



Vision for the Future and Roadmap to BIM

BIM Promotion Roundtable | 2019.9 | Japan



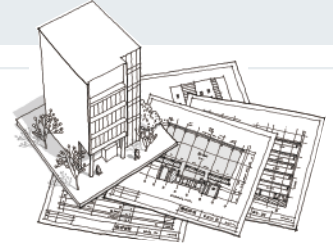
Ministry of Land, Infrastructure, Transport and Tourism



What is BIM?

BIM (Building Information Modelling) is...

a system which builds a structure's information model to include not only **three-dimensional form information** created with a computer but also **room names and areas, the specifications and performance of materials and components, and the building attribute information.**

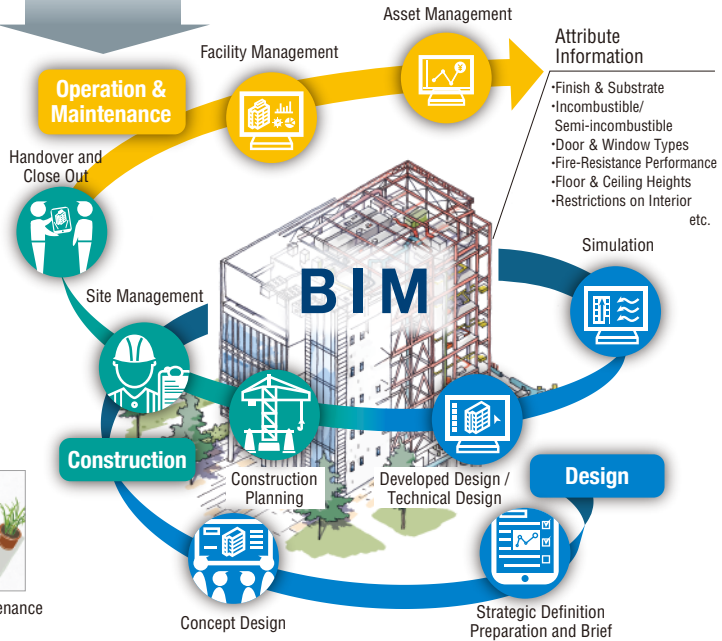


Current mainstream (CAD)

- ▶ Drawings are created individually. Floor plan, elevations, sections/structural drawings/mechanical and electrical drawings
- ▶ Attribute information for walls, equipment, etc. is linked to drawings in an analog way.
- ▶ Design information is seldom used after construction.

Building production and maintenance process using BIM

- ▶ Improves communication and understanding by "visualizing" a building in a three-dimensional form.
- ▶ Attribute information can be added to each model.
- ▶ Enables use of information throughout the life cycle of a building and linking to IoT.



Roles and functions BIM is expected to play in the future

Process

- Use as a communication tool, improved productivity through design process reform, etc.

Database

- Information database for production process and maintenance of buildings
- Consistent utilization throughout the life cycle

Platform

- Platform for coordination with IoT and AI

Visions of a Future Enabled by Utilization of BIM

Realization of high-quality and high-precision building production and operation & maintenance

High Quality



- ▶ Images can be shared even with non-architectural professionals by means of reviewing spaces using 3D models and attribute information
- ▶ Efficient quality management of architectural production can be realized by centrally controlling the design and construction information
- ▶ Optimal operation & maintenance, asset management, and energy management are supported by the data that can be continuously used after project completion

Realization of highly efficient life cycle use

Efficient and Quick



- ▶ Quick decision making through visualization of cost effectiveness (cost management)
- ▶ Efficient building life cycle use is achieved through smooth communication of information during the design, construction, and operation & maintenance stages
- ▶ Streamlining of work in each design and construction process
- ▶ Reduce labor costs for operation & maintenance
- ▶ Establishment of BIM as a common ground to share and compete internationally

