

# Trend of Promoting BIM Technology and Development and Application to Building Administrative Procedures in Japan



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# Topics

## 1. Development of BIM in Japan

- In design phase
  - Building Confirmation
  - BIM object library
- In construction phase
  - Private construction projects
  - Public construction projects / R&D

## 2. Recent Government Measures in BIM promotion of building sector

- PRISM
- Building BIM promotion roundtable in MLIT

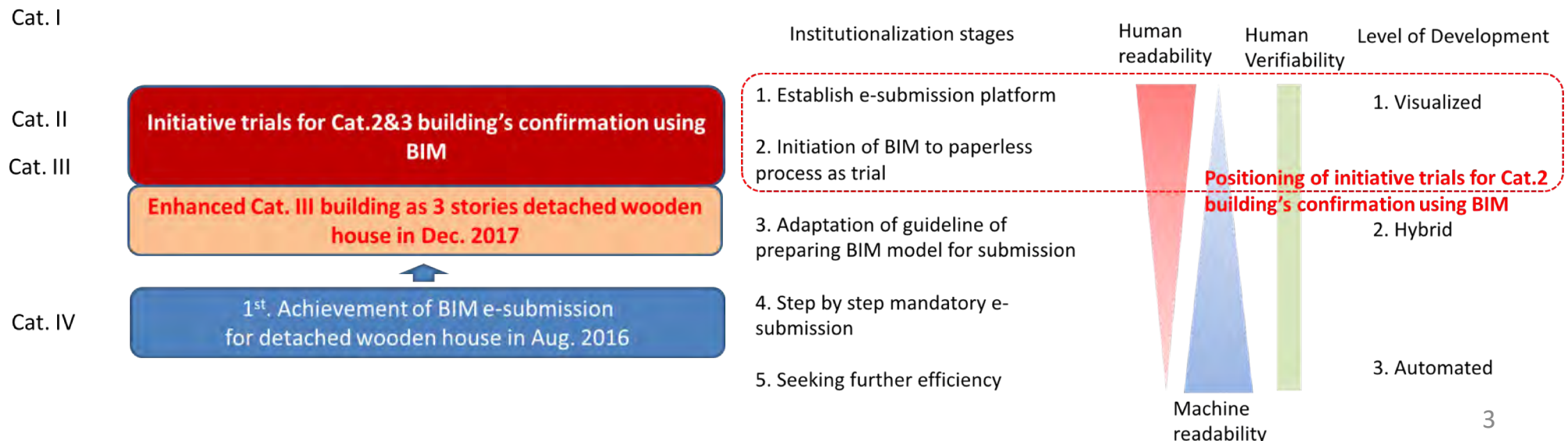
# 1. Development of BIM in Japan

- In design phase

## Building confirmation

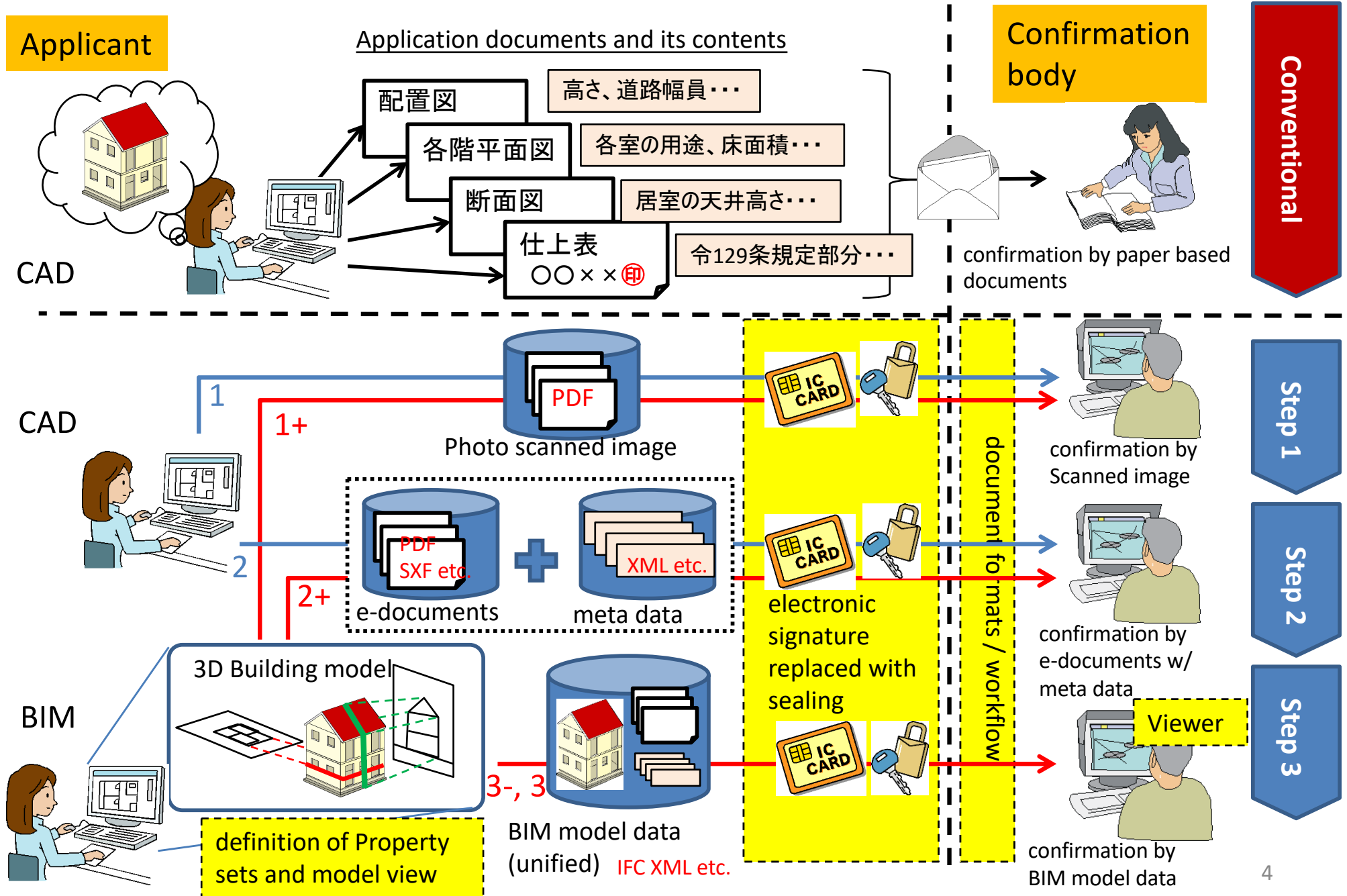
- In 2015:
  - e-submission for building confirmation was started. (Paperless application)
  - "Development Step for BIM building confirmation" was indicated by BRI.
- The trials of application BIM to confirmation process were started and enhanced the targets by each confirmation body from 2016.
- Now, the communization of these procedure is desired by confirmation bodies.

