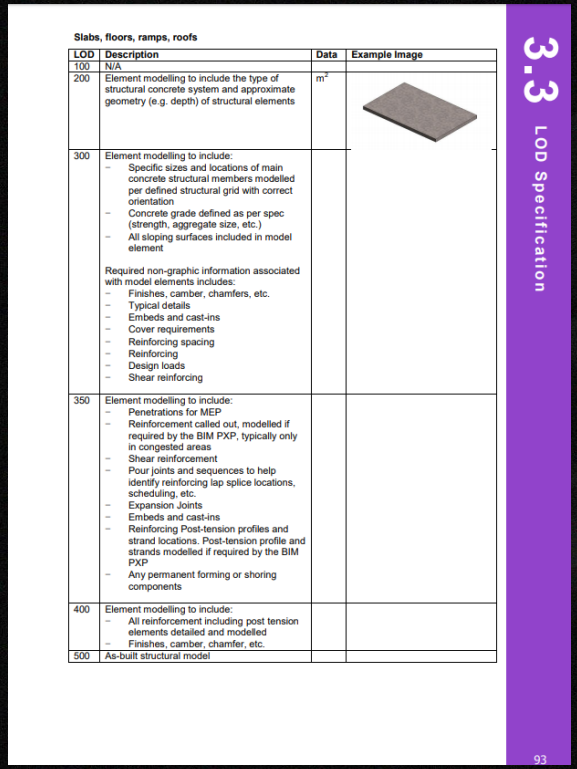
LOD	Description	Data	Example Image
100	Massing model representing the overall building volume, shape, location and orientation. The model may include schematic wall elements.	Floor areas	
200	N/A		

Note: the conceptual massing model shall be converted into normal building elements of floors, walls, doors, window etc. at the scheme design stage.

Rooms, spaces, corridors, plant & equipment rooms

LOD	Description	Data	Example Image
100	Room or space functions or purposes may be indicated by symbol or text.		
200	Spaces shall be modelled approximately to show size, function, location and orientation. Each space shall have a unique ID and name based on the room function which can be used to locate the space.	Room Data	
300	Space height shall be modelled from FFL to soffit of exposed slab or suspended ceiling above.		
400	N/A		
500	The as-built room ID, name and associated Room Data shall be verified on site and updated.		

72



3.3 LOD Specification

Slabs, floors, ramps, roofs

LOD	Description	Data	Example Image
100	N/A		
200	Element modelling to include the type of structural concrete system and approximate geometry (e.g. depth) of structural elements	m^2	
300	Element modelling to include: – Specific sizes and locations of main concrete structural members modelled per defined structural grid with correct orientation – Concrete grade defined as per spec (strength, aggregate size, etc.) – All sloping surfaces included in model element Required non-graphic information associated with model elements includes: – Finishes, camber, chamfers, etc. – Typical details – Embeds and cast-ins – Cover requirements – Reinforcing spacing – Reinforcing – Design loads – Shear reinforcing		
350	Element modelling to include: – Penetrations for MEP – Reinforcement called out, modelled if required by the BIM PXP, typically only in congested areas – Shear reinforcement – Pour joints and sequences to help identify reinforcing lap splice locations, scheduling, etc. – Expansion Joints – Embeds and cast-ins – Reinforcing Post-tension profiles and strand locations. Post-tension profile and strands modelled if required by the BIM PXP – Any permanent forming or shoring components		
400	Element modelling to include: – All reinforcement including post tension elements detailed and modelled – Finishes, camber, chamfer, etc.		
500	As-built structural model		

93

LOD 2019 Specification and CIC BIM Standard are contained level of development in the context of graphics and information

L4

3.1 Client BIM Strategic Stage

- 3.1.5 Determine level of development in the context of graphics and information

Transfer Structure (transfer plate, truss)

LOD	Description	Data	Example Image
100	N/A		
200	Element modelling to include the type of structural concrete system and approximate geometry (e.g. depth) of structural elements		
300	Element modelling to include: – Specific sizes and locations of main structural members modelled per defined structural grid with correct orientation – Concrete or steel grade defined as per spec (strength, aggregate size, etc.) – All sloping surfaces included in model element Required non-graphic information associated with model elements includes: – Finishes, camber, chamfers, etc. – Typical details – Embeds and cast-ins – Cover requirements – Reinforcing spacing – Reinforcing – Design loads – Shear reinforcing		
350	Element modelling to include: – Penetrations for MEP – Reinforcement called out, modelled if required by the BIM PXP, typically only in congested areas – Shear reinforcement – Embeds and cast-ins – Reinforcing post-tension profiles and strand locations. Post-tension profile and strands modelled if required by the BIM PXP – Any permanent forming or shoring components		
400	Element modelling to include: – All reinforcement including post tension elements detailed and modelled – Finishes, camber, chamfer, etc		
500	As-built structural model		

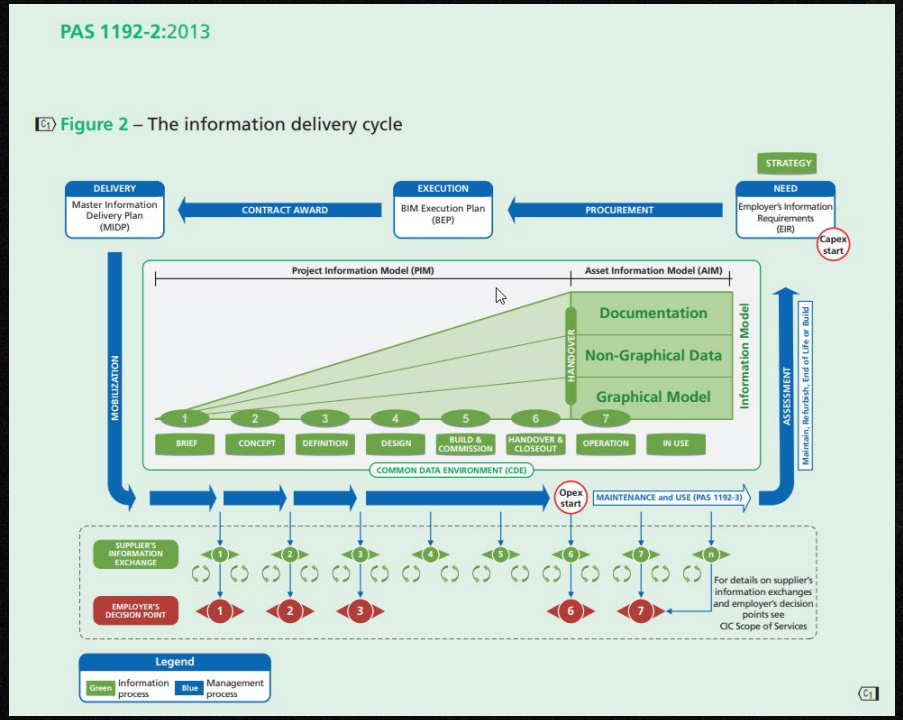
300	Element modelling to include: – Specific sizes and locations of main structural members modelled per defined structural grid with correct orientation – Concrete or steel grade defined as per spec (strength, aggregate size, etc.) – All sloping surfaces included in model element Required non-graphic information associated with model elements includes: – Finishes, camber, chamfers, etc. – Typical details – Embeds and cast-ins – Cover requirements – Reinforcing spacing – Reinforcing – Design loads – Shear reinforcing
350	Element modelling to include: – Penetrations for MEP – Reinforcement called out, modelled if required by the BIM PXP, typically only in congested areas – Shear reinforcement – Embeds and cast-ins – Reinforcing post-tension profiles and strand locations. Post-tension profile and strands modelled if required by the BIM PXP – Any permanent forming or shoring components
400	Element modelling to include: – All reinforcement including post tension elements detailed and modelled – Finishes, camber, chamfer, etc
500	As-built structural model

LOD 2019 Specification and CIC BIM Standard are contained level of development in the context of graphics and information

L4

3.1 Client BIM Strategic Stage

- 3.1.6 Determine level of integration of digital information into asset & facility management

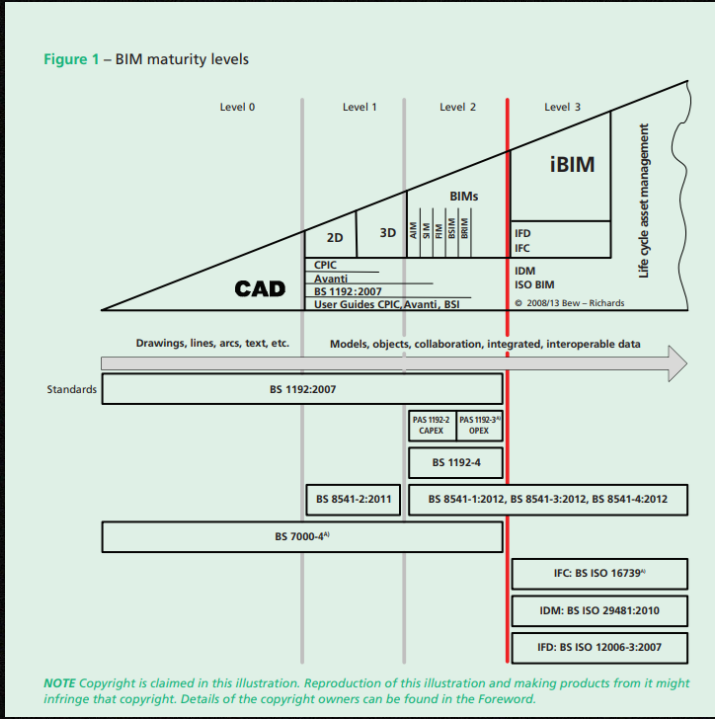


The information delivery cycle shows the level of integration of digital information into asset & facility management

L4

3.1 Client BIM Strategic Stage

- 3.1.6 Determine level of integration of digital information into asset & facility management

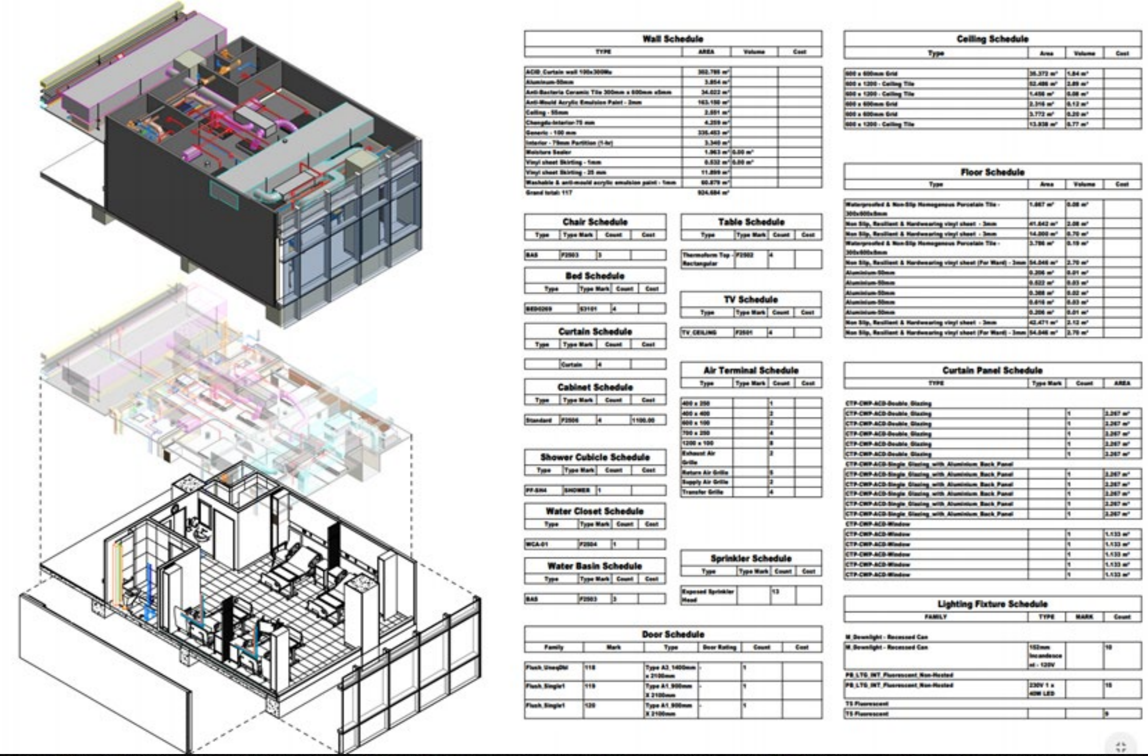


BIM maturity level shows the standard would be used in different BIM level/

L4

3.1 Client BIM Strategic Stage

- 3.1.7 Case study

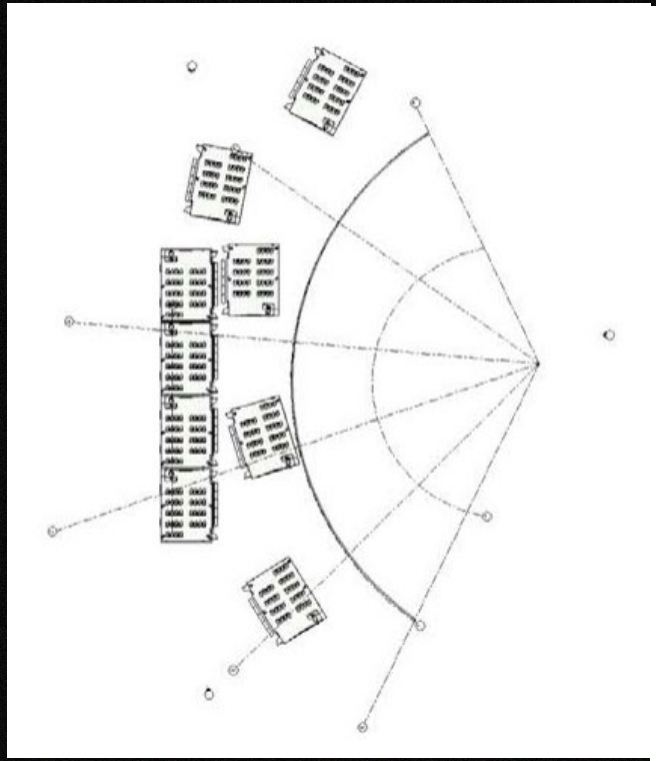


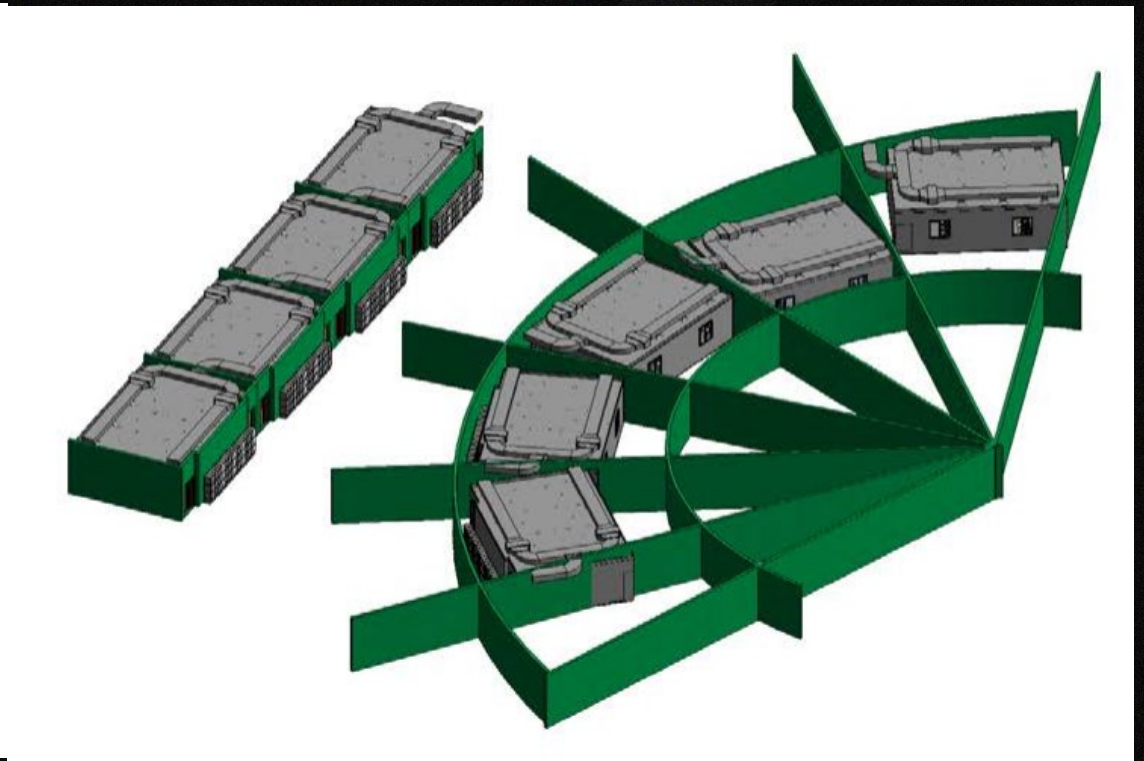
Design modularization and optimization in BIM

L2

3.1 Client BIM Strategic Stage

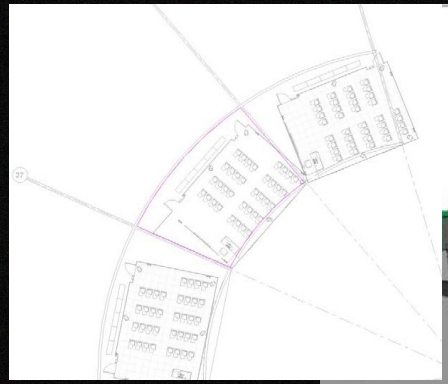
- 3.1.7 Case study

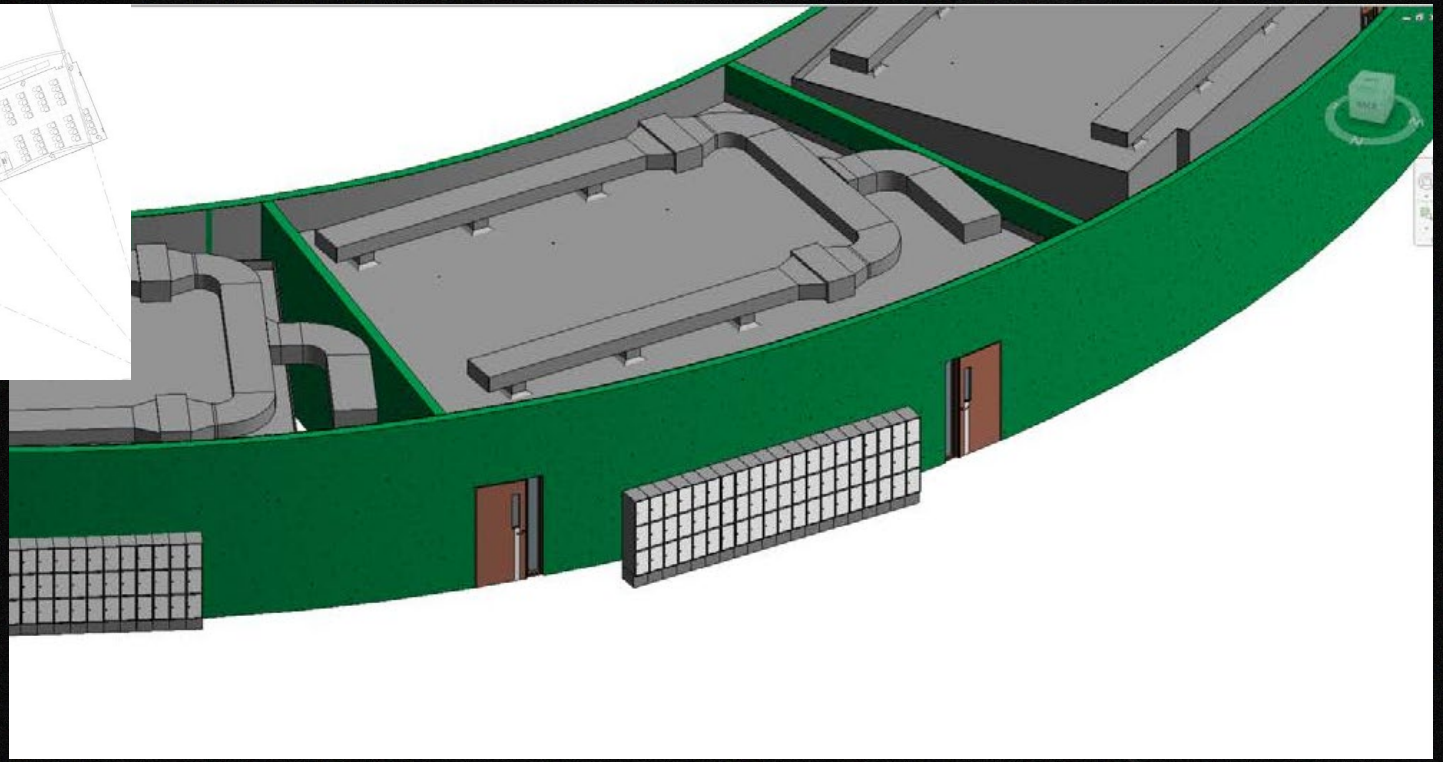




3.1 Client BIM Strategic Stage

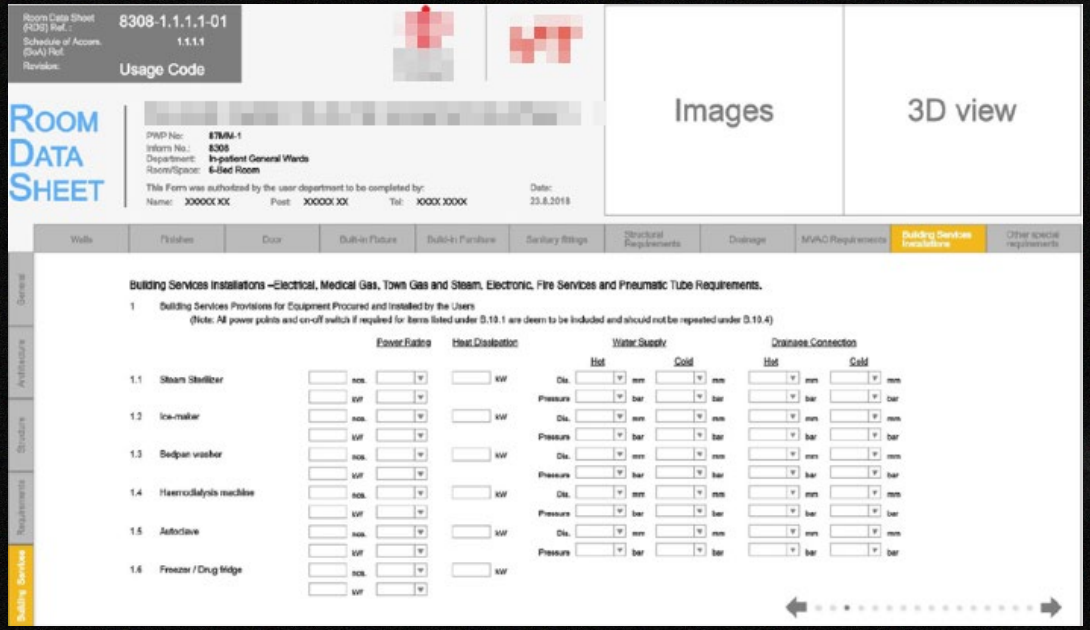
- 3.1.7 Case study





3.2 Client Pre-tender Project Stage

- 3.2.1 Determine & oversee the development of Client Information Model (CIM)
  - 3.2.1.1 Organisational Information Requirements (OIRs)

