Advanced
Construction
Information
Development Ltd.

BIM – Management Training

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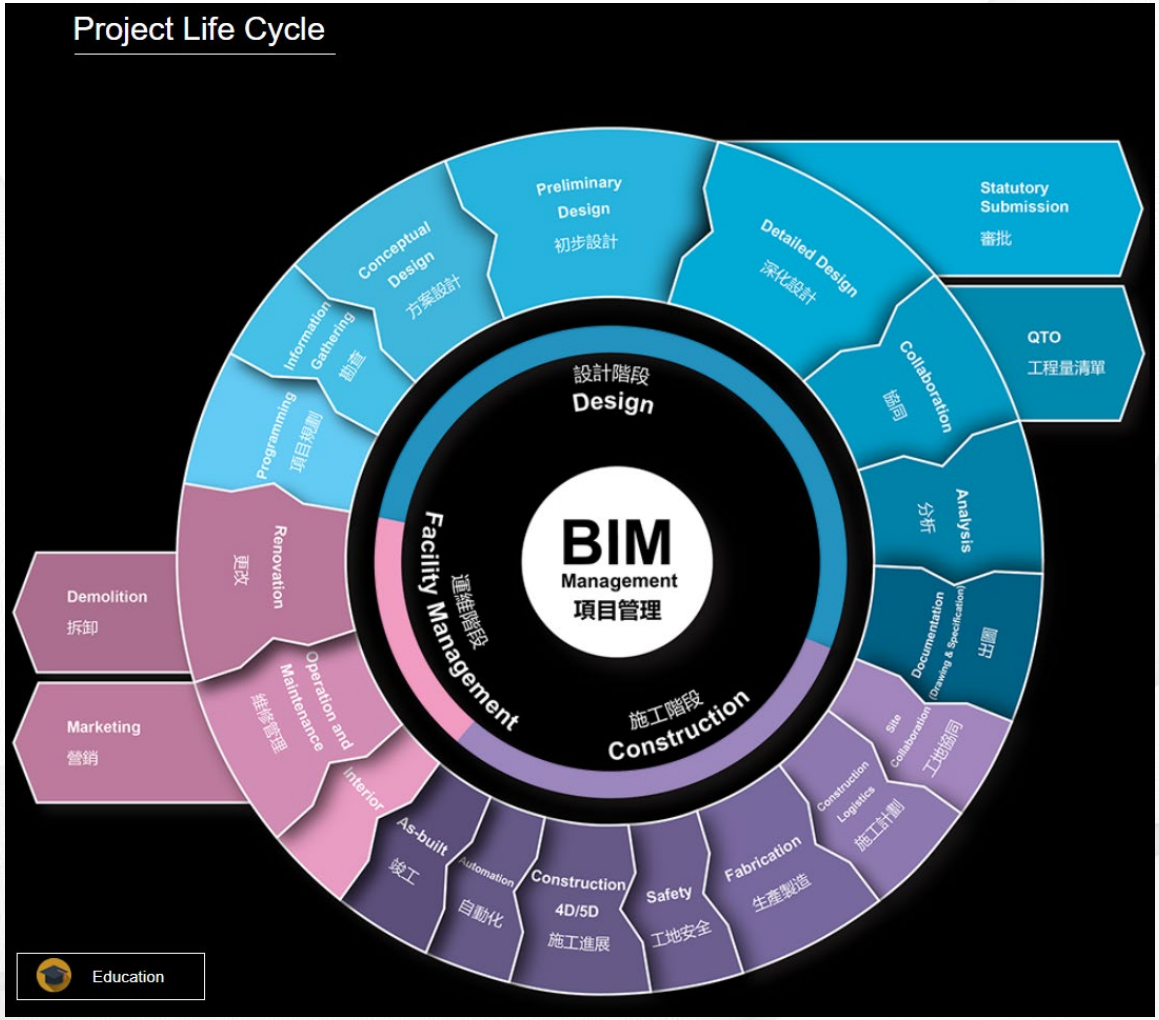
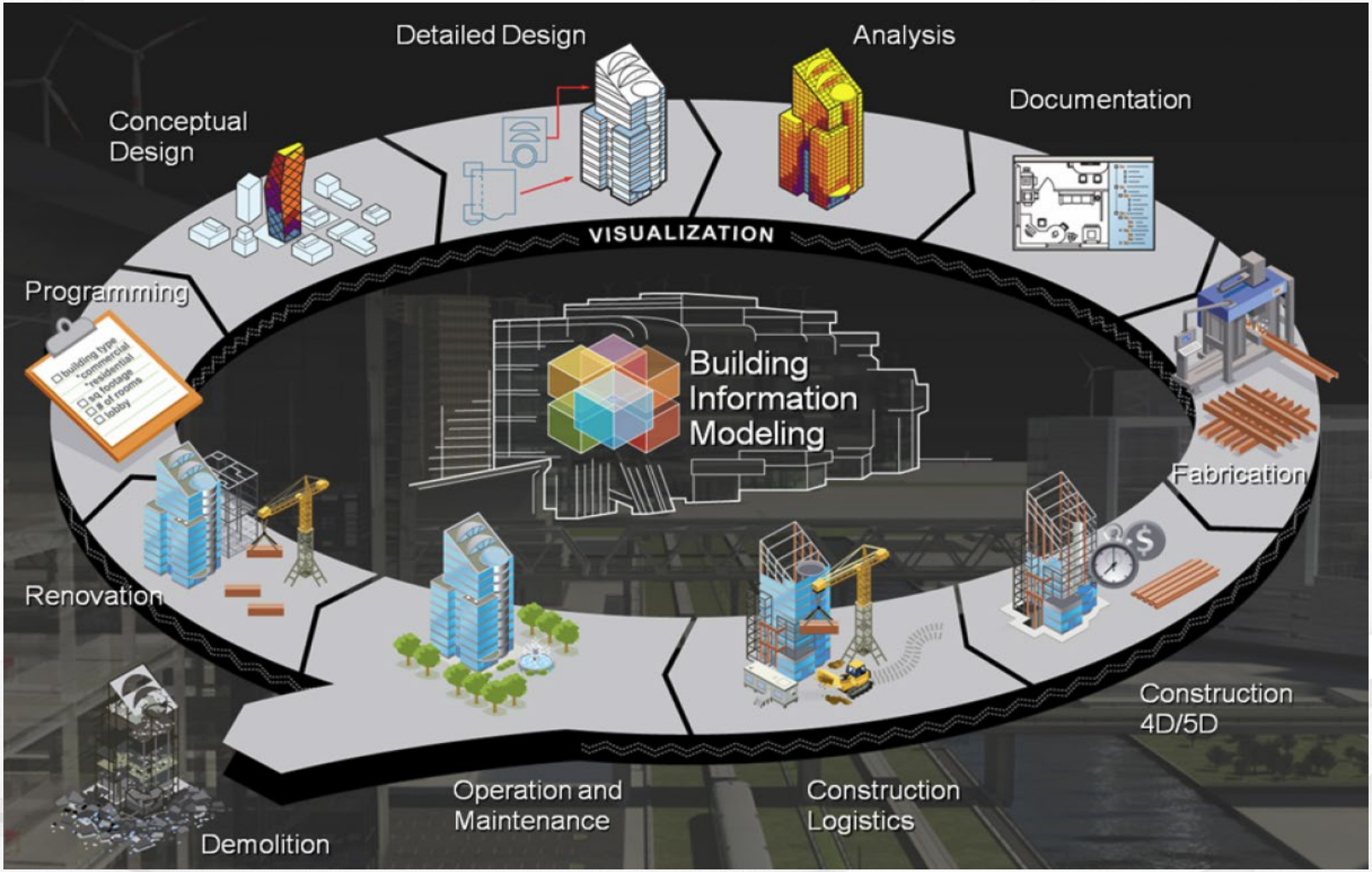
Day 1 - Introduction (Full Day)

1. Correct Concept of BIM



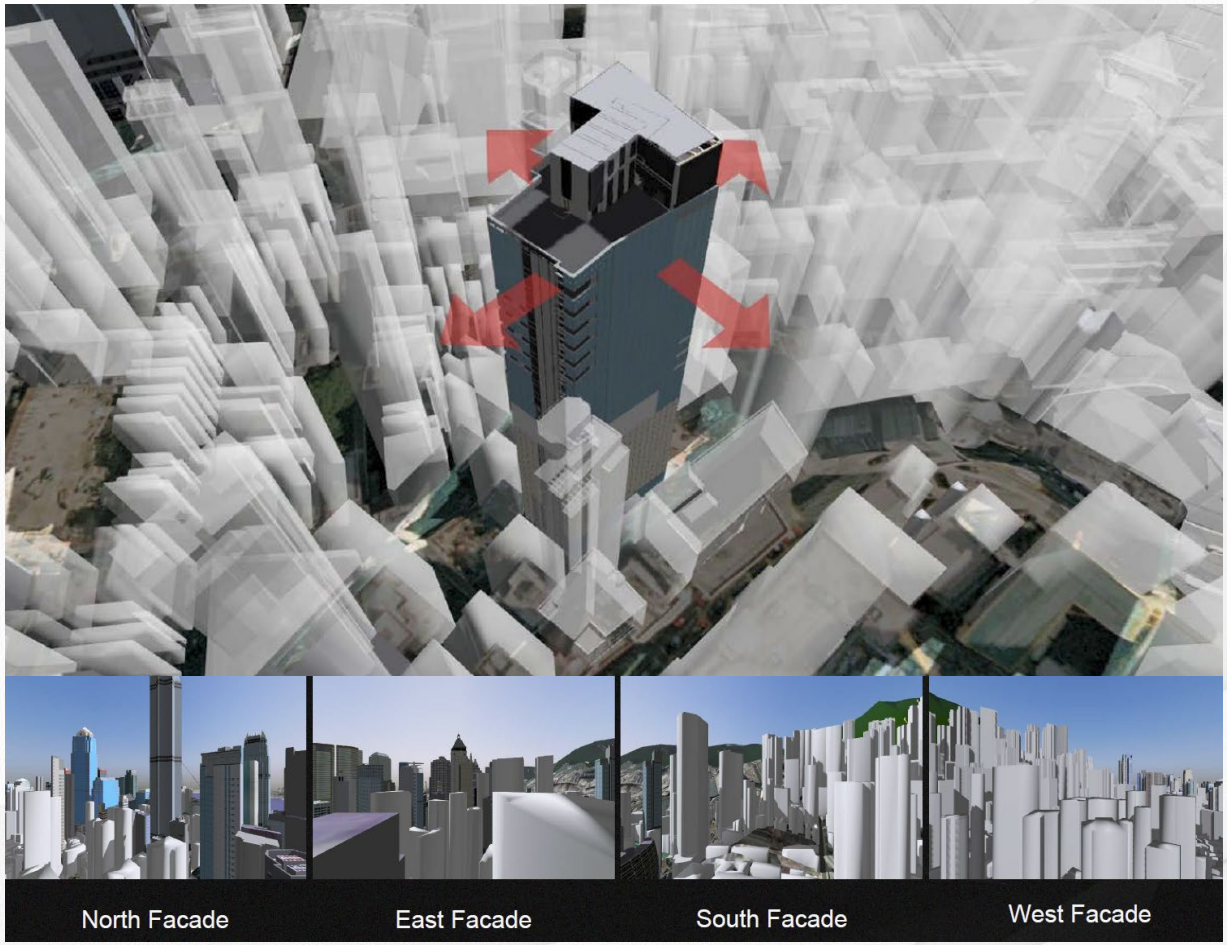
An Information Flow throughout Project Life Cycle

2. What is BIM?



About Life Cycle, Information management method

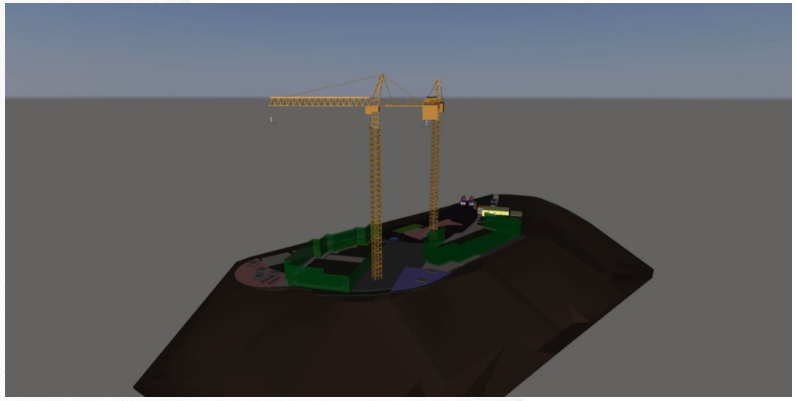
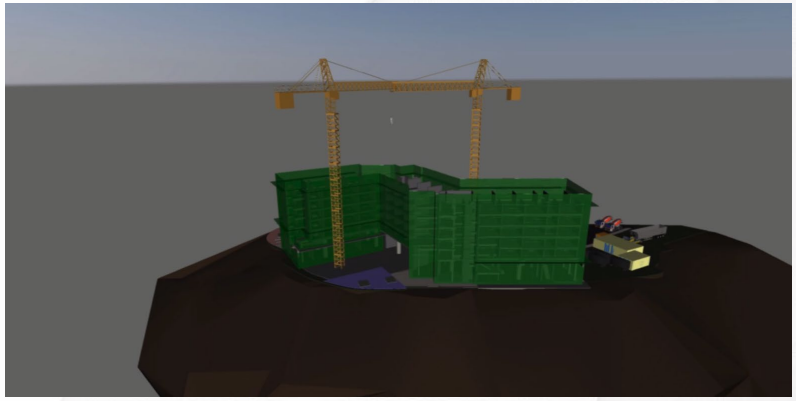
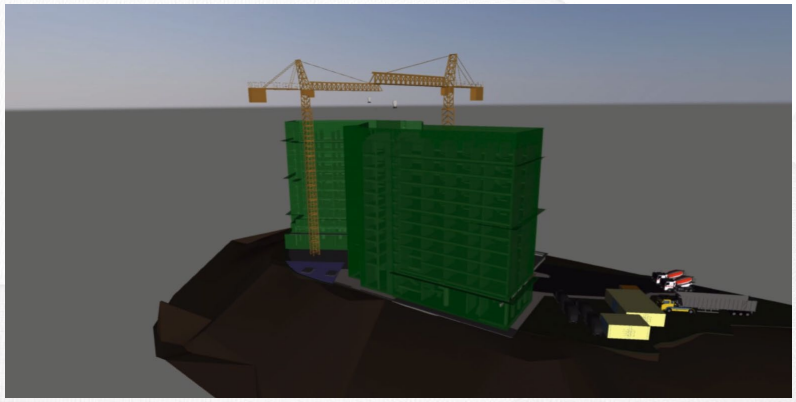
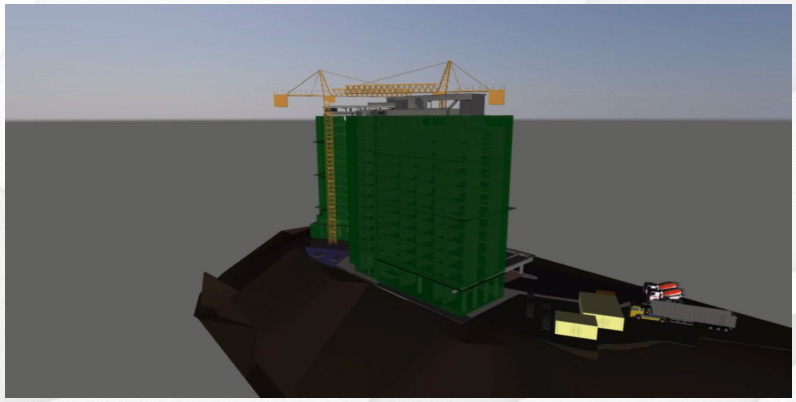
3. What is BIM?



