# BUILDING INFORMATION MODELLING (BIM)

CIDB MALAYSIA

HANDBOOK FOR THE IMPLEMENTATION OF BUILDING INFORMATION MODELLING IN

## CONSTRUCTION INDUSTRY TRANSFORMATION PROGRAMME 2016-2020

CIDB TECHNICAL PUBLICATION NO 184

# COPYRIGHT

**Published in 2018 by**

CONSTRUCTION INDUSTRY DEVELOPMENT
BOARD MALAYSIA (CIDB)
Level 10, Menara Dato' Onn,
Putra World Trade Centre, No. 45,
Jalan Tun Ismail,
50480 Kuala Lumpur

**Handbook for the Implementation of Building Information Modelling In Construction Industry Transformation Programme 2016–2020**

CIDB Malaysia
ISBN 978-967-0997-34-6

# CONTENTS

## SECTION 1: BIM STATE OF ART IN MALAYSIA



## SECTION 2: BIM HANDBOOK


# ACKNOWLEDGEMENT

The Construction Industry Development Board Malaysia would like to acknowledge individuals and organisations for their contribution and valuable insights during the development of the HANDBOOK FOR THE IMPLEMENTATION OF BUILDING INFORMATION MODELLING IN CONSTRUCTION INDUSTRY TRANSFORMATION PROGRAMME 2016–2020. In particular, we would like to acknowledge contributions from the following:

| | |
|---|---|
| Ahmad Azmil Mohd Azlan | Cawangan Pengurusan Projek Kompleks (PROKOM) |
| Ir Hj Mohd Daud bin Harun | Cawangan Pengurusan Projek Kompleks (PROKOM) |
| Sr. Nur Waheeda binti Ismail | Cawangan Pengurusan Projek Kompleks (PROKOM) |
| Muhammad Khairi bin Sulaiman | Public Work Department (PWD) |
| Ir. Ahmad ridzuan bin Abu Bakar | Public Work Department (PWD) |
| Ir. Mohd Faiz bin Shapiai | Public Work Department (PWD) |
| Wan Rizana binti Wan Muhammad | Public Work Department (PWD) |
| Ar. Abu Zarim Abu Bakar | Pertubuhan Arkitek Malaysia (PAM) |
| Ar. Chan Seong Aun | Pertubuhan Arkitek Malaysia (PAM) |
| Ar. Gary Wong | Pertubuhan Arkitek Malaysia (PAM) |
| Sr.Quek Jin Keat | Royal Institution of Surveyors Malaysia (RISM) |
| Ir. Ahmad Rashidi Zainudin | Association of Consulting Engineers Malaysia (ACEM) |
| Ir Walter Sim Kian Joo | Association of Consulting Engineers Malaysia (ACEM) |
| Sr. Roznita Othman | Malaysia Asset and Project Management Association (MAPMA) |
| Ahmad Sharainon Md Shaarani | Malaysian Association of Facility Management (MAFM) |
| Rofizlan Ahmad | CIDB E-Construct Sdn Bhd |
| Mohammad Farid A. Hamid | CIDB E-Construct Sdn Bhd |
| Azizah Hamzah | Prime Minister's Department |
| Dr. Ahmad Tarmizi Haron | Universiti Malaysia Pahang (UMP) |
| Dr. Affifuddin Husairi bin Hussain | Universiti Teknologi Malaysia (UTM) |
| Sufian Abdullah | Sime Darby Property Berhad |
| Mohd Nur Hafidz Ismail | 3dTech Parametric Sdn. Bhd. |
| Isrin Ismail | BIMASIA Sdn. Bhd. |
| Mohamad Hassan Zakaria | Brunsfield Construction Sdn. Bhd |
| Dr Che Wan Fadhil Che Wan Putra | Emost Services Sdn Bhd |