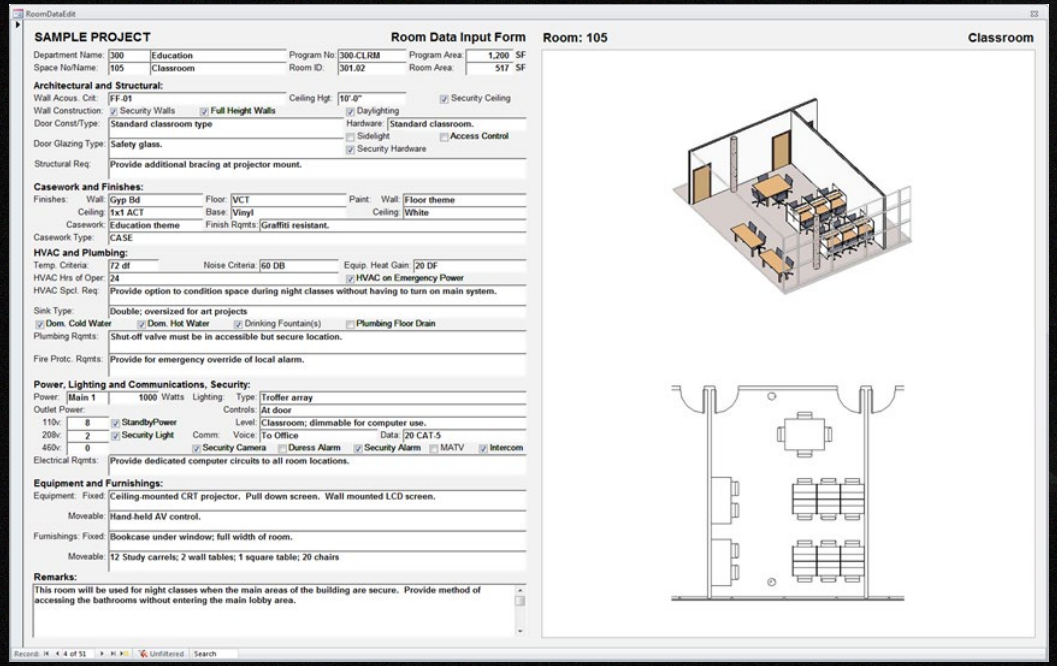


Room Data Sheet System

L4

3.2 Client Pre-tender Project Stage

- 3.2.1 Determine & oversee the development of Client Information Model (CIM)
  - 3.2.1.1 Organisational Information Requirements (OIRs)

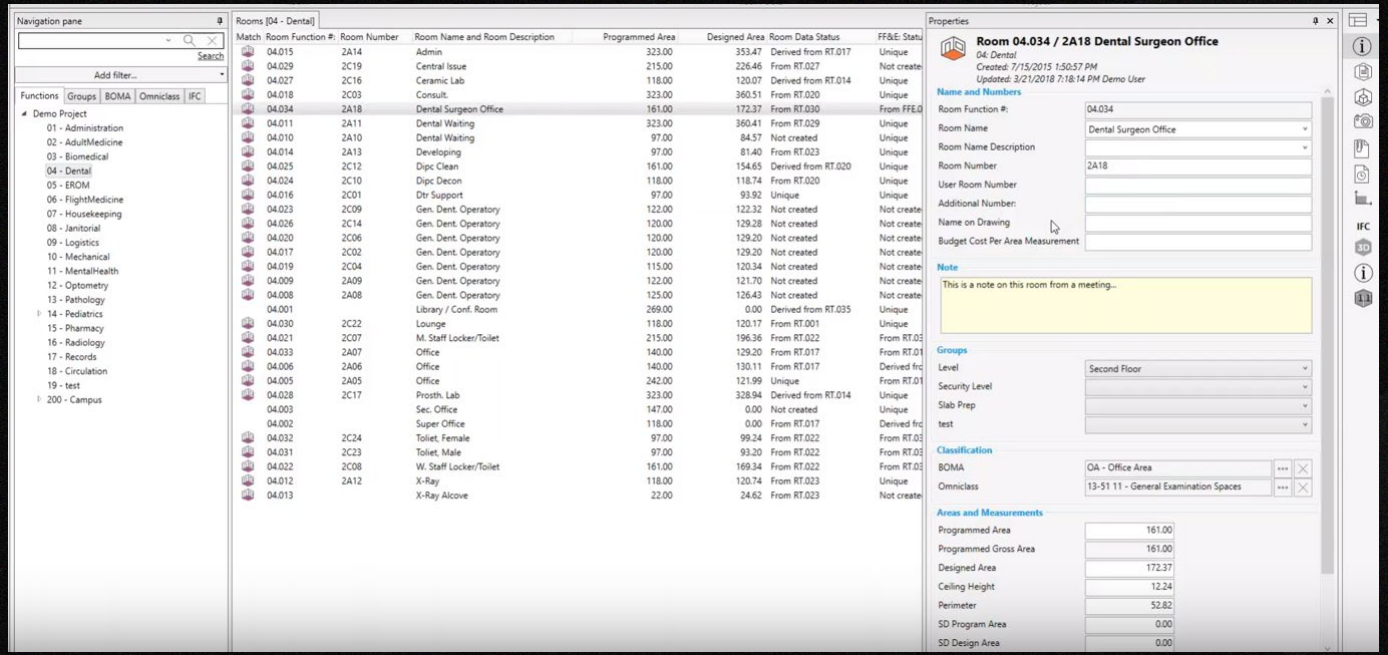


Sample Interface Refer to dRofus

L4

3.2 Client Pre-tender Project Stage

- 3.2.1 Determine & oversee the development of Client Information Model (CIM)
  - 3.2.1.1 Organisational Information Requirements (OIRs)

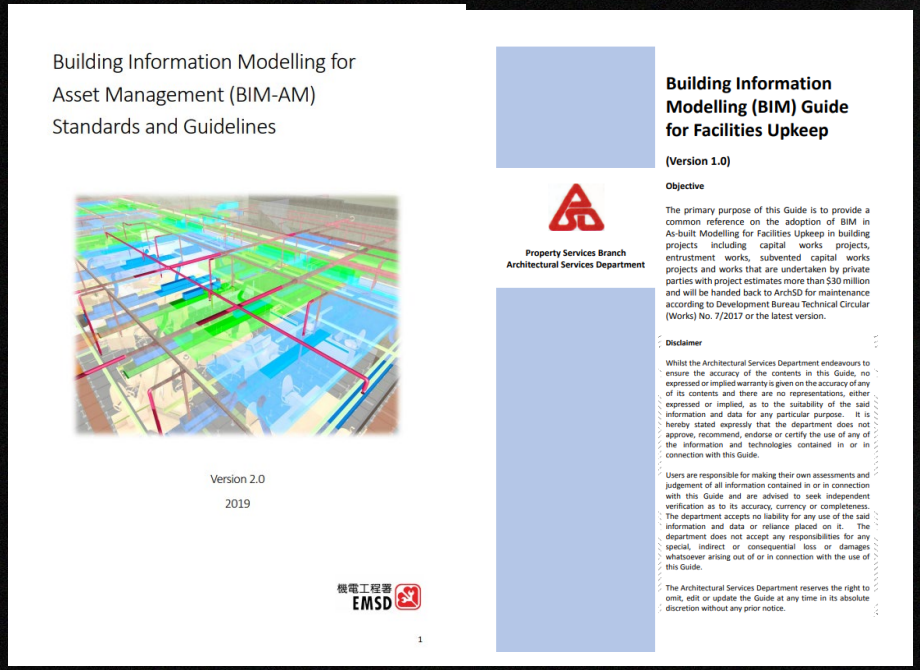


Sample Interface Refer to dRofus

L4

3.2 Client Pre-tender Project Stage

- 3.2.1 Determine & oversee the development of Client Information Model (CIM)
  - 3.2.1.2 Asset Information Requirements (AIRs)

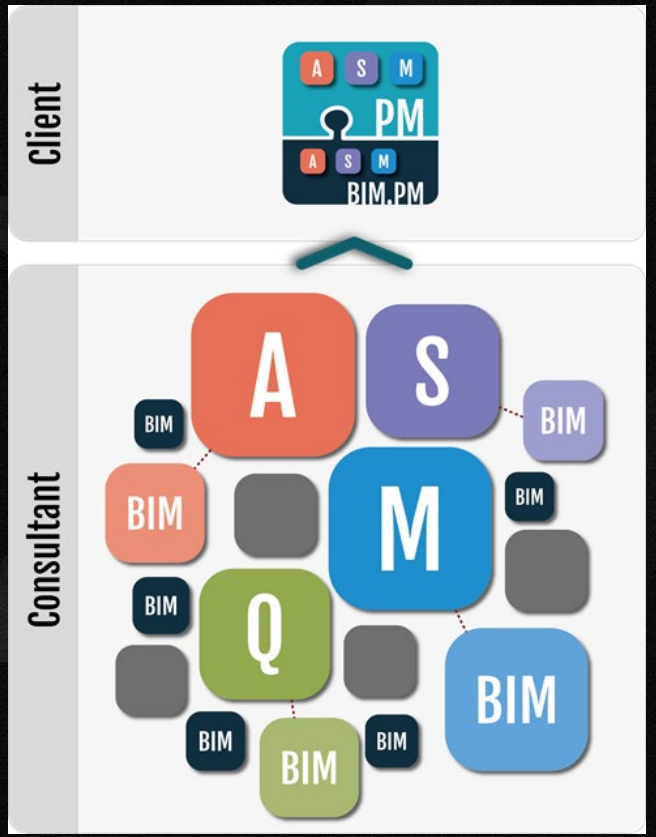


EMSD BIM Standard and ASD standard contained asset information requirement.

L4

3.2 Client Pre-tender Project Stage

- 3.2.2 Employers Information Requirements (EIR)

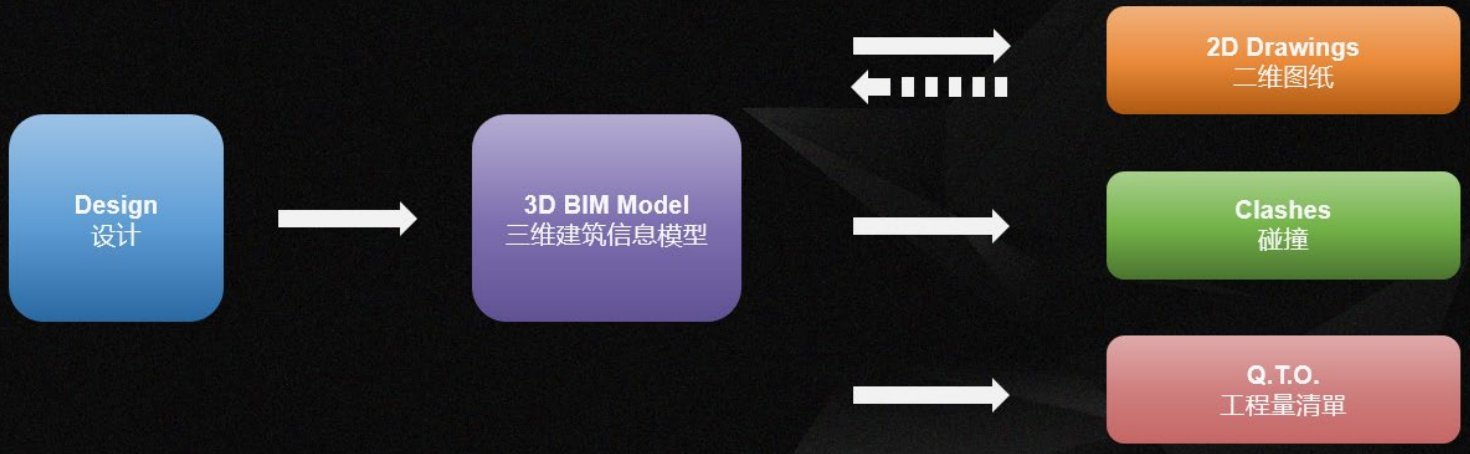


Specialized BIM
High Demand

L4

3.2 Client Pre-tender Project Stage

- 3.2.2 Employers Information Requirements (EIR)

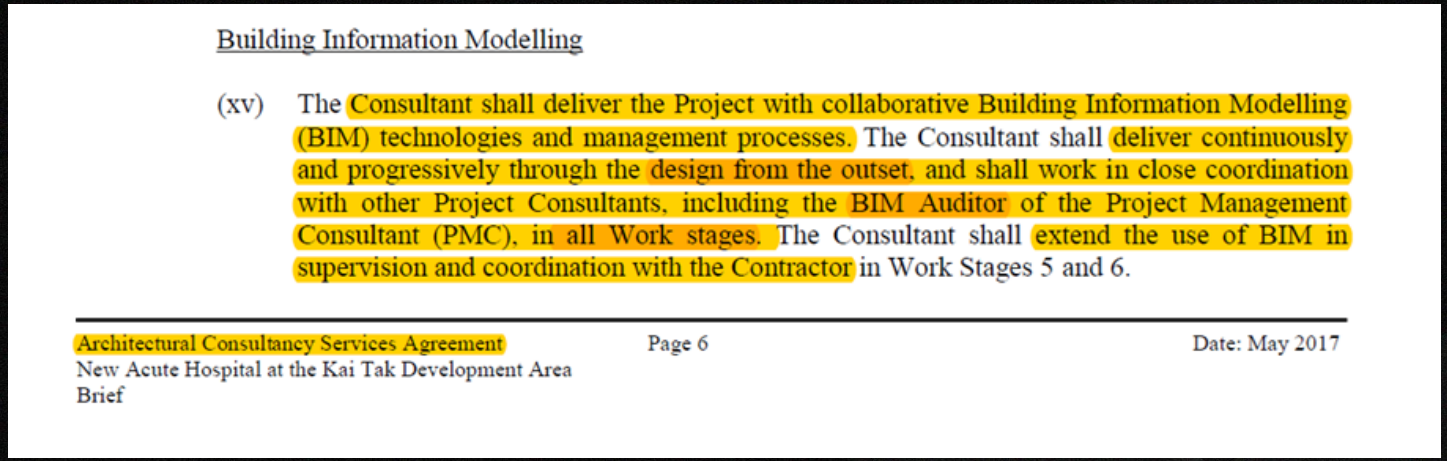


True BIM Workflow

L4

3.2 Client Pre-tender Project Stage

- 3.2.2 Employers Information Requirements (EIR)



Building Information Modelling

(xv) The Consultant shall deliver the Project with collaborative Building Information Modelling (BIM) technologies and management processes. The Consultant shall deliver continuously and progressively through the design from the outset, and shall work in close coordination with other Project Consultants, including the BIM Auditor of the Project Management Consultant (PMC), in all Work stages. The Consultant shall extend the use of BIM in supervision and coordination with the Contractor in Work Stages 5 and 6.

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New Acute Hospital at the Kai Tak Development Area
Brief

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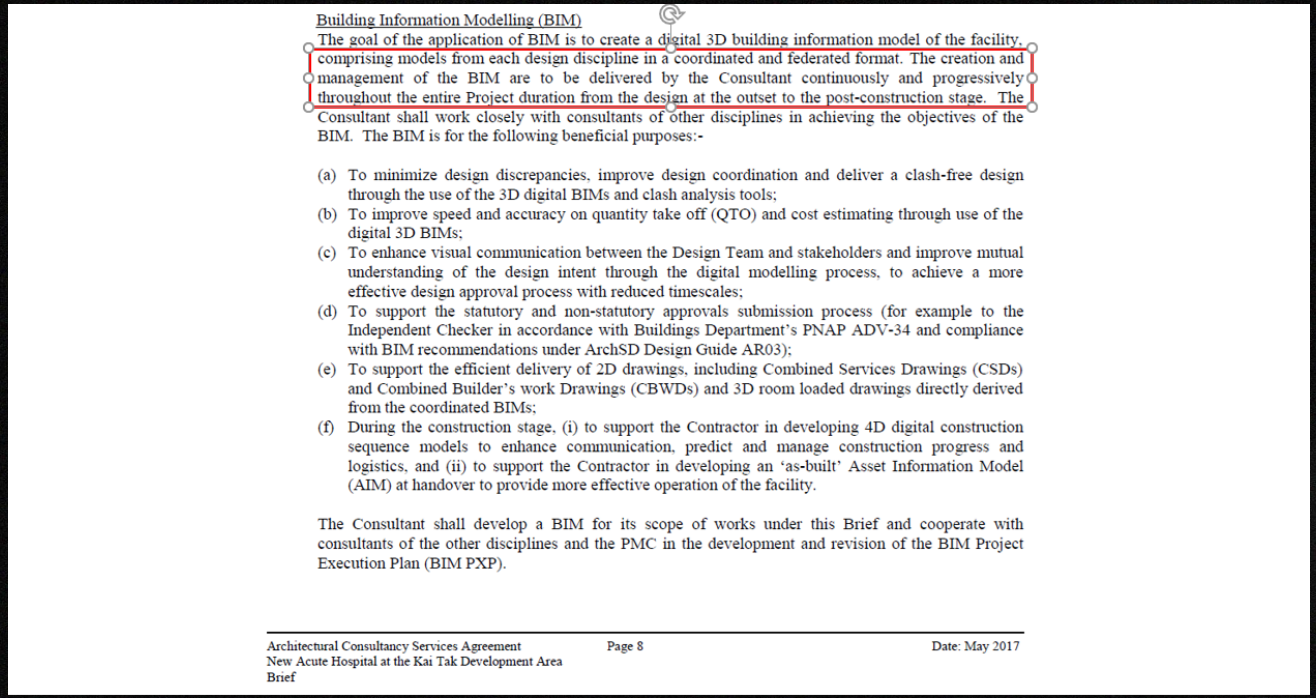
Date: May 2017

BIM Enabled Consultancy

L4

3.2 Client Pre-tender Project Stage

- 3.2.2 Employers Information Requirements (EIR)



Building Information Modelling (BIM)

The goal of the application of BIM is to create a digital 3D building information model of the facility, comprising models from each design discipline in a coordinated and federated format. The creation and management of the BIM are to be delivered by the Consultant continuously and progressively throughout the entire Project duration from the design at the outset to the post-construction stage. The Consultant shall work closely with consultants of other disciplines in achieving the objectives of the BIM. The BIM is for the following beneficial purposes:-

(a) To minimize design discrepancies, improve design coordination and deliver a clash-free design through the use of the 3D digital BIMs and clash analysis tools;
(b) To improve speed and accuracy on quantity take off (QTO) and cost estimating through use of the digital 3D BIMs;
(c) To enhance visual communication between the Design Team and stakeholders and improve mutual understanding of the design intent through the digital modelling process, to achieve a more effective design approval process with reduced timescales;
(d) To support the statutory and non-statutory approvals submission process (for example to the Independent Checker in accordance with Buildings Department's PNAP ADV-34 and compliance with BIM recommendations under ArchSD Design Guide AR03);
(e) To support the efficient delivery of 2D drawings, including Combined Services Drawings (CSDs) and Combined Builder's work Drawings (CBWDs) and 3D room loaded drawings directly derived from the coordinated BIMs;
(f) During the construction stage, (i) to support the Contractor in developing 4D digital construction sequence models to enhance communication, predict and manage construction progress and logistics, and (ii) to support the Contractor in developing an 'as-built' Asset Information Model (AIM) at handover to provide more effective operation of the facility.