About Rehearsal in the Virtual World

- To simulate surrounding environment for sightline, weather, traffic analysis
- To design a building / complex within a virtual environment with information

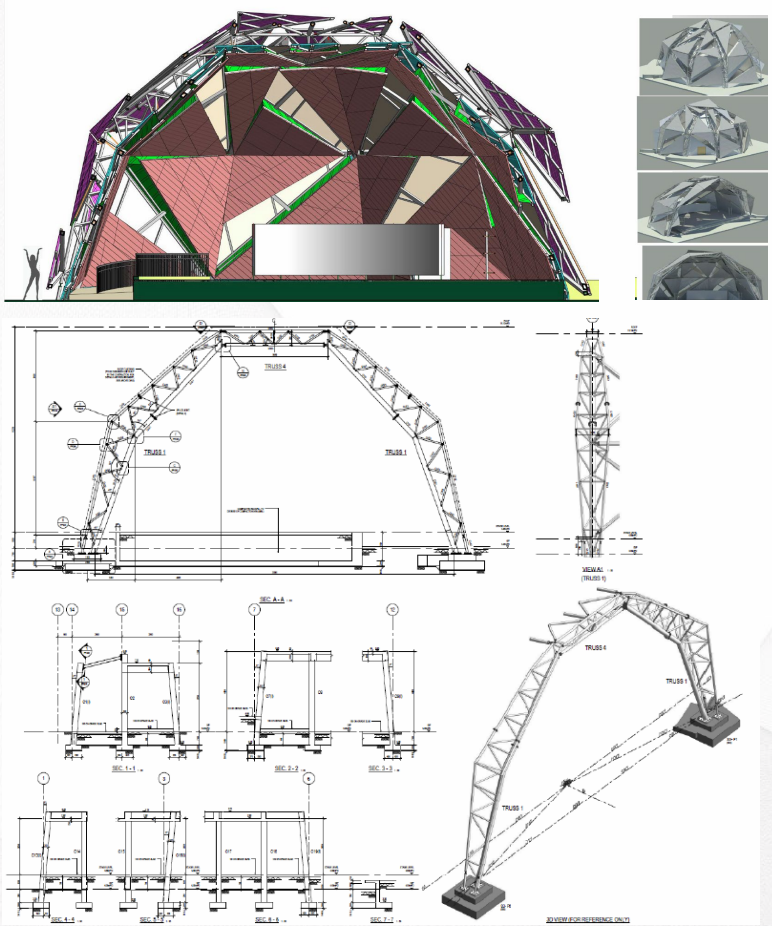
4. What is BIM?

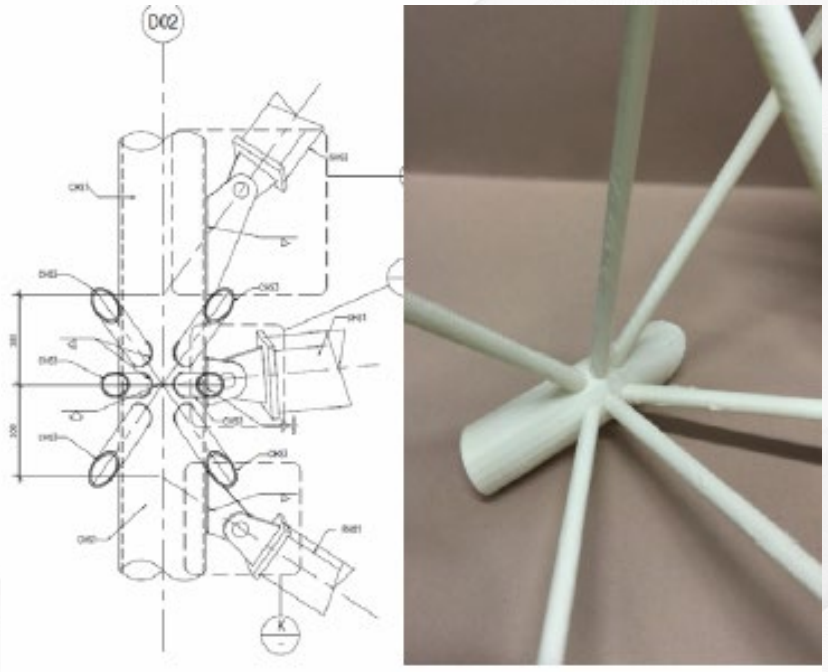





Rehearsal 3D, time, cost

- To review design in response to time management and construction sequence.
- A better way to resolve the discrepancy in the virtual world before construction.

5. What is BIM?

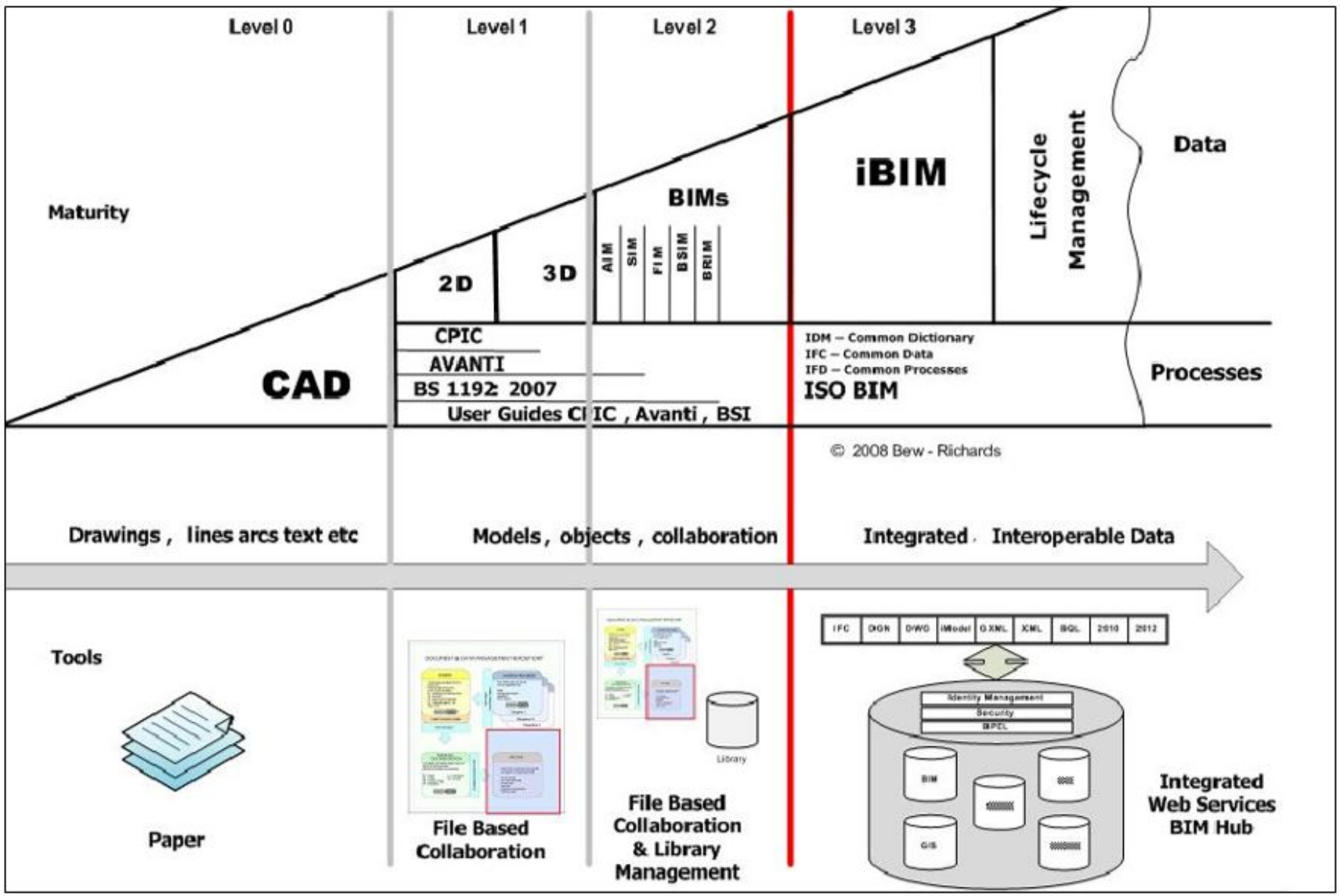




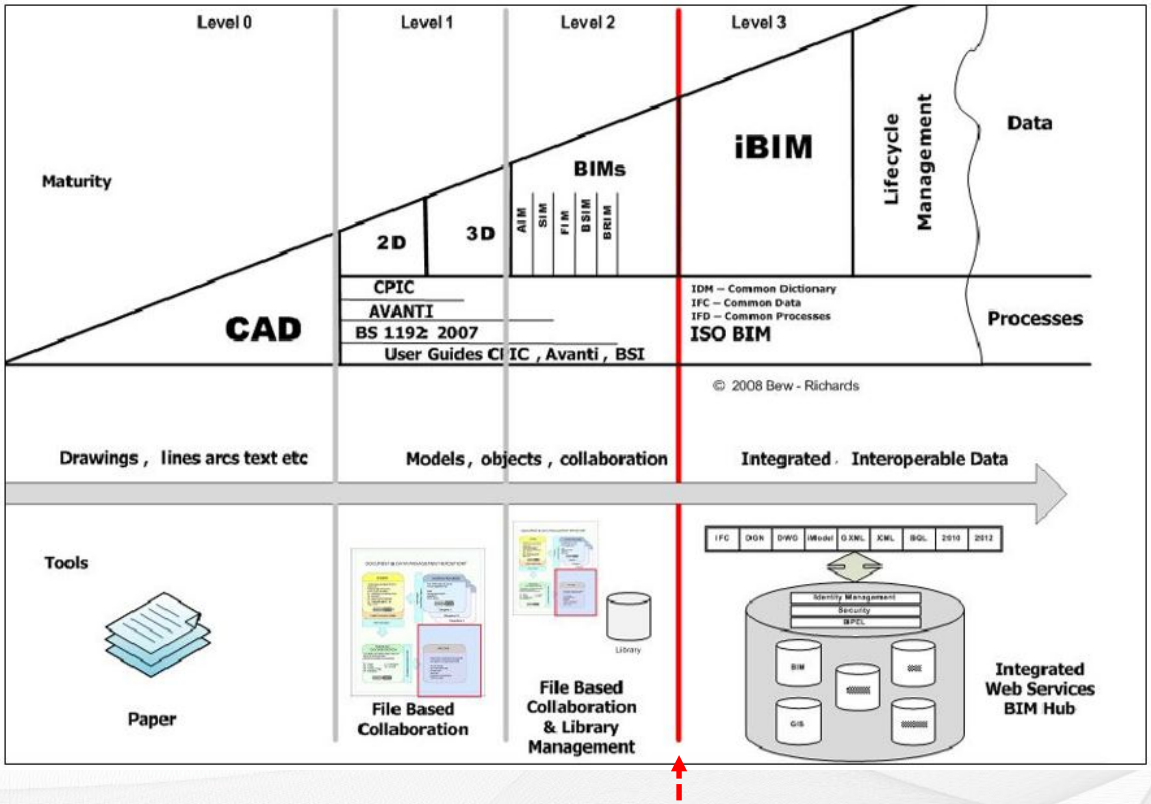
About Rehearsal Design, Details and Construction

- To develop the design from schematic to details in the virtual world with different discipline profession
- Single Source of Ture (SSOT) ensure the consistence during the project development

6. BIM Maturity?



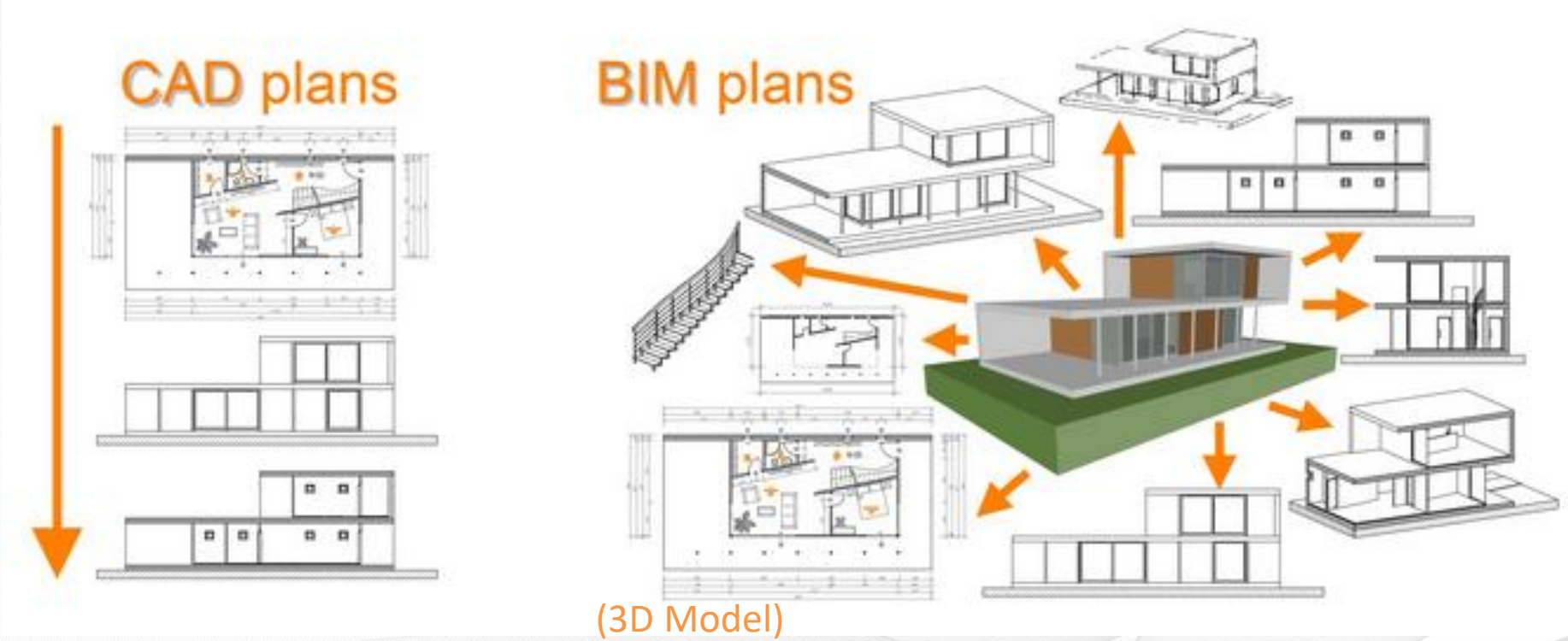
7. UK - PAS 1192-2



From CAD to BIM Level

- Level 0 – Drawings from CAD, line areas & text
- Level 1 – 2D & 3D basic element
- *Level 2 – 2D & 3D models, objects, collaboration (Currently in 2018)*
- Level 3 – with ISO BIM, use full of BIM

8. 3D CAD is BIM?