Relation between Institutionalization stages and level of development (LOD)



Enhancement of the target of BIM building confirmation and its level of development (LOD)

# BRI development step for BIM confirmation by e-submission



# Detail of development steps and R&D status

Step		Level of development	Additional Contents from conventional application	Compatibility	In-service	R&D status
0	CAD BIM	Conventional application		-	✓	
0+	CAD BIM	Added Some data contents with Step0 paper docs.	CVS/XML form data of application's by data media	-	✓ (1993~)	
1	CAD BIM	Just photo scanned or e-published application forms and drawings	(same as conventional application)	-	✓ (2015.1~)	
1+	BIM	e-published application forms and drawings with BIM certification	Footprint of BIM certification for each view of e-documents	☆	✓ 2016.8~*	generalize the method
2	CAD BIM	Added Some data contents with Step1 docs.	CVS/XML form data of application's	-	✓ (2015.1~)	
2+	BIM	Added essential IFC model data with Step1 docs.	IFC Model data incl. form data as meta data	☆☆	trial	fixed concepts
3-	BIM	Available partial auto code checking (ACC)	IFC Model data compatible with partial ACC	☆☆	-	develop IFC MVD Concept
3	BIM	Available full auto code checking (ACC)	IFC Model data compatible with full ACC	☆☆☆	-	

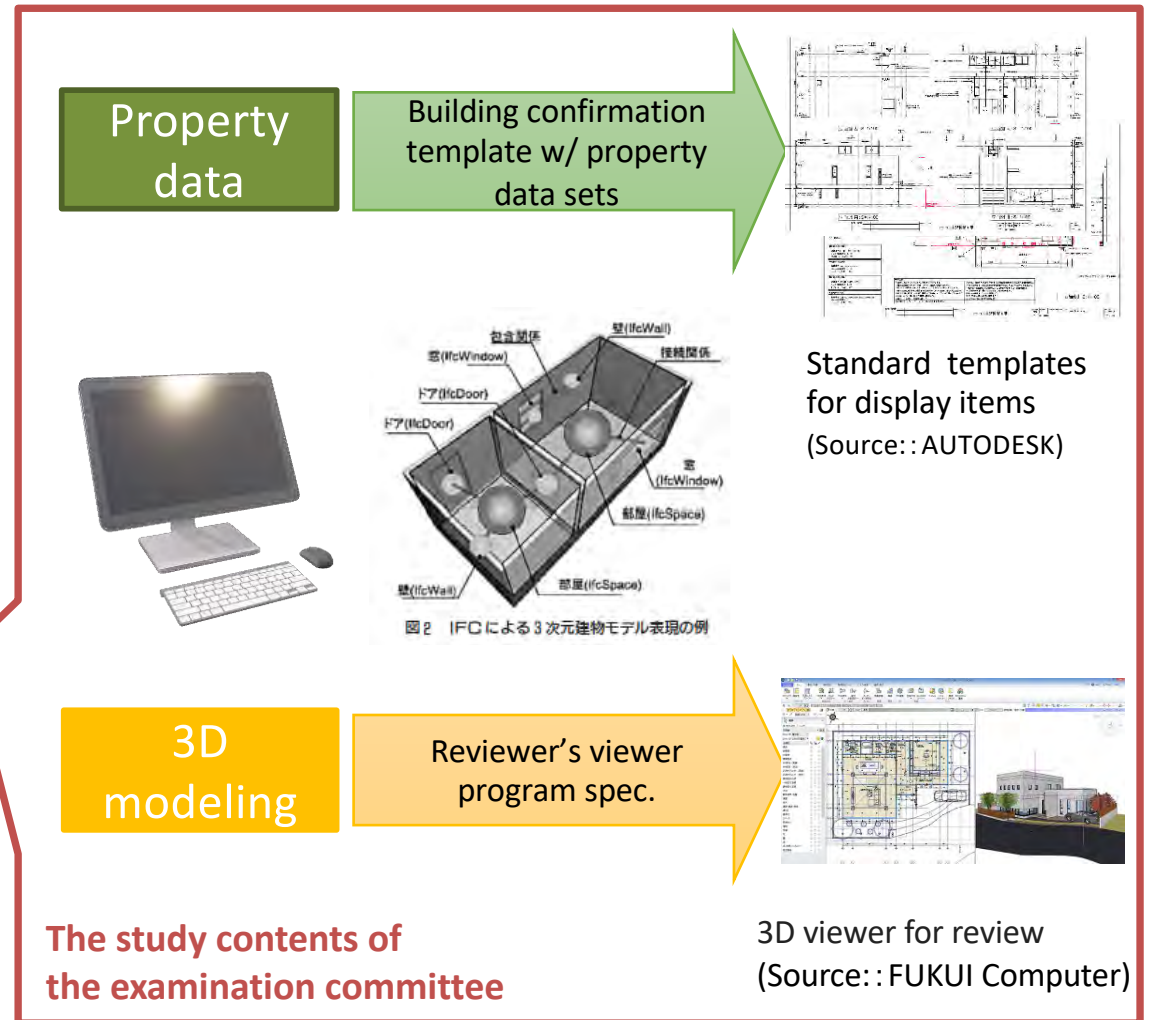
\* In-service specialized for small scale (e.g. less than 3 stories) wooden house