| | |
|---|---|
| Soh Wan Heng | IJM Construction Sdn. Bhd. |
| Amy Ooi Wan Tze | IJM Construction Sdn. Bhd. |
| Shaharin Hashim | Integrated Project Management Solutions Sdn Bhd |
| Syarifah Noraini Noreen Syed Ibrahim Al-Jamallulail | Integrated Project Information Management |
| Ho Kah Chun | PRIMA |
| Wan Muhd Amrul Wan Mustapha | Sime Darby Property Berhad |
| Zulkarnain Hasan | Sime Darby Property Berhad |
| Suffian Shahabuddin | Six Design Office Sdn. Bhd |
| Chung Soo Kiong | Sunway Construction |
| Jeremy Loh Tze Wei | Sunway Construction |
| Ric Chan Kok Choon | Sunway Construction |
| Alvin Brian Dragon | Sunway Construction |
| Muhaimi Tusiman | YTL Corporation Bhd |
| Ar. Sharina Intan binti Abdullah | Ministry of Urban Wellbeing, Housing and Local Government |
| Noriman Muhammad | Ministry of Urban Wellbeing, Housing and Local Government |
| Shirley Ho | REHDA Malaysia |
| David Shieh Chong | REHDA Institute |
| Assoc. Prof. Sr. Dr. Kherun Nita Bt Ali | Royal Institution of Surveyors Malaysia (RISM) |
| Mohd Radzman Othman | KWASALAND Sdn Bhd |
| Tuan Sapuan Tuan Mat | Perbadanan Putrajaya |
| Assoc. Prof. Sr. Dr. Hafez Salleh | University of Malaya |
| Dr. Hj. Mohd Yuhyi bin Mohd Tadza | Universiti Malaysia Pahang (UMP) |
| Ir. Reuben Selvarajah | HSS Integrated Sdn Bhd |
| Tim Sin | Sinar BIM Sdn Bhd |
| Ar. Husam Abdulfatah Haron | TotalBIM Consultants |
| Commander (R) Ong Lam Seng | Gamuda Engineering Sdn Bhd |

# EDITORIAL TEAM

# EDITORIAL **TEAM**

| | |
|---|---|
| Datuk Ir. Elias Ismail | Construction Industry Development Board (CIDB) Malaysia |
| Ir. Noraini Bahri | Construction Industry Development Board (CIDB) Malaysia |
| Ahmad Farrin Mokhtar | Construction Industry Development Board (CIDB) Malaysia |
| Hj Razuki Hj Ibrahim | Construction Industry Development Board (CIDB) Malaysia |
| Jasni Ismail | Construction Industry Development Board (CIDB) Malaysia |
| Mazieana Che Amat | Construction Industry Development Board (CIDB) Malaysia |
| Muhammad Razif Abdullah | Construction Industry Development Board (CIDB) Malaysia |
| Sharifuddin Umar | Construction Industry Development Board (CIDB) Malaysia |
| Ir. Dr. Zuhairi Abd. Hamid, FASc | Construction Research Institute of Malaysia (CREAM) |
| Maria Zura Mohd. Zain | Construction Research Institute of Malaysia (CREAM) |
| Ahmad Farhan Roslan | Construction Research Institute of Malaysia (CREAM) |
| Nurulhuda Mat Kilau | Construction Research Institute of Malaysia (CREAM) |

# LIST OF **FIGURES**



# LIST OF **TABLES**

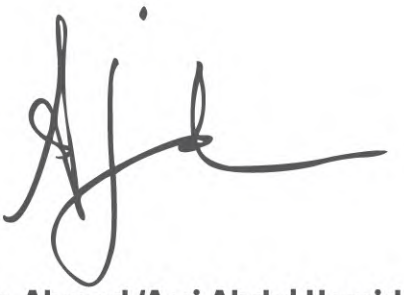
# FOREWORD

# FOREWORD

## CIDB Malaysia Chief Executive

The Building Information Modelling (BIM) Handbook 2016–2020 is developed as a strategy for BIM implementation in Malaysian construction industry. The handbook provides a blueprint to enable the construction industry to achieve a minimum of 40% implementation rate of Level 2 BIM maturity in accordance with the Construction Industry Transformation Programme 2016–2020.