CAD

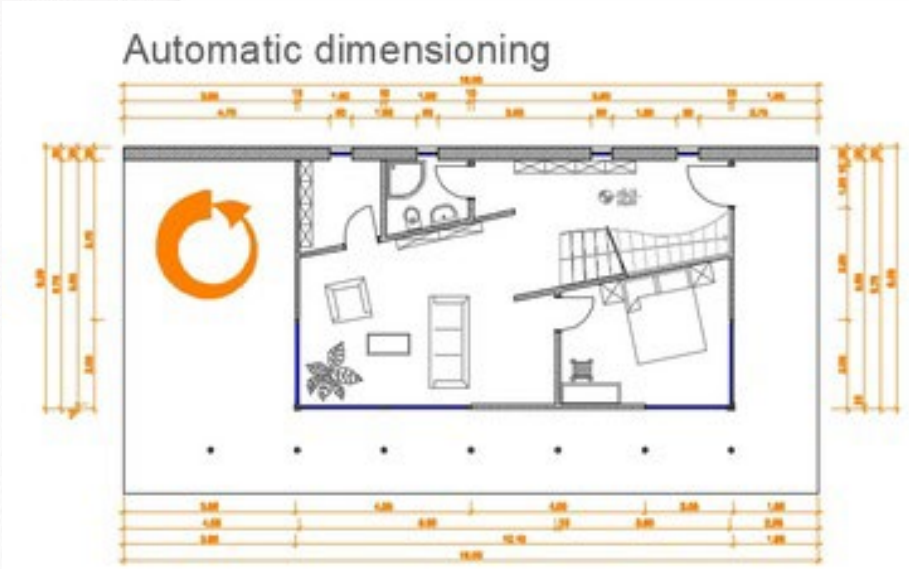
- Drafting in 2D
- No Information
- Many sources

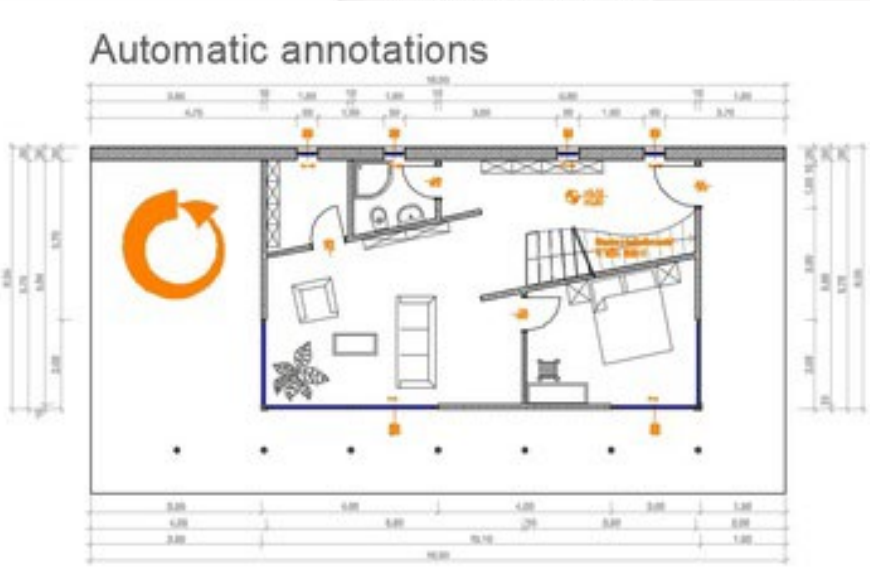
BIM

- In 2D and 3D
- Information contained
- Single Source of Truth (SSOT)

http://www.cadtobim.com/what-is-bim.html

9. BIM with Information?



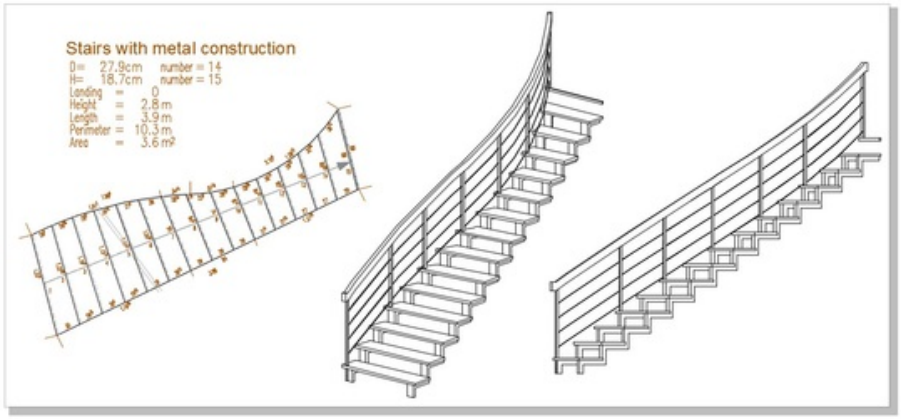


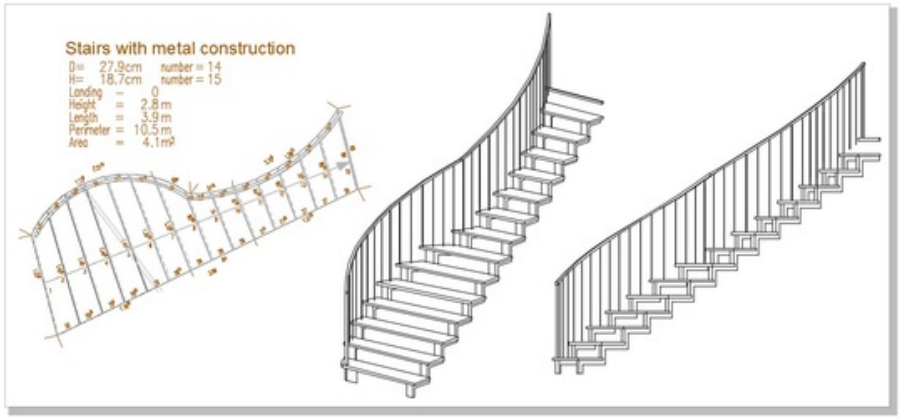
SSOT with Automation

- All element contain information
- Eg. Dimension and annotations can be automated
- Windows and doors are divided in different family with information which can be automated within the same model

http://www.cadtobim.com/what-is-bim.html

10. BIM as Design Tools



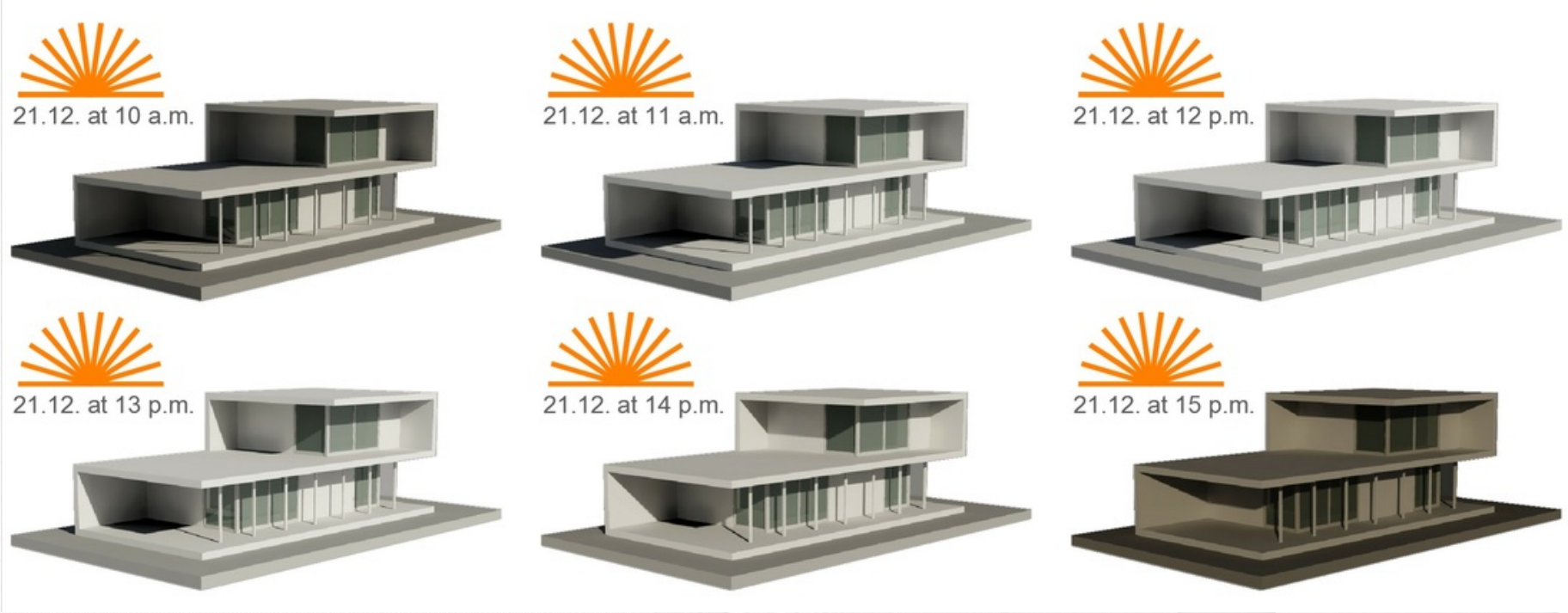


SSOT with Model Information

- Change of design will be synchronized at one source
- Eg. Dimension and annotations can be automated
- All Plans, section & elevation will be synchronized at the same time

http://www.cadtobim.com/what-is-bim.html

11. BIM as Virtual Simulation Tools



SSOT with Simulation

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

http://www.cadtobim.com/what-is-bim.html

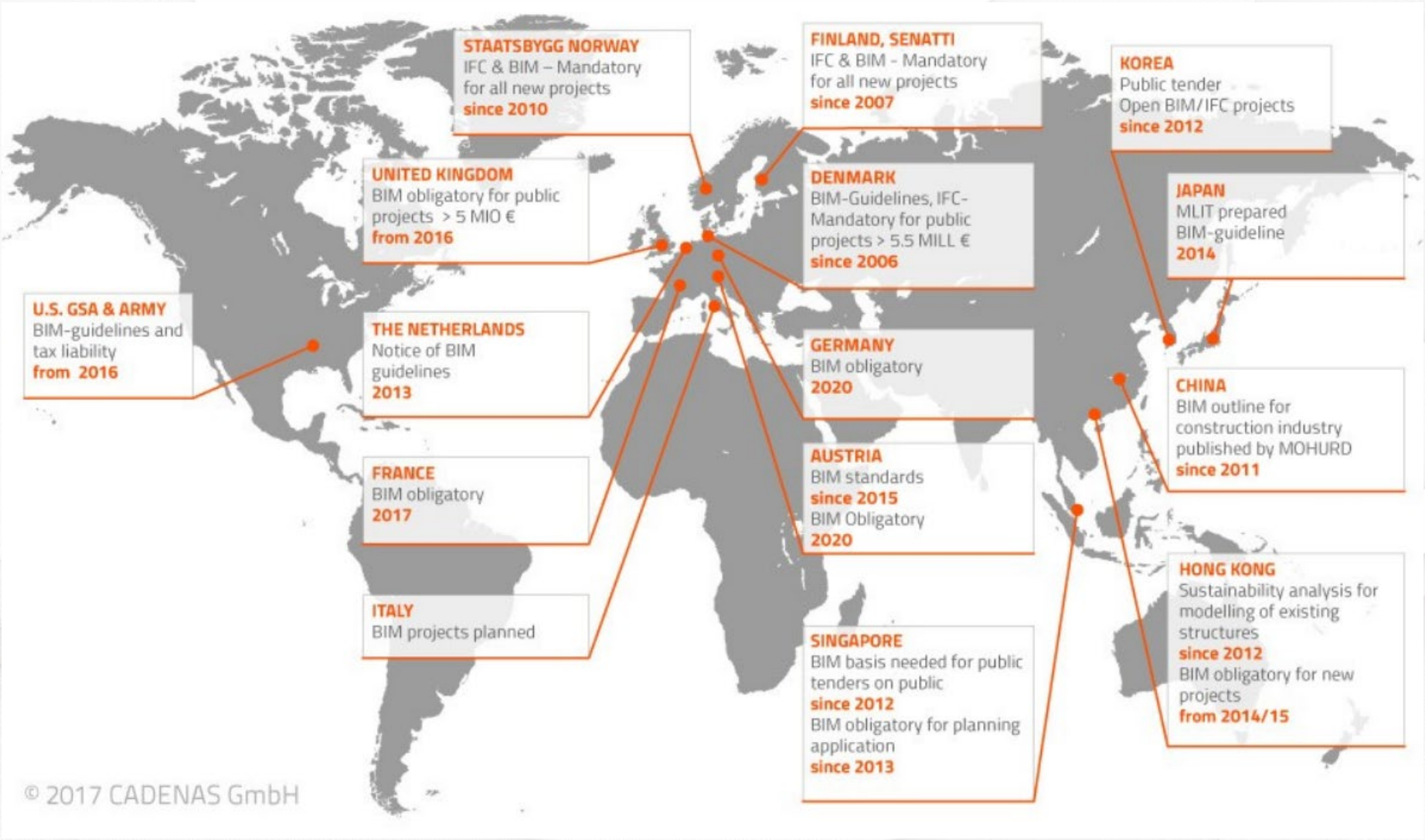
12. BIM Software Overview Experience

Autodesk Revit

Aecosim Building Designer

Graphisoft ArchiCAD

13. Global BIM & Development



14. BIM Development

Hong Kong
2002 / 10
Autodesk Revit Launch

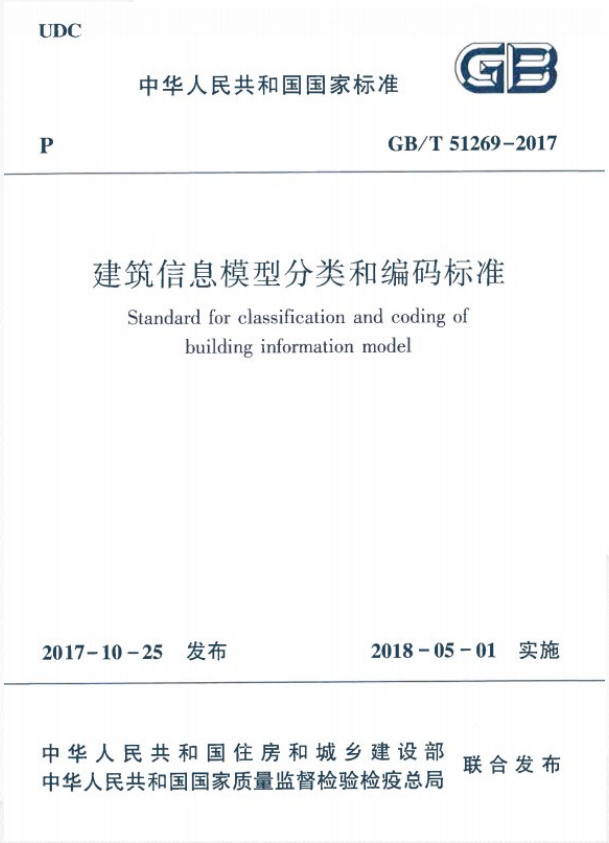
Beijing BIM trip
2005 / 06

15. BIM Development

Seoul BIM Talk
2007 / 04
Hong Kong BIM Delegates

Singapore BCA
2011 / 08
Singapore Delegates visit to HK

16. BIM Development



UDC

中华人民共和国国家标准

P GB/T 51269–2017

建筑信息模型分类和编码标准

Standard for classification and coding of building information model

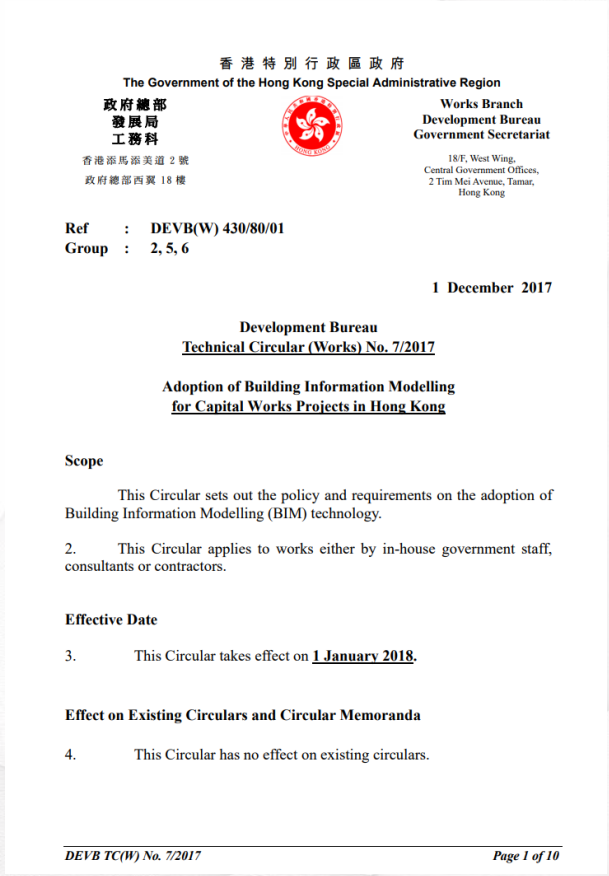
2017–10–25 发布 2018–05–01 实施

中华人民共和国住房和城乡建设部
中华人民共和国国家质量监督检验检疫总局 联合发布

China Government

2017

2020 BIM use in 90%



香港特別行政區政府
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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.