# 1. Development of BIM in Japan

- In design phase

## The task examination committee of building confirmation using BIM

### Use of BIM in architecture



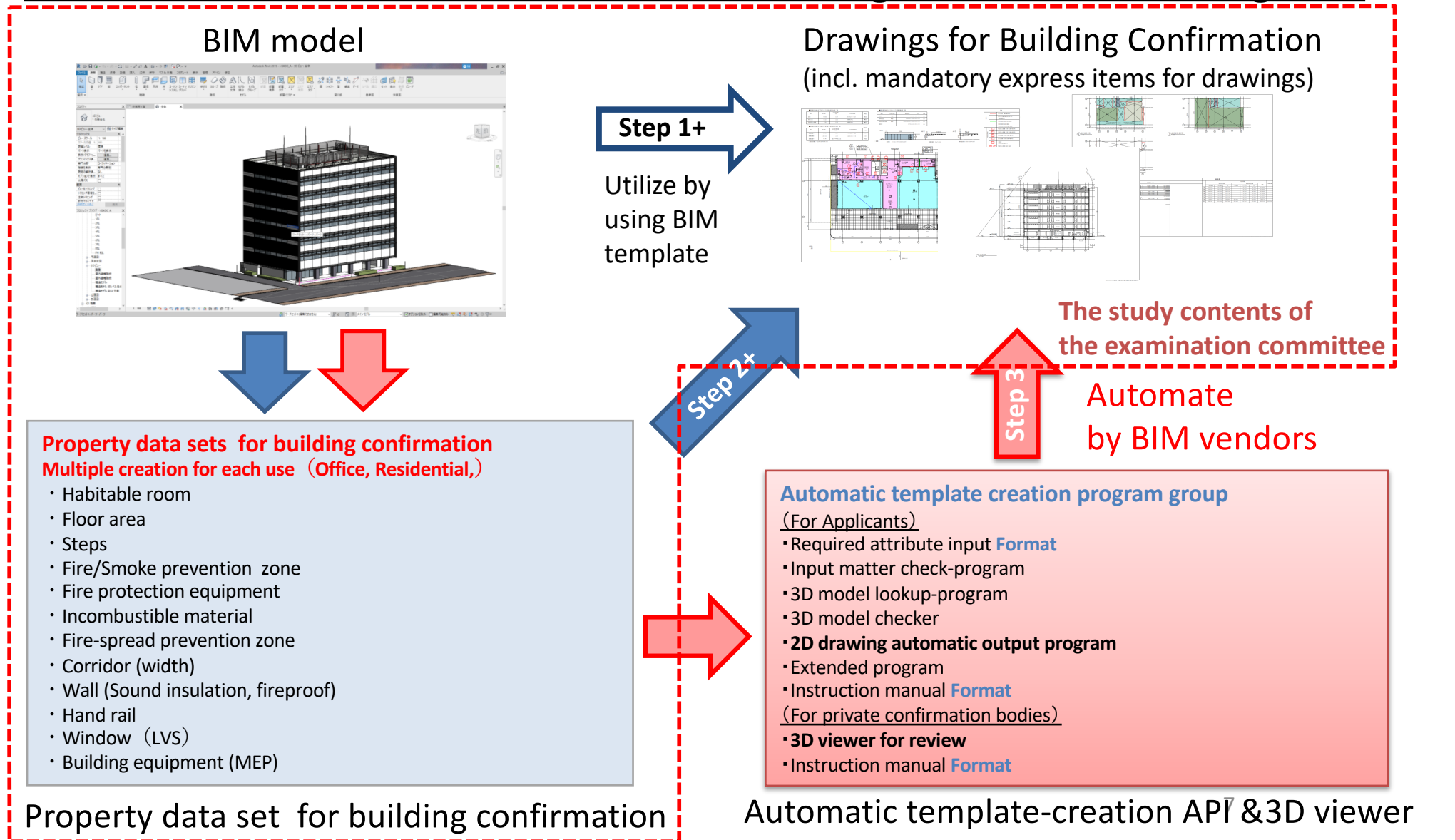
Member : academic persons(2), BRI (2), private confirmation bodies(7)  
Observer: MLIT, local authorities, bSJ , BIM vendors(4)