The Consultant shall develop a BIM for its scope of works under this Brief and cooperate with consultants of the other disciplines and the PMC in the development and revision of the BIM Project Execution Plan (BIM PXP).

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New Acute Hospital at the Kai Tak Development Area
Brief
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Date: May 2017

BIM Enabled Consultancy

L4

3.2 Client Pre-tender Project Stage

3.2.3 Determine project technology & systems requirement & integration

1. Recommended hardware requirements for Design Authoring – Generating of various discipline BIM models

The project team will ensure the suitability of servers, workstations and network connectivity (both internal and external) to meet the minimum specifications of the adopted BIM tools and allow for software upgrades during the progress of the project.

Hardware	Specification	Users	Unit
PC Workstation	The following are the minimum hardware requirements for generating BIM models, families and assemblies: ● Intel Core i7-7700 @ 3.60GHz or equivalent AMD Athlon ® processor ● Microsoft® Windows 7 Pro 64-bit ● 64GB RAM ● 1TB free disk space ● GeForce capable graphics card with GTX900 series, GTX 1050 or later ● Video display 1,280x1,024 with true colour ● Internet connection for communication with project team ● Two-bottom mouse with scroll wheel ● Microsoft® Internet Explorer® 8.0 or later ● Two 24" 1.67 million True colour monitors	Project Manager & BIM Discipline Lead (ARC/CIV/ STR /BSE/CON/FAC)	1 no. (Quantity of PC should be decided by Project Manager)

L4

3.2 Client Pre-tender Project Stage

3.2.3 Determine project technology & systems requirement & integration

2. Recommended Software for BIM Use

The following software choices have been established to deliver the prioritised BIM objectives. Any software version changes and updates must be explicitly agreed by design team, contractor (post tender) and the BIM Manager before implementation.

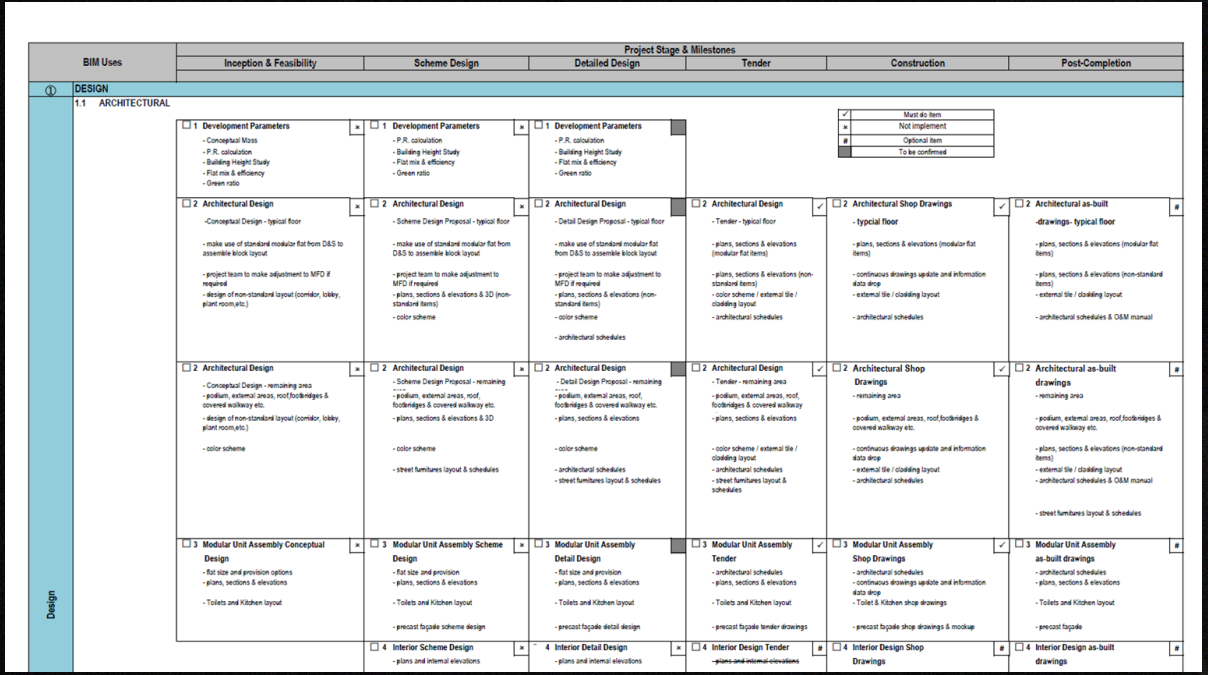
BIM Use	User		Software*	Unit
	Project Manager	BIM Discipline Lead		
Design Authoring	✓	ARC/ STR /BSE	Building Design Suite (Including Revit, Navisworks)	1 license (Quantity of license should be decided by Project Manager)
Design Reviews	✓	ARC/CIV/ STR /BSE	BIM 360 Docs	25 seats (Enough for consultant and PM team)
			Revit Server(Setup cost & Maintenance cost	1 no.
Spatial Planning / Libraries of assemblies / systems / components		ARC/CIV/ STR /BSE	Building Design Suite 2018 or above (Including Revit, Navisworks	/
3D Coordination	✓	ARC/CIV/ STR /BSE	Fuzor	1 licence (Quantity of license should be decided by Project Manager)

L4

3.2 Client Pre-tender Project Stage

- 3.2.4 Determine project delivery requirements

BIM Use checklist is used for different discipline to determine the stage they want to implement.



BIM Uses	Project Stage & Milestones					
	Inception & Feasibility	Scheme Design	Detailed Design	Tender	Construction	Post-Completion
① DESIGN						
1.1 ARCHITECTURAL						
Design	☐ 1 Development Parameters - Conceptual Mass - P.R. calculation - Building Height Study - Flat mix & efficiency - Green ratio ×	☐ 1 Development Parameters - P.R. calculation - Building Height Study - Flat mix & efficiency - Green ratio ×	☐ 1 Development Parameters - P.R. calculation - Building Height Study - Flat mix & efficiency - Green ratio			
	☐ 2 Architectural Design -Conceptual Design - typical floor - make use of standard modular flat from D&S to assemble block layout - project team to make adjustment to MFD if required - design of non-standard layout (corridor, lobby, plant room,etc.) ×	☐ 2 Architectural Design - Scheme Design Proposal - typical floor - make use of standard modular flat from D&S to assemble block layout - project team to make adjustment to MFD if required - plans, sections & elevations & 3D (non-standard items) - color scheme ×	☐ 2 Architectural Design - Detail Design Proposal - typical floor - make use of standard modular flat from D&S to assemble block layout - project team to make adjustment to MFD if required - plans, sections & elevations (non-standard items) - color scheme - architectural schedules	☐ 2 Architectural Design - Tender - typical floor - plans, sections & elevations (modular flat items) - plans, sections & elevations (non-standard items) - color scheme / external tile / cladding layout - architectural schedules ✓	☐ 2 Architectural Shop Drawings - typical floor - plans, sections & elevations (modular flat items) - continuous drawings update and information data drop - external tile / cladding layout - architectural schedules ✓	☐ 2 Architectural as-built -drawings- typical floor - plans, sections & elevations (modular flat items) - plans, sections & elevations (non-standard items) - external tile / cladding layout - architectural schedules & O&M manual #
	☐ 2 Architectural Design - Conceptual Design - remaining area - podium, external areas, roof,footbridges & covered walkway etc. - design of non-standard layout (corridor, lobby, plant room,etc.) - color scheme ×	☐ 2 Architectural Design - Scheme Design Proposal - remaining area - podium, external areas, roof, footbridges & covered walkway etc. - plans, sections & elevations & 3D - color scheme - street furnitures layout & schedules ×	☐ 2 Architectural Design - Detail Design Proposal - remaining area - podium, external areas, roof, footbridges & covered walkway etc. - plans, sections & elevations - color scheme - architectural schedules - street furnitures layout & schedules	☐ 2 Architectural Design - Tender - remaining area - podium, external areas, roof, footbridges & covered walkway - plans, sections & elevations - color scheme / external tile / cladding layout - architectural schedules - street furnitures layout & schedules ✓	☐ 2 Architectural Shop Drawings - remaining area - podium, external areas, roof,footbridges & covered walkway etc. - continuous drawings update and information data drop - external tile / cladding layout - architectural schedules ✓	☐ 2 Architectural as-built drawings - remaining area - podium, external areas, roof,footbridges & covered walkway etc. - plans, sections & elevations (non-standard items) - external tile / cladding layout - architectural schedules & O&M manual - street furnitures layout & schedules #
	☐ 3 Modular Unit Assembly Conceptual Design - flat size and provision options - plans, sections & elevations - Toilets and Kitchen layout ×	☐ 3 Modular Unit Assembly Scheme Design - flat size and provision - plans, sections & elevations - Toilets and Kitchen layout - precast façade scheme design ×	☐ 3 Modular Unit Assembly Detail Design - flat size and provision - plans, sections & elevations - Toilets and Kitchen layout - precast façade detail design	☐ 3 Modular Unit Assembly Tender - architectural schedules - plans, sections & elevations - Toilets and Kitchen layout - precast façade tender drawings ✓	☐ 3 Modular Unit Assembly Shop Drawings - architectural schedules - continuous drawings update and information data drop - Toilet & Kitchen shop drawings - precast façade shop drawings & mockup ✓	☐ 3 Modular Unit Assembly as-built drawings - architectural schedules - plans, sections & elevations - Toilets and Kitchen layout - precast façade #
		☐ 4 Interior Scheme Design - plans and internal elevations ×	☐ 4 Interior Detail Design - plans and internal elevations ×	☐ 4 Interior Design Tender ~~- plans and internal elevations~~ #	☐ 4 Interior Design Shop Drawings #	☐ 4 Interior Design as-built drawings #

✓	Must do item
×	Not implement
#	Optional item
	To be confirmed

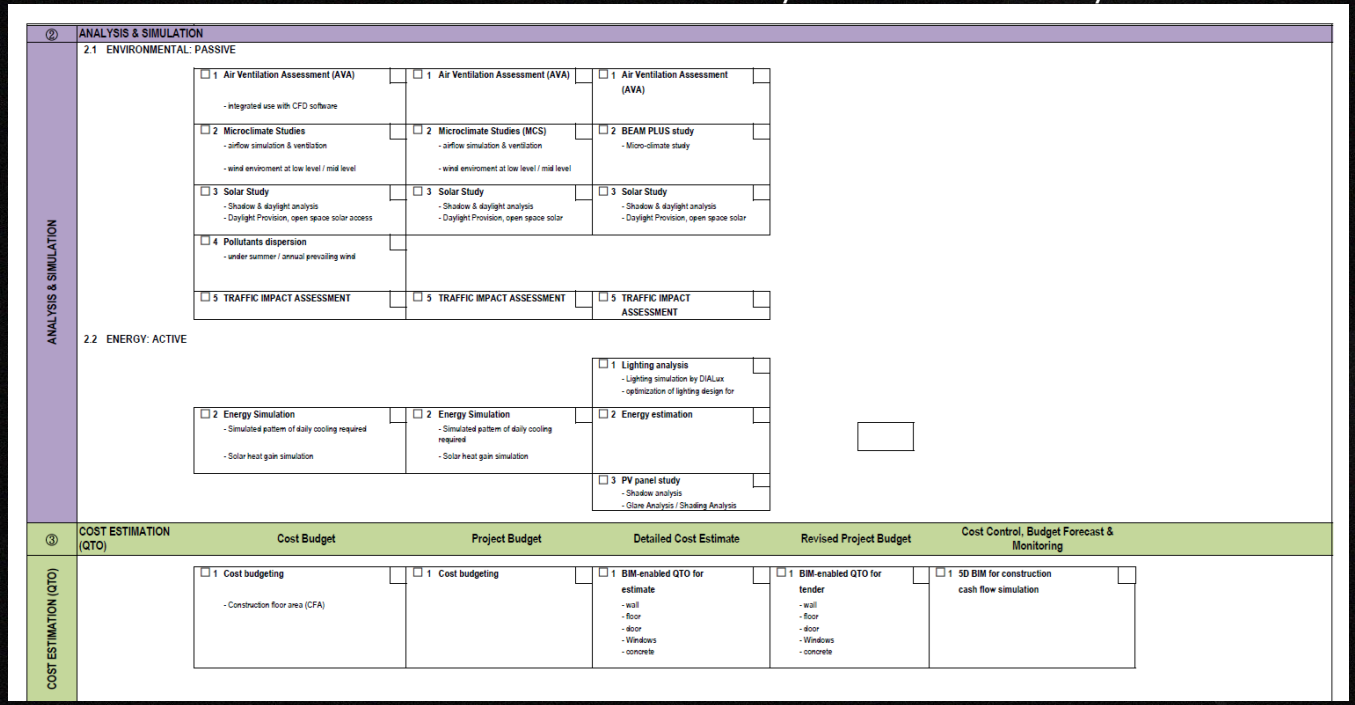
Example of Design Stage

L4

3.2 Client Pre-tender Project Stage

- 3.2.4 Determine project delivery requirements

Designer and client should determine which millstone they would like to do by use BIM.



②	ANALYSIS & SIMULATION					
ANALYSIS & SIMULATION	2.1 ENVIRONMENTAL: PASSIVE					
	☐ 1 Air Ventilation Assessment (AVA) - integrated use with CFD software	☐ 1 Air Ventilation Assessment (AVA)	☐ 1 Air Ventilation Assessment (AVA)			
	☐ 2 Microclimate Studies - airflow simulation & ventilation - wind environment at low level / mid level	☐ 2 Microclimate Studies (MCS) - airflow simulation & ventilation - wind environment at low level / mid level	☐ 2 BEAM PLUS study - Micro-climate study			
	☐ 3 Solar Study - Shadow & daylight analysis - Daylight Provision, open space solar access	☐ 3 Solar Study - Shadow & daylight analysis - Daylight Provision, open space solar	☐ 3 Solar Study - Shadow & daylight analysis - Daylight Provision, open space solar			
	☐ 4 Pollutants dispersion - under summer / annual prevailing wind					
	☐ 5 TRAFFIC IMPACT ASSESSMENT	☐ 5 TRAFFIC IMPACT ASSESSMENT	☐ 5 TRAFFIC IMPACT ASSESSMENT			
	2.2 ENERGY: ACTIVE					
			☐ 1 Lighting analysis - Lighting simulation by DIALux - optimization of lighting design for			
	☐ 2 Energy Simulation - Simulated pattern of daily cooling required - Solar heat gain simulation	☐ 2 Energy Simulation - Simulated pattern of daily cooling required - Solar heat gain simulation	☐ 2 Energy estimation			
			☐ 3 PV panel study - Shadow analysis - Glare Analysis / Shading Analysis			
③	COST ESTIMATION (QTO)	Cost Budget	Project Budget	Detailed Cost Estimate	Revised Project Budget	Cost Control, Budget Forecast & Monitoring
COST ESTIMATION (QTO)	☐ 1 Cost budgeting - Construction floor area (CFA)	☐ 1 Cost budgeting	☐ 1 BIM-enabled QTO for estimate - wall - floor - door - Windows - concrete	☐ 1 BIM-enabled QTO for tender - wall - floor - door - Windows - concrete	☐ 1 5D BIM for construction cash flow simulation	

Example of Analysis & Simulation and QTO

L4

3.2 Client Pre-tender Project Stage

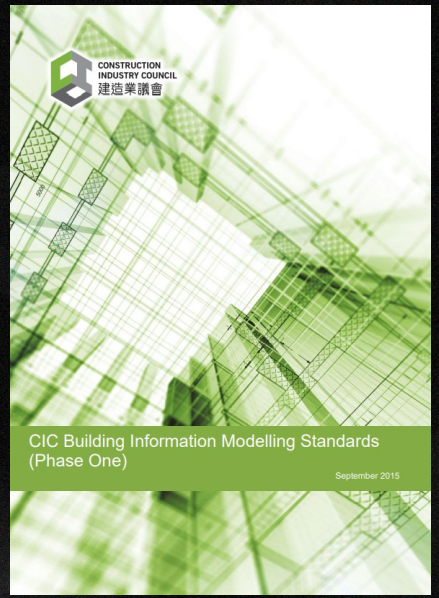
- 3.2.5 Determine the soft landings approach

BIM USES:

Highlight and place an X next to the additional BIM Uses to be developed by the use of the BIM model as selected by the project team using the BIM Goal & Use Analysis Worksheet. See BIM Project Execution Planning Guide at www.engr.psu.edu/BIM/BIM_Uses for Use descriptions. Include additional BIM Uses as applicable in empty cells.

X	PLAN	X	DESIGN	X	CONSTRUCT	X	OPERATE
	PROGRAMMING		DESIGN AUTHORING		SITE UTILIZATION PLANNING		BUILDING MAINTENANCE SCHEDULING
	SITE ANALYSIS		DESIGN REVIEWS		CONSTRUCTION SYSTEM DESIGN		BUILDING SYSTEM ANALYSIS
			3D COORDINATION		3D COORDINATION		ASSET MANAGEMENT
			STRUCTURAL ANALYSIS		DIGITAL FABRICATION		SPACE MANAGEMENT / TRACKING
			LIGHTING ANALYSIS		3D CONTROL AND PLANNING		DISASTER PLANNING
			ENERGY ANALYSIS		RECORD MODELING		RECORD MODELING
			MECHANICAL ANALYSIS				
			OTHER ENG. ANALYSIS				
			SUSTAINABLITY (LEED) EVALUATION				
			CODE VALIDATION				
	PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)
	COST ESTIMATION		COST ESTIMATION		COST ESTIMATION		COST ESTIMATION
	EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING

To set up BIM deliverable and LOD

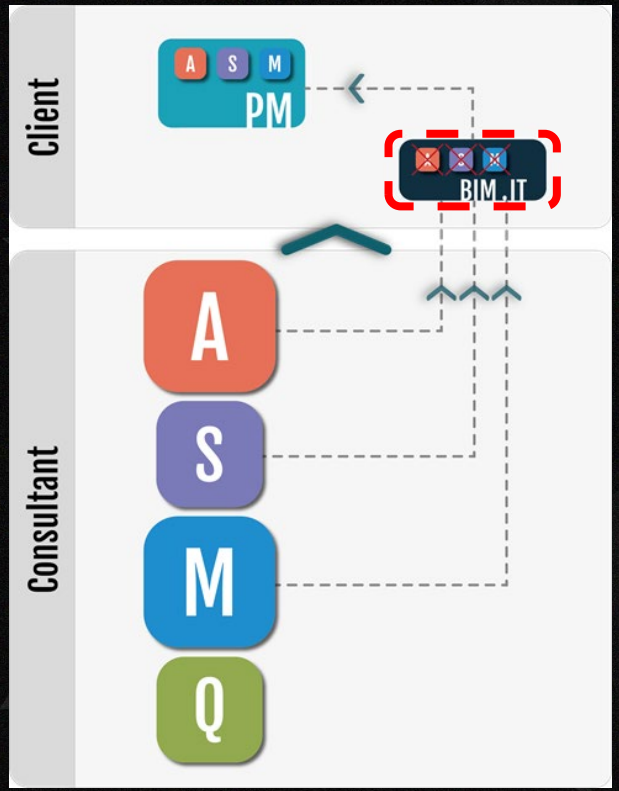


To selective for BIM use in different stage

L4

3.2 Client Pre-tender Project Stage

- 3.2.6 Contract & consultancy requirement



Low Level BIM

Super BIM !

