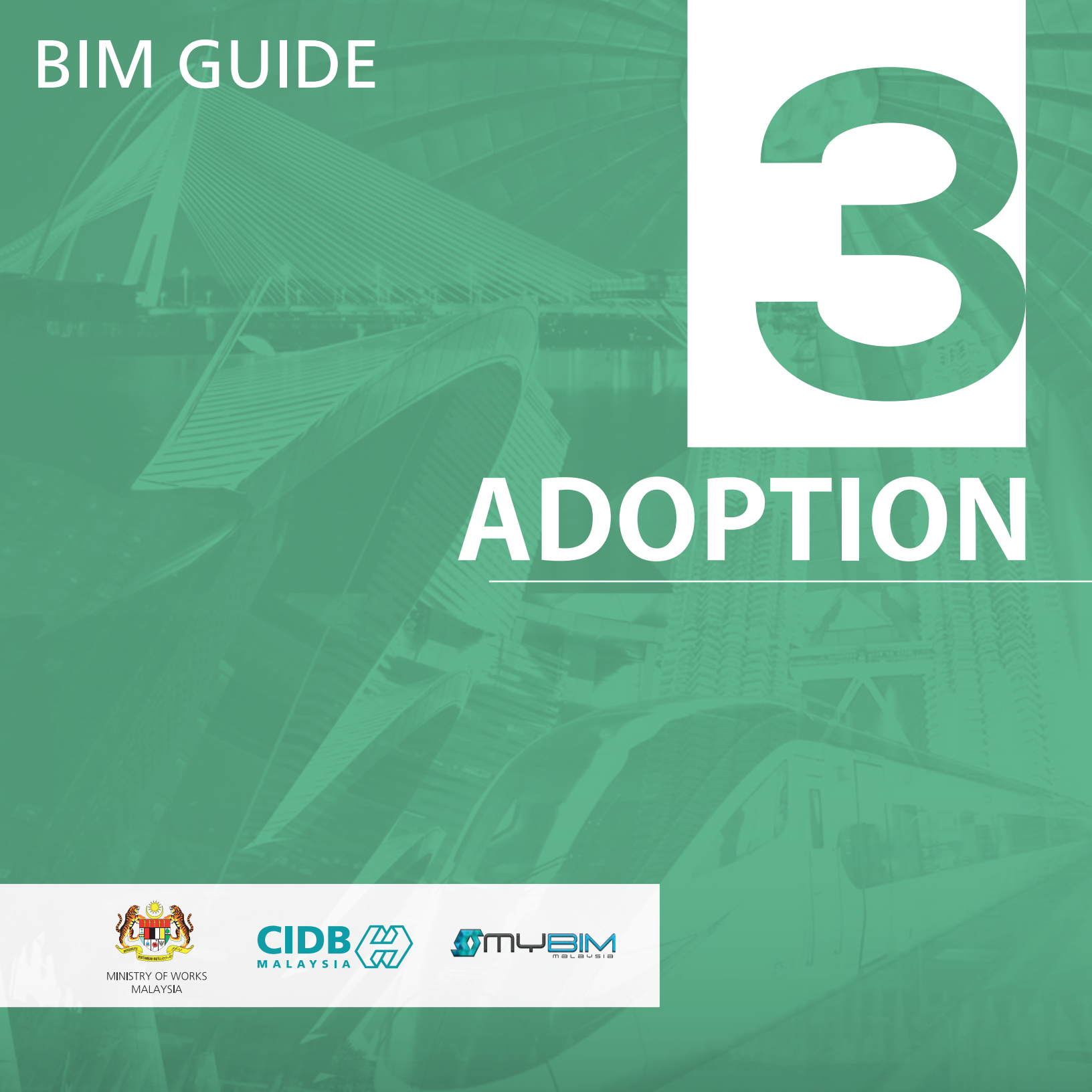
BIM GUIDE

3

ADOPTION



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The BIM Guide | 1st Edition |

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ABOUT

Booklet 3 | BIM Adoptions

HOW to adopt BIM in an organisation or any project?

Booklet 3 aims to assist readers in identifying the factors to consider when adopting BIM.

This booklet will explain BIM project requirement, roles and responsibilities, infrastructure needs, deliverables and execution plan.

Understanding the basic and fundamental of BIM will assist readers to know **HOW** BIM can be adopted in their organisations/projects. This booklet will explain the decision making process prior to BIM adoption.