# 1. Development of BIM in Japan

- In design phase

## The task examination committee of building confirmation using BIM

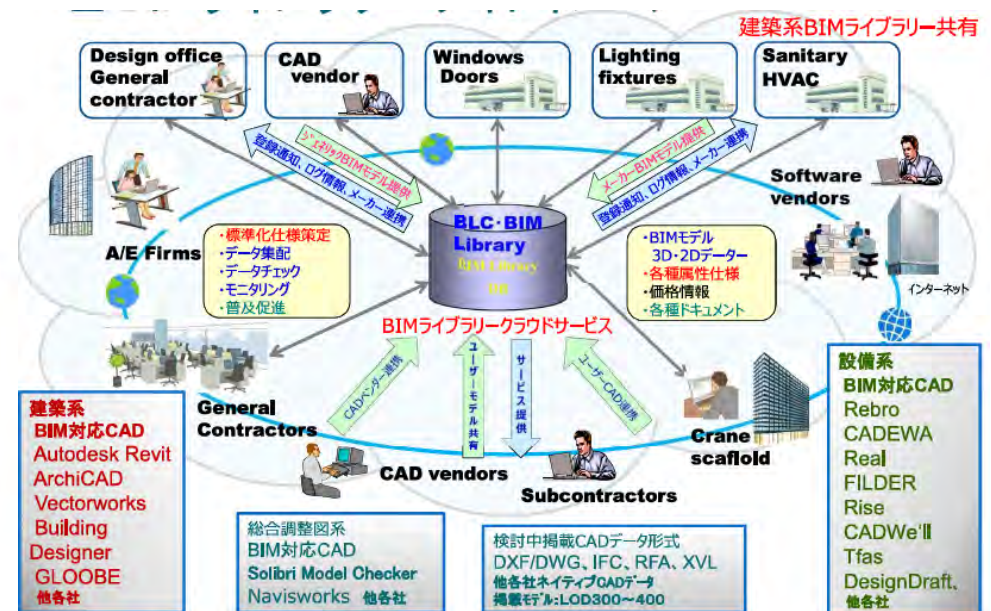
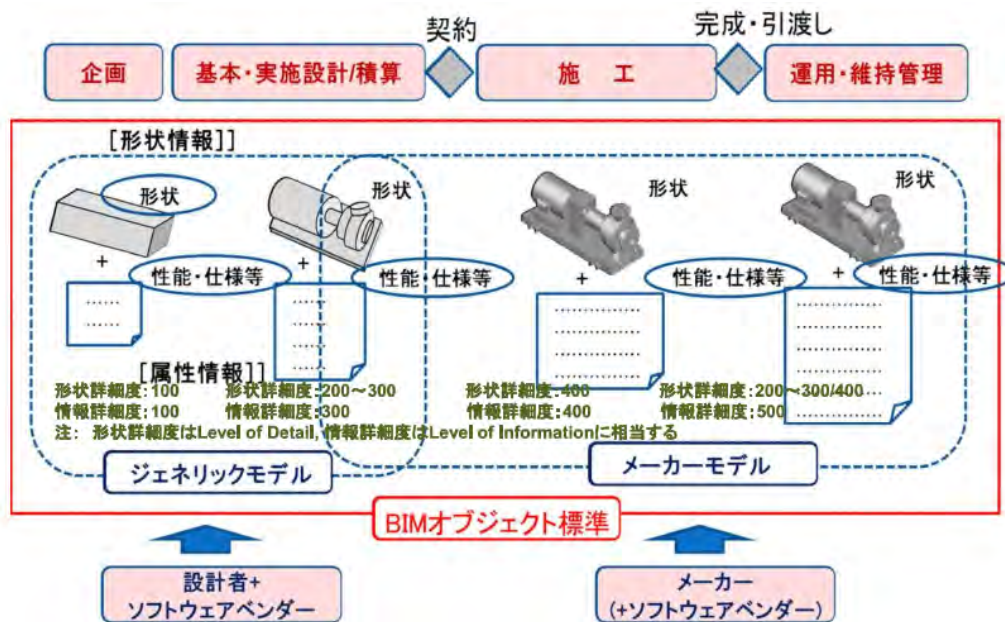


# 1. Development of BIM in Japan

- In design phase

## BIM object library

- In Oct. 2015, BIM Library Consortium (BLC), Japan was established.
- BLC is consisted of architectural design offices, construction companies, construction material and components' manufacturers, software vendors and academic members.
- BLC defines shape representation and attribute information contents that should be possessed by the object model suitable for Japan's practice, and plans to build a concrete product model within the next couple of years.



BIM objects standard configuration and the image of its utilization (Source: BIM library consortium, Japan.)



- In design phase

## BIM object library

■表の概要				ファイル形式		◎ 必須 ● 推奨		F7/F												
建具寸法の仮定】 片開きドア 900×2000 両開きドア 1600×2000 縦子ドア 1200×2000 ・引き違い窓 2枚 腰壁付き 1800×1500 h=500 ・引き違い窓 2枚 掃き出し 1800×2000 属性項目の定義】 ◎ 必須 メーカーオブジェクトは何らかの情報が入力されている ● 推奨 属性項目は設定するが、空欄か/となっているものもある × 該当する項目があるオブジェクトについては「必須」と同じ扱い 該当する項目の無いオブジェクトは属性項目を設定しない				仕様が記載されている有無		パラメータ	プロパティ	オブジェクト ジェネリック オブジェクト	オブジェクト オブジェクト	ガラス（A） ガラス（A）	ガラス（B） ガラス（B）	ガラス（C） ガラス（C）	ガラス（D） ガラス（D）	ガラス（E） ガラス（E）	ガラス（F） ガラス（F）	ガラス（G） ガラス（G）	ガラス（H） ガラス（H）	ガラス（I） ガラス（I）	ガラス（J） ガラス（J）	ガラス（K） ガラス（K）
属性項目	概要	NBL_PropertyGroupe	NBL_Property																	
【共通管理情報】																				
メーカーコード					○		○	○	○	○	○	○	○	○	○	○	○	○	○	○
メーカー名(製造会社名)		NBS.General	ManufacturerName		○		○	○	○	○	○	○	○	○	○	○	○	○	○	○
メーカーURL		NBS.General	ManufacturerURL		○		○	○	○	○	○	○	○	○	○	○	○	○	○	○
機器分類コード		NBS.General	UnitClass2015Code		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
メーカー型番(品番)		COB	ModelNumber		○		○	○	○	○	○	○	○	○	○	○	○	○	○	○
型式名称(製品名)(商品名)					○		○	○	○	○	○	○	○	○	○	○	○	○	○	○
製品リリース年月日					○		○	○	○	○	○	○	○	○	○	○	○	○	○	○
製造停止年月日					○		○	○	○	○	○	○	○	○	○	○	○	○	○	○
BLC仕様書バージョン		NBS.General	Version	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
【建築・建具（ドア・引き戸）情報】																				
＜管理項目＞																				
建具設置別 外部か内部		FC	IsExternal	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
建具種別		COB	Features	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
建具番号		COB	TagNumber	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
建具枝番号				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
＜建具（ドア・引き戸）仕様項目＞																				
【FC 属性項目 PsetDoorCommon】																				
遮音性能		遮音等級線	FC	AcousticRating	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
遮音性能		遮音等級線	FC	AcousticRating	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
防火性能		防火等級線	FC	FireRating	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
防火性能		防火等級線	FC	FireRating	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
気密性能		気密等級線	FC	Infiltration	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
気密性能		気密等級線	FC	Infiltration	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
建具設置別 外部か内部		FC	IsExternal	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
参照		FC	Reference	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
セキュリティレベル		FC	SecurityRating	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
自動閉装置があるか		FC	SelfClosing	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
閉止めの有無		FC	SnapsTop	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
熱伝導率		FC	ThermalTransmittance	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
【FC 属性項目 PsetDoorWindowGlazingType】																				
可視光線透過率(放射率)		FC	BeamRadiationTransmittance	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ガラスの充填		FC	FillGas	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ガラスの色		FC	GlazingColor	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ガラスの層数		FC	GlazingLayers	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ガラス・厚さ1		FC	GlazingThickness1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ガラス・厚さ2		FC	GlazingThickness2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ガラス・厚さ3		FC	GlazingThickness3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ガラスのコーティングがされているか		FC	IsCoated	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ガラスが他の材料と重ね合っているか		FC	IsLaminated	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
耐火ガラスか否か		FC	IsFireResistant	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
網入りガラスか否か		FC	IsWired	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Data definition of the BIM object library (draft) (Source: BIM library consortium, Japan)

# 1. Development of BIM in Japan

- In construction phase

## Private construction projects

- In major construction contractors, use cases of construction BIM are increasing.
- About the cooperation by the BIM model between primary and subcontractor, the Japan Federation of Construction Contractor (JFCC, Nikkenren) published "Style of Construction BIM" as a case example of the construction of steel frame construction, and it is utilized as a guidebook.