L2

Client shall list out requirement of BIM Manager, Coordinator and BIM deliverable

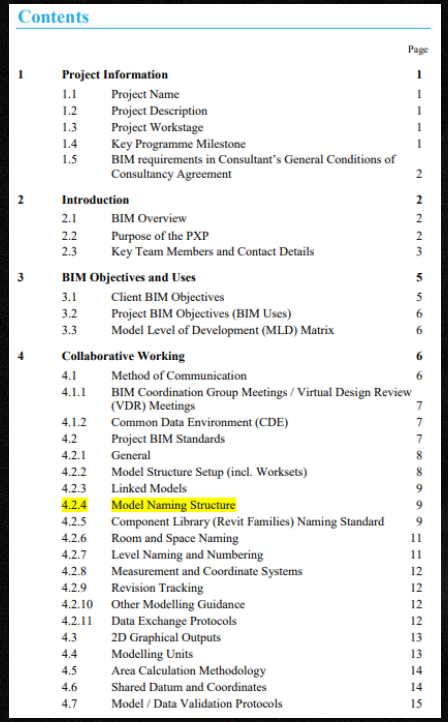
3.2 Client Pre-tender Project Stage

- 3.2.6 Contract & consultancy requirement

L2

3.2 Client Pre-tender Project Stage

- 3.2.6 Contract & consultancy requirement



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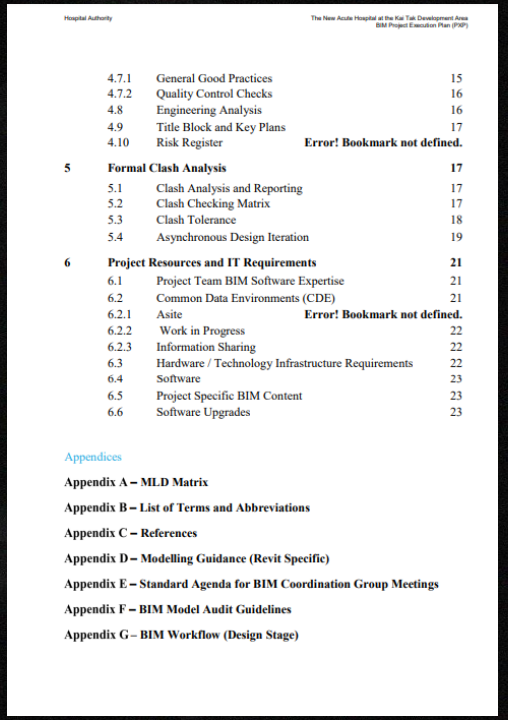


Setup of PXP and BIM Requirement

Client shall list out requirement of BIM Manager, Coordinator and BIM deliverable

L2

3.2 Client Pre-tender Project Stage

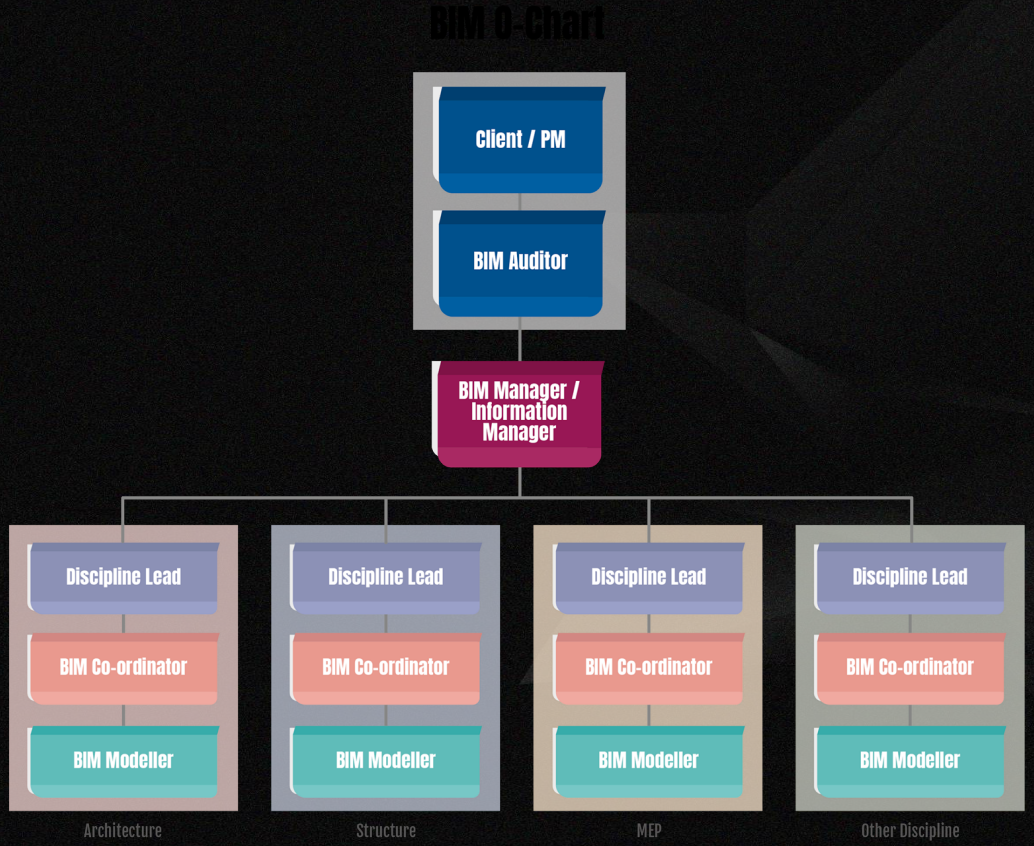
- 3.2.7 Assessment on supply chain capability & capacity (Tender Assessment)

One of the assessment is CIC BIM Manager Certification. Successful applicants can use title and logo of CIC Certified BIM Manager.

L4

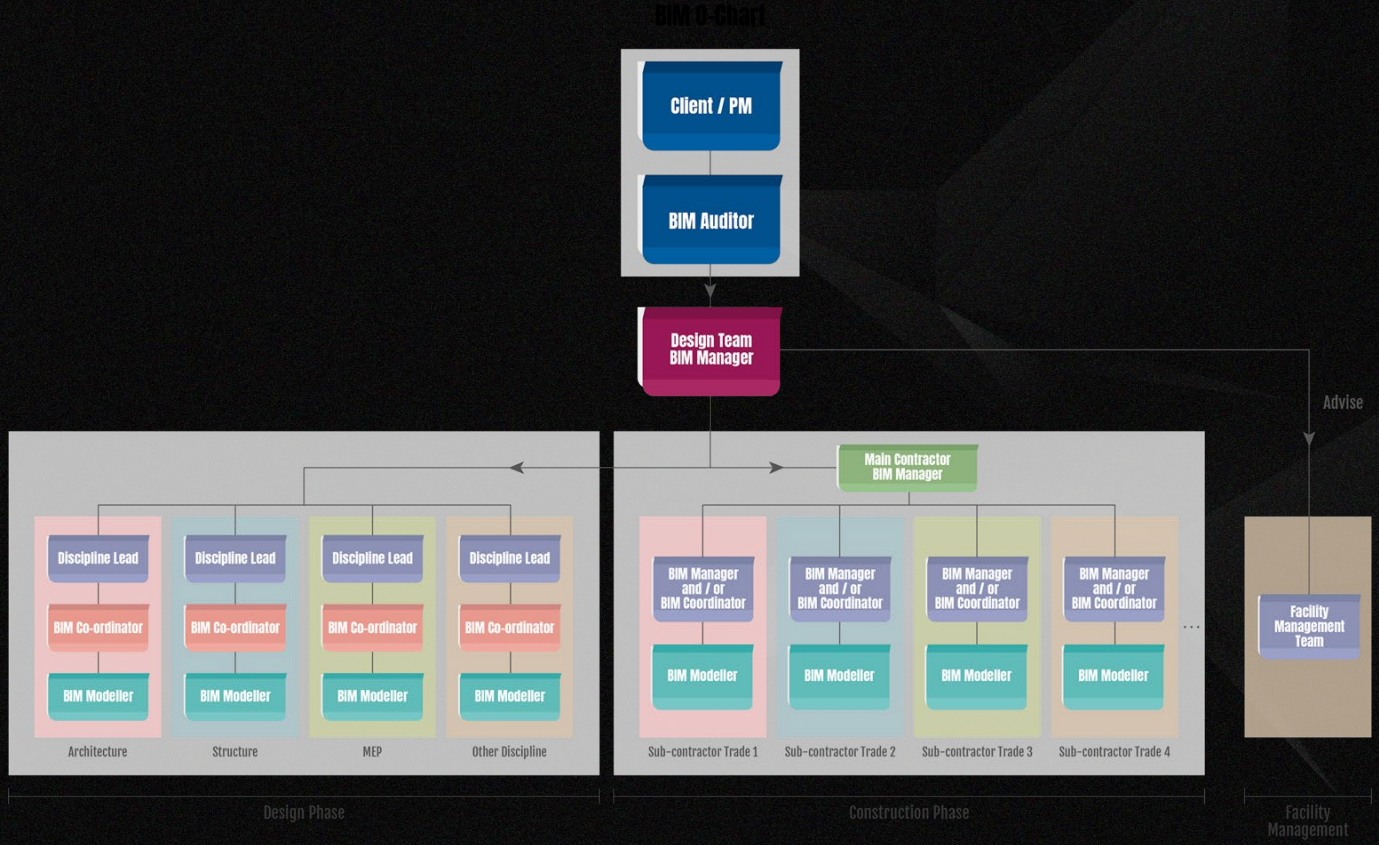
3.2 Client Pre-tender Project Stage

- 3.2.7 Assessment on supply chain capability & capacity (Tender Assessment)



3.2 Client Pre-tender Project Stage

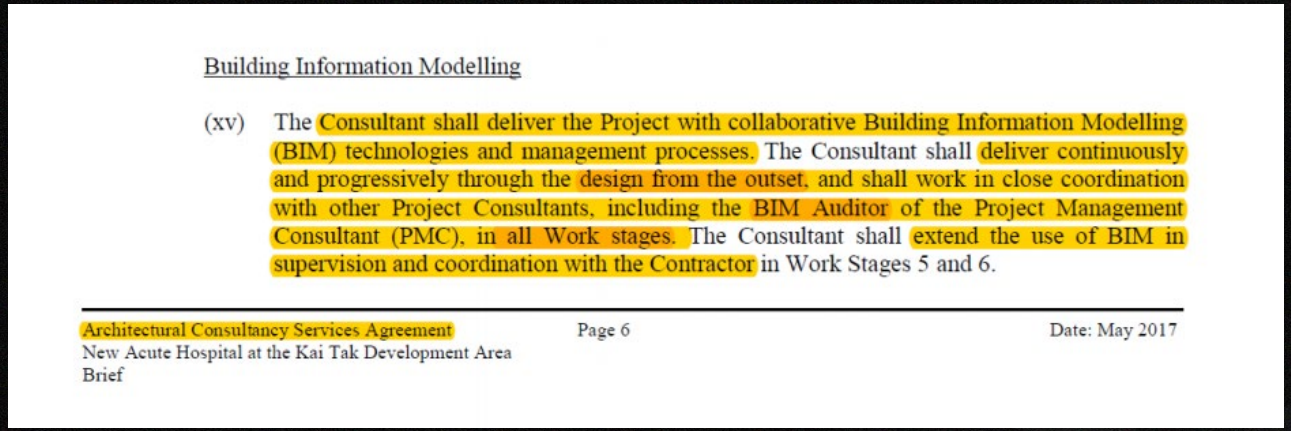
- 3.2.7 Assessment on supply chain capability & capacity (Tender Assessment)



L4

3.2 Client Pre-tender Project Stage

- 3.2.8 Case study



Building Information Modelling

(xv) The Consultant shall deliver the Project with collaborative Building Information Modelling (BIM) technologies and management processes. The Consultant shall deliver continuously and progressively through the design from the outset, and shall work in close coordination with other Project Consultants, including the BIM Auditor of the Project Management Consultant (PMC), in all Work stages. The Consultant shall extend the use of BIM in supervision and coordination with the Contractor in Work Stages 5 and 6.

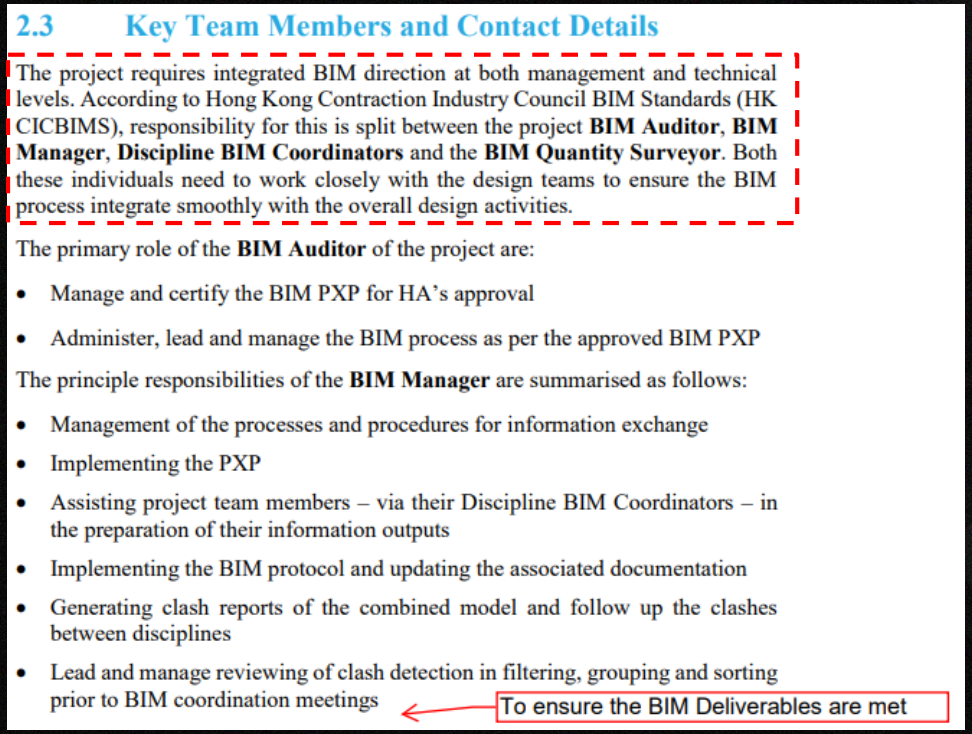
Right tender requirement

Deliver continuously and progressively through the design from the outset

L2

3.2 Client Pre-tender Project Stage

- 3.2.8 Case study



2.3 Key Team Members and Contact Details

The project requires integrated BIM direction at both management and technical levels. According to Hong Kong Contraction Industry Council BIM Standards (HK CICBIMS), responsibility for this is split between the project **BIM Auditor**, **BIM Manager**, **Discipline BIM Coordinators** and the **BIM Quantity Surveyor**. Both these individuals need to work closely with the design teams to ensure the BIM process integrate smoothly with the overall design activities.

The primary role of the **BIM Auditor** of the project are:

- Manage and certify the BIM PXP for HA's approval
- Administer, lead and manage the BIM process as per the approved BIM PXP

The principle responsibilities of the **BIM Manager** are summarised as follows:

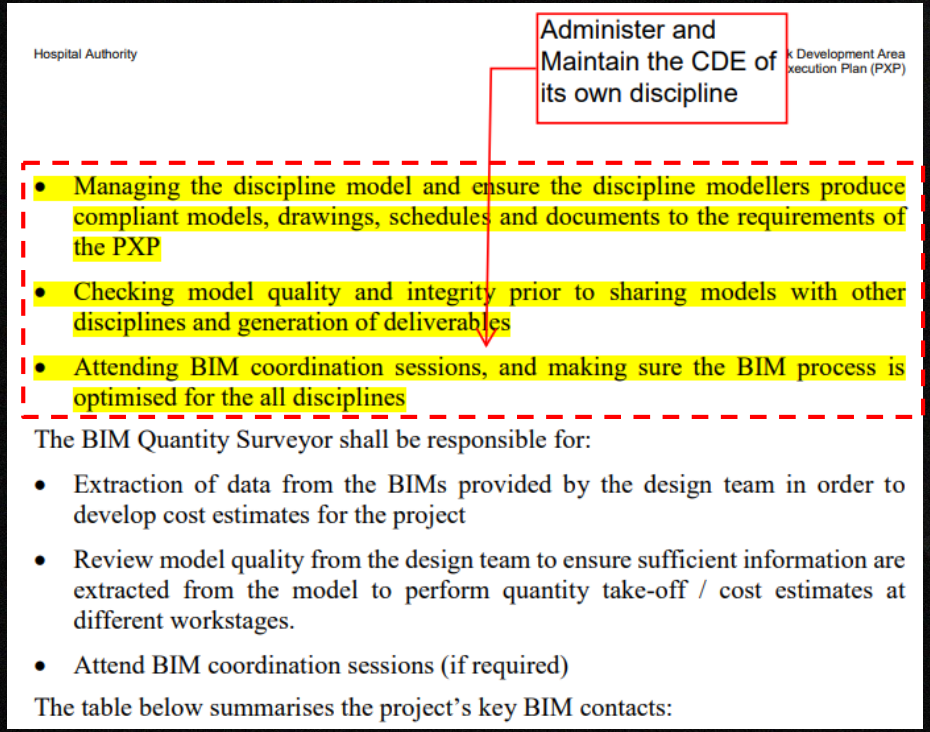
- Management of the processes and procedures for information exchange
- Implementing the PXP
- Assisting project team members – via their Discipline BIM Coordinators – in the preparation of their information outputs
- Implementing the BIM protocol and updating the associated documentation
- Generating clash reports of the combined model and follow up the clashes between disciplines
- Lead and manage reviewing of clash detection in filtering, grouping and sorting prior to BIM coordination meetings

Right tender requirement

L2

3.2 Client Pre-tender Project Stage

- 3.2.8 Case study



Right tender requirement

L2

3.3 Definition & Design Stage

- 3.3.1 BIM Execution Plan developed by supply chain
  - 3.3.1.1 Pre-contract BIM Project Execution Plan

	Sections included in PxP	Content Description
Section A	BM Project Execution Plan Overview	BIM Mission Statement
Section B	Project Information	Basic project reference information and determined project milestones.
Section C	Key Project Contacts	Lead BIM contacts for each organization
Section D	Project Goals, BIM Uses	How BIM Model and Facility Data are leveraged to maximize project value (e.g. design alternatives, life-cycle analysis, scheduling, estimating, material selection, pre-fabrication opportunities, site placement, etc.)
Section E	Organisational Roles/ Staffing	BIM Roles/Responsibilities and BIM Use Staffing
Section F	BIM Process Design	Process maps for each BIM Use
Section G	BIM Information Excnages	Important model elements by discipline, level of detail, and any specific attributes
Section H	BIM and Facility Data Requirememnts	Owners BIM requirements
Section I	Collaboration Procedures	How the project team will collaborate
Section J	Quality Control	Strategy to control the quality of the model
Section K	Technological Infrastructure Needs	Hardware, Software and IT Infrastructure requirements
Section L	Model Structure	List the structure for model file name, show the Model is separated
Section M	Project Deliverables	List the BIM deliverables for the project and the format
Section N	Deliver Strategy/ Contract	Delivery and Contracting Strategy, Team Selection Procedure and BIM Contracting Procedure

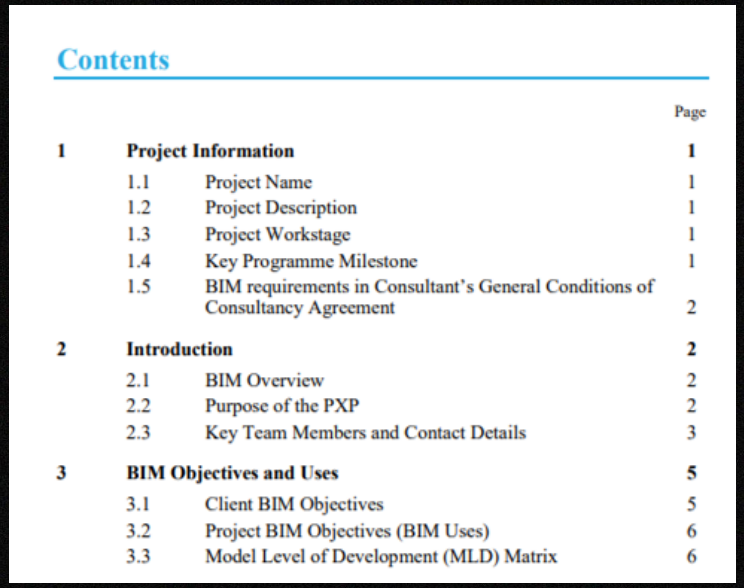
L4

Contents of PXP

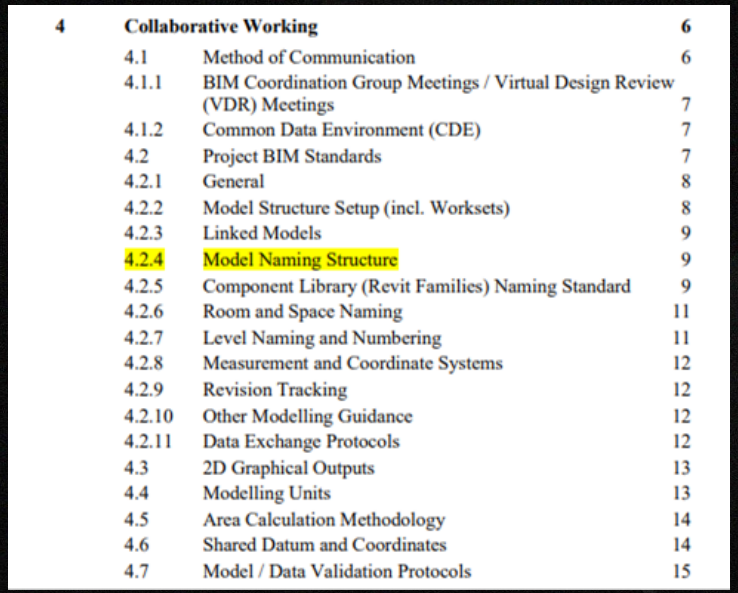
3.3 Definition & Design Stage

- 3.3.1 BIM Execution Plan developed by supply chain
  - 3.3.1.1 Pre-contract BIM Project Execution Plan

The first four section of project execution plan mainly include project information, Introduction of BIM and PXP, BIM objectives and Uses and Collaborative working.