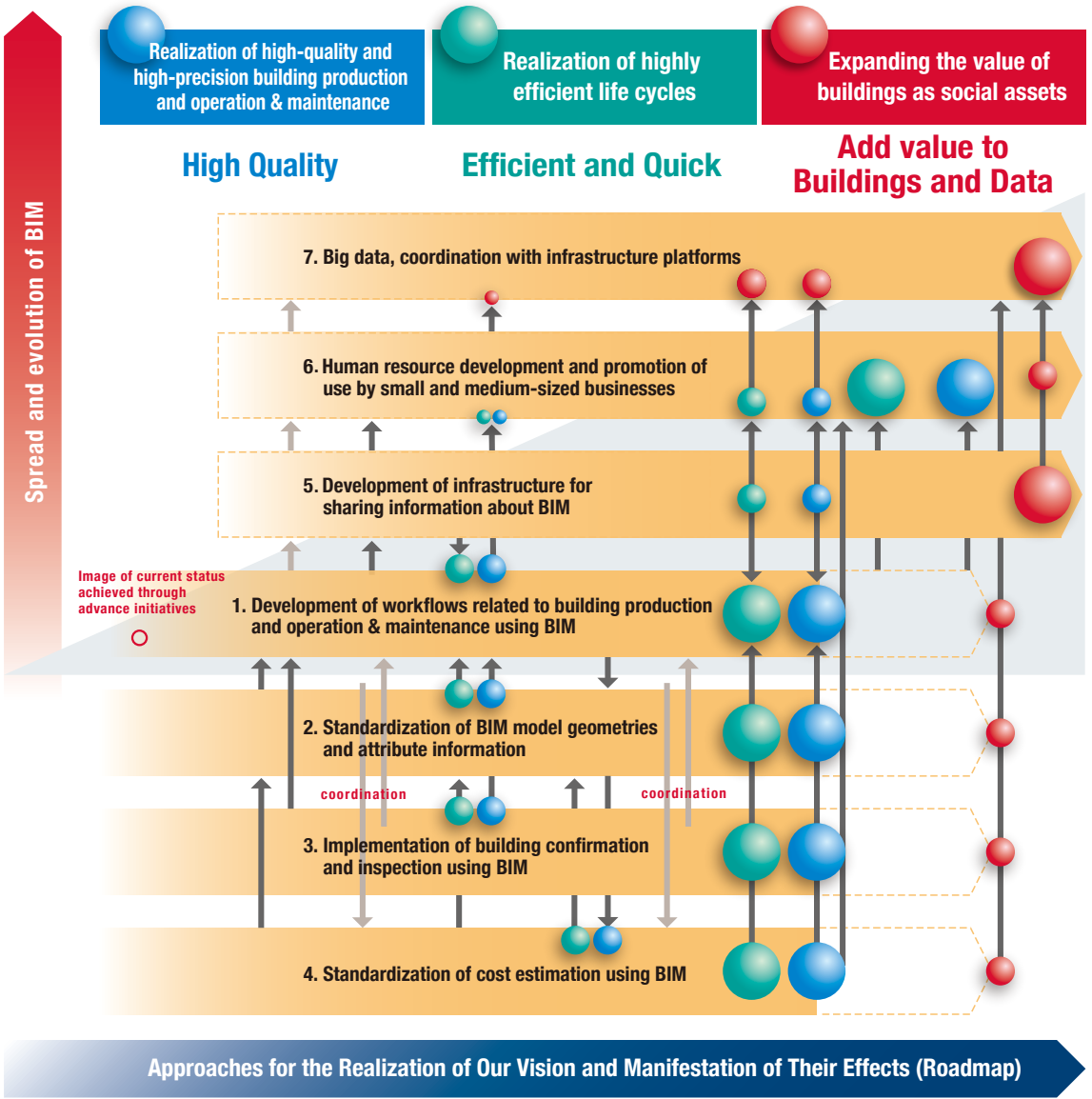
Expanding the value of buildings as social assets

Add value to Buildings and Data



- ▶ Realization of appropriate and real-time asset evaluation and management
- ▶ Expansion of services for buildings through coordination with centers, etc.
- ▶ Creation of new industries with buildings as their origin through the use of big data and AI
- ▶ Realization of optimal risk management through integration with infrastructural platforms

Vision for BIM and Necessary Approaches for Its Realization (Roadmap)



* The size of the ball indicates onset of effect expected at the time of attainment.

Basic Strategies for Realization of Future Images

In order to realize the future images of BIM, the construction industry shall proceed with efforts relevant to the development of an environment for BIM utilization in accordance with the following policies.

1 Utilizing market functions, the public and private sectors shall work together under appropriate roles.

2 Advance efforts that could precede others and then attempt generalization (Improve accuracy by PDCA cycle)

3 In order to strengthen the international competitiveness of the Japanese building industry, proceed as much as possible in accordance with international standards and norms.