04. 鉄骨製作図を中心とした製作図BIM

2. 作業フロー

このページのポイント

- 活用レベルごとのフローを確認
- BIMモデルと成果物の関係を把握
- 工種間の連携のタイミングを確認

マイルストーン	初級レベル	中級レベル	上級レベル
元請	鉄骨製作図書手	鉄骨設計	鉄骨製作図書
鉄骨 FAB	鉄骨モデル (構造部)	鉄骨モデル (構造部・衛生・電気)	鉄骨モデル (構造部)
設備	設備部品	設備部品	設備部品
昇降設備	昇降設備	昇降設備	昇降設備
鉄骨階段	鉄骨階段	鉄骨階段	鉄骨階段
外壁	外壁	外壁	外壁
外部建具	外部建具	外部建具	外部建具
内装・内部建具	内装・内部建具	内装・内部建具	内装・内部建具
金物・その他	金物・その他	金物・その他	金物・その他

活用例

10

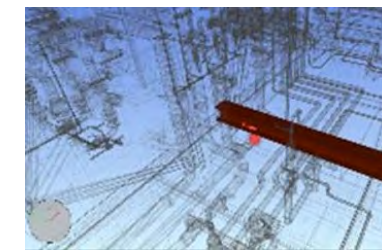
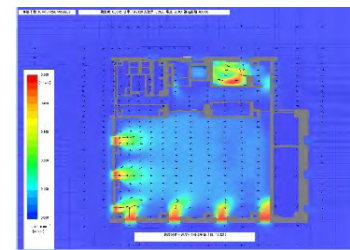
"Style of Construction BIM" and its contents (Source: JFCC, Nikkenren: <http://www.nikkenren.com/kenchiku/bim/>)

# 1. Development of BIM in Japan

- In construction phase

## Public construction projects

- In March 2014, the Governmental Office Construction BIM Guidelines were established.
- Now, Government Building Dept., MLIT has a policy to positively evaluate for adopting ICT and BIM technologies on its construction project in accordance with the promotion policy of “**i-Construction**” by MLIT.
- While “**i-Construction**” directly aims at digitizing construction production, the true goal is to improve the productivity of construction projects and to reform the work style of the construction industry works by digitizing construction production.



1st BIM application in Government Buildings Dept. work (~ Shinjuku Labor General Office ~) (Source: MLIT)

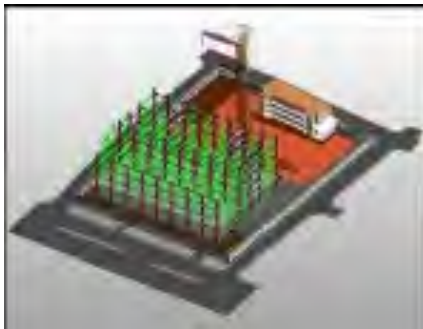


# 1. Development of BIM in Japan

- In construction phase

## Trial of Construction BIM for National Gov. Bldg. project

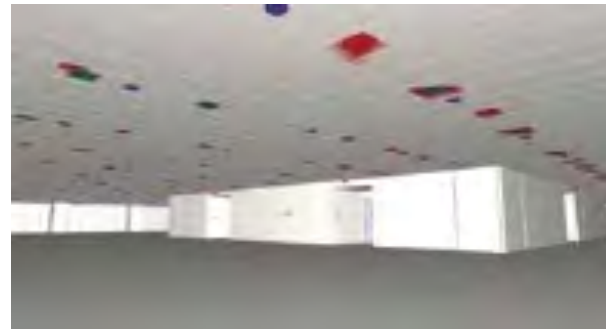
- In 2018FY, Government Building Dept., MLIT mandated trial use of construction BIM for 3 large scale National Government Building projects\* by contractors.  
*(\*e.g. 2 government office complexes and International Center of Japan Coast Guard Academy)*
- Mandatory use of BIM and verify of the effect of labor saving for following typical examinations;
  1. Temporary works planning
  2. Digital Mockup
  3. Position adjustment of electric or air conditioning equipment
  4. Crash detection on co-ordination view