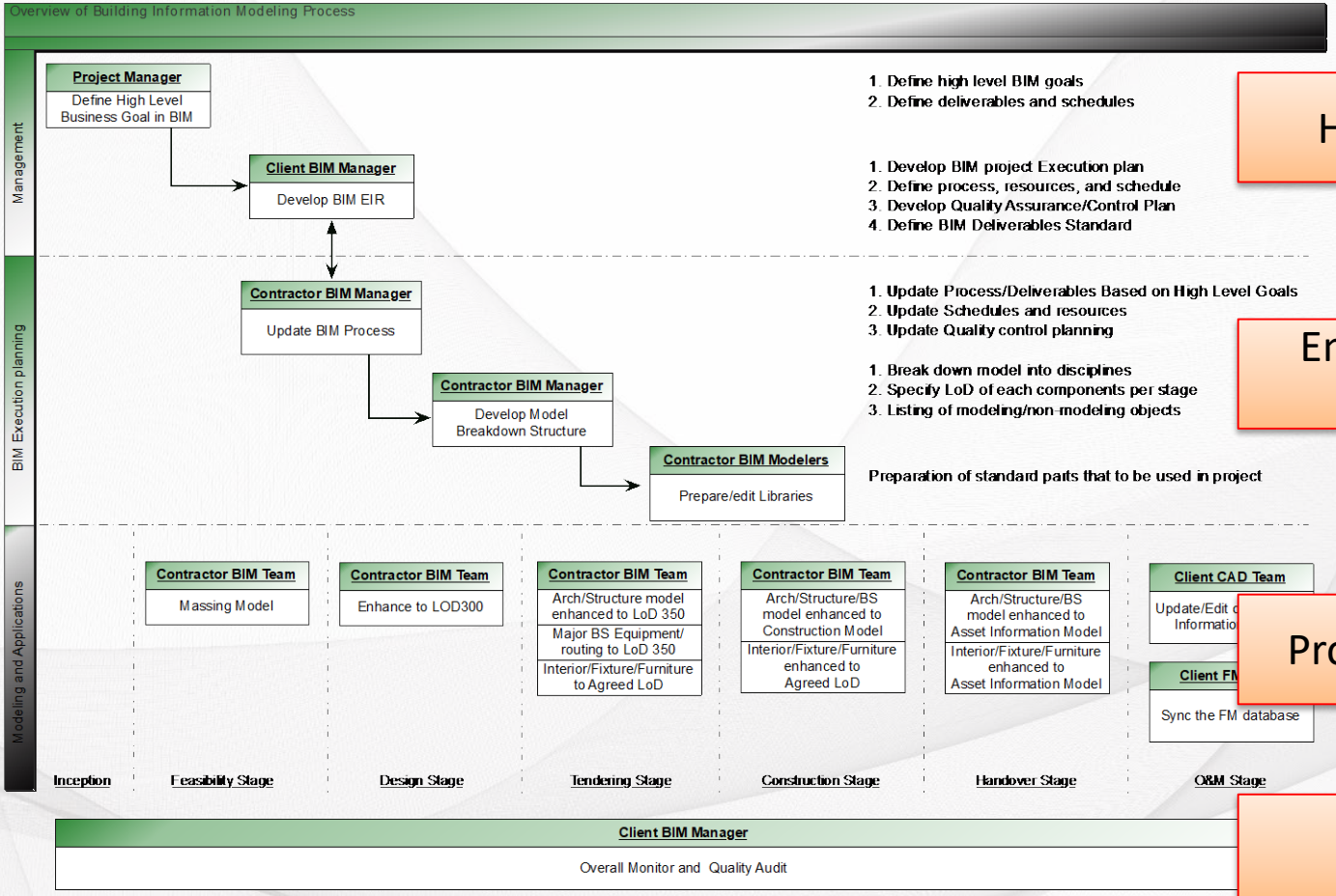
DEVB TC(W) No. 7/2017 Page 1 of 10

Hong Kong

2017 / 05

2018 January onward

17. BIM Execution Process



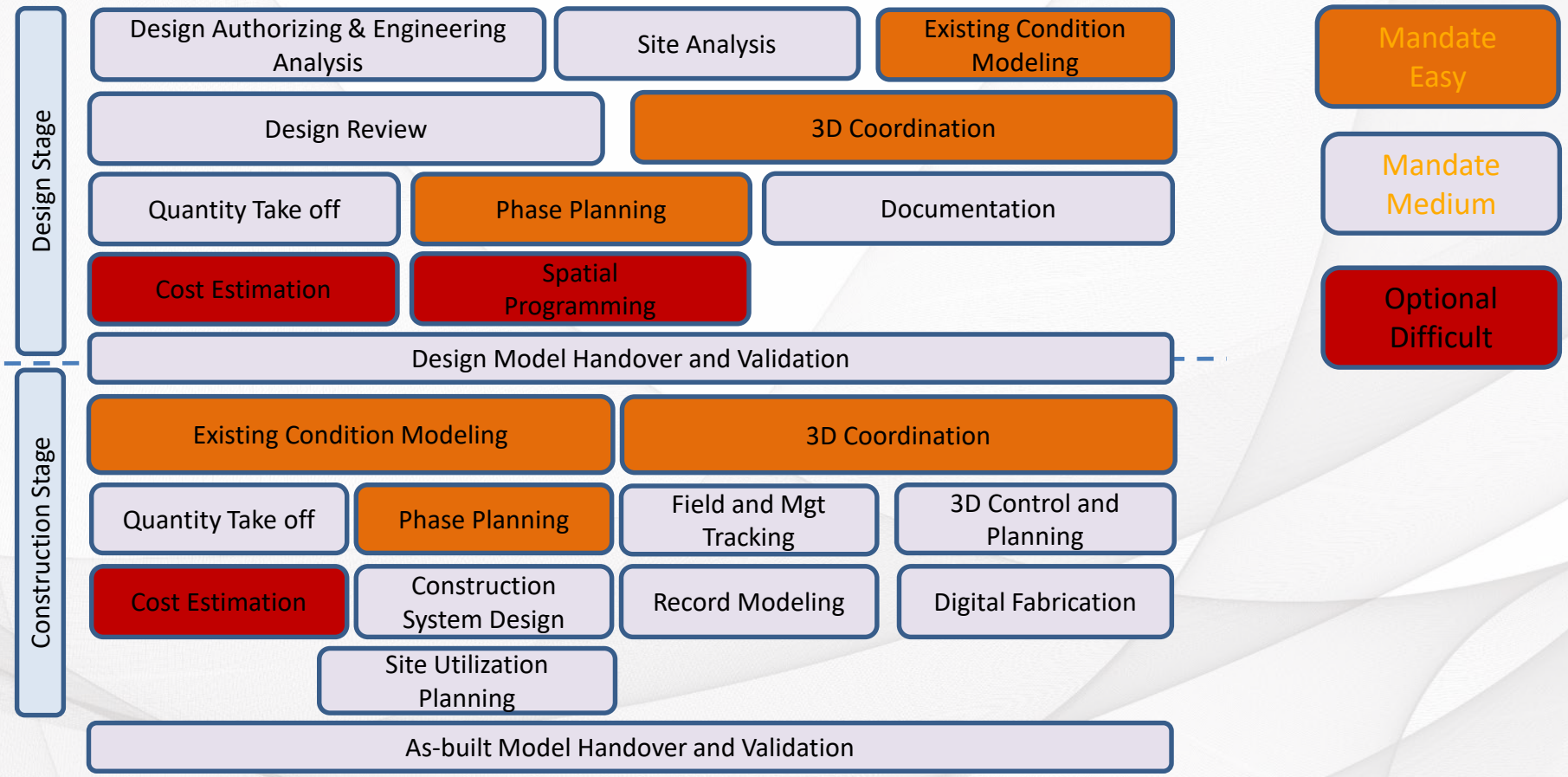
High Level BIM Goal

Employer Information Requirement

Process Re-engineering

Quality Audit

18. High level BIM Goals



19. Formulation of BIM strategy and standards

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

The Chief Executive's 2017 Policy Address

繁體 | 简体 A A A Search

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.

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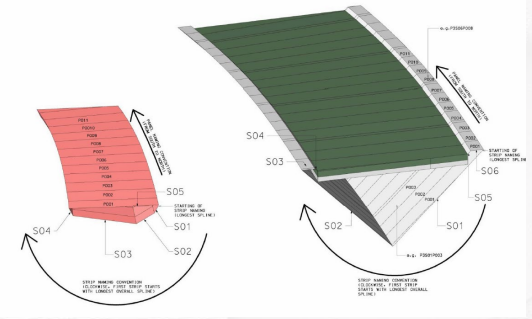
20. Details Design

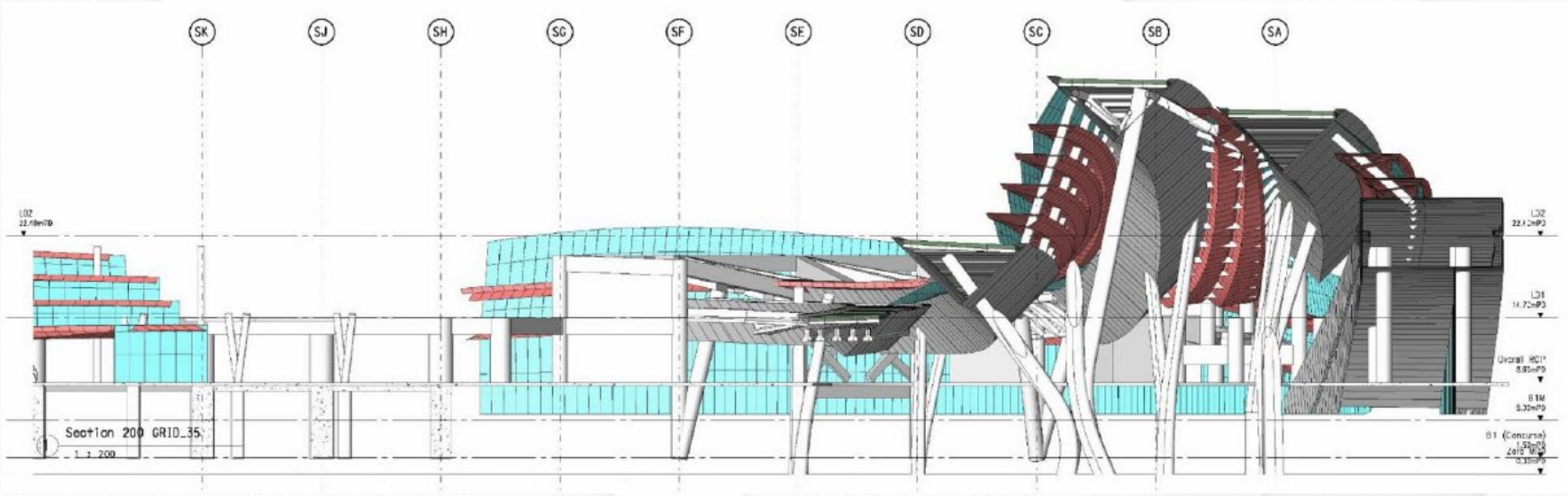


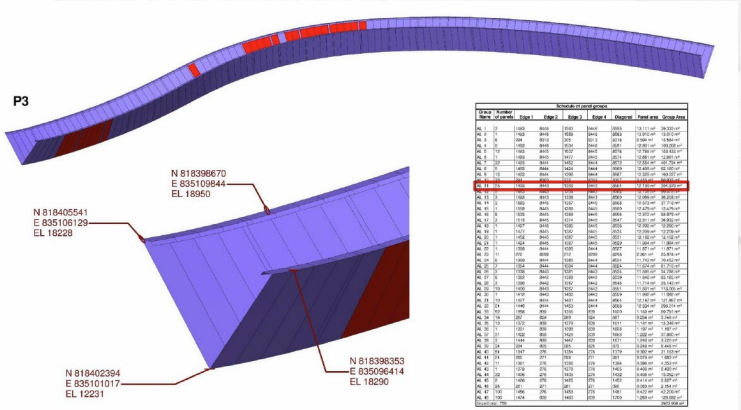
- Each panel contained information including size, location & coordinate