Process for Realizing the Vision for BIM

Realization of high-quality and high-precision architectural production and operation & maintenance

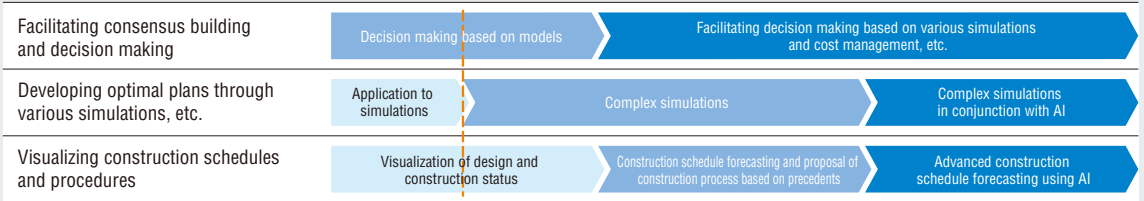
BIM Utilization Steps

Use BIM

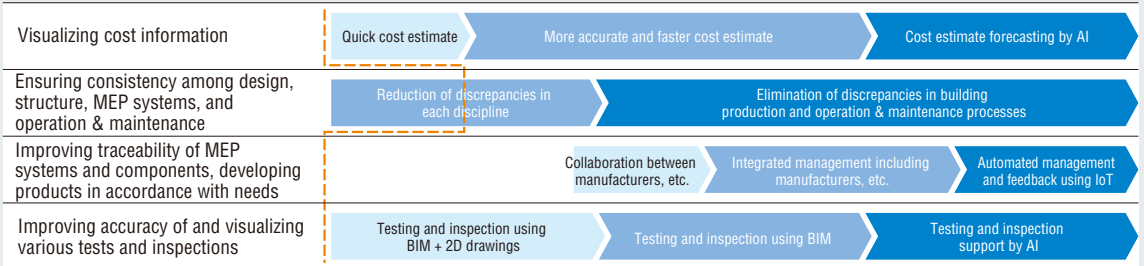
Each agent uses BIM collaboratively

Coordination with AI & IoT

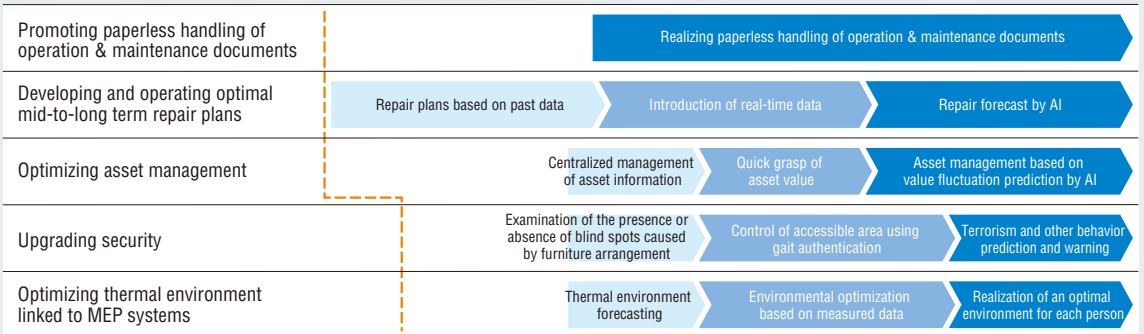
Images can be shared even with non-architectural professionals by reviewing spaces using 3D model geometries and attribute information.



The efficient quality management of architectural production can be realized by centrally controlling design and construction information.



Optimal operation & maintenance, asset management, and energy management are supported by data that can be used after project completion.



--- Image of current status achieved through advance initiatives Small Medium Large Small, medium, and large qualitatively express the effect of each item.