BIM IMPLEMENTATION

The first steps to initiate BIM adoption in an organisation/project is often the hardest. It is important to strategise the steps into small and manageable processes. Therefore, it is crucial to assess the internal capabilities of the organisation towards adopting BIM.

The transition process in adopting BIM is more than just technology or process change; it is a work process culture change and it requires tactical strategies. The organisation/project can start small and begin a step-by-step transition as proposed in this guide.

The figure below shows the generic guide that is applicable to any organisation, which will smoothen the initial transition and enable them to reap the benefits of BIM.

1 DEFINING BIM PROJECT REQUIREMENTS

This is the first step. It is imperative to determine the project requirement based on BIM goals and objectives. The establishment of BIM goals and BIM objectives will determine the use of BIM (BIM Uses) and Level of detail (Lod) required for the project.

The example of BIM Goals, objectives and uses are shown below (non exhaustive):

BIM PROJECT REQUIREMENTS		BIM USES
BIM Goals	**BIM Objectives**	
To produce an accurate 3D model consisting of existing conditions for a site, facilities on a site, or a specific area within a facility.	To model an accurate representation of existing condition for a site, building, adjacent facilities or services.	Existing Conditions Modelling.
Evaluation of comprehensive design development.	To develop a general outline for design development.	Site Analysis.
	To predict anticipated cost at the early stage.	
Managing project cost throughout project lifecycle.	To provide cost exercises throughout the project lifecycle.	Cost Estimation.
Acquiring comprehensive workable model.	To transform the building's design into a workable model.	• Design Authoring. • Design Review. • Spatial Planning. • Code Validation.

BIM PROJECT REQUIREMENTS		BIM USES
BIM Goals	**BIM Objectives**	
Evaluation the performance of building's operation.	To execute the engineering analysis in order to increase the design of the facility and its energy consumption during its life cycle.	• Structural Analysis. • Lighting Analysis. • Energy Analysis. • Mechanical Analysis. • Other Engineering Analysis. • LEED Evaluation.
Minimize conflict throughout construction process.	To streamline the coordination of BIM models in order to resolve conflicts throughout construction process.	3D Coordination.
Managing activities onsite.	To create visualisation the onsite construction process.	• Site utilisation planning. • 3D Control and Planning.
Acquiring pre fabrication model at early stage.	To produce detailing model that is ready for pre fabrication activities.	• Construction System. • Design. • Digital Fabrication.
Acquiring comprehensive operation and maintenance model.	To deliver a model for operation and maintenance decision-making throughout a project's lifecycle.	• Asset Management. • Building Maintenance Management. • Building System Design. • Disaster Planning.

2 DEVELOPING BIM ROLES AND RESPONSIBILITIES

The intention of developing BIM roles and responsibilities is not to create new disciplines/roles, but to enhance the competencies of the disciplines in an integrated manner. For example, a BIM Manager requires an architect or engineer with vast experience and knowledge in design and construction and equipped with the knowledge and competency of BIM.

The table below illustrates the matrix of the roles and responsibilities to support BIM process:

Roles	Responsibilities
BIM Manager	• Deliver change management process for BIM implementation in organisation/project. • Facilitate the use of BIM Methodology and tools to support efficient delivery of the project. • Provide information on delivery process, accuracy of the model and timing of the project including the pre/post contract BIM Execution Plan (BEP). • Ensure effective communication between client, contractor and the design team. • Review and monitor BIM process.
BIM Coordinator	• Manage and maintain a fully coordinated of BIM model to ensure all information is up to date and correct. • Create BIM model and assess clash detection and alter the model accordingly. • Create and manage BIM content library. • Manage the co-ordination of information between the involved parties. • Manage process of exchange, collaboration and coordination of BIM Model with involved parties. • Maintain BIM Execution Plan and workflow.
BIM Modeller	• Produce BIM Model according to the relevant design discipline. • Ensure construction documents accuracy based on discipline BIM Modelling. • Follow BIM content standards and development procedures. • Prepare his own discipline model and/or content for BIM Coordination.

The roles and responsibilities may differ according to specific BIM project or organisation requirements

3 DETERMINE INFRASTRUCTURE NEEDS

In order to adopt BIM, the organisation needs to invest in BIM tools, BIM hardware and servers. The value of investment will depend on the maturity and level of BIM process adopted.