BIM is at the centre of an industrial revolution, known as 'Industry 4.0'. The digital transformation of the construction industry increases its productivity and competitiveness. This handbook is a beneficial reference for industry players to increase their adoption of BIM. It outlines a dynamic strategic plan to assist public and private sectors to implement BIM collectively. At Construction Industry Development Board Malaysia, we are determined to encourage BIM adoption and continuously support transformation towards modern construction practices and technologies.



**Dato' Ir. Ahmad 'Asri Abdul Hamid**
Chief Executive CIDB Malaysia

# EXECUTIVE SUMMARY

# EXECUTIVE **SUMMARY**

The Construction Industry Development Board (CIDB) Malaysia continues to transform the construction industry into a modern, highly productive and sustainable industry under the Construction Industry Transformation Programme (CITP) 2016–2020. The CITP blueprint, which is spearheaded by the Ministry of Works and CIDB, aims to empower and strengthen the construction industry as outlined in the thrusts of the Eleventh Malaysia Plan (11th MP). Embracing new technology and modern construction, such as information and communications technology, is envisioned as the future direction for improving the productivity of the industry.

The fourth industrial revolution or 'Industry 4.0' requires the industry to prepare for the technological and cultural changes in digital construction. Building Information Modelling (BIM) is a metaphor for digital construction, and its role as a fundamental component of the creation of intelligent data throughout the project life cycle is pivotal.

To steer the construction industry towards this target, CIDB has developed the BIM Handbook with seven critical areas. These seven areas, known as pillars, encompass strategies and initiatives to materialise the BIM agenda in the Malaysian construction industry. These pillars comprise Pillar 1 - BIM Standards and Guidelines; Pillar 2 - Collaboration and Incentives; Pillar 3 - BIM Capability and Capacity; Pillar 4 - National BIM Object Library; Pillar 5 - Legal Issues; Pillar 6 - Special Interest Groups; and Pillar 7- Research and Development.

## CONSTRUCTION INDUSTRY TRANSFORMATION PROGRAMME 2016 TO 2020 (CIDB MALAYSIA, 2015)

Aligned with the national agenda, CITP aims to transform the Malaysian construction industry with the implementation of Level 2 BIM maturity, in which a minimum of 40% implementation rate of public projects valued at RM 100 million and above shall implement the corresponding approaches and processes by 2020.

# HANDBOOK FOR THE IMPLEMENTATION OF BUILDING INFORMATION MODELLING IN CONSTRUCTION INDUSTRY TRANSFORMATION PROGRAMME 2016–2020

CIDB TECHNICAL PUBLICATION
NO 184

# SECTION 01

# BIM STATE OF ART IN MALAYSIA

CIDB TECHNICAL PUBLICATION
NO 184

# INTRO DUCTION

## INTRODUCTION

**In the era of digital empowerment, the construction industry must reimagine business models and change the work process to stay competitive. The technological revolution begins with enhanced process and management through building information modelling (BIM). BIM is recognised as an advanced information and communications technology (ICT) with the potential to transform the construction industry by enhancing efficiency, productivity and quality.**

BIM has evolved as the panacea of virtual representation of construction throughout the life cycle of the construction process. BIM is characterised as a data-rich, object-oriented, intelligent and parametric digital representation of the facility for building. The characteristics of BIM provide independent models that will fulfil stakeholders' needs to extract and analyse all the information needed in the supply chain. BIM comprises a model-based framework for multidisciplinary collaboration that encompasses design, analysis, construction, operation and data management.