SSOT to improve detail design

Project : West Kowloon Station

21. Details Design

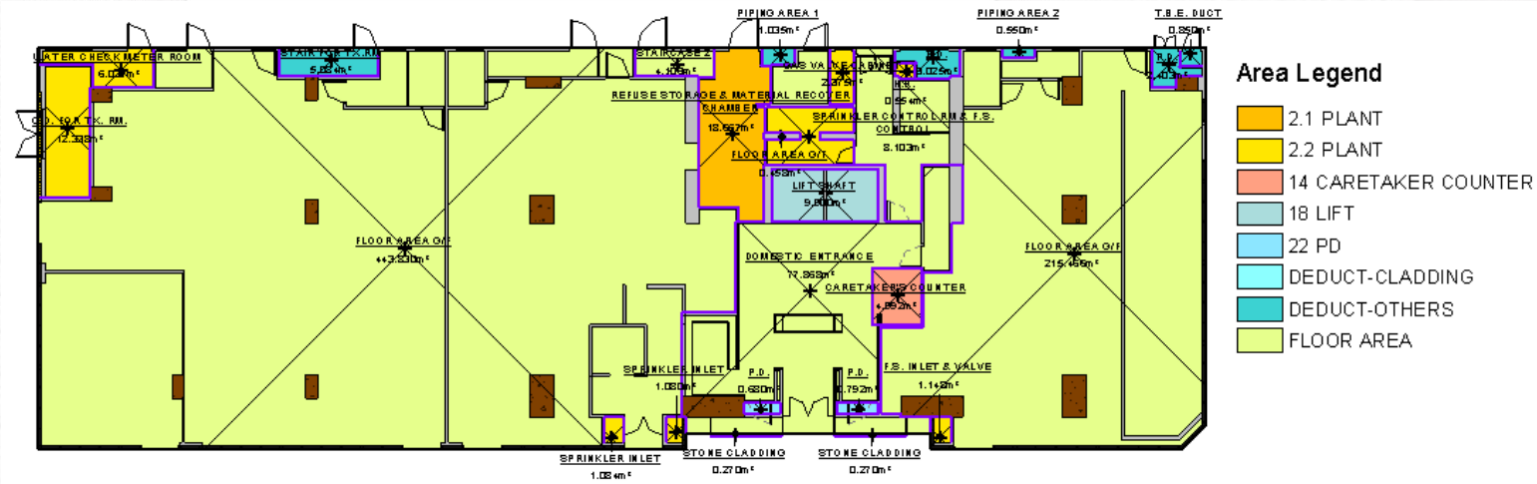




SSOT to improve detail design

Project : West Kowloon Station

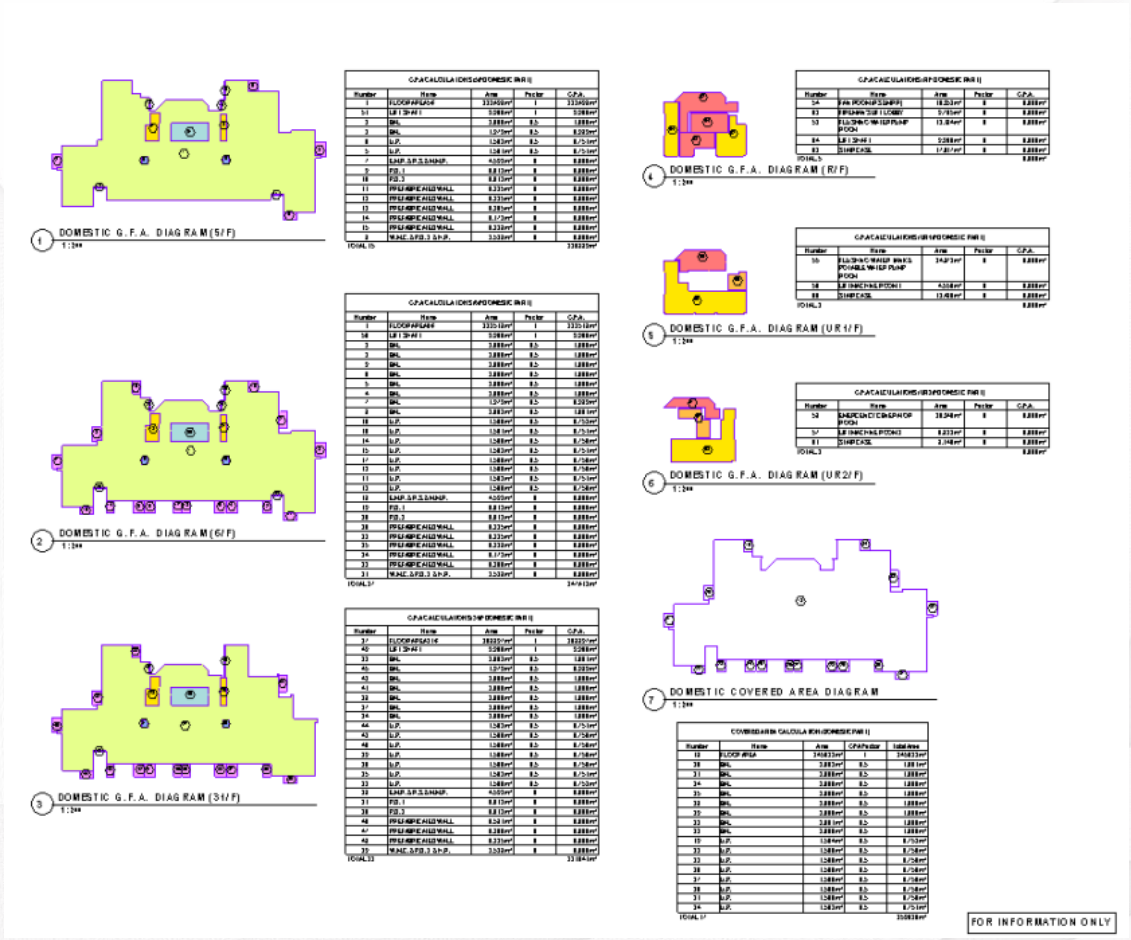
22. General Buildings Plan Submission



SSOT to improve GBP Submission

- Information Modeling enhance the consistency of the project
- Time saving for project operation

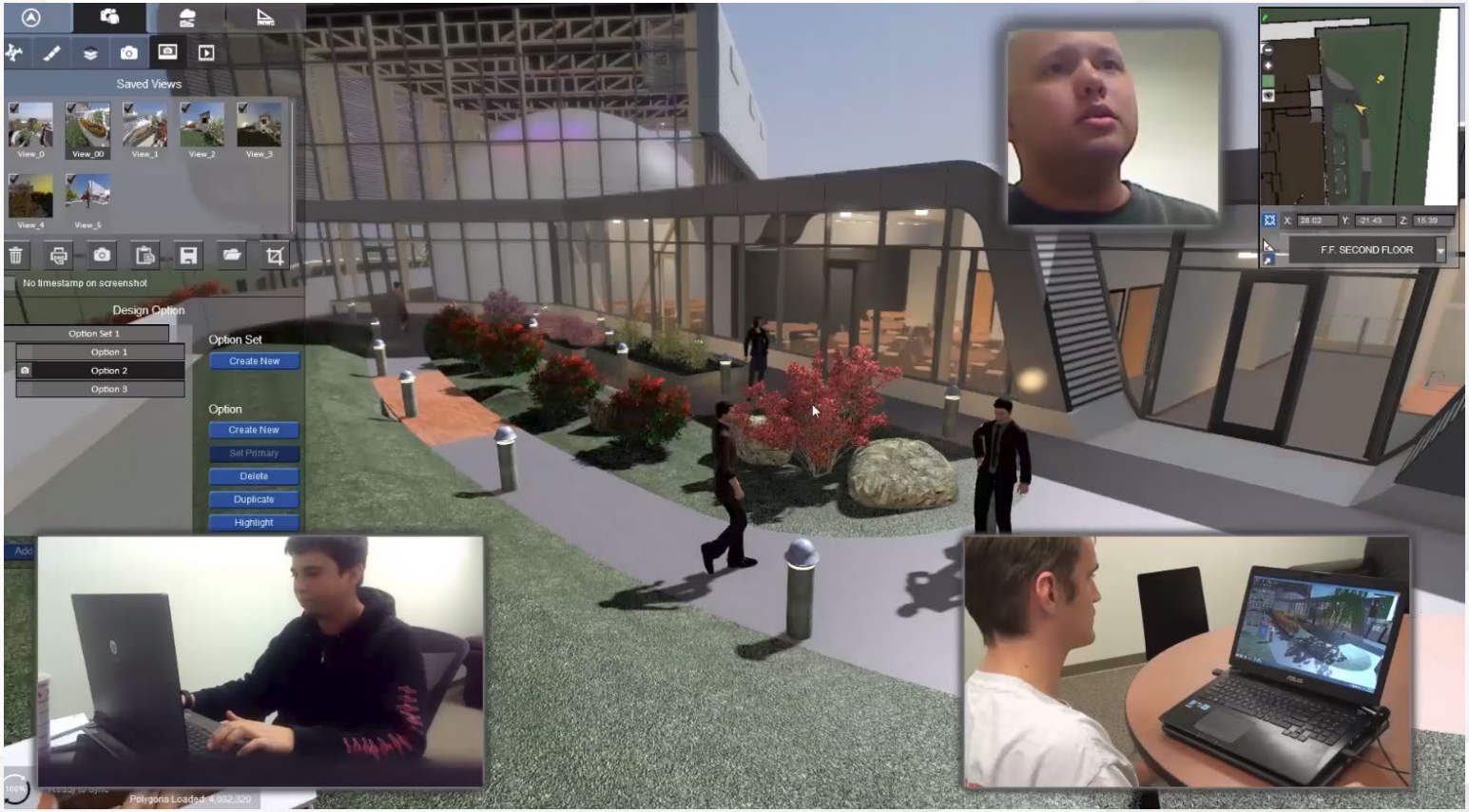
23. General Buildings Plan Submission



SSOT to improve GBP Submission

- Information Modeling enhance the consistency of the project
- Time saving for project operation

24. Design Review and 3D Coordination

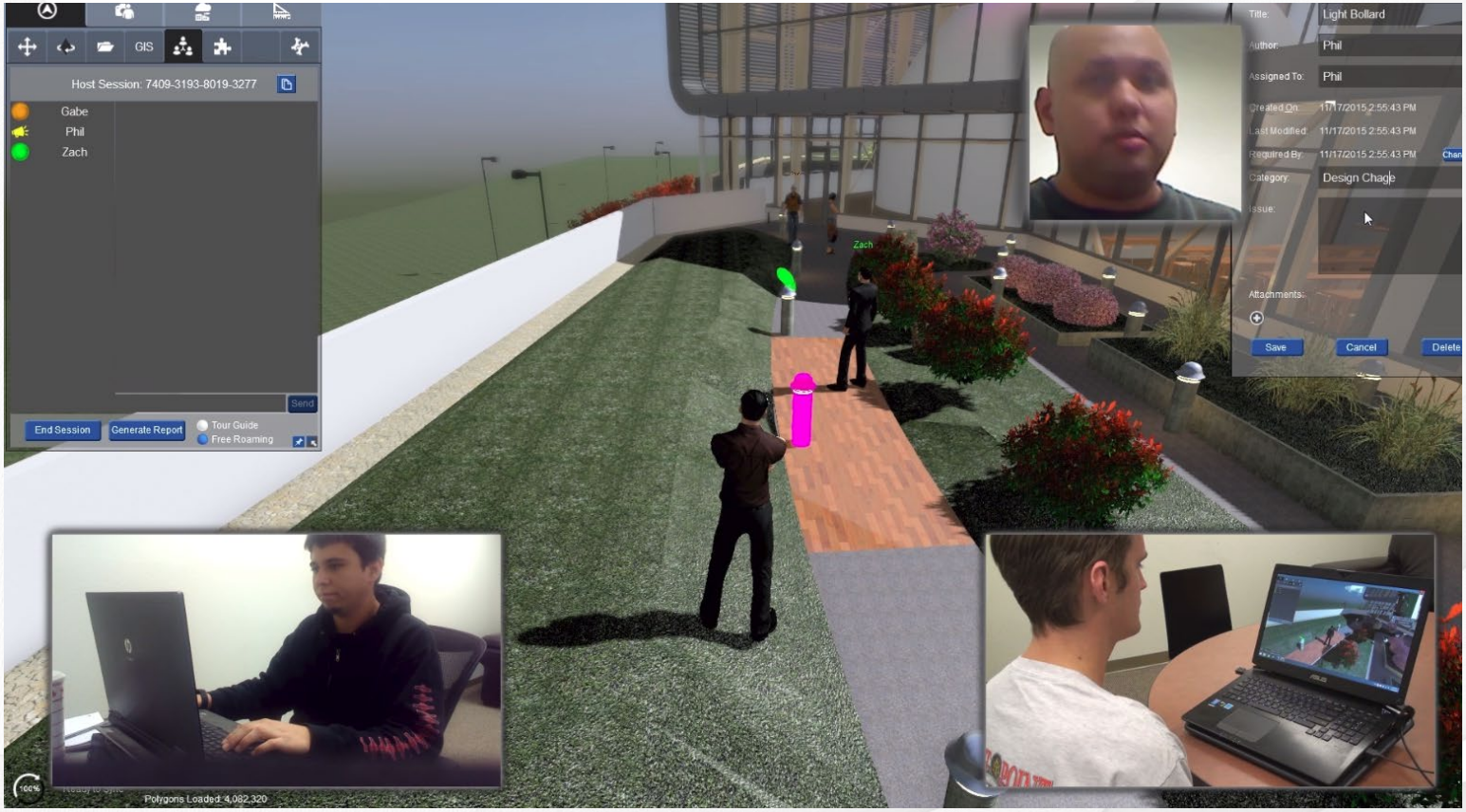


SSOT to improve Coordination

- Plugin software to simulate the virtual environment
- Different discipline can involve and revise the design at the same time

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

25. Design Review and 3D Coordination



SSOT to improve Coordination

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- Different discipline can involve and revise the design at the same time