Realization of highly efficient life cycle

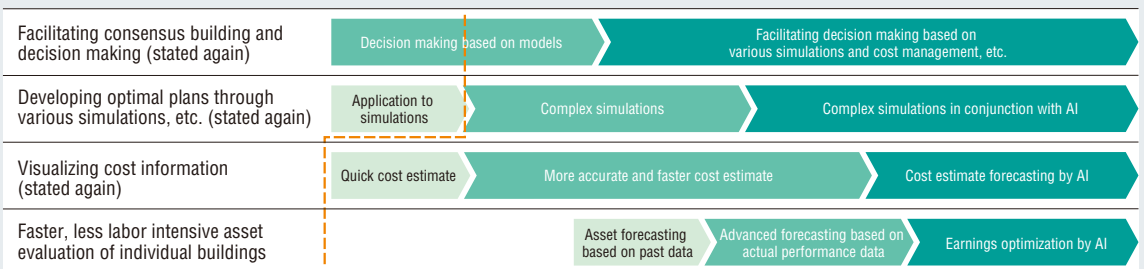
BIM Utilization Steps

Use BIM

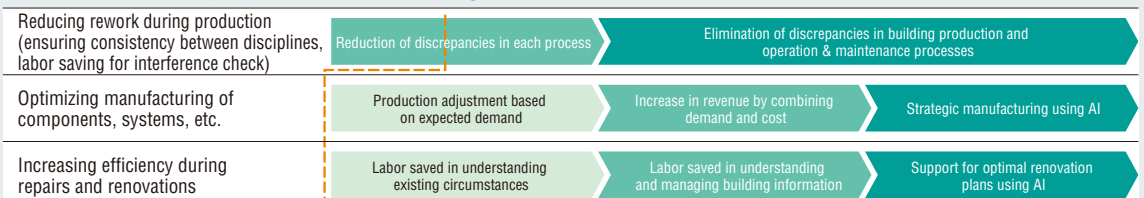
Each agent uses BIM collaboratively

Coordination with AI & IoT

Quick decision making through visualization of cost effectiveness (cost management)

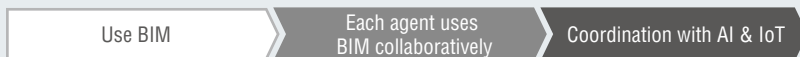


Efficient building life cycle use is achieved through smooth communication of information during the design, construction, and operation & maintenance stages

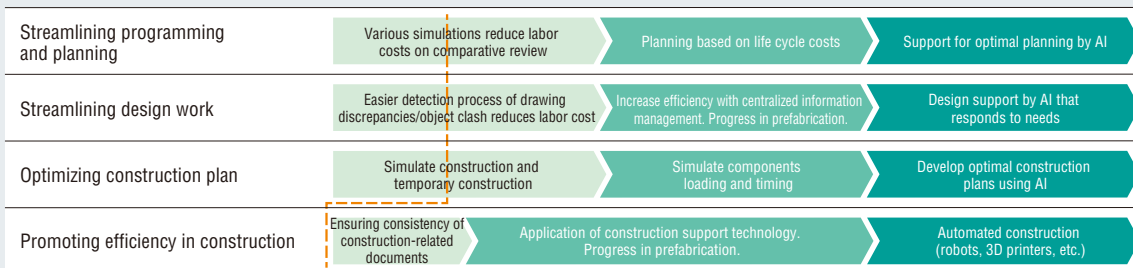


Realization of highly efficient life cycle

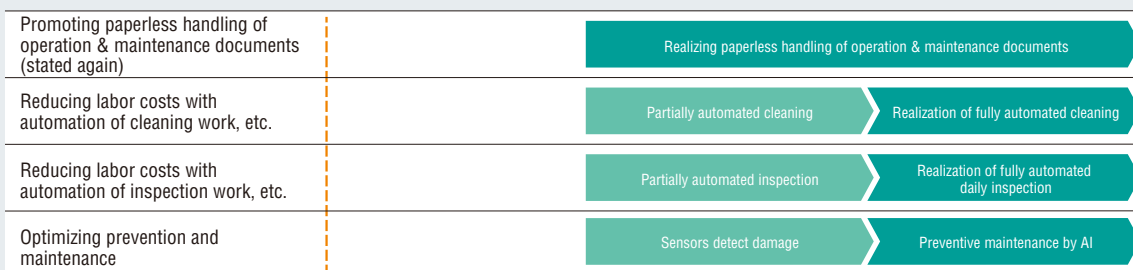
BIM Utilization Steps



Streamlining of work in each design and construction process



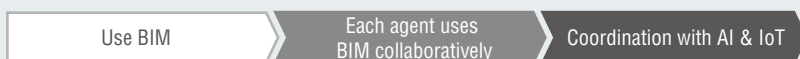
Labor costs reduced on operation & maintenance