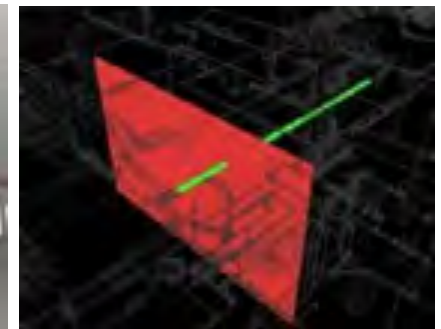
1. Temporary works planning



2. Digital Mockup



3. Position adjustment of electric or air conditioning equipment



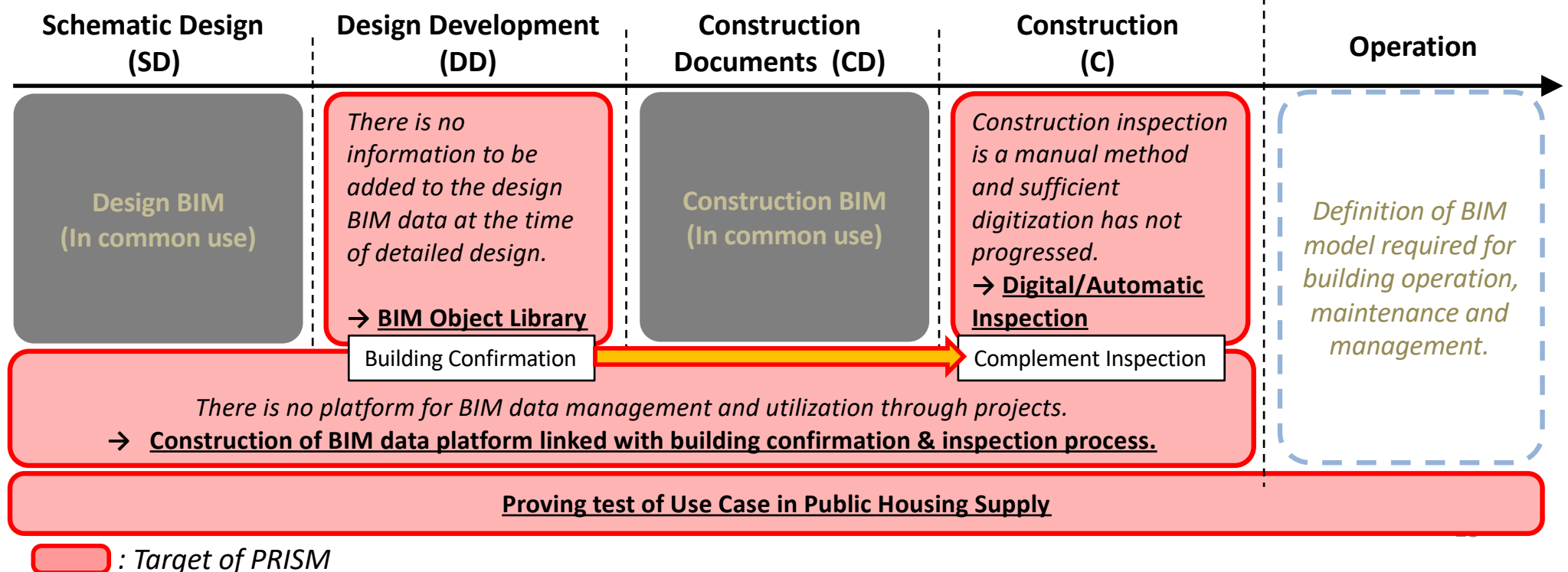
4. Crash detection on co-ordination view

<http://www.mlit.go.jp/common/001247624.pdf> (Source: MLIT) <sup>12</sup>

## 2. Recent Government Measures in BIM promotion of building sector

### PRISM (130M JPY/2019FY)

- NILIM, MLIT and BRI executed the **PRISM\*** project. (\* Public/Priate R&D Intestment Strategic Expansion PrograM: **PRISM**)
- While BIM in Japan is matured by individual company's efforts in basic design and construction plan, there is a recognition that it lacks the technology and mechanism related to the use of data throughout.
- As a theme of PRISM related to BIM, technology development necessary for infrastructure development of consistent use of BIM data is selected.

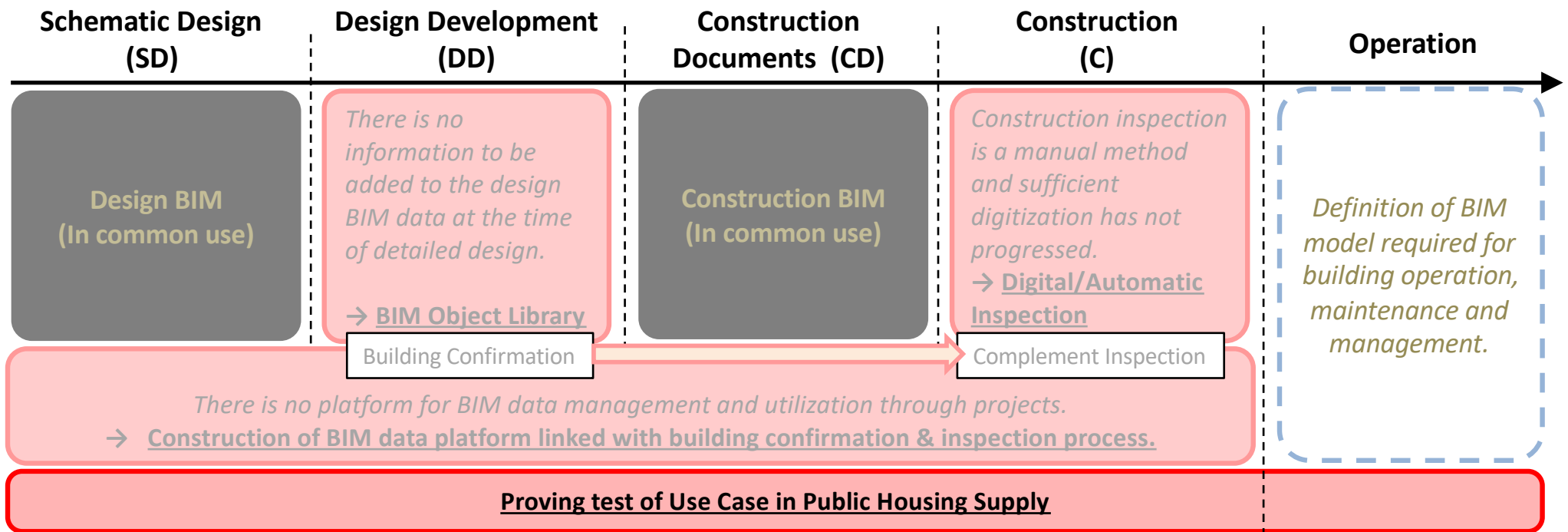




## 2. Recent Government Measures in BIM promotion of building sector

### PRISM project for UR

- Implemented development of BIM usage method in actual housing complex rebuilding project
- This project will develop BIM guidelines for public housing supplier with reference to the BIM guidelines of the gov. bldg. dept., MLIT.