Contents



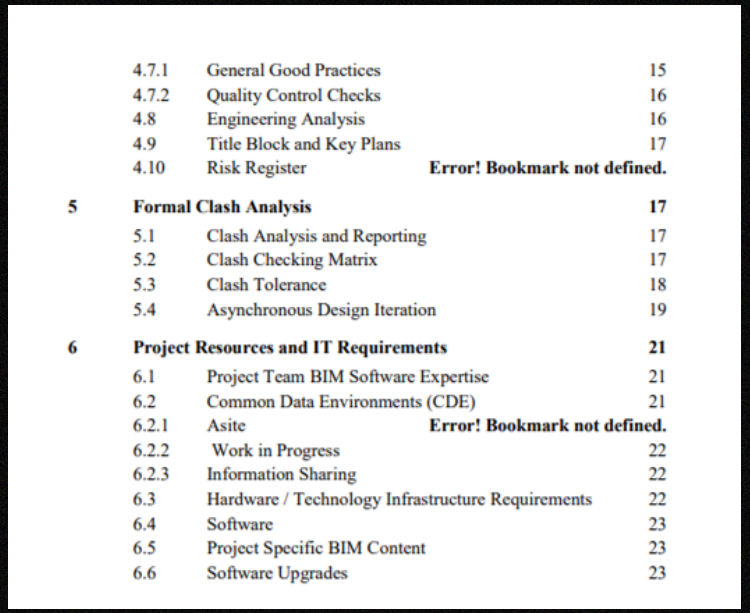
Contents of PXP

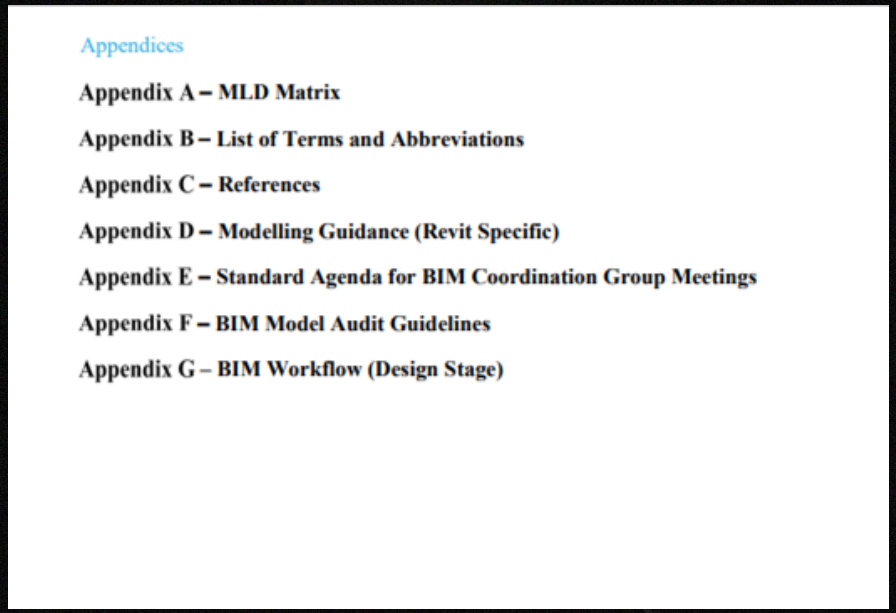
L4

3.3 Definition & Design Stage

- 3.3.1 BIM Execution Plan developed by supply chain
  - 3.3.1.1 Pre-contract BIM Project Execution Plan

The last two section of project execution plan mainly include Formal Clash Analysis, Project Resources and IT requirement.





Appendices

L4

Contents of PXP

3.3 Definition & Design Stage

- 3.3.2 Supervision in fulfilling BIM uses in planning & design stages listed in CIC BIM Standards

BIM Project Audit Checklist

Project Title	Audit Report Number
Project Number	
Discipline	
Central File Name	
BIM Coordinator	
Audit Date	
BIM Manager	

Numb	AUDIT CHECK POINT	EVIDENCE	COMMENT	COMPLIANC	TARGET COMPLETION DATE	COMPLETION DATE	FEEDBACK
	GENERAL						
1	Windows Explorer organization- Project revit folder structure and naming protocols. (CIC BIM Standard Section 4.1 "BIM Standard shall be stored within the project filing system.") Below is folder structure of the project. Therefore, if there is a Common Data Environment (CDE) or Ftp in your project... It is suggested that to use the folder structure in PXP Section 6.2.2"Work in Progress" 						

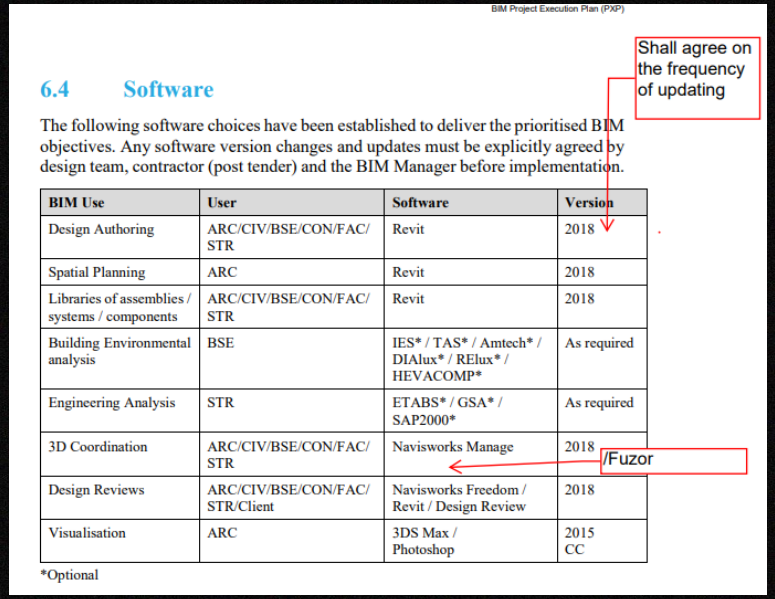
BIM Project Audit Checklist is used for audit different discipline model by BIM Manager. BIM Manager to advise other parties through geometry, the information and naming convention.

BIM Coordination Meeting would be chaired by BIM Manager one weeks after receiving the model from different discipline.

L4

3.3 Definition & Design Stage

- 3.3.3 Project Information Model (PIM) data exchanges and validation



BIM Project Execution Plan (PXP)

Shall agree on the frequency of updating

6.4 Software

The following software choices have been established to deliver the prioritised BIM objectives. Any software version changes and updates must be explicitly agreed by design team, contractor (post tender) and the BIM Manager before implementation.

BIM Use	User	Software	Version
Design Authoring	ARC/CIV/BSE/CON/FAC/ STR	Revit	2018
Spatial Planning	ARC	Revit	2018
Libraries of assemblies / systems / components	ARC/CIV/BSE/CON/FAC/ STR	Revit	2018
Building Environmental analysis	BSE	IES* / TAS* / Amtech* / DIAlux* / RElux* / HEVACOMP*	As required
Engineering Analysis	STR	ETABS* / GSA* / SAP2000*	As required
3D Coordination	ARC/CIV/BSE/CON/FAC/ STR	Navisworks Manage	2018
Design Reviews	ARC/CIV/BSE/CON/FAC/ STR/Client	Navisworks Freedom / Revit / Design Review	2018
Visualisation	ARC	3DS Max / Photoshop	2015 CC

*Optional

/Fuzor

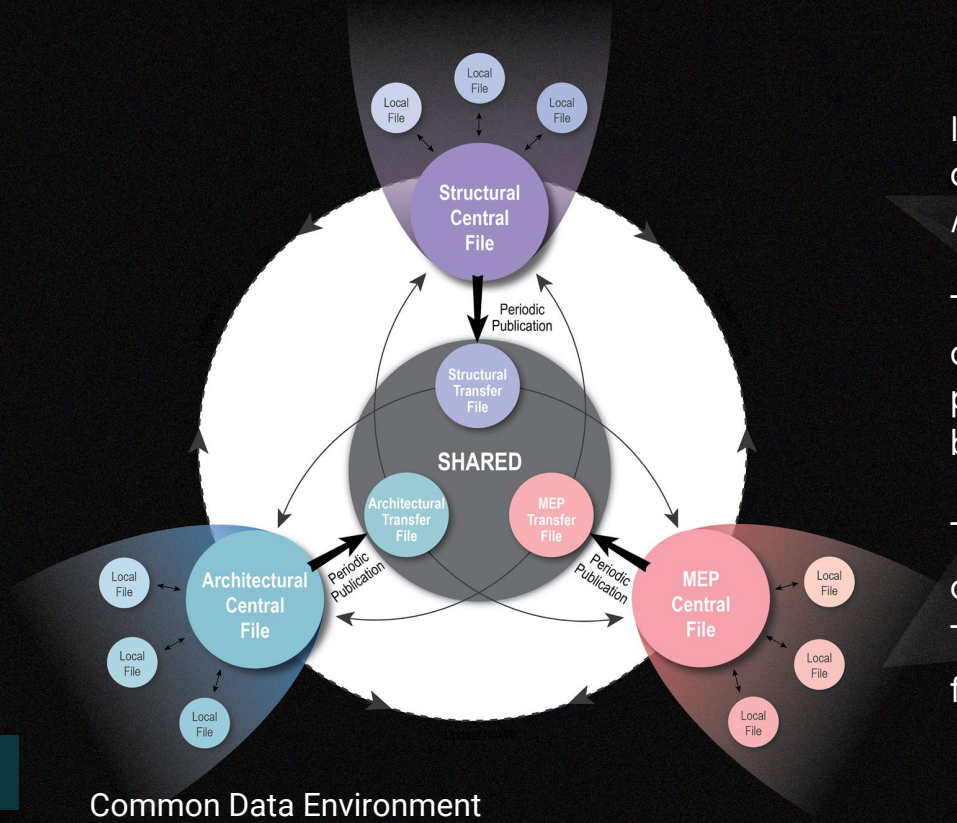
PXP Section 6.6

According to Project Execution Plan, Revit is used for Design Authoring, Spatial Planning . Naviswork and Fuzor are the platform for 3D coordination. For Design Reviews, Navisworks Freedom are used.

L4

3.3 Definition & Design Stage

- 3.3.3 Project Information Model (PIM) data exchanges and validation



Information in the form of documents, drawings and models are to be uploaded / logged via a CDE.

This process will ensure consistent and accessible information is provided to the project team and also accountability can be determined.

The BIM coordination team will upload a central model to share folder every week. The transfer file should be link to central file for different discipline.

L4

Common Data Environment

3.3 Definition & Design Stage

- 3.3.4 BIM PIM file setup
  - 3.3.4.1 BIM origin point & orientation setup

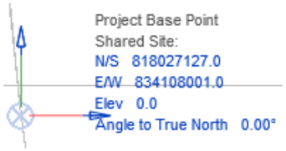
4.6 Shared Datum and Coordinates

The Lead Consultant is required and has established a known location (project / survey point) and defined this correctly in their Revit model. They should then share the coordinates and datum with all design consultants who should publish this into their Revit models.

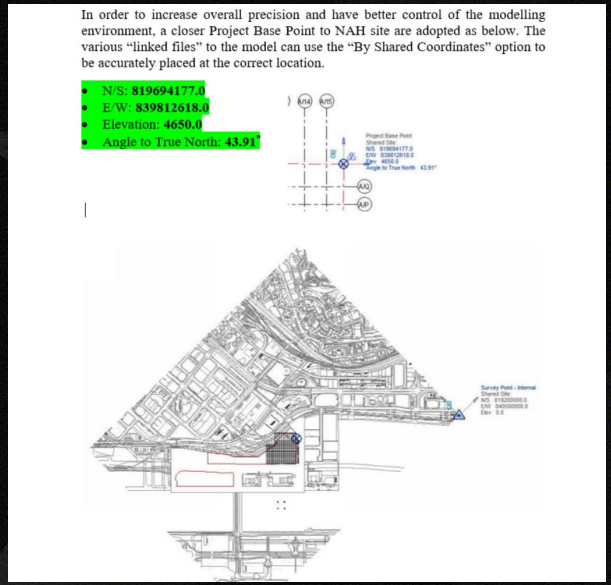
Following this, the relative location of all models should be checked by the design team continuously throughout the design process to ensure that there are no conflicting project coordinates or inaccurately placed models or building elements.

In order to increase overall precision and have better control of the modelling environment, a closer Project Base Point to NAH site are adopted as below. The various "linked files" to the model can use the "By Shared Coordinates" option to be accurately placed at the correct location.

- N/S: **to be inserted**
- E/W: **to be inserted**
- Elevation: **to be inserted**
- Angle to True North: **to be inserted**



Shared Datum and coordinates of projects should be mentioned in PXP.

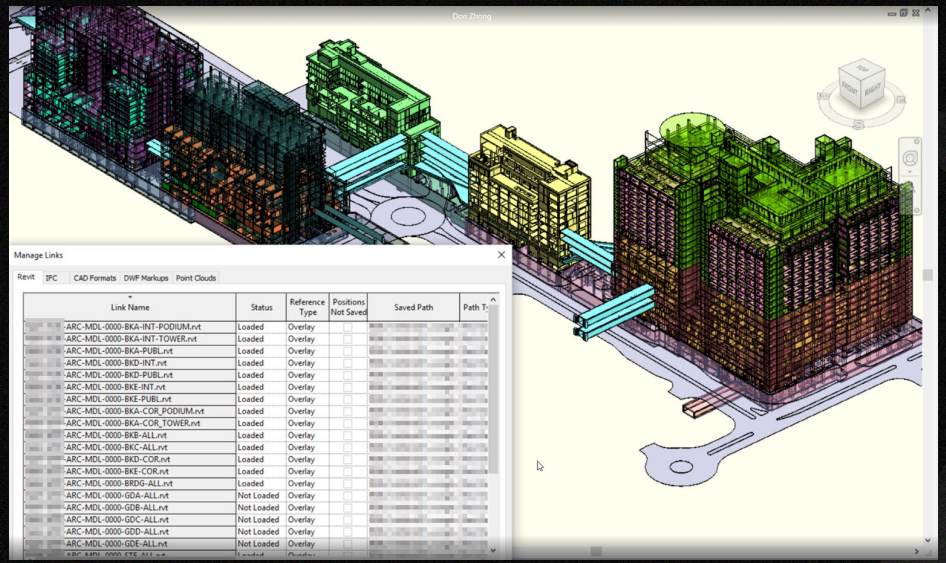


Site map should be mentioned for the detail of share coordinates.

L4

3.3 Definition & Design Stage

- 3.3.4 BIM PIM file setup
  - 3.3.4.2 Model division



Models generally will be split by “discipline”.

If models need to be subdivided further by sub-discipline – e.g. BSE into BME, BPD, they should be recorded in this PXP.

Post tender if specialist subcontractor design is involved, any further splitting of the model in any discipline should be coordinated by the BIM Manager and recorded in the PXP.

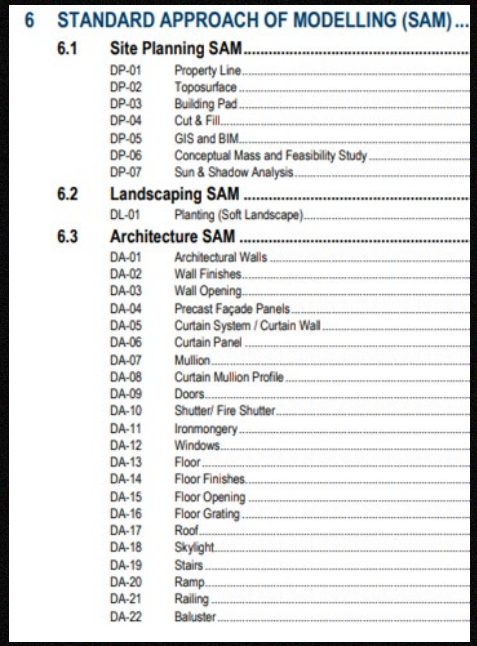
All subcontractor models should follow the standards and protocols contained in the PXP.

L4

3.3 Definition & Design Stage

- 3.3.4 BIM PIM file setup
  - 3.3.4.3 Modelling methodology

There are standard approach of modelling for site planning, landscaping, ARC and STR works.



6 STANDARD APPROACH OF MODELLING (SAM) ...

6.1 Site Planning SAM

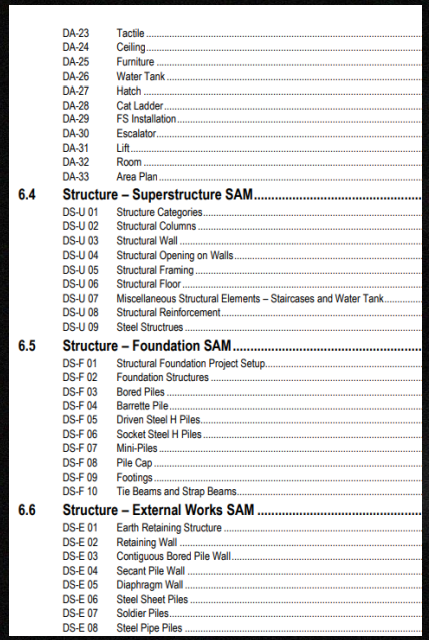
DP-01	Property Line
DP-02	Toposurface
DP-03	Building Pad
DP-04	Cut & Fill
DP-05	GIS and BIM
DP-06	Conceptual Mass and Feasibility Study
DP-07	Sun & Shadow Analysis

6.2 Landscaping SAM

DL-01	Planting (Soft Landscape)

6.3 Architecture SAM

DA-01	Architectural Walls
DA-02	Wall Finishes
DA-03	Wall Opening
DA-04	Precast Façade Panels
DA-05	Curtain System / Curtain Wall
DA-06	Curtain Panel
DA-07	Mullion
DA-08	Curtain Mullion Profile
DA-09	Doors
DA-10	Shutter/ Fire Shutter
DA-11	Ironmongery
DA-12	Windows
DA-13	Floor
DA-14	Floor Finishes
DA-15	Floor Opening
DA-16	Floor Grating
DA-17	Roof
DA-18	Skylight
DA-19	Stairs
DA-20	Ramp
DA-21	Railing
DA-22	Baluster



DA-23	Tactile
DA-24	Ceiling
DA-25	Furniture
DA-26	Water Tank
DA-27	Hatch
DA-28	Cat Ladder
DA-29	FS Installation
DA-30	Escalator
DA-31	Lift
DA-32	Room
DA-33	Area Plan

6.4 Structure – Superstructure SAM

DS-U 01	Structure Categories
DS-U 02	Structural Columns
DS-U 03	Structural Wall
DS-U 04	Structural Opening on Walls
DS-U 05	Structural Framing
DS-U 06	Structural Floor
DS-U 07	Miscellaneous Structural Elements – Staircases and Water Tank
DS-U 08	Structural Reinforcement
DS-U 09	Steel Structrues

6.5 Structure – Foundation SAM

DS-F 01	Structural Foundation Project Setup
DS-F 02	Foundation Structures
DS-F 03	Bored Piles
DS-F 04	Barrette Pile
DS-F 05	Driven Steel H Piles
DS-F 06	Socket Steel H Piles
DS-F 07	Mini-Piles
DS-F 08	Pile Cap
DS-F 09	Footings
DS-F 10	Tie Beams and Strap Beams

6.6 Structure – External Works SAM

DS-E 01	Earth Retaining Structure
DS-E 02	Retaining Wall
DS-E 03	Contiguous Bored Pile Wall
DS-E 04	Secant Pile Wall
DS-E 05	Diaphragm Wall
DS-E 06	Steel Sheet Piles
DS-E 07	Soldier Piles
DS-E 08	Steel Pipe Piles

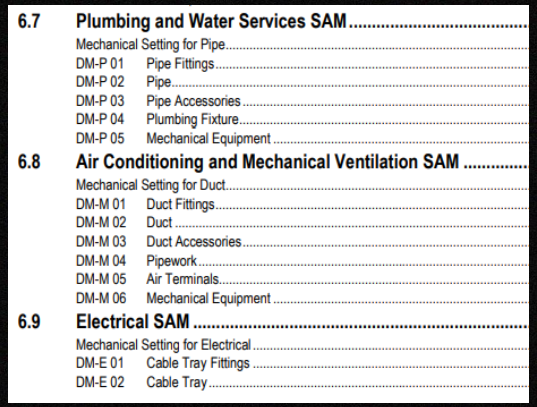
L4

Content of Housing Authority BIM Standards and Guidelines

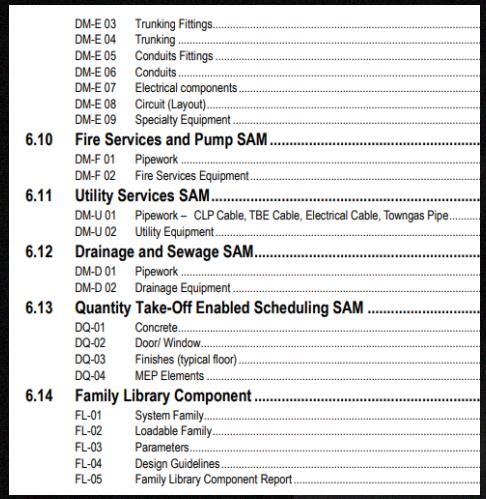
3.3 Definition & Design Stage

- 3.3.4 BIM PIM file setup
  - 3.3.4.3 Modelling methodology

There are standard approach of modelling for MEP and Family Library.