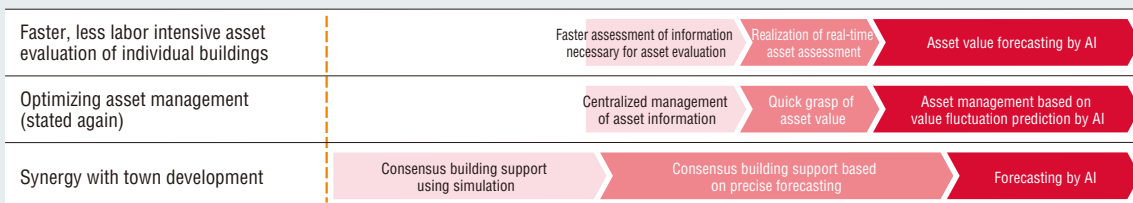
--- Image of current status achieved through advance initiatives Small Medium Large Small, medium, and large qualitatively express the effect of each item.

Expanding the value of buildings as social assets

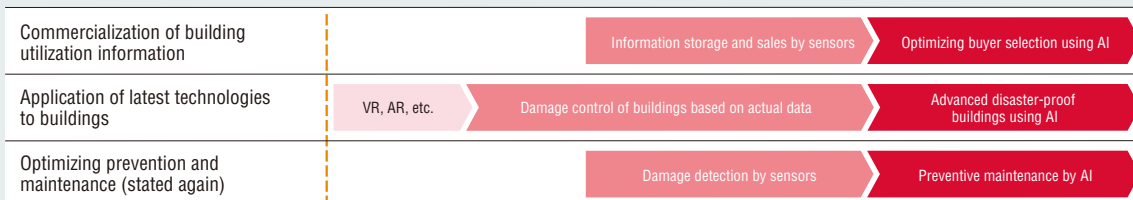
BIM Utilization Steps



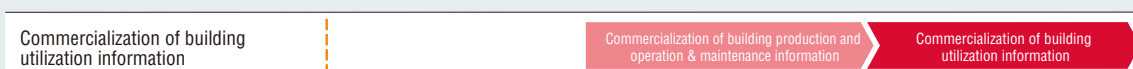
Realization of appropriate and real-time asset evaluation and management



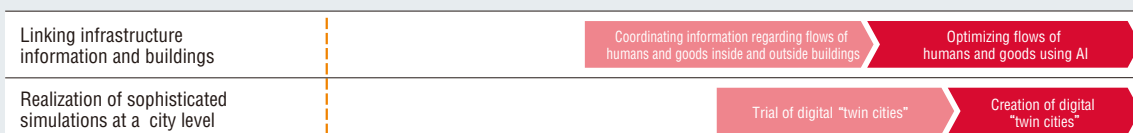
Expansion of services for buildings through coordination with centers, etc.



Creation of new industries with buildings as their origin through the use of big data and AI



Realization of optimal risk management through integration with infrastructural platforms



--- Image of current status achieved through advance initiatives Small Medium Large Small, medium, and large qualitatively express the effect of each item.

Basic Strategies for Realization of Future Images | Schedule

1

Development of Workflows Related to Building Production and Operation & Maintenance Using BIM

By sorting out "BIM models and extent of information <scope, level of details>" required at each stage of design, construction, operation & maintenance, and repair, and by clarifying the roles and responsibilities in each process accordingly, the environment for enabling the consistent use of BIM in the building production and operation & maintenance processes will be improved.

■ Main committee members: MLIT + relevant organizations

Item to Consider	Summary	Process 1	Process 2	Process 3
1-1. BIM standard guidelines (BIM workflow)	Establish a workflow from programming through design, construction, and management, and sort out BIM model geometries and the extent of attribute information (standard format) required at each stage.	Investigation	Trial	Implementation
1-2. Development of BEP (BIM Execution Plan) standards	Develop a template with the necessary preliminary arrangements for using BIM in projects	Investigation	Trial	Implementation
1-3. Development of EIR (BIM Employer's Information Requirements) standards	Develop a template to define the criteria for an employer to manage the preparation of project information.	Investigation	Trial	Implementation
1-4. Completion model definition	Define BIM models and information contents to be transferred to operation & maintenance managers after completion.	Investigation	Trial	Implementation
1-5. Sorting out relationships with parts manufacturers	Sort out appropriate relationships with parts manufacturers using BIM data at each stage of the workflow.	Investigation	Trial	Implementation
1-6. Contracts for projects using BIM	Define the responsibilities for each party according to their roles, and prepare contract standards for BIM based design and construction		Investigation	Trial
1-7. Ideal remuneration for work	Sort out remuneration for work related to design and construction, etc. using BIM.		Investigation	Implementation
1-8. Copyright	Sort out the relationships regarding copyright in building production and operation & maintenance using BIM.		Investigation	Trial