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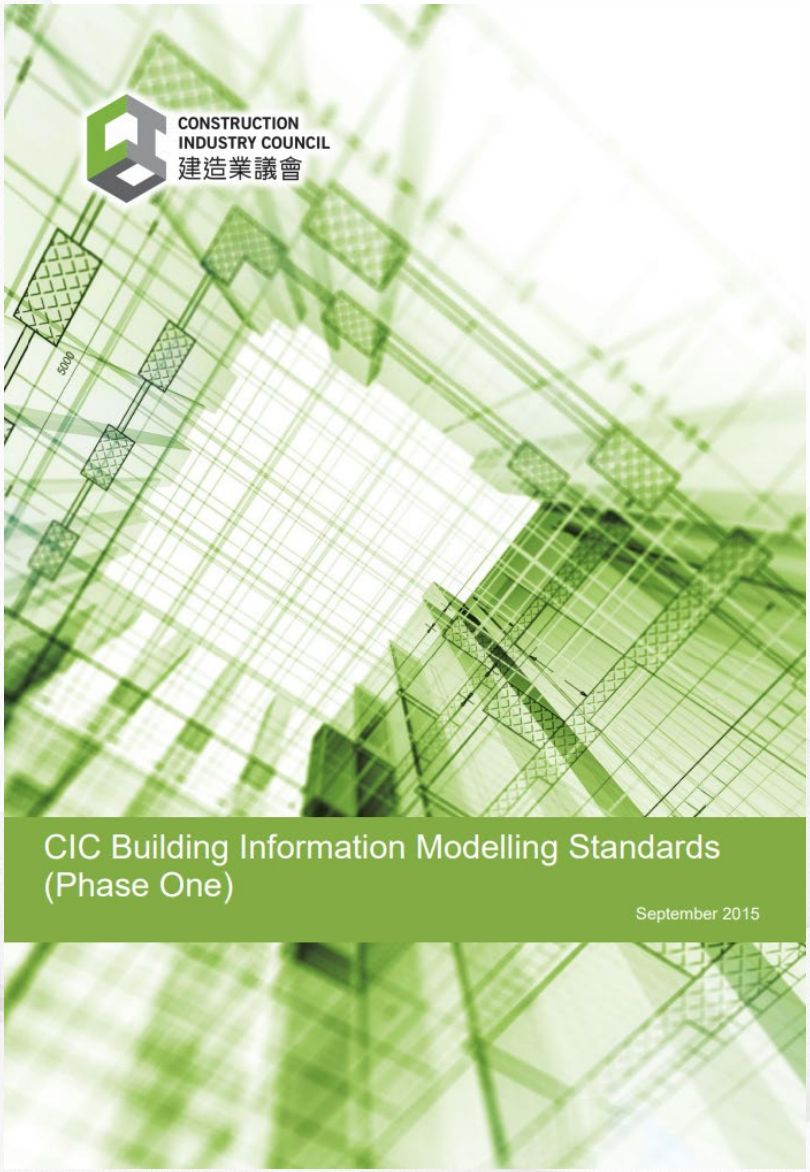
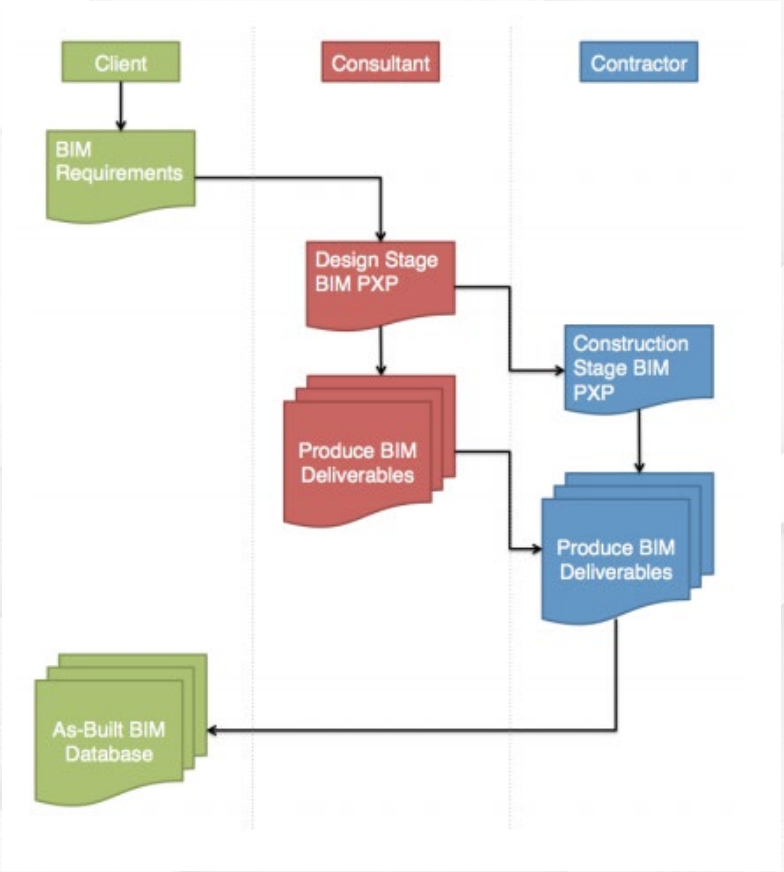
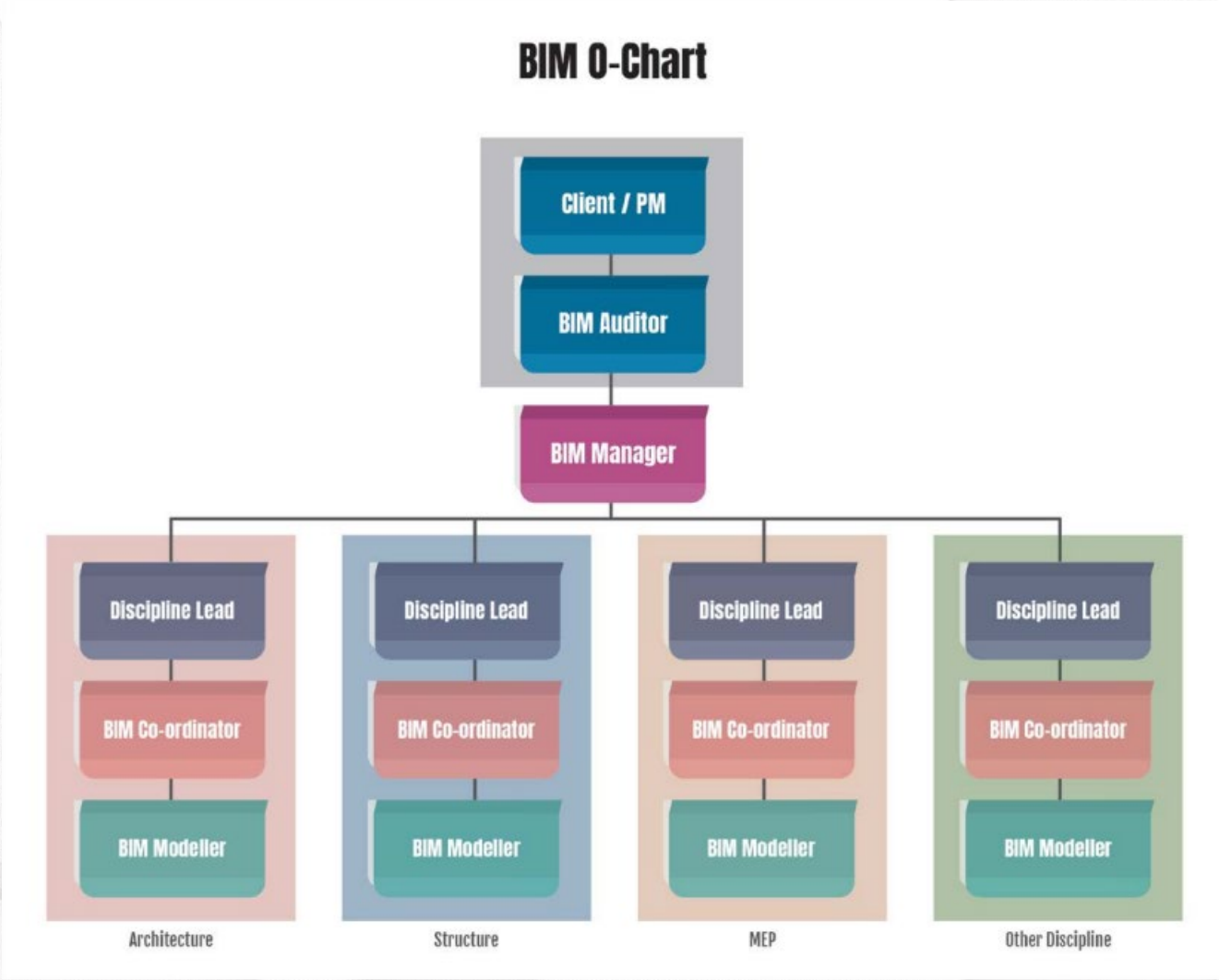
26. Introduction of CIC's BIM Standards

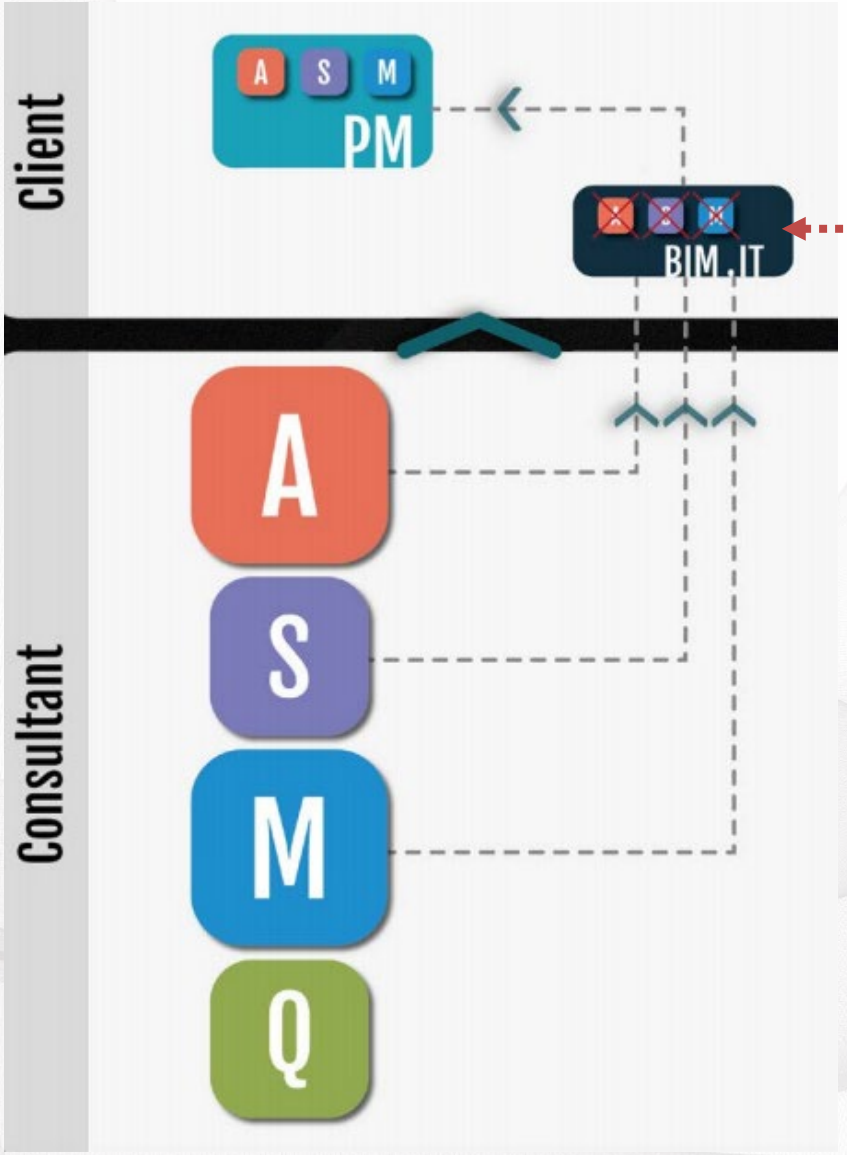




27. Introduction of CIC's BIM Standards



28. Low level BIM



Inefficient Workflow

- Architect, Structural Engineer & Buildings Services Engineer to produce drawings by CAD and deliver to BIM Consultants.
- BIM Consultants as a Modeler and Coordinator to handle all the architectural, structural and MEP as one body.

Inefficient Result

- Workload for Architect, Structural Engineer & Buildings Services Engineer have been duplicated from CAD to 3D.
- Most of the clash problem cannot be resolved since the modeler ae not professional body with no liability.
- The BIM result with no value for the projects.

29. Low level BIM Quotation Example

2. BIM Modeling services

2.1 Architecture and Structure Modeling Package

- To develop Architecture and Structure BIM models based on CAD drawings provided by Client according to BIM Requirement Specification for clash analysis and constructability review.
- Modeling duration: 2 weeks
- Deliverable: Architecture and Structure model for the basement carparks (including B1/F and B2/F) and podium for clubhouse and residential entrance lobbies (including G/F and 1/F) in Autodesk Revit Format

2.2 Detail M&E Modeling Package

- To develop detail M&E BIM models for all areas based on CAD drawings provided by Client according to BIM Requirement Specification for clash analysis and constructability review
- Modeling duration: 2 weeks
- Deliverable: Detail M&E model for the basement carparks (including B1/F and B2/F) and podium for clubhouse and residential entrance lobbies (including G/F and 1/F) in Autodesk Revit Format

2.3 Update Architecture and Structure Modeling Package (Maximum 5 times)

- To update Architecture and Structure BIM models based on updated CAD drawings provided by Client according to BIM Requirement Specification for clash analysis and constructability review
- Modeling duration: 1 week
- Deliverable: Updated Architecture and Structure model for the basement carparks (including B1/F and B2/F) and podium for clubhouse and residential entrance lobbies (including G/F and 1/F) in Autodesk Revit Format

Drawings produced by CAD Base

- Workload for Architect, Structural Engineer & Buildings Services Engineer have been duplicated from CAD to 3D

3. Project Management Services

- To manage BIM documentation systematically to ensure quality of data
- To provide BIM/ CAD manager off-site with the following scope of works
  - To develop BIM project execution plan
  - To develop clash analysis and constructability review matrix
  - To develop systematic procedures for quality assurance, BIM model review and inspect information flow, BIM modeling process, clash analysis process and technical query reporting process.
  - To perform clash analysis based on clash analysis and constructability review matrix
  - To prepare 2D views for example 2D section(s), 3D section(s) from integrated BIM model as requested by Client
  - To prepare technical query of clashes detected and report to the Project team
  - To coordinate with Project team to resolve the clashes detected
  - To attend meetings when request by client and coordinate with Project team in the meetings
  - To assess, control and assure the quality of BIM deliverables
  - To report on project progress and issues
  - To deliver BIM deliverables such as BIM models, Technical Query, Model Progress Report, CSD, CBWD in Autodesk Revit Format and other relevant documents to the main contractor for smooth transition of the information and models.

Clash Analysis

- Most of the clash problem cannot be resolved since the modeler ae not professional body with no liability.
- The BIM result with little value for the projects.

30. UK BIM Standards

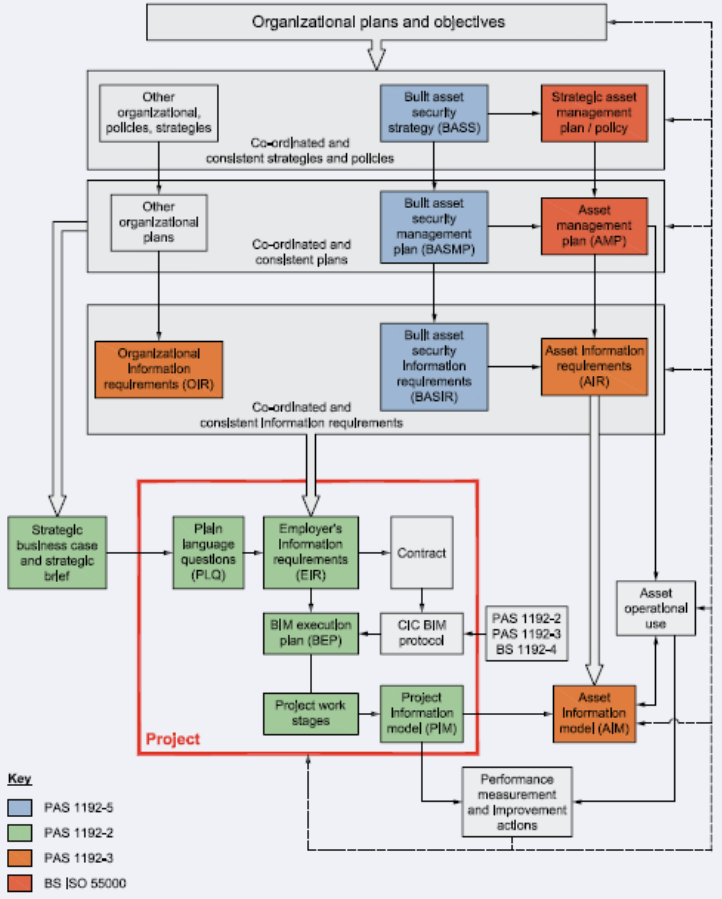
PAS 1192-5:2015

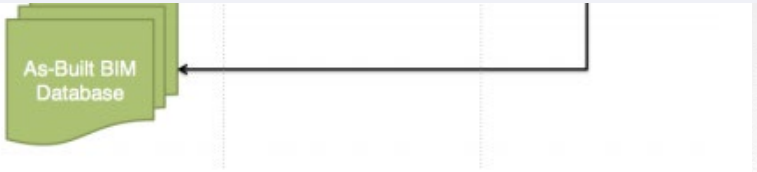
Specification for security-minded building information modelling, digital built environments and smart asset management

CPNI
Centre for the Protection of National Infrastructure

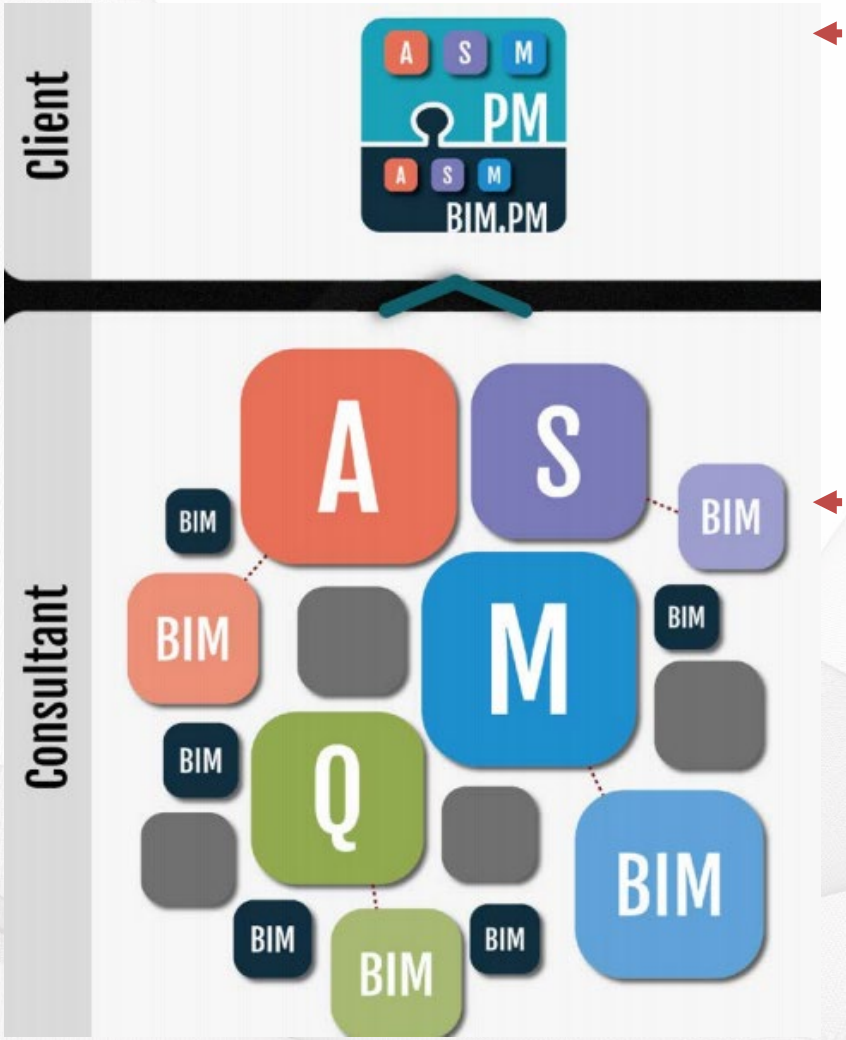
bsi.