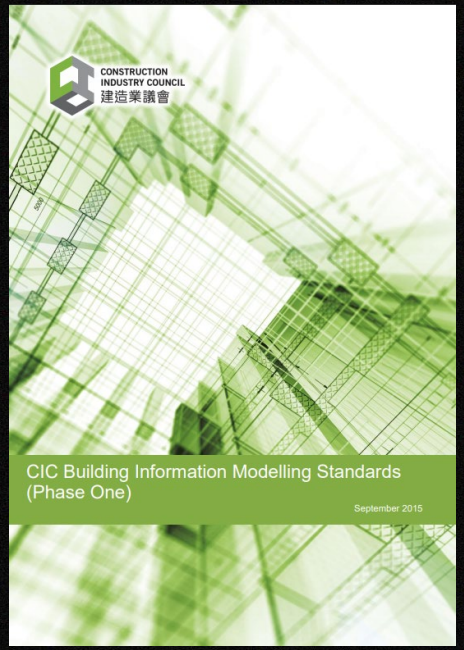
6.7	**Plumbing and Water Services SAM**	
	Mechanical Setting for Pipe	
	DM-P 01	Pipe Fittings
	DM-P 02	Pipe
	DM-P 03	Pipe Accessories
	DM-P 04	Plumbing Fixture
	DM-P 05	Mechanical Equipment
6.8	**Air Conditioning and Mechanical Ventilation SAM**	
	Mechanical Setting for Duct	
	DM-M 01	Duct Fittings
	DM-M 02	Duct
	DM-M 03	Duct Accessories
	DM-M 04	Pipework
	DM-M 05	Air Terminals
	DM-M 06	Mechanical Equipment
6.9	**Electrical SAM**	
	Mechanical Setting for Electrical	
	DM-E 01	Cable Tray Fittings
	DM-E 02	Cable Tray



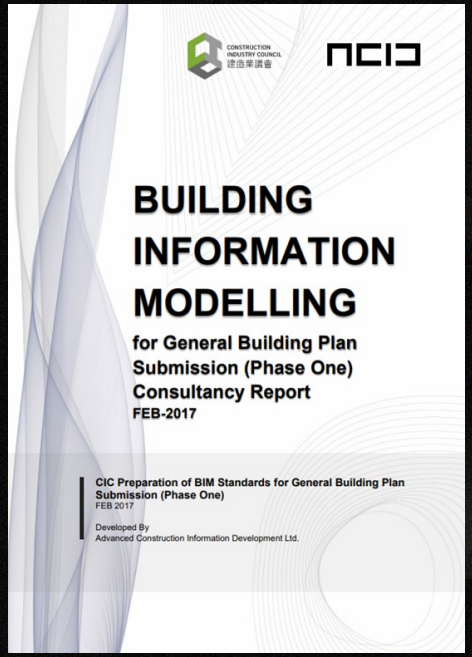
	DM-E 03	Trunking Fittings
	DM-E 04	Trunking
	DM-E 05	Conduits Fittings
	DM-E 06	Conduits
	DM-E 07	Electrical components
	DM-E 08	Circuit (Layout)
	DM-E 09	Specialty Equipment
6.10	**Fire Services and Pump SAM**	
	DM-F 01	Pipework
	DM-F 02	Fire Services Equipment
6.11	**Utility Services SAM**	
	DM-U 01	Pipework – CLP Cable, TBE Cable, Electrical Cable, Towngas Pipe
	DM-U 02	Utility Equipment
6.12	**Drainage and Sewage SAM**	
	DM-D 01	Pipework
	DM-D 02	Drainage Equipment
6.13	**Quantity Take-Off Enabled Scheduling SAM**	
	DQ-01	Concrete
	DQ-02	Door/ Window
	DQ-03	Finishes (typical floor)
	DQ-04	MEP Elements
6.14	**Family Library Component**	
	FL-01	System Family
	FL-02	Loadable Family
	FL-03	Parameters
	FL-04	Design Guidelines
	FL-05	Family Library Component Report

3.3 Definition & Design Stage

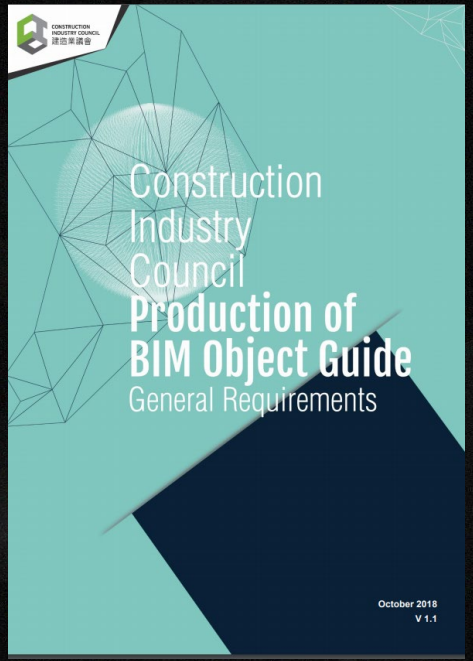
- 3.3.4 BIM PIM file setup
  - 3.3.4.4 Project-based industry and BIM standards



CIC BIM Standard (Phase 1)



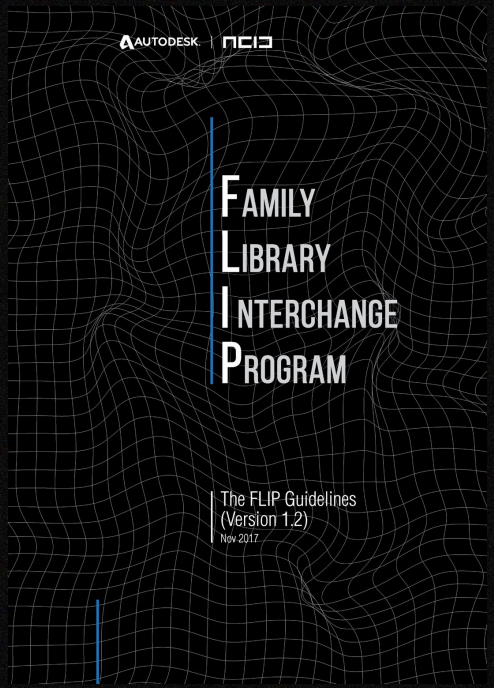
BIM for GBP Submission Standard



BIM Object Guide - General Requirement

3.3 Definition & Design Stage

- 3.3.4 BIM PIM file setup
  - 3.3.4.4 Project-based industry and BIM standards



The FLIP Guideline

Building Information Modelling (BIM) Guide for Facilities Upkeep

(Version 1.0)

Property Services Branch
Architectural Services Department

Objective

The primary purpose of this Guide is to provide a common reference on the adoption of BIM in As-built Modelling for Facilities Upkeep in building projects including capital works projects, entrustment works, subvented capital works projects and works that are undertaken by private parties with project estimates more than $30 million and will be handed back to ArchSD for maintenance according to Development Bureau Technical Circular (Works) No. 7/2017 or the latest version.

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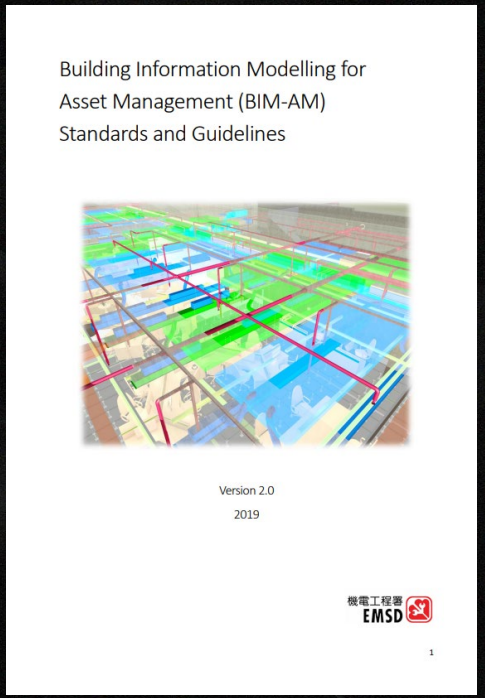
The Architectural Services Department reserves the right to omit, edit or update the Guide at any time in its absolute discretion without any prior notice.

BIM Guide for Facilities Upkeep PSB



Building Information Modelling for Asset Management (BIM-AM) Standards and Guidelines

Version 2.0

2019

機電工程署 EMSD

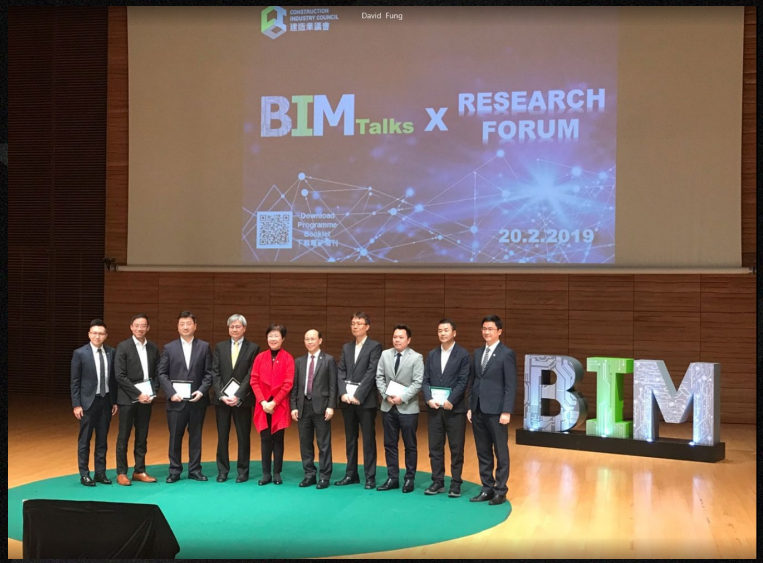
1

EMSD BIM Standard (Version 2.0)

L4

3.3 Definition & Design Stage

- 3.3.5 Direct BIM related meetings
  - 3.3.5.1 Meeting with high level



BIM Talks X Research Forum on 19/2/2019

L2

3.3 Definition & Design Stage

- 3.3.5 Direct BIM related meetings
  - 3.3.5.1 Meeting with high level

BIM Certification and Accreditation Scheme Launch Ceremony on 28/1/2019

L2

3.3 Definition & Design Stage

- 3.3.5 Direct BIM related meetings
  - 3.3.5.2 Meeting with supply chain level

Collaboration Meetings
The following meetings are proposed but not exhaustive:

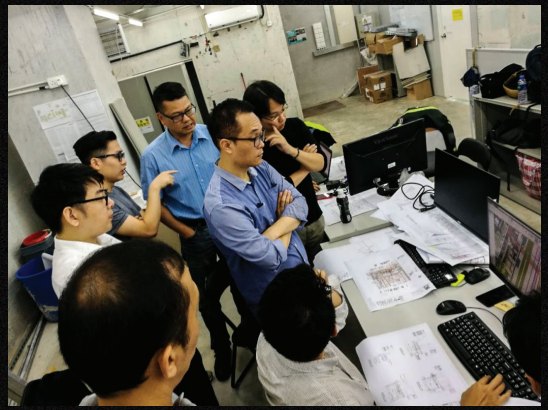
MEETING TYPE	PROJECT STAGE	FREQUENCY	PARTICIPANTS	Location
Design/ Constructability Review, Coordination Meeting	Construction Stage	As needed	Employer/ Project Design Consultants/ MC/ SC	On-site meeting or web meeting if possible
Site Progress Meeting	Construction Stage	Monthly	Employer/ Project Design Consultants/ MC/ SC	On-site meeting
Project Close-out	Construction Administration	As needed	AE/LDI/Employer/MC	TBD

Meeting with supply chain level by using Fuzor

L2

3.3 Definition & Design Stage

- 3.3.5 Direct BIM related meetings
  - 3.3.5.3 Internal meeting



Coordination in internal meeting

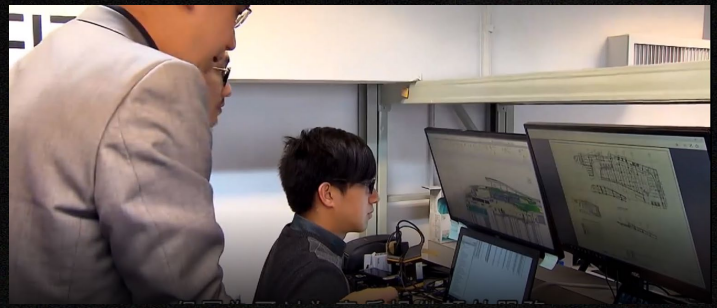
Model Audit in internal meeting

L2

3.3 Definition & Design Stage

- 3.3.5 Direct BIM related meetings
  - 3.3.5.4 Multi-discipline collaboration meeting

Coordination in Multi-discipline collaboration meeting



Model Auditing in Multidiscipline collaboration meeting

Coordination in Multi-discipline collaboration meeting

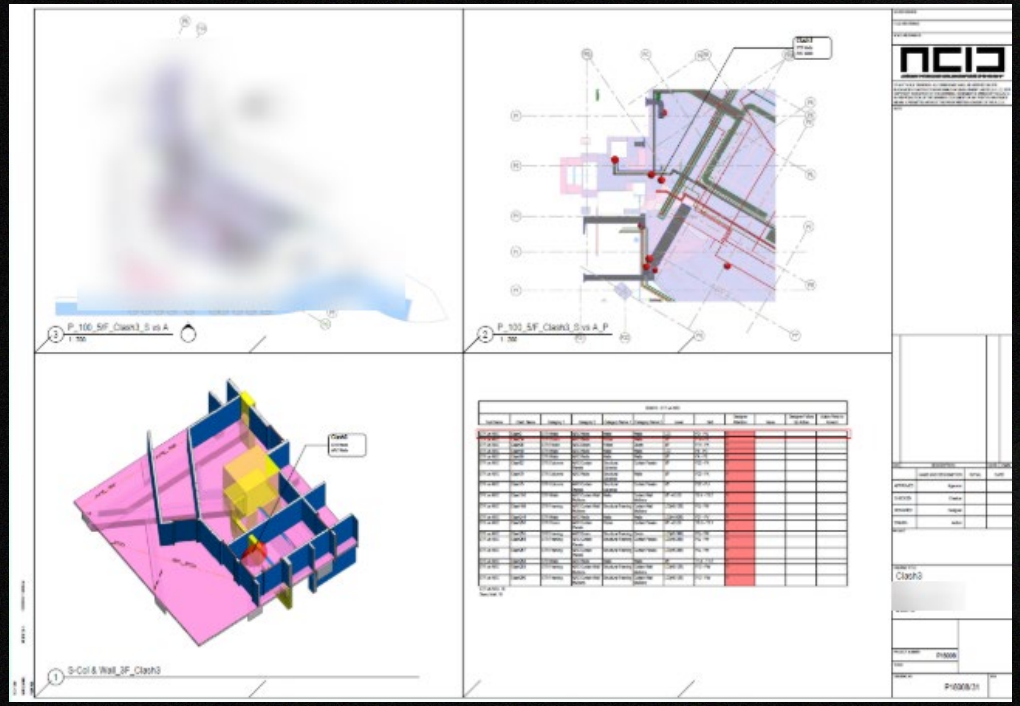
Visual check by using Fuzor

L2

3.3 Definition & Design Stage

- 3.3.6 Case Study

Collaboration in BIM

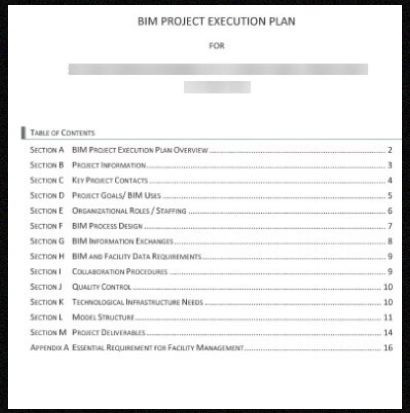


Example: Clash detection and indicate area to be reviewed.

L2

3.4 Construction Stage

- 3.4.1 BIM Execution Plan developed by supply chain
  - 3.4.1.1 Pre-contract BIM Project Execution Plan



BIM PROJECT EXECUTION PLAN

FOR

[redacted]

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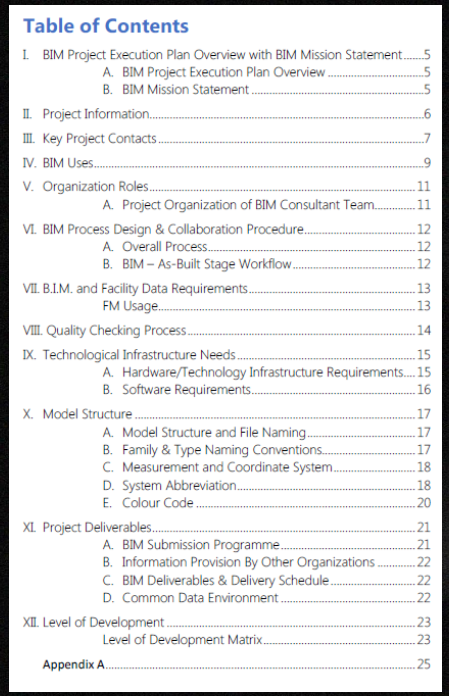


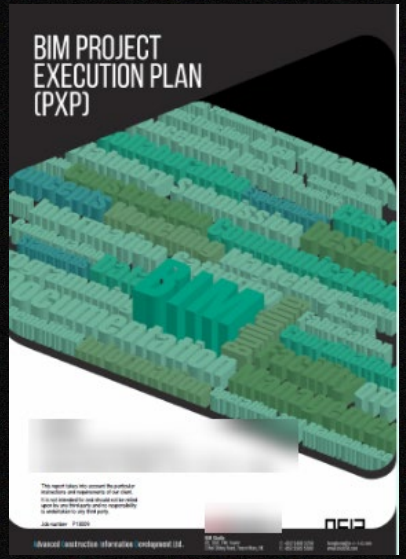
Table of Contents

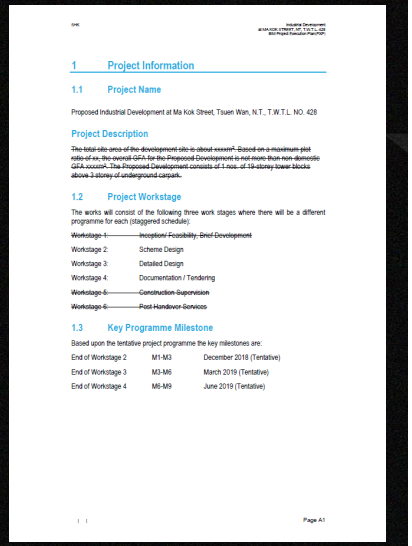
ASDF

L4

3.4 Construction Stage

- 3.4.1 BIM Execution Plan developed by supply chain
  - 3.4.1.2 Post-contract BIM Project Execution Plan





1 Project Information

1.1 Project Name

Proposed Industrial Development at Ma Kok Street, Tsuen Wan, N.T., T.W.T.L. NO. 428

Project Description

~~The total site area of the development site is about xxxxm². Based on a maximum plot ratio of xx, the overall GFA for the Proposed Development is not more than non-domestic GFA xxxxm². The Proposed Development consists of 1 nos. of 19-storey tower blocks above 3 storey of underground carpark.~~

1.2 Project Workstage

The works will consist of the following three work stages where there will be a different programme for each (staggered schedule):

~~Workstage 1:~~	~~Inception/ Feasibility, Brief Development~~
Workstage 2:	Scheme Design
Workstage 3:	Detailed Design
Workstage 4:	Documentation / Tendering
~~Workstage 5:~~	~~Construction Supervision~~
~~Workstage 6:~~	~~Post Handover Services~~

1.3 Key Programme Milestone

Based upon the tentative project programme the key milestones are:

End of Workstage 2	M1-M3	December 2018 (Tentative)
End of Workstage 3	M3-M6	March 2019 (Tentative)
End of Workstage 4	M6-M9	June 2019 (Tentative)

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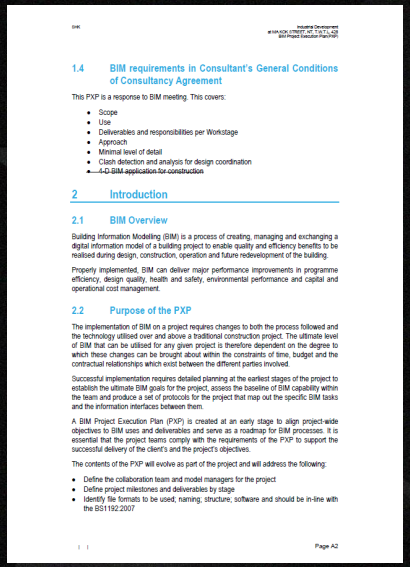

1.4 BIM requirements in Consultant's General Conditions of Consultancy Agreement

This PXP is a response to BIM meeting. This covers:

- Scope
- Use
- Deliverables and responsibilities per Workstage
- Approach
- Minimal level of detail
- Clash detection and analysis for design coordination
- ~~4-D BIM application for construction~~

2 Introduction

2.1 BIM Overview

Building Information Modelling (BIM) is a process of creating, managing and exchanging a digital information model of a building project to enable quality and efficiency benefits to be realised during design, construction, operation and future redevelopment of the building.

Properly implemented, BIM can deliver major performance improvements in programme efficiency, design quality, health and safety, environmental performance and capital and operational cost management.

2.2 Purpose of the PXP

The implementation of BIM on a project requires changes to both the process followed and the technology utilised over and above a traditional construction project. The ultimate level of BIM that can be utilised for any given project is therefore dependent on the degree to which these changes can be brought about within the constraints of time, budget and the contractual relationships which exist between the different parties involved.

Successful implementation requires detailed planning at the earliest stages of the project to establish the ultimate BIM goals for the project, assess the baseline of BIM capability within the team and produce a set of protocols for the project that map out the specific BIM tasks and the information interfaces between them.

A BIM Project Execution Plan (PXP) is created at an early stage to align project-wide objectives to BIM uses and deliverables and serve as a roadmap for BIM processes. It is essential that the project teams comply with the requirements of the PXP to support the successful delivery of the client's and the project's objectives.