2. Standardization of BIM model geometries and attribute information, 3. Implementation of building confirmation and inspection using BIM, 4. Standardization of cost estimation using BIM

2

Standardization of BIM Model Geometries and Attribute Information

By standardizing the modeling (geometry) methods, objects, attribute information items, and attribute information input methods for occasions of BIM creation (such as design, construction, and handover), an environment wherein BIM is used consistently in the production process may be developed. At the same time, cooperation with manufacturers of building materials, structures, and MEP systems will be promoted.

■ Main committee members: Building Information modeling Library Collaborative research association of Japan + relevant organizations

Item to Consider	Summary	Process 1	Process 2	Process 3
2-1. Object standards	Present basic BIM model creation and display methods.	Investigation	Trial	Implementation
2-2. Standardization of attribute information	Present information items to be added to BIM and standard input methods.	Investigation	Trial	Implementation
2-3. Object library	Create generic objects that are not produced by specific manufacturers and publish them along with the manufacturers' objects.	Trial	Implementation	
2-4. Manufacturers' objects	Make objects created by manufacturers of MEP systems, etc. available in libraries.	Investigation	Trial	Implementation
2-5. Coordination between libraries and specification information	In order to make consistent use of information, link BIM information with construction-related specification information (including standard specifications and construction procedures).	Investigation	Practice and Trial	Implementation

4-1. Development of classification systems

1. Development of workflows related to building production and operation & maintenance using BIM

3

Implementation of Building Confirmation and Inspection Using BIM

The method of using 2D drawings generated from BIM will be improved to carry out more efficient and accurate building confirmation and inspection using BIM and attribute information. Further, BIM review and inspection as well as coordination with AI and IoT devices will be examined and practiced for more advanced utilization.

■ Main committee members: Meeting for promotion of BIM utilization in building confirmation + relevant organizations

Item to Consider	Summary	Process 1	Process 2	Process 3
3-1. BIM 2D review	Develop a method for creating 2D drawings from BIM models and conduct review using BIM + 2D drawings.	Investigation	Trial	Implementation
3-2. Viewer	Define the specifications of viewer software for conducting the review using BIM and proceed with its development.	Investigation	Trial	Implementation
3-3. BIM review	Carry out confirmation and inspection of building using BIM models (develop related laws and regulations in conjunction).	Investigation	Trial	Implementation
3-4. BIM inspection	Conduct interim and final inspection of building using BIM models.	Investigation	Trial	Implementation
3-5. AI review and inspection	Examine digitalization methods for building confirmation information, conduct more efficient building confirmation using AI and more efficient interim and final inspection using IoT devices.		Investigation	Trial

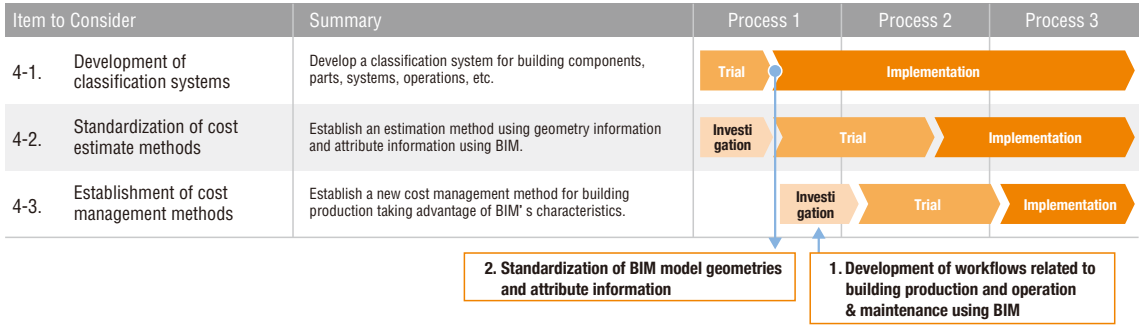
2. Standardization of BIM model geometries and attribute information

4

Standardization of Cost Estimate Using BIM

To be able to calculate quantities for a cost estimate from geometries and attribute information using BIM, coding that can centrally manage the components, parts, MEP systems, etc. of a building will be developed, and standardization of cost estimation methods based on each object suitable to BIM will be attempted.