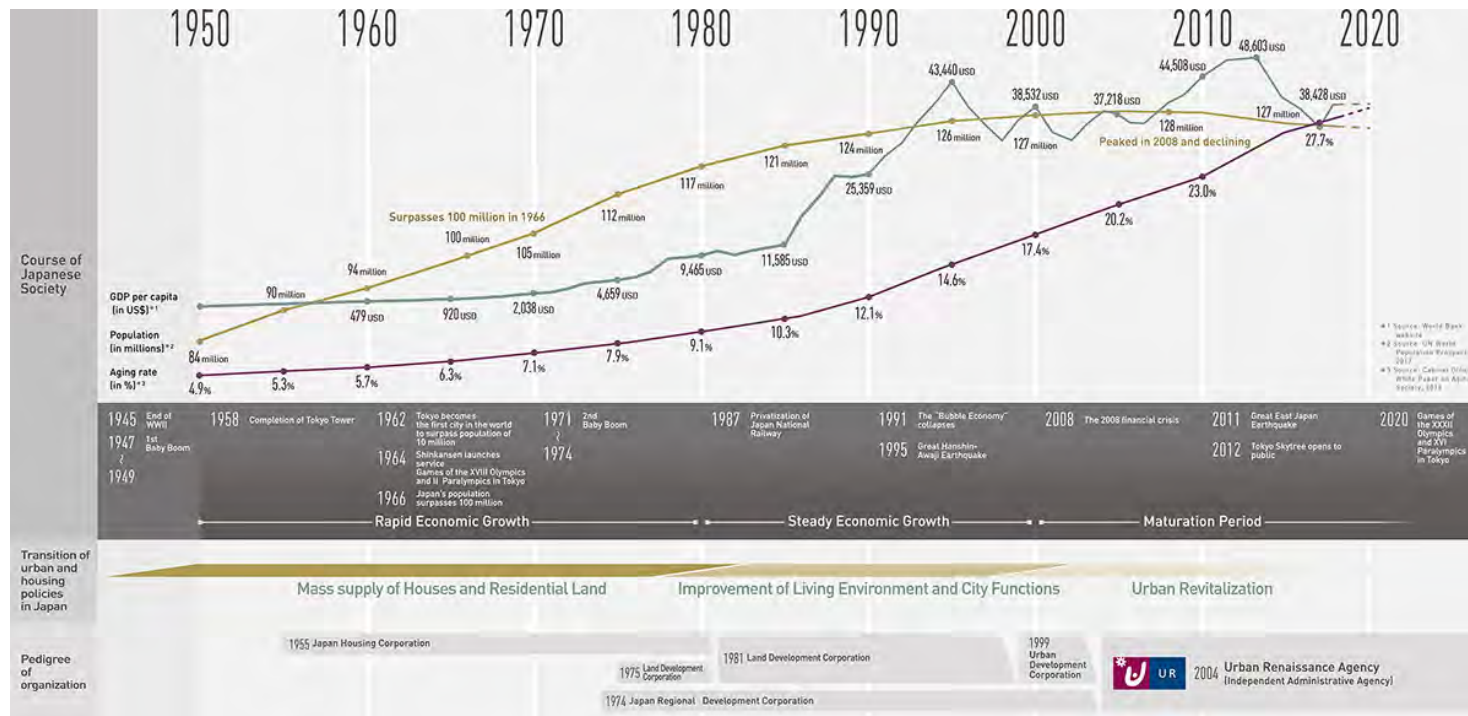


 : Target of PRISM

## 2. Recent Government Measures in BIM promotion of building sector

### About UR agency

- Urban Renaissance Agency (UR) is a semi-governmental organization originally established in 1955 as Japan Housing Corporation to address urban and housing agendas in Japan.
- UR has led large-scale, quality urban development and housing projects at the forefront, and has also made significant contributions to institutional designs and technological growth.