The contents of the PXP will evolve as part of the project and will address the following:

- Define the collaboration team and model managers for the project
- Define project milestones and deliverables by stage
- Identify file formats to be used; naming, structure; software and should be in-line with the BS1192:2007

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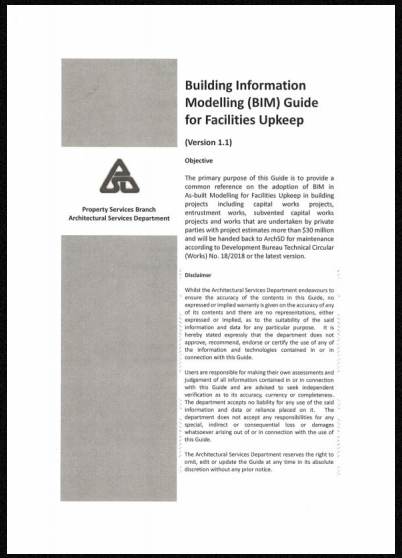
To address the PXP regard to different stage of the project

L4

Some item could be omitted / added due to various involvement of the BIM use.

3.4 Construction Stage

- 3.4.2 Supervision in fulfilling BIM uses in construction & handover stage listed in CIC BIM Standards



Building Information Modelling (BIM) Guide for Facilities Upkeep

(Version 1.1)

Objective

The primary purpose of this Guide is to provide a common reference on the adoption of BIM in As-built Modelling for Facilities Upkeep in building projects including capital works projects, entrustment works, subvented capital works projects and works that are undertaken by private parties with project estimates more than $30 million and will be handed back to Arch'SD for maintenance according to Development Bureau Technical Circular (Works) No. 18/2018 or the latest version.

Disclaimer

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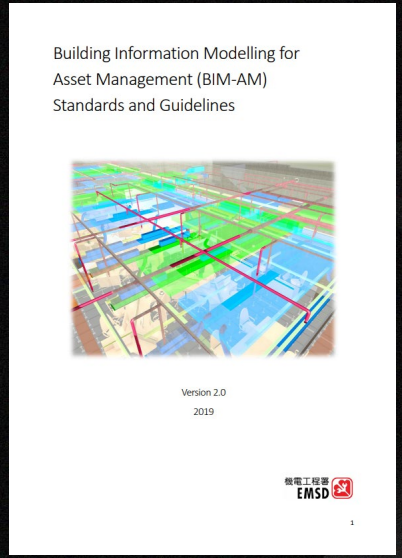
Users are responsible for making their own assessments and judgement of all information contained in or in connection with this Guide and are advised to seek independent verification as to its accuracy, currency or completeness. The department accepts no liability for any use of the said information and data or reliance placed on it. The department does not accept any responsibilities for any special, indirect or consequential loss or damages whatsoever arising out of or in connection with the use of this Guide.

The Architectural Services Department reserves the right to omit, edit or update the Guide at any time in its absolute discretion without any prior notice.



Building Information Modelling for Asset Management (BIM-AM) Standards and Guidelines

Version 2.0

2019

機電工程署 EMSD

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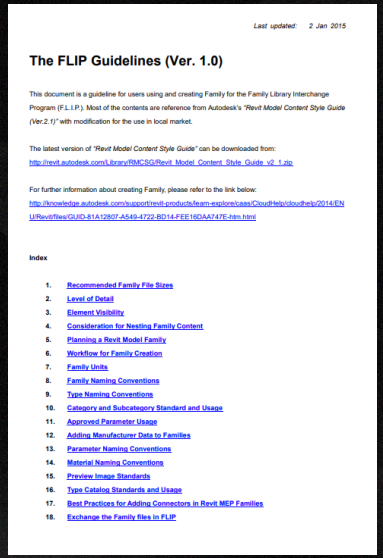


Last updated: 2 Jan 2015

The FLIP Guidelines (Ver. 1.0)

This document is a guideline for users using and creating Family for the Family Library Interchange Program (F.L.I.P.). Most of the contents are reference from Autodesk's *"Revit Model Content Style Guide (Ver.2.1)"* with modification for the use in local market.

The latest version of *"Revit Model Content Style Guide"* can be downloaded from:
http://revit.autodesk.com/Library/RMCSG/Revit_Model_Content_Style_Guide_v2_1.zip

For further information about creating Family, please refer to the link below:
http://knowledge.autodesk.com/support/revit-products/learn-explore/caas/CloudHelp/cloudhelp/2014/ENUS/Revit/files/GUID-81A12807-A549-4722-BD14-FEE16DAA747E-htm.html

Index

BIM Guide for Facilities Upkeep and Naming Standard

LOD Standard for As-built Model, 3D Animation, Model Requirement & Non-graphic Information

L4

3.4 Construction Stage

- 3.4.2 Supervision in fulfilling BIM uses in construction & handover stage listed in ASD upkeeping guideline

2.3.3 3D Animation

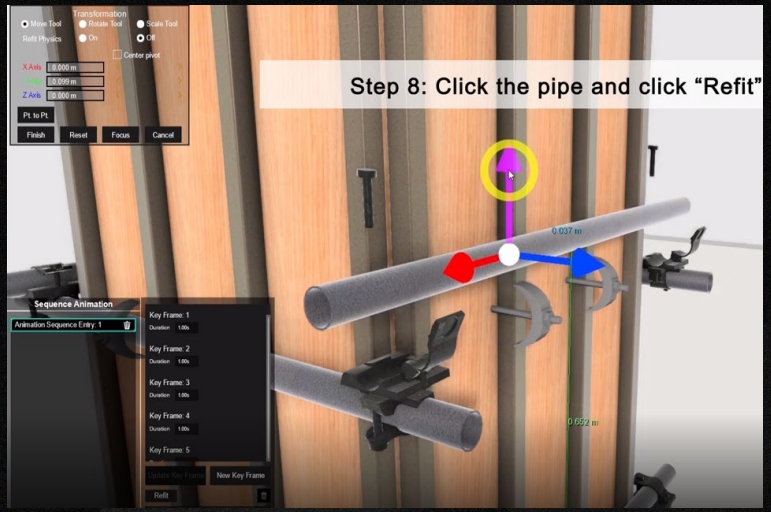
The as-built model shall be provided with video clip files with 3D animation showing the assembly, disassembly, repair and replacement method for special component or special building system such as curtain wall system, etc. as specified in the contract and Appendix 3 for viewing in the AIS. The objective of the 3D animation is to illustrate how the special component or special building system can be maintained.

2.3.4 Model Requirement for Graphic & Non-graphic Information

The model requirement of the architectural, plumbing and drainage as-built model shall follow the requirement in Appendix 3. In case another requirement in the same contract requests for a higher LOD, a higher LOD of the concerned as-built model shall be provided. Besides, for plumbing and drainage as-built model, the requirements stated in the Building Information Modelling for Asset Management (BIM-AM) – Standards and Guidelines issued by Electrical & Mechanical Services Department (EMSD) shall also be followed.

2.3.5 Drawing Production

The as-built model shall also be arranged to create sheet records and contain information & schedules to meet the requirements indicated in Appendix 4 and ArchSD's Particular Specification for Approved Shop Drawings, As-built Drawings, Operation and Maintenance Manual and Records.

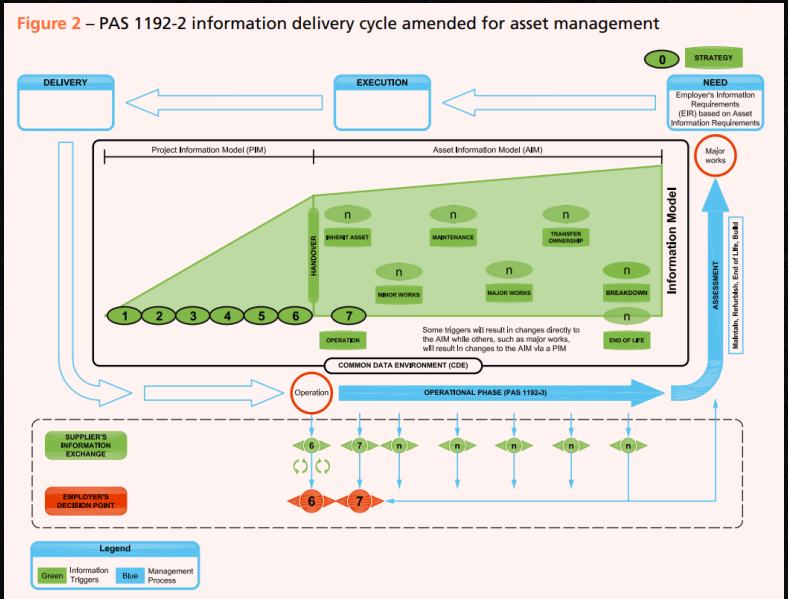


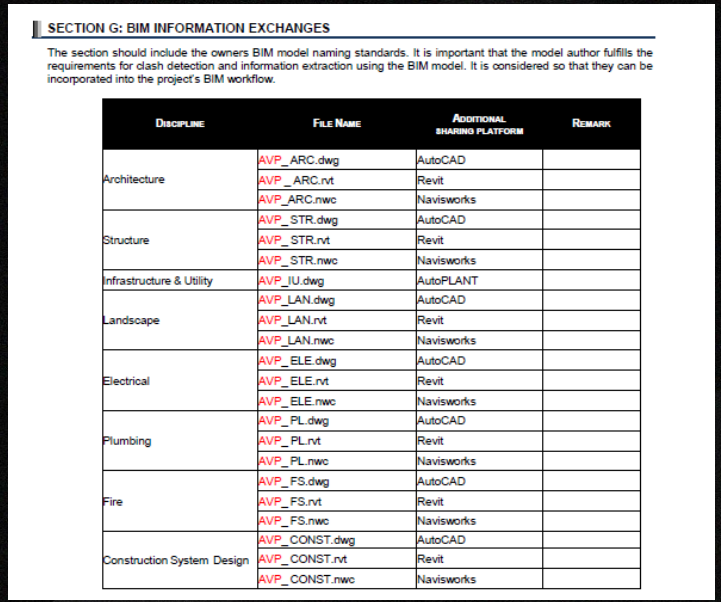
Construction Sequences to be included for upkeeping (4D simulation)

L4

3.4 Construction Stage

- 3.4.3 Project Information Model (PIM) data exchanges and validation





SECTION G: BIM INFORMATION EXCHANGES

The section should include the owners BIM model naming standards. It is important that the model author fulfills the requirements for clash detection and information extraction using the BIM model. It is considered so that they can be incorporated into the project's BIM workflow.

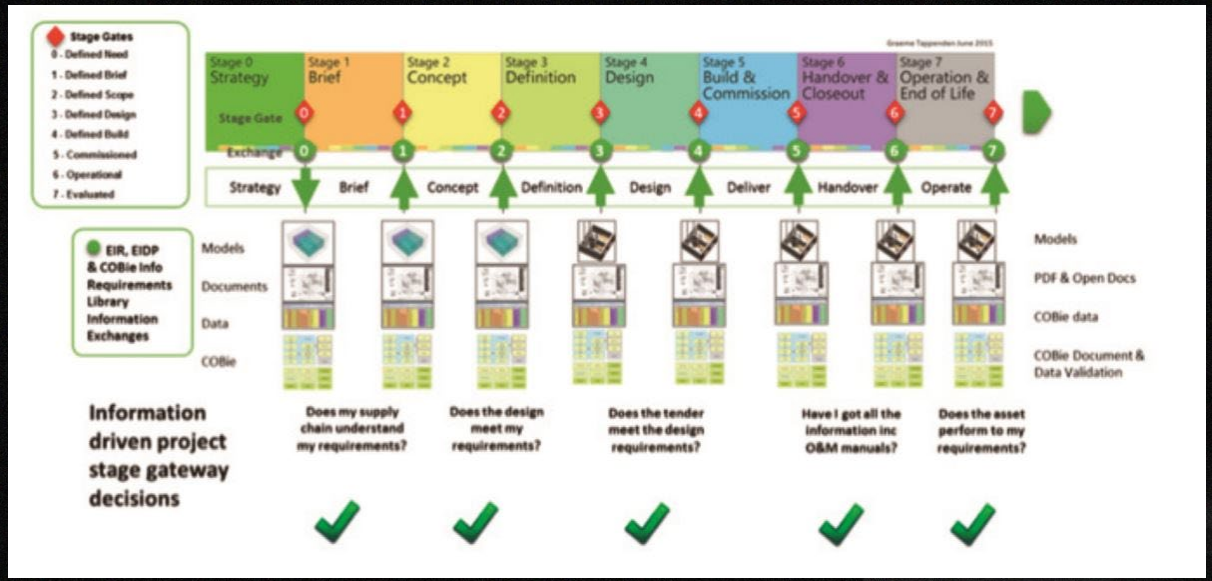
Discipline	File Name	Additional sharing platform	Remark
Architecture	AVP_ARC.dwg	AutoCAD	
	AVP _ARC.rvt	Revit	
	AVP_ARC.nwc	Navisworks	
Structure	AVP_STR.dwg	AutoCAD	
	AVP_STR.rvt	Revit	
	AVP_STR.nwc	Navisworks	
Infrastructure & Utility	AVP_IU.dwg	AutoPLANT	
Landscape	AVP_LAN.dwg	AutoCAD	
	AVP_LAN.rvt	Revit	
	AVP_LAN.nwc	Navisworks	
Electrical	AVP_ELE.dwg	AutoCAD	
	AVP_ELE.rvt	Revit	
	AVP_ELE.nwc	Navisworks	
Plumbing	AVP_PL.dwg	AutoCAD	
	AVP_PL.rvt	Revit	
	AVP_PL.nwc	Navisworks	
Fire	AVP_FS.dwg	AutoCAD	
	AVP_FS.rvt	Revit	
	AVP_FS.nwc	Navisworks	
Construction System Design	AVP_CONST.dwg	AutoCAD	
	AVP_CONST.rvt	Revit	
	AVP_CONST.nwc	Navisworks	

Project Information Model (PIM) continues to develop in accordance with the Master Information Delivery Plan (MIDP).

L4

3.4 Construction Stage

- 3.4.3 Project Information Model (PIM) data exchanges and validation



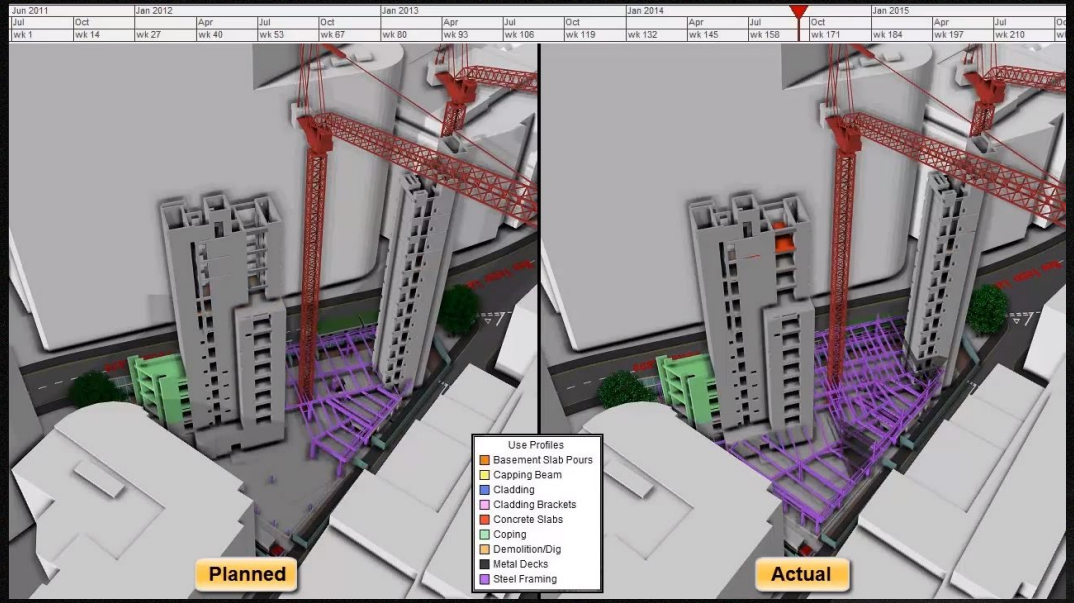
PIM data exchange to upkeeping

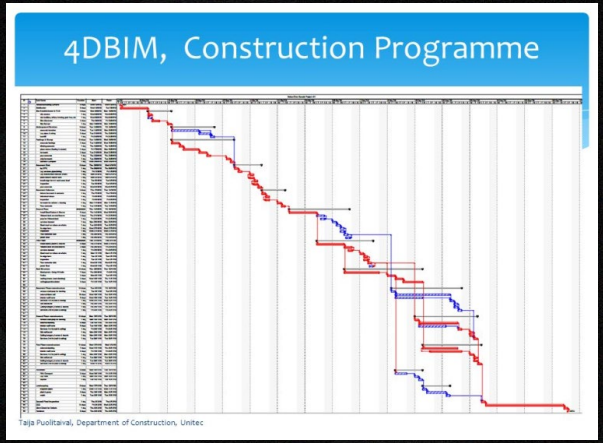
L4

The PIM generally comprises a series of domain based models, a federated model along with related graphical and non-graphical data such as Construction Operation information exchange (COBie) and electronic documentation.

3.4 Construction Stage

- 3.4.4 Direct BIM related meetings





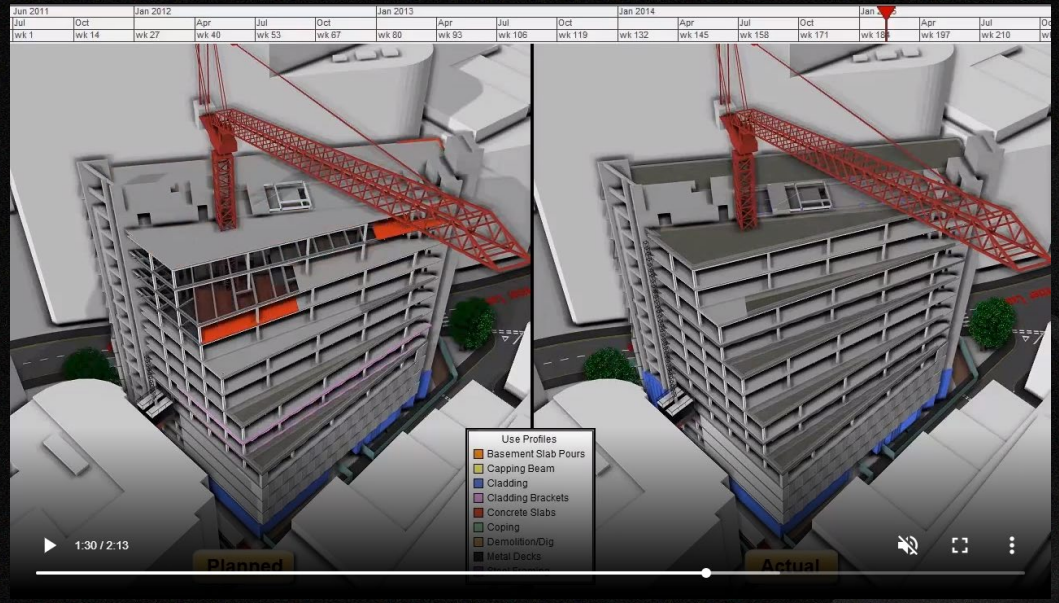
4D Simulation and review of site progress

The use of BIM in 4D simulation can compare to actual construction progress

L4

3.4 Construction Stage

- 3.4.4 Direct BIM related meetings



4D Simulation and review of site progress

The use of BIM in 4D simulation can compare to actual construction progress

L4

3.4 Construction Stage

- 3.4.5 Case study

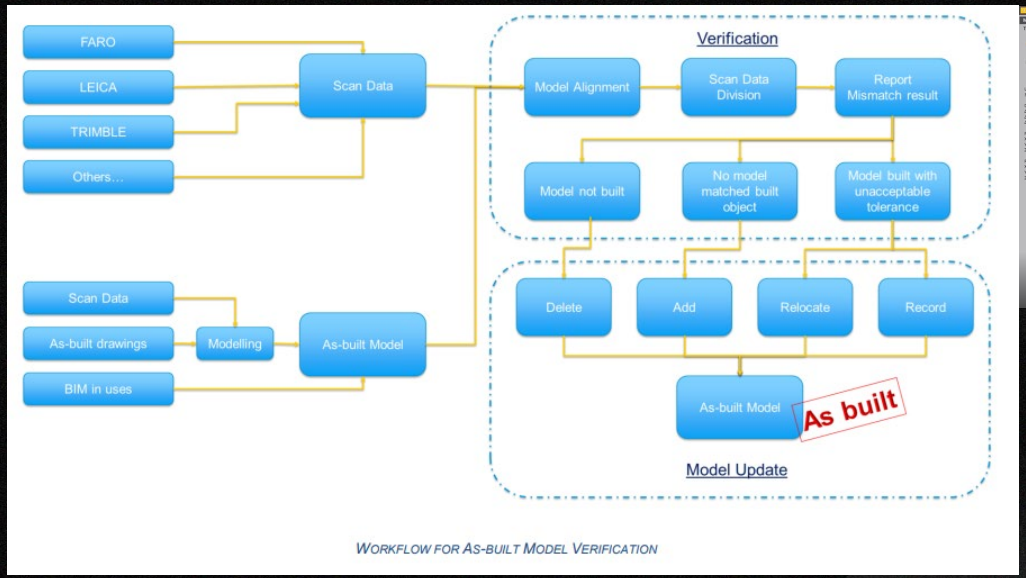
Simulation of Construction Progress - CSD, CBWD, 4D, CQMS

Site arrangement and Construction Sequences.