The factors to consider prior to any investment in the BIM processes are :

1 Acquire the BIM tools

There are various types of BIM related software available in the market. The acquisition of BIM software should be based on the expected usage and the available budget/ investment capabilites. Some of the anticipated cost are :

i. initial cost to acquire the software;
ii. training cost;
iii. annual subscription cost;

2 Acquire Hardware

To initiate BIM adoption, organisation does not necessarily require new hardware. Organisation can use the existing hardware that can can accommodate the basic requirements of BIM related tool. However, at advance BIM adoption stages, it is recommended that some of the existing hardware need to be upgraded with high-performance graphics, RAM and processors to support the productivity and efficiency of the BIM process.

3 Acquire Network Environment

BIM encourages collaboration in construction process. In order to adopt BIM, the organisation may need have dedicated server as collaboration platform. At initial stage, it may be possible for the organisation to use their existing server to support BIM process. But, as the collaboration involves complex collaboration process, the organisation needs to have an independent server such Network-Attached Storage (NAS) or cloud based server

4 IDENTIFYING BIM DELIVERABLES

BIM deliverables are the result of BIM process. Organisation should choose the suitable BIM deliverables in accordance to their BIM project requirement.

PURPOSE OF BIM ACTIVITIES	BIM USES	DELIVERABLES	
To model an accurate representation of the existing conditions for a site, building, adjacent facilities or services.	Existing Conditions Modelling.	• Geographical Information • Site Investigation Report • Site Condition Planning • Utilities Model	• Preliminary Development Brief • Feasibility Study Report • Land valuation report • Risk analysis report
To develop a general outline for design development.	Site Analysis	• Input for authority information • Solar Analysis • Terrain Analysis • Environmental Impact Assessment	• Wind Analysis • Traffic Impact Assessment • Infrastructure Development Report
To provide a cost exercises throughout the project lifecycle.	Cost Management	• Preliminary Cost Estimates • Cost Planning • Cost Estimate • Bill of Quantities	• Procurement Contracts • Cash Flow Analysis • Value Management • Life-Cycle Costing
To transform the building's design into a workable model.	Design Model	• Architectural Model • Structure Model • MEP Model	• Submission Model to Local Authority (e-submission)

PURPOSE OF BIM ACTIVITIES	BIM USES	DELIVERABLES
To execute the analysis of model in order to increase the performance, suitability and productivity throughout the project lifecycle.	Design Analysis	• Sun (shading, orientation) • Building orientation • Natural ventilation • Structural Analysis • Energy Analysis • Life Cycle Cost Modeling • Sustainability Analysis • Lighting Analysis
To streamline the coordination of BIM models in order to resolve conflicts before and during construction.	3D Coordination	• Design Coordination Report • Clash Analysis Report • Constructability Report
To produce detailing model that is ready for pre-fabrication activities.	Digital Fabrication	• Modular pre-fabrication model • Manufacturer specific content libraries
To capture completed as-built parametric and geometric information of project in model.	As-Built Modelling	• Project close-out report
To deliver a model for operation and maintenance decision-making throughout a building's lifecycle	FM System	• Operation And Maintenance Manual • Operation Schedule • Building Operation Data

5 BIM EXECUTION PLAN

Each project team needs to prepare a BIM Execution Plan (BEP) in the early stages of a project that defines the Best Practice Guidelines and Standards for that particular project.

The framework Of BEP ideally will become the guide for the project team to achieve full effectiveness of BIM throughout the project. BEP criterias should encompass the following items:

- Detailed document control standards incorporating BIM and Project standards;
- Point of references for data management and responsibilities within the project team;
- Important information that outlines the detail of the project which will be updated and coordinated continually.

BEP is intended to assist in :

- Providing a clear workflow of BIM Objectives and Deliverables;
- Providing information on roles and responsibilities of each team member and key stakeholders;
- Identifying the Level of detail (Lod) required to fulfil BIM and project requirements
- Identifying resourcing needs;
- Identifying contractual obligations and requirements.

MOVING FORWARD

These three booklets series (**Booklet 1: Awareness**, **Booklet 2: Readiness** and **Booklet 3: Adoption**) intend to equip construction industry players with knowledge and understanding of BIM. This will encourages strategic collaboration between industry players to adopt BIM to increase productivity and efficiency of construction process in Malaysia.

This version of BIM Guide is intended for a wide readership from basic to keen industry players. The content of these booklets is not sufficient to execute BIM implementation. Therefore, readers are encouraged to enhance their knowledge by attending the available courses, seminars, workshops, road shows and training programs provided by CIDB, JKR and other relevant professional bodies.

Other series of BIM Guide will be developed to support BIM implementation according to BIM maturity at level 1, 2 and 3.

We appreciate any feedback and suggestions for continuous improvement of these BIM Guide series.

NOTE

For further information, you may refer to :

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