Figure 2 – The integration of the security-minded approach





31. High level BIM



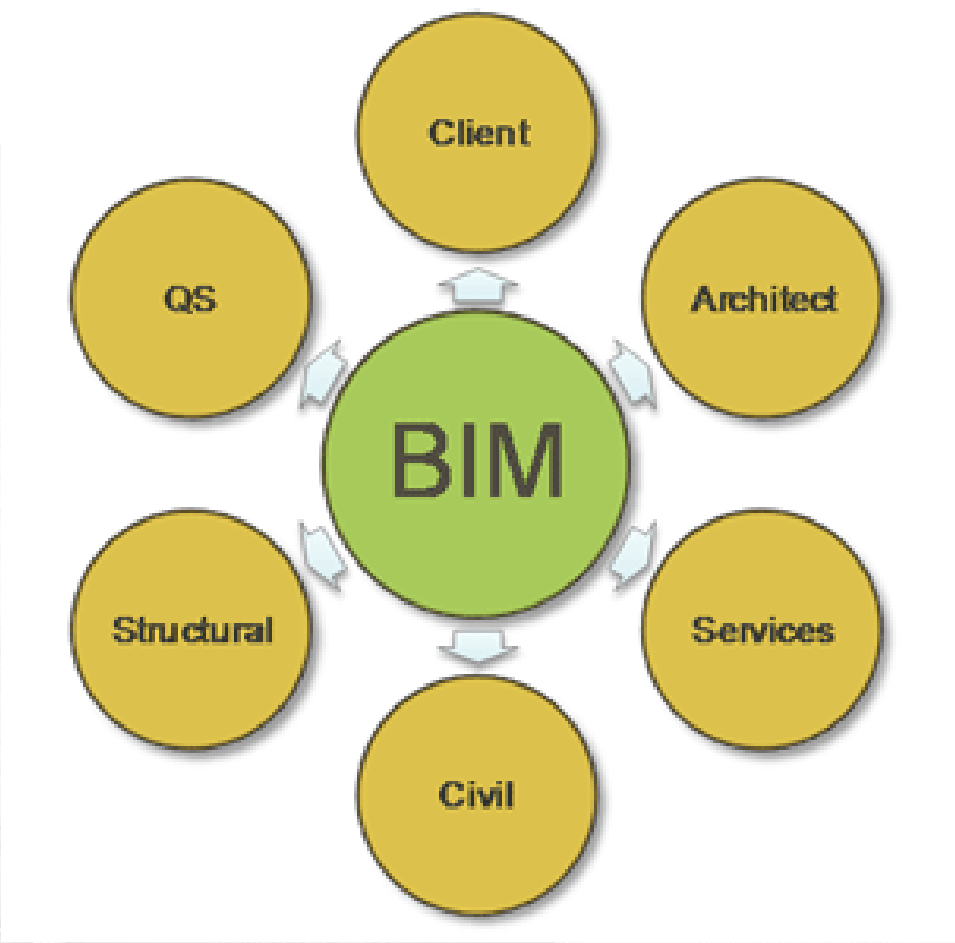
Better Result

- A BIM Manager to assess the BIM deliverable on each party time to time.
- Minimize the risk for variation order since all information are simulate in the BIM.

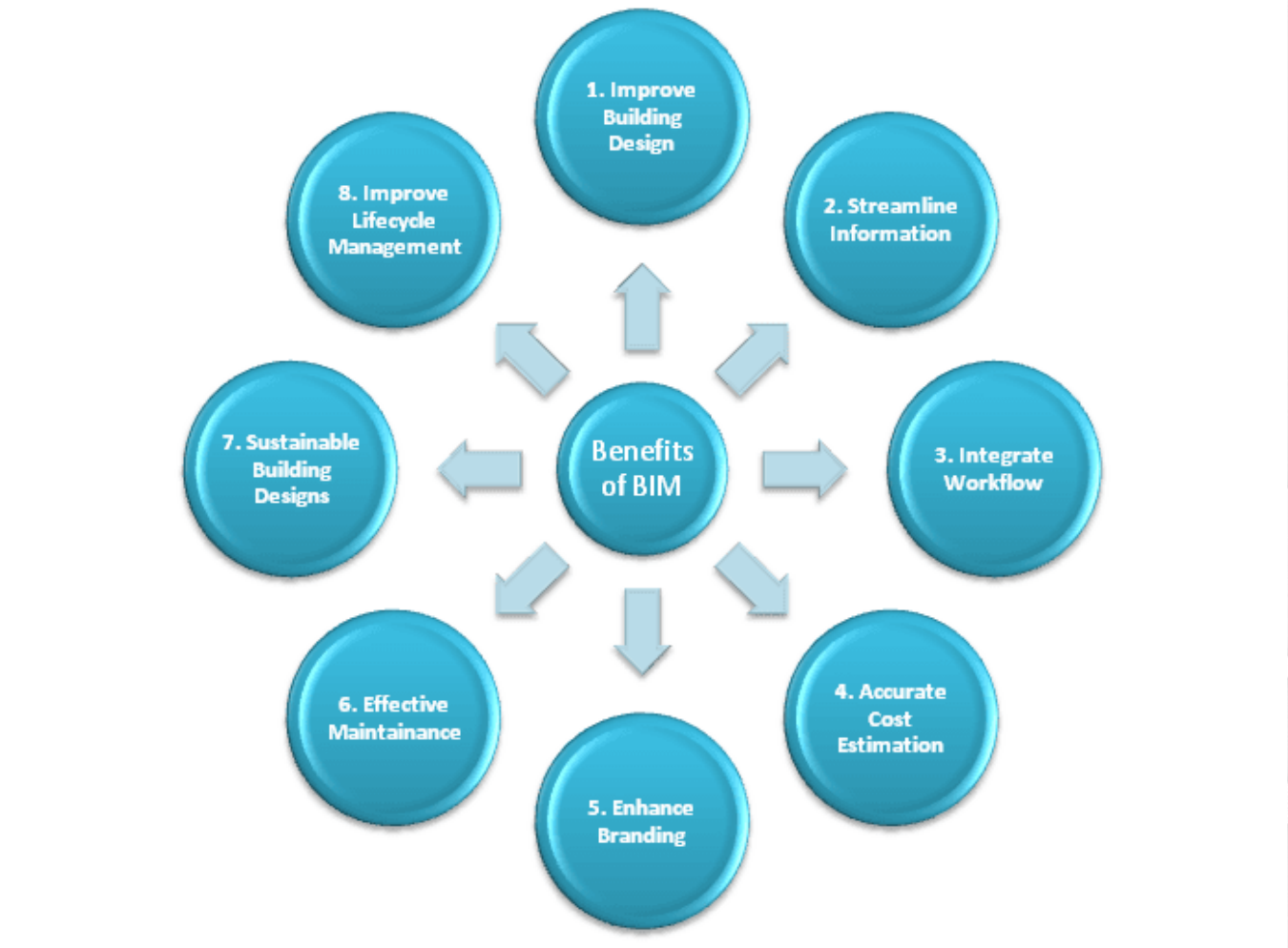
Efficient BIM workflow

- Architect, Structural Engineer, Buildings Services Engineer & QS to input in BIM directly in order to generate drawings, schedules and information.
- Each party have an independent BIM Coordinator to ensure the model is well coordinated.
- Clash result can be resolved during the details design process since all information is contained in earlier stage.

32. Basic concept, advantages and limitations of BIM design process



33. Basic concept, advantages and limitations of BIM design process



34. Basic concept, advantages and limitations of BIM design process

BIM ADVANTAGES

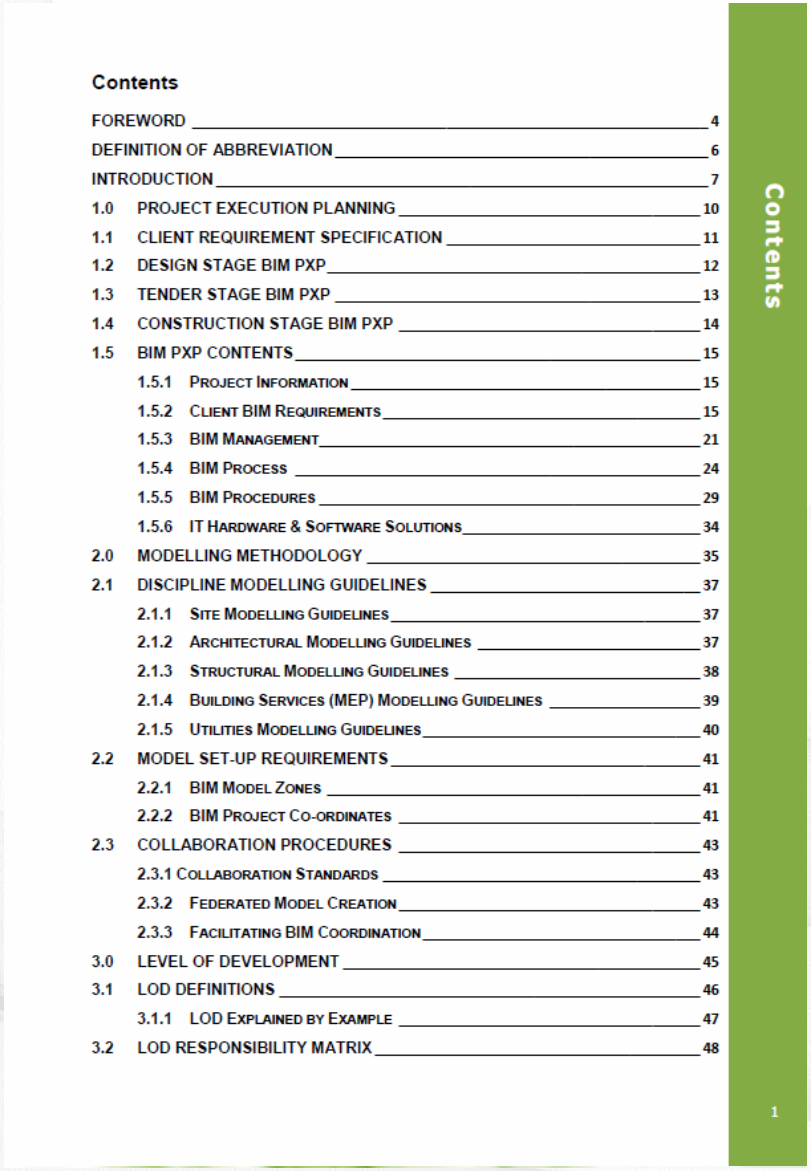
- 3D collaboration with all members of the team with automated detection of clashes. e.g. Is the service void designed by the architect sufficient for the M&E services.
- Visualization of projects to enable greater understanding of all members of the team. For example, it is far easier to schedule scaffolding requirements looking at a 3D model than in 2D.
- 4D visualization i.e. linking the 3D model to the programme to explore logistics.
- Faster to incorporate change into a Revit (3D) CAD layout as no need to update loads of individual drawings.
- 5D potential introducing costs into elements of model e.g electronic drawing take-off.
- Ability to incorporate additional information into model elements e.g maintenance and life span information for Facilities Management or sustainability information, etc

35. Basic concept, advantages and limitations of BIM design process

BIM DISADVANTAGES

- To be effective you need all major members of design team on significantly earlier than is often the case.
- 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.
- New protocols will be needed for managing information transfer and commenting, potentially new roles such as BIM Coordinators (much more than a document handler)
- Problems over information ownership and design responsibility within the model.

36. Introduction of CIC's BIM Standards



Contents

1

Phase one included:

- Project Execution Planning
- Client Requirement Specification
- Design & Tender Stage BIM PXP
- Construction Stage BIM PXP
- BIM PXP Contents
- Modelling Methodology
- Discipline Modelling Guidelines
- Model Set-up Requirements
- Collaboration Procedures
- *Level of Development*
- *LOD Definitions*
- *LOS Responsibility Matrix*
- *LOD Speification*
- Component Presentation Style & Data Organisation
- Folder Structures
- Model Hierarchy & Data Structures
- Drawing Production
- Reference

37. Definition and requirements of LOD (Level of Development)

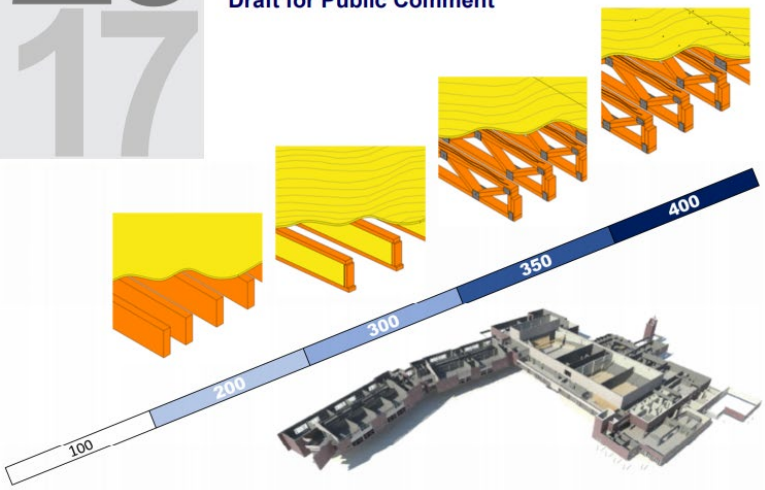
2017

LEVEL OF DEVELOPMENT SPECIFICATION

BIMFORUM

October 03, 2017

Draft for Public Comment



Milestones/Deliverables

Building Systems / Model Elements		SD		DD		CD	Constr. Coord.	Fabrication

PARTICIPATING ORGANIZATIONS

The American Institute of Architects

AGC of America — THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA — Quality People. Quality Projects.