L2

3.5 Handover Stage

- 3.5.1 As-built information verification



WORKFLOW FOR AS-BUILT MODEL VERIFICATION

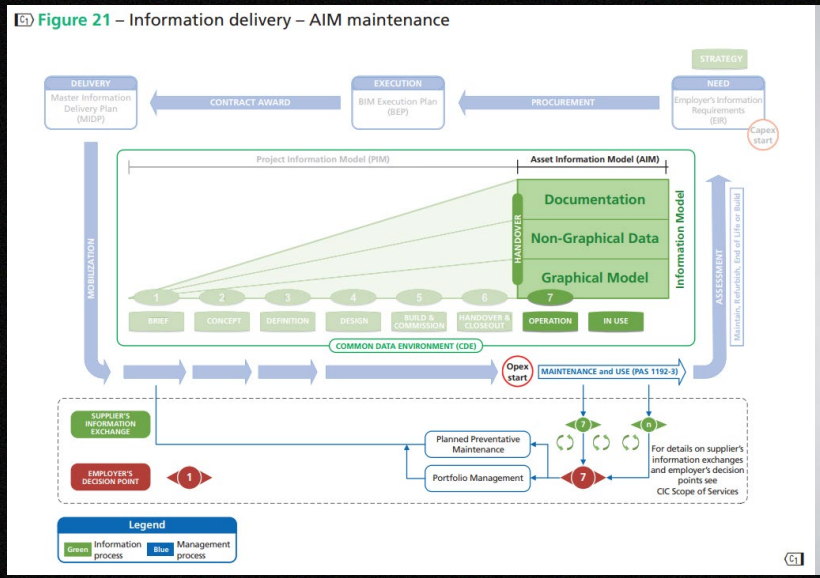
Laser Scan and BIM As-Built Information

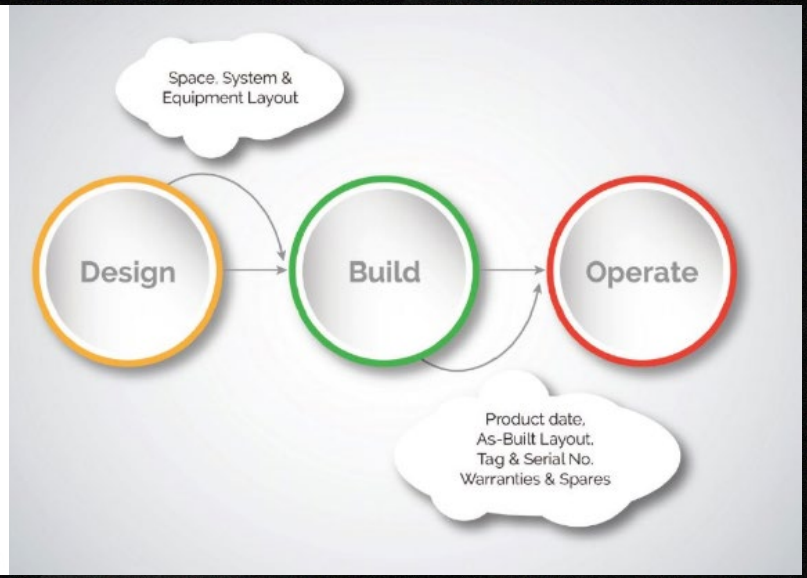
To review the discrepancy between As-Built and BIM to adjust the information.

L4

3.5 Handover Stage

- 3.5.2 Oversee data transfer from PIM to Asset Information Model (AIM)





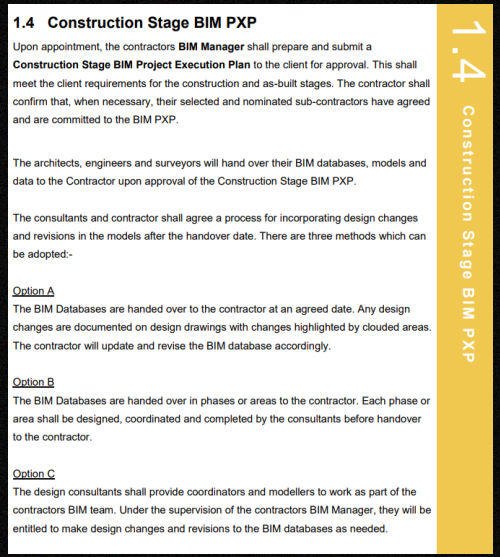
What information is contained in the AIM?

The AIM comprises models, data, documents and other records related to or required for the operational phase of an asset. (refer to BSI 1192:2)

L4

3.5 Handover Stage

- 3.5.3 Supervision in fulfilling BIM uses in handover stage listed in CIC BIM Standards



1.4 Construction Stage BIM PXP

Upon appointment, the contractors **BIM Manager** shall prepare and submit a **Construction Stage BIM Project Execution Plan** to the client for approval. This shall meet the client requirements for the construction and as-built stages. The contractor shall confirm that, when necessary, their selected and nominated sub-contractors have agreed and are committed to the BIM PXP.

The architects, engineers and surveyors will hand over their BIM databases, models and data to the Contractor upon approval of the Construction Stage BIM PXP.

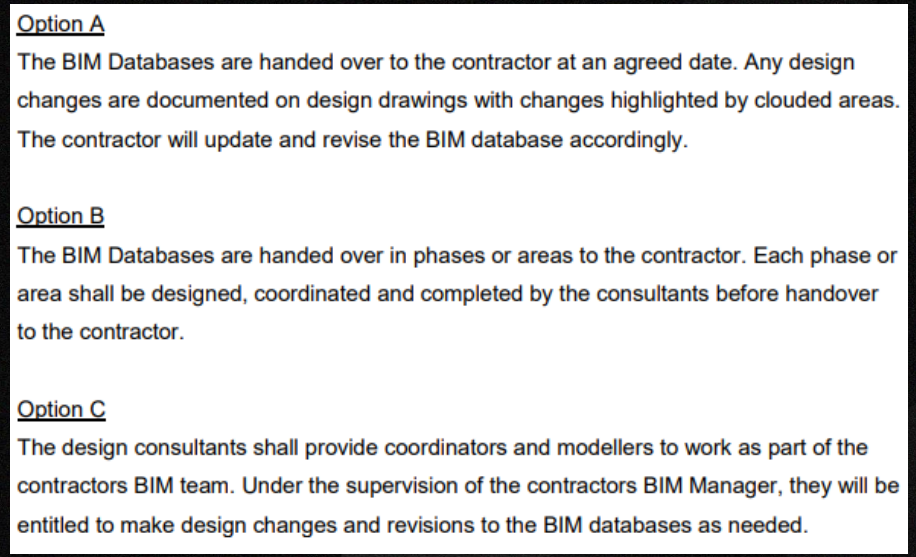
The consultants and contractor shall agree a process for incorporating design changes and revisions in the models after the handover date. There are three methods which can be adopted:-

Option A
The BIM Databases are handed over to the contractor at an agreed date. Any design changes are documented on design drawings with changes highlighted by clouded areas. The contractor will update and revise the BIM database accordingly.

Option B
The BIM Databases are handed over in phases or areas to the contractor. Each phase or area shall be designed, coordinated and completed by the consultants before handover to the contractor.

Option C
The design consultants shall provide coordinators and modellers to work as part of the contractors BIM team. Under the supervision of the contractors BIM Manager, they will be entitled to make design changes and revisions to the BIM databases as needed.

1.4 Construction Stage BIM PXP



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Option C
The design consultants shall provide coordinators and modellers to work as part of the contractors BIM team. Under the supervision of the contractors BIM Manager, they will be entitled to make design changes and revisions to the BIM databases as needed.

Upon appointment of Contractor, BIM Manager to prepare BIM PXP

According to CIC BIM Standard, BIM Manager shall agree with consultants to BIM deliverable

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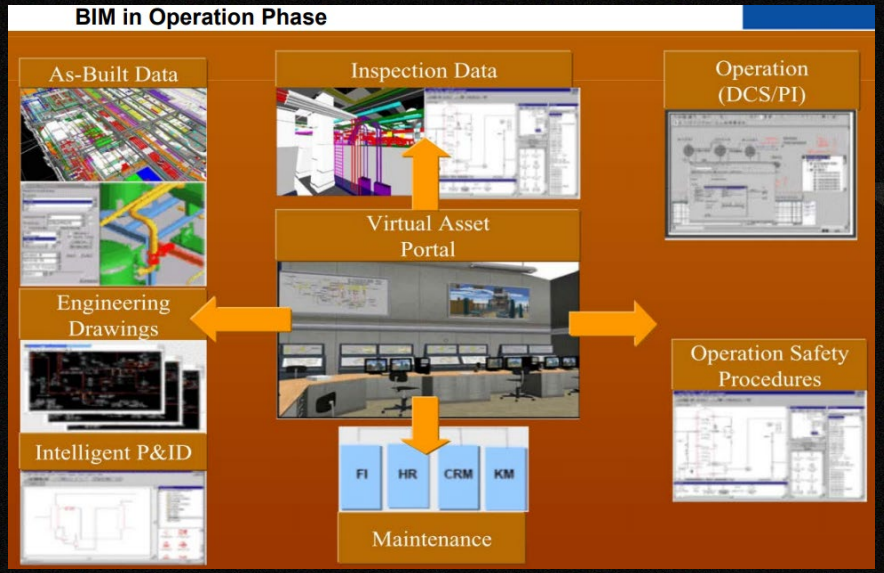
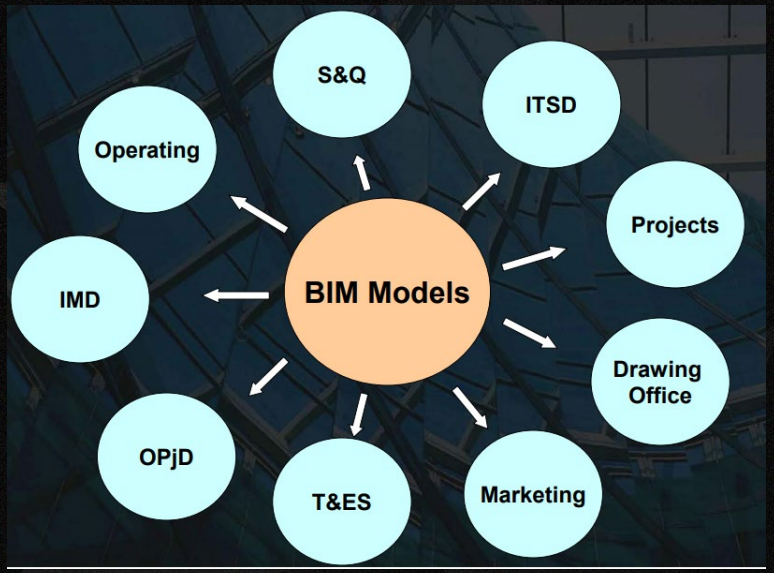
3.5 Handover Stage

- 3.5.4 Case study





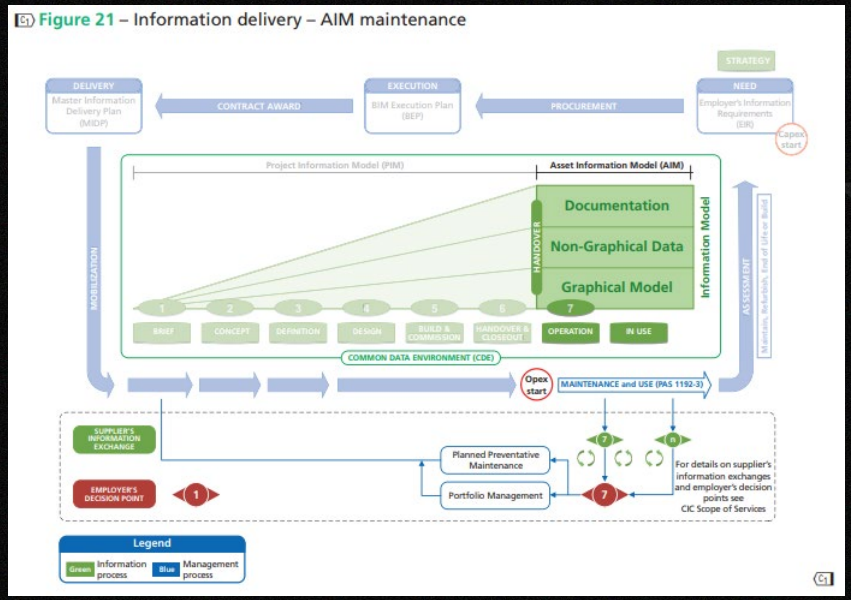
Selective operation from BIM - Hospitals, Railway, Commercial Building

Facility Management shall decide which item to be used from BIM before Construction

L2

3.6 Operation & Maintenance Stage

- 3.6.1 Update Assets Information Model (AIM)



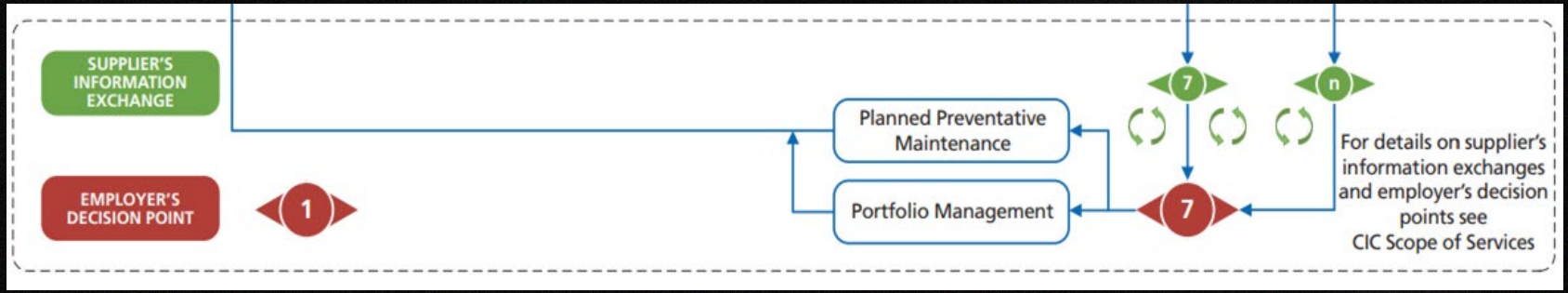
BSI 1192:2 - Assets Information Model (AIM)

as the means to receive information from other parties throughout the project stages, up to acceptance of the "as-built" PIM (as specified in PAS 1192-2)

L2

3.6 Operation & Maintenance Stage

- 3.6.2 Roles, responsibilities and authorities for maintaining the AIM



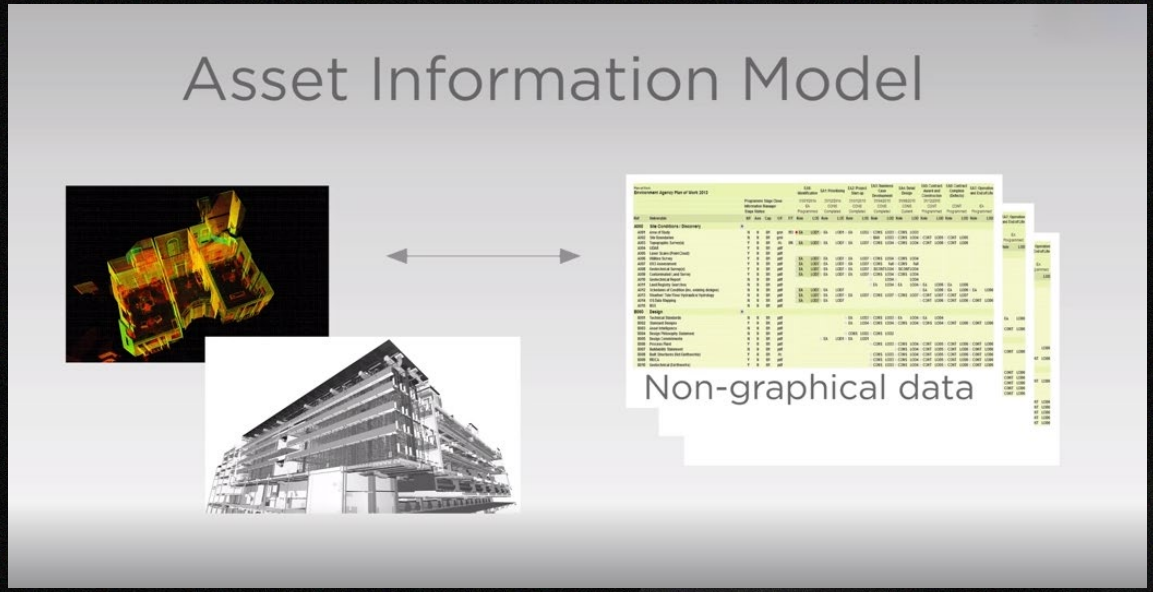
Facility Management Team

Using the AIM in this way provides the benefits of ensuring a "single source of truth", where all information is in one place.

L2

3.6 Operation & Maintenance Stage

- 3.6.3 Post occupancy evaluation



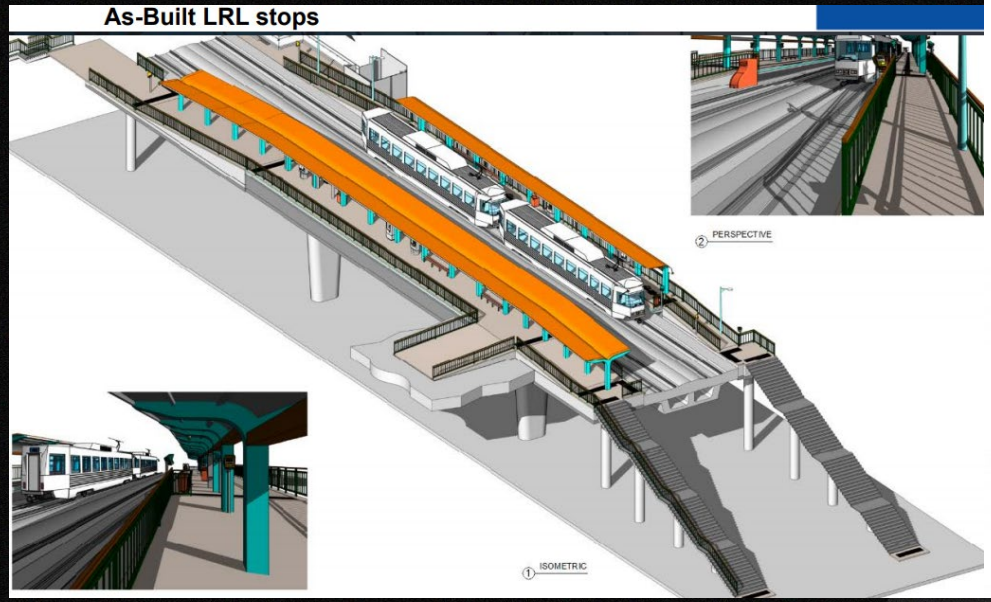
AIM shall be reviewed from time to time

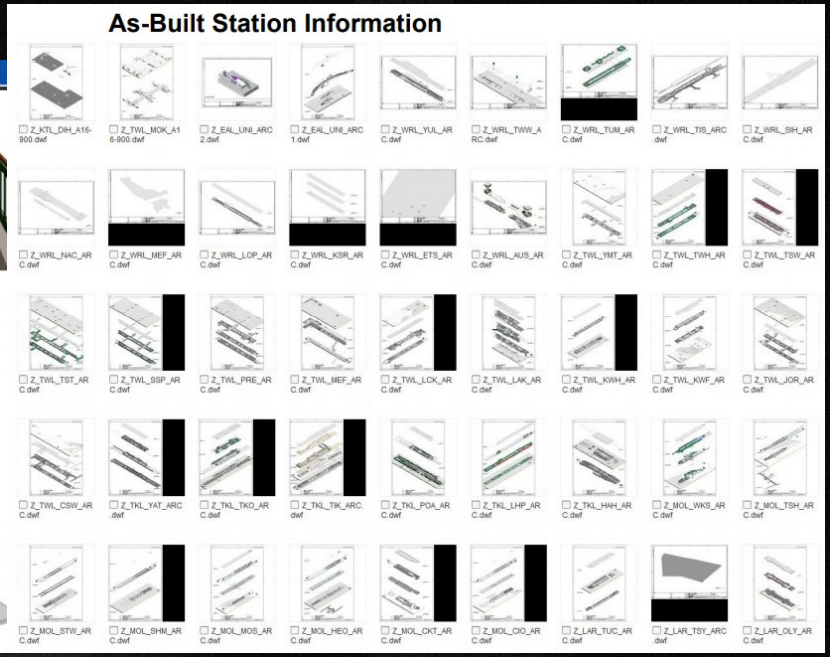
In addition, appropriate surveys such as point cloud or LiDAR shall be provided to verify the completeness of the as-constructed model

L2

3.6 Operation & Maintenance Stage

- 3.6.4 Case Study





As-Built with Information

https://www.theb1m.com/video/what-is-6d-bim

L2