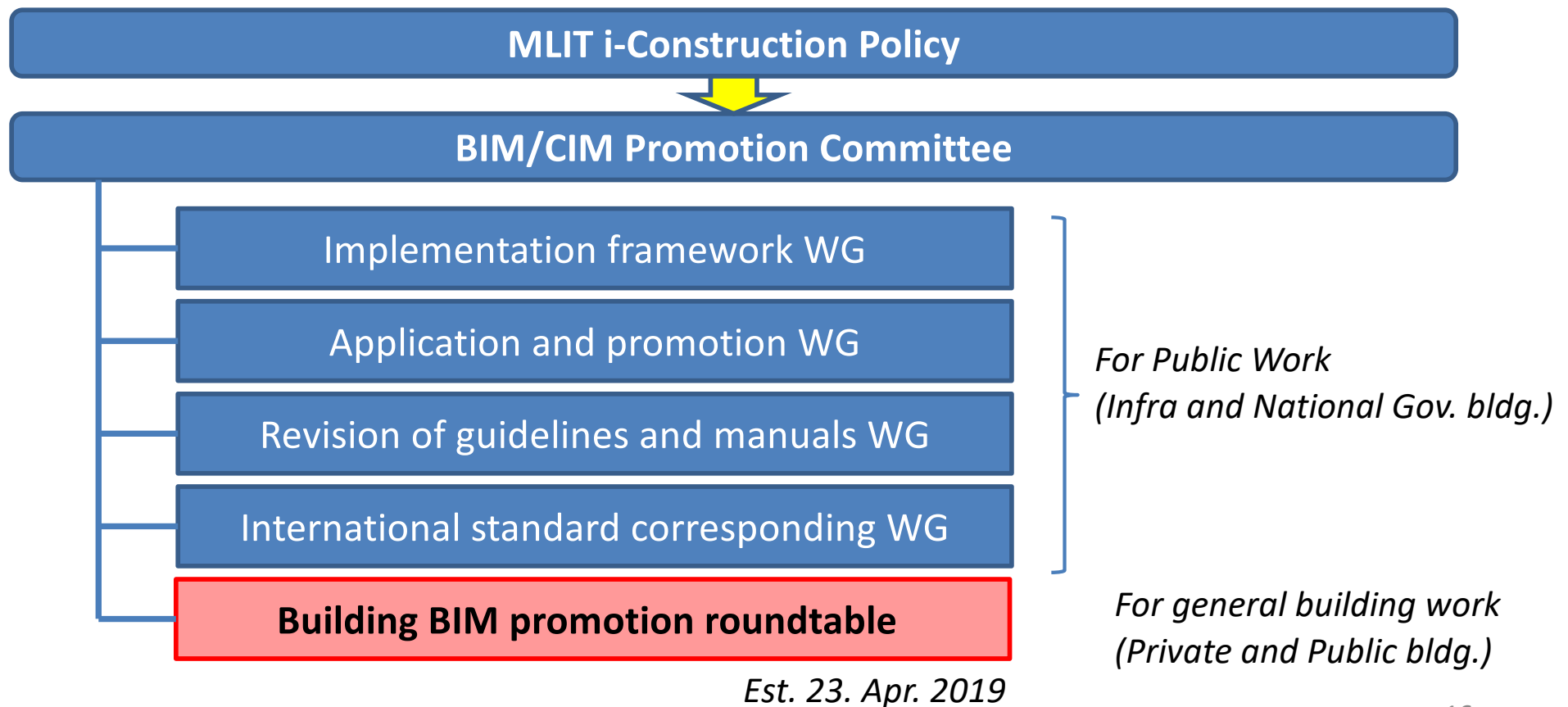


<https://www.ur-net.go.jp/overseas/about/history.html>

## 2. Recent Government Measures in BIM promotion of building sector

### Building BIM promotion roundtable in MLIT

Under the MLIT i-construction policy, the building BIM promotion roundtable was established.



## 2. Recent Government Measures in BIM promotion of building sector

### Building BIM promotion roundtable in MLIT

Building BIM promotion roundtable ...

- shares the state of progress in each business field.
- presents the future image of the surrounding environment brought about by the building production and maintenance management process using BIM.
- presents the public-private role responsibilities and roadmap for the future.
- has established a WG to address particular issues and promotes the development of a market environment for BIM utilization.

## 2. Recent Government Measures in BIM promotion of building sector

### Stakeholders of Building BIM promotion roundtable

	Private sector	MLIT and Public sector
<b>Design</b>	Japan Federation of Architects & Building Engineers Association (Shikai-rengokai), Japan Association of Architectural Firms (Nichijiren), The Japan Institute of Architects (JIA), Japan Federation of Mechanical & Electorical Consulting Firms Association (JAFMEC), The Building Surveyor's Institute of Japan (BSIJ)	<ul style="list-style-type: none"> <li>Building Guidance Div. of Housing Bureau, MLIT</li> <li>Government Buildings Dept. of Minister's Secretariat, MLIT</li> </ul>
<b>Building Confirmation</b>	Building Center of Japan (BCJ), and the other building confirmation bodies.	<ul style="list-style-type: none"> <li>Building Guidance Div. of Housing Bureau, MLIT</li> </ul>
<b>Construction</b>	Associated General Contractors of Japan, Inc. (Zenkenren), the Japan Federation of Construction Contractor (JFCC, Nikkenren) , Japan Electrical Construction Association (Densetsu-kyo), Air-Conditioning & Plumbing Contractors Association of Japan (Nikku-ei)	<ul style="list-style-type: none"> <li>Construction Industry Div. of Land Economy and Construction Industries Bureau, MLIT</li> <li>Government Buildings Dept. of Minister's Secretariat, MLIT</li> </ul>
<b>Building Owner Operation, maintenance</b>	Building Maintenance & Management Center (BMMC) , Japan Facility Management Association (JFMA), The Real Estate Companies Association of Japan (Fudo-kyo)	<ul style="list-style-type: none"> <li>Real Estate Market Div. of Land Economy and Construction Industries Bureau, MLIT</li> <li>Housing Production Div. of Housing Bureau, MLIT</li> </ul>
<b>Research</b>	building SMART Japan, Architectural Institute of Japan (AIJ)	<ul style="list-style-type: none"> <li>NILIM, MLIT</li> <li><b><u>Building Research Institute (BRI)</u></b></li> </ul>
<b>Other</b>	Japan Construction Information Center (JACIC), BIM Software Benders	<ul style="list-style-type: none"> <li>Japan Conference of Building Administration (JCBA)</li> </ul>



## 2. Recent Government Measures in BIM promotion of building sector

### Image of Implementation steps on Building BIM promotion roundtable

	Design	Construction	Maintenance/Management
Development & Promotion of BIM	<b>Step1 : The society that enables building production process with consistent BIM model data</b>		
	<ul style="list-style-type: none"> <li>➢ Step1+ BIM Building Confirmation</li> <li>➢ Reception of design products by BIM model data</li> <li>➢ Smooth transition of information from design to construction BIM</li> <li>➢ business improvement and work style reform in short-term</li> </ul>	<ul style="list-style-type: none"> <li>➢ Smooth handover of design BIM information</li> <li>➢ Utilized BIM for construction inspection</li> <li>➢ business improvement and work style reform in short-term</li> </ul>	<ul style="list-style-type: none"> <li>➢ Utilized BIM for building maintenance and management</li> <li>➢ Efficiency improvement of equipment update</li> <li>➢ LCC optimization</li> </ul>
	<b>Step2 : The society that is concluded building production process by BIM model data</b>		
	<ul style="list-style-type: none"> <li>➢ Step2+ BIM Building Confirmation</li> <li>➢ Reception of design products by BIM model data</li> </ul>	<ul style="list-style-type: none"> <li>➢ Collaboration with on-site 3D scanning and BIM</li> <li>➢ Robot Construction</li> <li>➢ 4D BIM Construction</li> </ul>	<ul style="list-style-type: none"> <li>➢ Collaboration with 3D scanning and BIM in renewal/renovation work</li> <li>➢ Full digitalized document archiving</li> </ul>
	<b>Step3 : The society that is closely integrated BIM model data and AI &amp; IoT technologies</b>		
	<ul style="list-style-type: none"> <li>➢ AI building Confirmation</li> <li>➢ Computational design using AI</li> </ul>	<ul style="list-style-type: none"> <li>➢ AI and robotics construction management work such as automatic temporary work planning or on-site patrol guard by robot</li> </ul>	<ul style="list-style-type: none"> <li>➢ Maintenance work by robots</li> <li>➢ Realization of Society 5.0 by data linkage</li> </ul>

Thank you for your attention!

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