■ Main committee members: Building Surveyor's Institute of Japan + relevant organizations

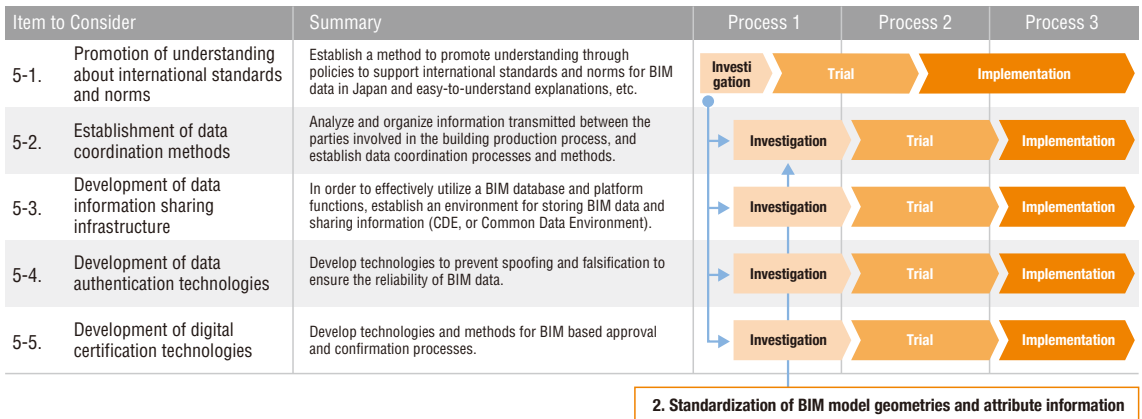


5

Development of infrastructure for sharing information about BIM

Data distribution and storage methods based on international standards and norms will be established to facilitate data coordination between related parties, and an information sharing environment that allows BIM data to be used even after a long period of time will be developed. At the same time, technologies to ensure the reliability of BIM data itself including data authentication, security, and digital certification will be developed.

■ Main committee members: buildingSMART Japan + relevant organizations

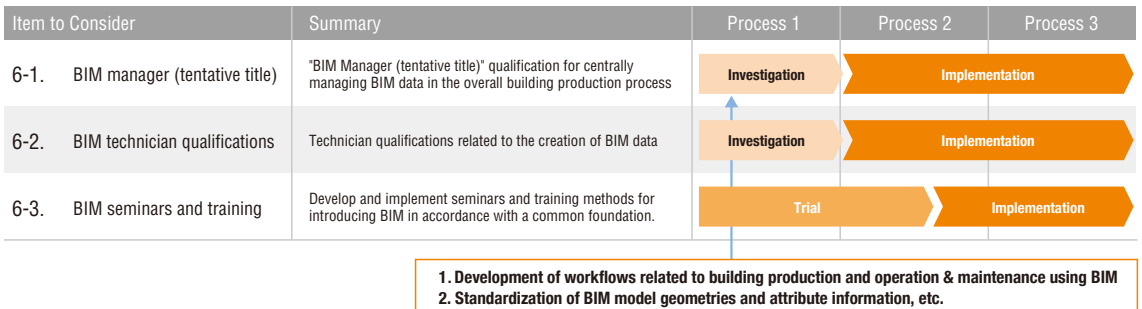


6

Human Resource Development and Promotion of Use by Small and Medium-Sized Businesses

In addition to improving the efficiency of building production and operation & maintenance using BIM, BIM managers, technical qualification systems, and human resource development will be promoted so that small and medium-sized businesses can introduce BIM smoothly.