The use of BIM is identified as a key lever to increased productivity and consolidation in the value chain. Enormous challenges that are crucial for stakeholders, such as the maximum utilisation of BIM, still remain, although the richness provided by BIM is clearly observed. High levels of integration at the early design levels lead to great opportunities to derive the maximum utilisation of BIM. BIM represents a new paradigm within Architecture, Engineering and Construction (AEC) that encourages the integration of each stakeholder into a project. Therefore, well-developed strategies for BIM adoption are imperative.

A strategic BIM implementation plan was initiated by CIDB due to the growing interest of the construction industry in BIM use. CIDB has not only developed the 'BIM Handbook' to foster the implementation of BIM in Malaysia but also initiated a comprehensive strategy to achieve BIM Level 2 by 2020.

### DEFINITION BY CIDB (CIDB MALAYSIA, 2016)

BIM, recognised as the latest advanced ICT, is defined as a 'modelling technology and associated set of processes to produce, communicate, analyse and use digital information models throughout the construction project life cycle'.

# HISTORICAL DEVELOPMENT OF BIM HANDBOOK

The development of the BIM Handbook facilitates BIM implementation in Malaysia. A series of activities has been organised for the development of the BIM Handbook since 2013. Table 1 shows the details of such activities.

**Table 1.** Activities organised during the development of the BIM Handbook

| Activities | Output |
|---|---|
| **1st BIM workshop**<br>(16 December 2013) | ○ **Identified the three major elements of handbook development:**<br>i. Industrial stakeholders' motivations of BIM implementation<br>ii. Key milestone<br>iii. Key performance indicator platform<br>○ **The focus was based on the motivations from various stakeholders (i.e. developer, academe, design consultant, facilities management, contractor, quantity surveyor, vendor and BIM consultant and public agency)** |
| **National BIM Steering Committee Meeting**<br>(26 February 2014) | ○ **Three approaches to developing the BIM Handbook were reviewed and identified by the BIM handbook subcommittee.**<br>**Approach 1:** Adoption of another country's approach (i.e. United Kingdom, Hong Kong, Australia and Singapore)<br>**Approach 2:** Refinement of pillars/perspectives through the combination of strategies from different countries<br>**Approach 3:** Extending the pillars through the combination of pillars from different countries and synergies with Malaysian programmes.<br>○ **The committee members unanimously agreed to adopt Approach 3.**<br>**All the committee members reached consensus and agreed on the six pillars of the Malaysia BIM Handbook (Standard and Accreditation; Education and Awareness; National BIM Library; BIM Guidelines; Special Interest Group and Research and Development)** |

| Activities | Output |
|---|---|
| **2nd BIM workshop**<br>(8 April 2014) | ○ **The workshop discussed the following:**<br>i. BIM Handbook timeline<br>ii. Current status and global BIM activities<br>iii. BIM strategy developed by other countries<br>iv. Benchmarking of current Malaysia BIM status and International BIM development<br>○ **Pillar 2 - Collaboration and Incentives was identified and set to be included.** |
| **3rd BIM workshop**<br>(11 August 2014) | ○ **Review and discussion of the content of the Malaysia BIM Handbook (final draft)** |
| **4th BIM workshop**<br>(4 November 2014) | ○ **Validation of the final draft of the BIM Handbook 2016–2020** |
| **Construction Industry Transformation Programme (CITP) 2016–2020**<br>(September 2015) | ○ **BIM Handbook embedded in CITP under productivity thrust**<br>○ **BIM Handbook's execution to support CITP from 2016 to 2017**<br>○ **Monitoring, evaluation and modification of the BIM Handbook** |
| **Initiative Working Group on BIM (IWG11)** | ○ **CITP Initiative Working Group on BIM (IWG11) was established in 2016 by CIDB.** |
| **5th BIM Workshop**<br>(7 February 2017) | ○ **Review of BIM adoption report 2016 and discussion of issues and challenges for BIM implementation in Malaysia**<br>○ **Formulation of the latest strategy for BIM implementation from 2017 to 2020** |
| **6th BIM Workshop**<br>(27 February 2018) | ○ **Validation of the final draft the BIM Handbook (Reviewed) 2017–2020** |