BIM-M Building Information Modeling for Masonry

NISD National Institute of Steel Detailing

PCI Precast/Prestressed Concrete Institute

USIBD U.S. Institute of Building Documentation

3.1 LOD Definitions

LOD notations are comprised of numbers from LOD 100 to LOD 500 and are defined as follows:-

LOD 100 — The Model Element may be graphically represented in the Model with a **symbol** or other generic representation.

Information related to the Model Element (i.e. cost per square foot, tonnage of HVAC, etc.) can be derived from other Model Elements.

LOD 200 — The Model Element is graphically represented within the Model as a **generic** system, object, or assembly with approximate quantities, size, shape, location, and orientation.

LOD 300 — The Model Element is graphically represented within the Model as a **specific** system, object or assembly in terms of quantity, size, shape, location, and orientation.

LOD 350 — The Model Element is graphically represented within the Model as a specific system, object, or assembly in terms of quantity, size, shape, orientation, and **interfaces with other** building systems.

LOD 400 — The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing, **fabrication, assembly, and installation** information.

LOD 500 — The Model Element is a **field verified representation** in terms of size, shape, location, quantity, and orientation.

For LOD 200 to 500, Non-graphic information and data may also be attached to the Model Elements.

3.1 LOD Definitions

38. Model Subdivision and LOD

Project Specific Sub-division: O-Chart & File Size

ID	Disciplinary Model	Initial Model	Design Model	Coordinated Model	As-built Model	Sub Models
ES	Existing Site Model	200	200	250	250	4
ER	Road Model	250	300	350	500	7
BR	Bridge Model	250	300	350	500	34
UP	Underpass Model	250	300	350	500	11
BD	Building Model	250	300	350	500	27

Progressively Developed during project;
May not developed to same LoD

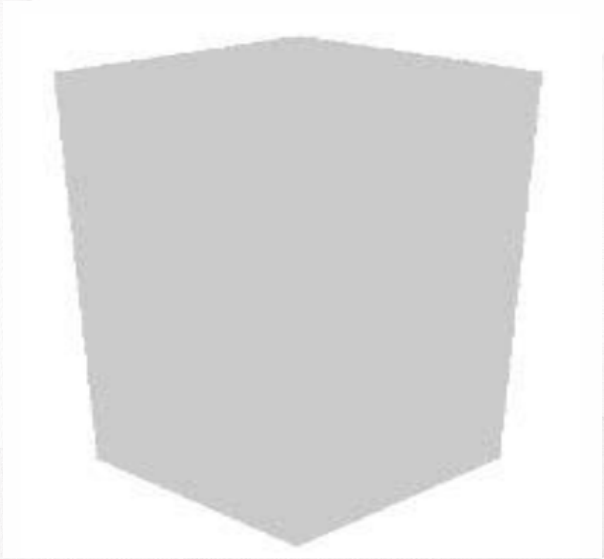
Further sub-division for operation and versioning

39. Geometric standard : Level of Development

LoD	Description
100	Graphically Represented as a **Symbol**
200	Graphically represented as a **Generic object**, with approximated size, shape, location, orientation
300	Graphically represented as a **Specific Object**, with accurate size, shape, location, and orientation Dimension can be directly measured from the model without referring to labels
400	Graphically represented as a specific object with **fabrication, assembly, construction joints, installation** information
500	Field verified representation with non-graphic attributes

40. LOD 100

LoD	Description
100	Steel Framing Columns as **Generic Column Element**

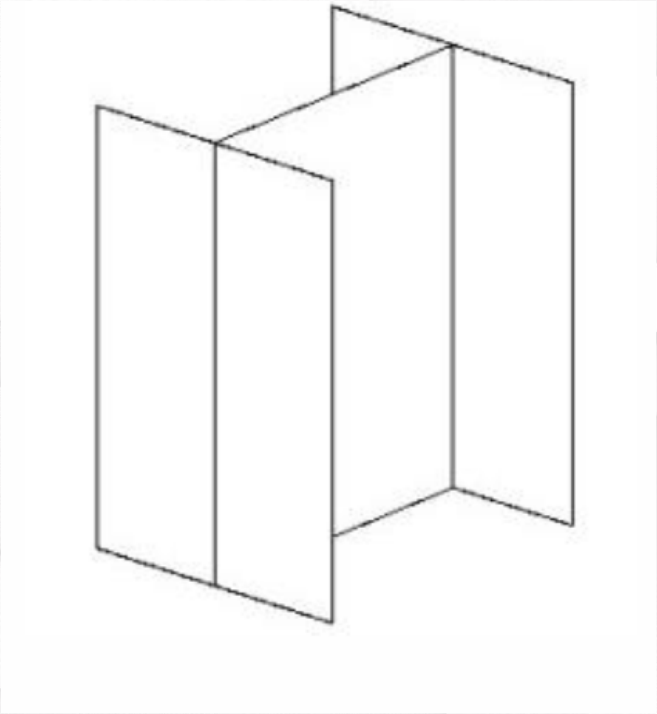


LOD in practice?

- Allow a design divide in different stages.
- A clear scope for consultant input
- Consultants can use the LOD standard to develop their design in different stages with a clear definition

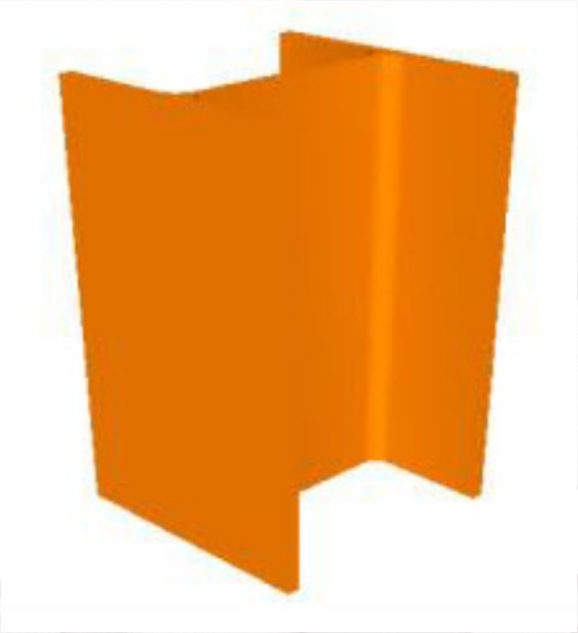
41. LOD 200

LoD	Description
100	Steel Framing Columns as **Generic Column Element**
200	Steel Framing Columns as **Generic Column** , with approximated size, shape, location, orientation



42. LOD 300

LoD	Description
100	Steel Framing Columns as **Generic Column Element**
200	Steel Framing Columns as **Generic Column** , with approximated size, shape, location, orientation
300	Steel Framing Columns with **Specific Sizes of Main Vertical Structural Members Modeled** per defined structural grid with current location and orientation.

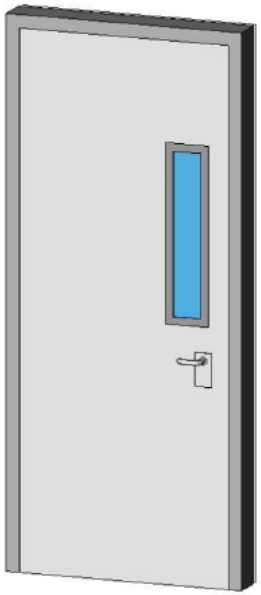


43. Level of Development – Steel Column

LoD	Description
100	Steel Framing Columns as **Generic Column Element**
200	Steel Framing Columns as **Generic Column** , with approximated size, shape, location, orientation
300	Steel Framing Columns with **Specific Sizes of Main Vertical Structural Members Modeled** per defined structural grid with current location and orientation.
400	Steel Framing Columns to include **welds, coping of members, cap pates, washers, nuts and all assembly elements, etc.**
500	Steel Framing Columns with **As-Built Information.**

44. Level of Development – Doors

Doors

LOD	Description	Data	Example Image
100	N/A		
200	Model doors with approximate dimensions in terms of location, size, count and type.		
300	Model doors accurately based on specific types. Ironmongery (handles, locks, hinges etc.) may be included as data for schedule output. Identify exterior and interior by type and by function. Each door shall have a unique ID based on the room or space which it is used to access.	Fire rating	
400	Update with specific manufacturers information.		
500	As-built door model.		

LOD in practice?

- The development can be carried out from consultants to contractor.
- All information can be contained and let the facility management team to operate the building with sufficient information.

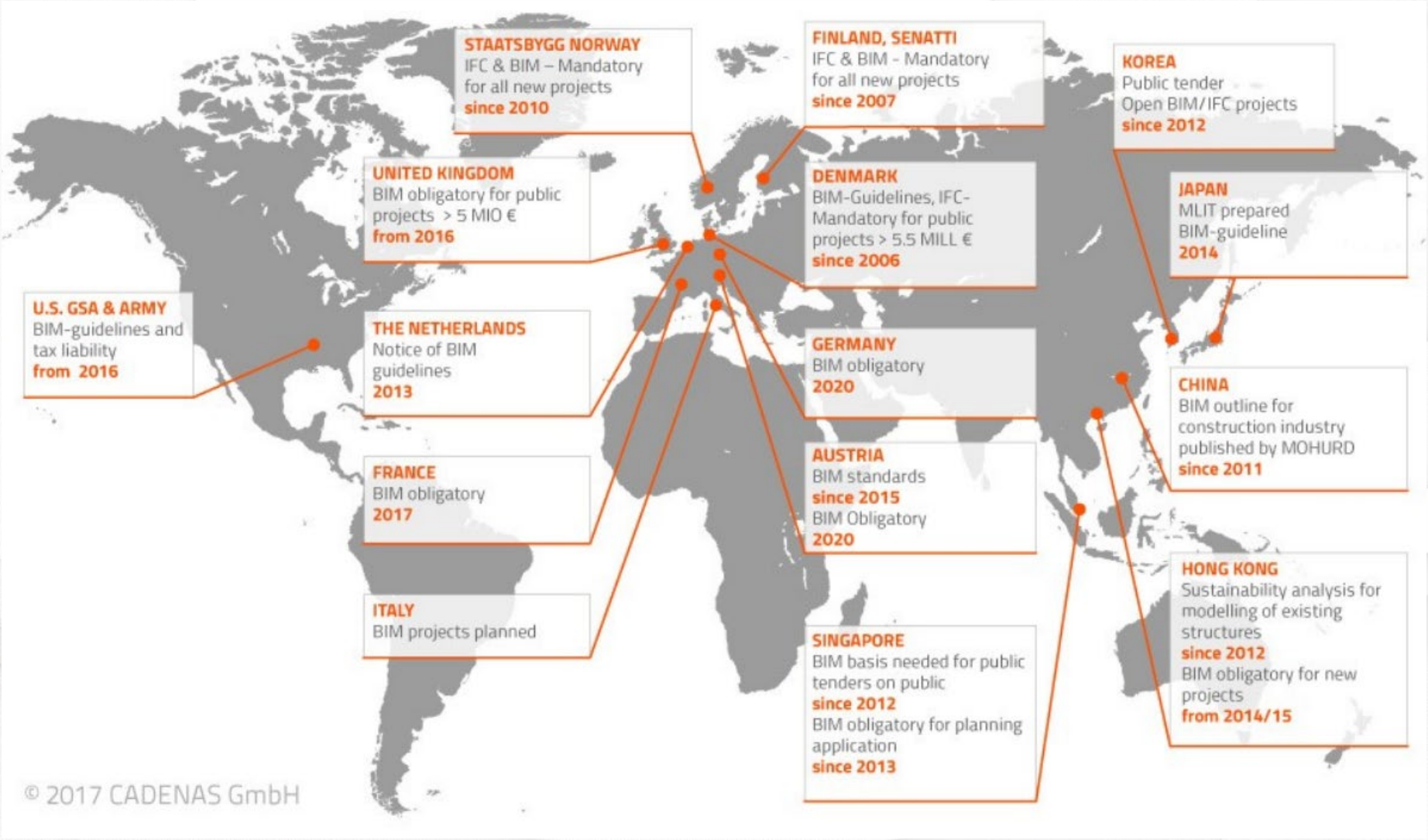
45. CIC Standard : Pavement

LOD	Description
100	Approximate alignment, width and spot levels of the paving surfaces
200	Element modelling to include approximate 3D alignment, shape and width of pavement
300	Element modelling to include: – Accurate size and geometry of every layer of paving components (frication course, wearing course, base-course, road-base, sub-base, etc.) that varies continuously along the road alignment – Accurate super-elevation and longitudinal fall of the pavement components Required non-graphic information associated with model elements includes: – Polygon Feature Type * – Surface Material Type * – Paver Type * – Headroom requirement (* to match HyD GIS requirement)
400	Element modelling to include: – Locations of Construction Joints – Locations of Movement Joints – Locations of Box-out Openings – Lane and Road markings Required non-graphic information associated with model elements includes: – Unique Identifier of construction bay
500	A field verified as-built model with complete non-graphic information

LOD in practice?

- The development can be carried out from consultants to contractor.
- Contractor shall use the model to develop his Shop Drawings for approval which allow the Single Source of Truth (SSOT) is reflected in the model.
- All information can be contained and let the facility management team to operate the building with sufficient information.

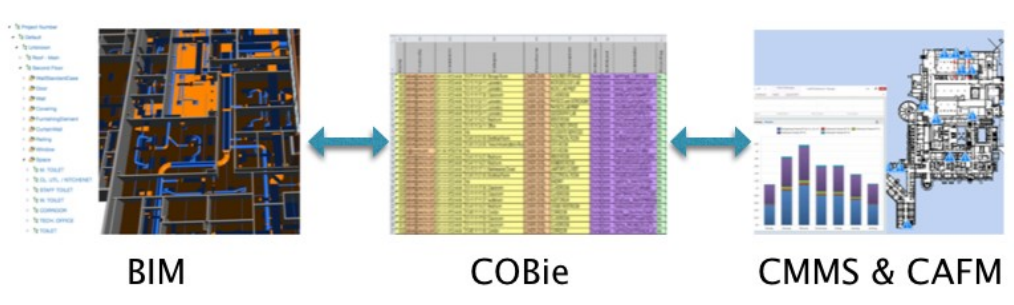
46. Recent development of BIM in various countries and the prevailing standards and requirements



47. Worldwide organizations and standards promoting BIM (CIC, IFC, COBie, etc.)

CONSTRUCTION INDUSTRY COUNCIL
建造業議會

buildingSMART
International home of openBIM



UDC

中华人民共和国国家标准

P GB/T ××××—201×

建筑工程信息模型应用统一标准

Unified standard for building information model application

（征求意见稿）

201×—××—×× 发布 201×—××—×× 实施

中华人民共和国住房和城乡建设部
中华人民共和国国家质量监督检验检疫总局 联 合 发 布

48. Identification of the uses of BIM

- Design authoring
- Design coordination
- Estimating and cost management
- 4D BIM for construction management
- 5D BIM i.e. 3D + time + cost - Environmental and engineering analysis
- Visualization
- Model federation and validation
- Site supervision and safety management

	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	O	M
4	Site Analysis	O	M	
5	3D Coordination		M	M
6	Cost Estimation	O	O	O
7	Engineering Analysis		O	O
8	Facility Energy Analysis		O	O
9	Sustainability Evaluation	O	O	O
10	Space Programming	O	O	
11	Phase Planning (4D Modelling)		O	M
12	Digital Fabrication		O	O
13	Site Utilization Planning			O
14	3D Control and Planning			O
15	As-Built Modelling			M
16	Project Systems Analysis			O
17	Maintenance Scheduling			O
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

THANK YOU