■ Main committee members: buildingSMART Japan + relevant organizations

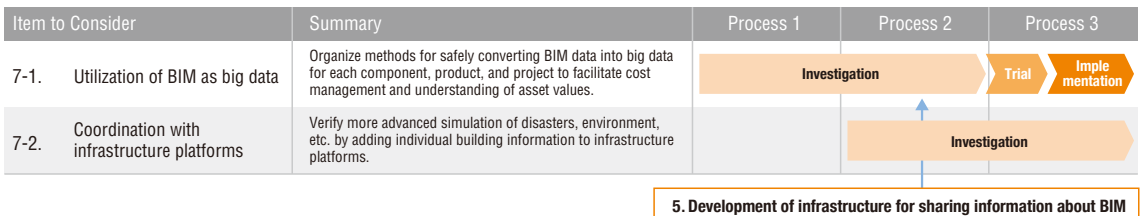


7

Big data, Coordination with Infrastructure Platforms

In addition to attempting to link BIM with AI and IoT devices, establish methods for applying BIM to information infrastructure, data storage, etc. so that BIM data itself can be used as a social asset.

■ Main committee members: National Institute for Land and Infrastructure Management, Building Research Institute + relevant organizations



※ For currently active items, organizations actively involved are listed. For currently inactive items, organizations expected to be actively involved are listed.

Investigation Organization for BIM Promotion Roundtable

■ Advisory panel

[Chairperson]	Shuichi Matsumura Hirotake Kanisawa Kazuya Shide Tsuyoshi Seike Koichi Yasuda	Project Professor at Department of Architecture School of Engineering University of Tokyo Professor at Shibaura Institute of Technology Department of Architecture and Building Engineering Professor at Shibaura Institute of Technology Department of Architecture and Building Engineering Professor at University of Tokyo Graduate School of Frontier Sciences Professor at School of Environment and Society, Architecture and Building Engineering
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■ Related Organizations

■ Design related organizations	Japan Federation of Architects and Building Engineers Associations, Japan Association of Architectural Firms, Japan Institute of Architects [JIA], Japan Structural Consultants Association [JSCA] Japan Federation of Mechanical & Electrical Consulting firms Association [JAFMEC] (Building Surveyor' s Institute of Japan [BSIJ])
■ Designated confirmation and inspection organization and Designated administrative agency	Japan Conference of Building Administration [JCBA] Building Center of Japan [BCJ]
■ Construction related organizations	Japan Federation of Construction Contractors, National General Contractors Association of Japan, Japan Electrical Construction Association, Air-Conditioning & Plumbing Contractors Associations of Japan
■ Management and employer related organizations	Japan Federation of Housing Organizations Japan Facility Management Association [JFMA] Building information modeling Library Collaborative research association of Japan [BLCJ] Real Estate Companies Association of Japan [RECAJ]
■ Examination and research organizations	National Institute for Land and Infrastructure Management National Research and Development Agency Building Research Institute buildingSMART Japan [bSJ] Architectural Institute of Japan [AJI]
■ Information system and international standards related organizations	Japan Construction Information Center Foundation [JACIC] Institute of International Harmonization for Building and Housing [IIBH]

■ Ministry of Land, Infrastructure, Transport and Tourism (MLIT) [Secretariat]

Definition of terms

■ **BIM (Building Information Modelling)** / A process of constructing a building information model that has not only three-dimensional graphic information created on a computer but also attribute information of the building, such as names and areas of rooms, specifications and performance of materials and members, and finishing.

■ **BIM model** / A building information model that has not only three-dimensional graphic information created on a computer but also attribute information of the building, such as names and areas of rooms, specifications and performance of materials and members, and finishing.

■ **BIM data** / The entire information including the 2D rewriting on the BIM in addition to the BIM model.

■ **3D Model** / A model that virtually represents a three-dimensional

geometry in a three-dimensional coordinate system of length, width, and height.

■ **2D** / A way of representing two-dimensional graphic information using CAD or the like.

■ **BEP (BIM Execution Plan)** / An arrangement for the design information necessary for using BIM in a specific project. It defines and documents objectives for using BIM, goals, implementation items and their priorities, level of detail (LOD) and accuracy at each stage, information sharing and management methods, an organization for providing services, roles of related parties, system requirements, etc. It is created as a requirements document after being negotiated in advance between the parties involved in the project.

■ **EIR (Employer's Information Requirements)** / Information requested by an employer in a specific project, including BIM data' s level of detail, processes of the project, how to operate the facility after completion, and contractual responsibility matrix.

For
more information



<http://www.mlit.go.jp/jutakukentiku/kenchikuBIMsuishinkaigi.html>

* Link to Japanese text only

I N F O R M A T I O N