# CITP INITIATIVE WORKING GROUP ON BIM (IWG11)

**The CITP Initiative Working Group on BIM (IWG11) was established in 2016 by CIDB. The committee was set up in collaboration with numerous local bodies involved in the construction industry. The committee facilitates BIM adoption in the construction industry via regulation and establishes a reference centre to support the development and adoption of BIM and modern methods.**

**List of appointed committee members:**

| | |
|---|---|
| **Dato' Sri Zohari bin Haji Akob (Chairman)** | Secretary General Ministry of Works |
| **Datuk Matthew Tee Kai Woon (Deputy Chairman)** | Secretary General Ministry of Works |
| **Ir. Razdwan bin Kasim** | Public Work Department (PWD) |
| **Muhammad Khairi bin Sulaiman** | Public Work Department (PWD) |
| **Salmawati binti Mansor** | Ministry of Finance Malaysia (MoF) |
| **Ar. Sharina Intan binti Abdullah** | Ministry of Urban Wellbeing, Housing and Local Government (KPKT) |
| **Harizan binti Hussin** | Economic Planning Unit (EPU) |
| **Badrul Hisham bin Baharom** | Prime Minister's Department |
| **Professor Dr. Rahinah binti Ibrahim** | Universiti Putra Malaysia (UPM) |
| **Dr. Ahmad Tarmizi bin Haron** | Universiti Malaysia Pahang (UMP) |
| **Ir. Ahmad Izdihar bin Supa'at** | Association of Consulting Engineers Malaysia (ACEM) |
| **Ir. Ahmad Ridzuan bin Abu Bakar** | Board of Engineers Malaysia (BEM) |
| **Ar. Zamri bin Ismail** | Pertubuhan Arkitek Malaysia (PAM) |
| **Sr Sharifah Noraini Noreen binti Syed Ibrahim Al-Jamallullail** | Royal Institution of Surveyors Malaysia (RISM) |
| **Soh Wan Heng** | IJM Construction Sdn Bhd |
| **Mohamad Hassan bin Zakaria** | Brunsfield Construction Sdn Bhd |
| **Dato' Sr Srikandan Kanagainthiram** | KPK Quantity Surveyors (Semenanjung) Sdn Bhd |
| **Datuk Ir. Elias Ismail** | CIDB Malaysia |
| **Mohd Nazli Ahmad Mahyadin** | CIDB Malaysia |
| **Sr Noridah Shaffii** | CIDB Malaysia |
| **Ahmad Farrin Mokhtar** | CIDB Malaysia |

# NEED FOR BIM:

The construction industry serves as the foundation for long-term economic growth and plays an important role in improving the quality of lives of people. The estimated value of construction projects for building and infrastructure increases due to the government's increasing expenditure on public infrastructure and development of residential units to meet housing demand. As the demand for the delivery of large and complex projects by the construction industry increases, the pressure for improved delivery also increases. As a solution, the construction industry is urged to use BIM as an innovative approach for the effective delivery of complex construction multi-projects.

The ability of BIM to virtually design, visualise, simulate and analyse the physical and functional key characteristics of each element in a project before construction improves the overall construction process. BIM is known as a process that uses intelligent digital models to facilitate coordination, communication, analysis and simulation, project management and collaboration and even asset management, maintenance and operations (Autodesk, 2012). BIM enables all the information stored in an integrated digital database to be reviewed and updated. The ability to keep information up-to-date and accessible in an integrated digital database enhances decision making, thereby increasing efficiency, quality and productivity.

# WHY DO WE CHANGE?

Figure 2 shows that the value chain in the BIM life cycle covers the overall phase of the construction life cycle with detailed activities. This integrated BIM life cycle model benefits buildings' features by selecting sustainable and long-term economic solutions to sustain the maximum standard of service during the operation phase.

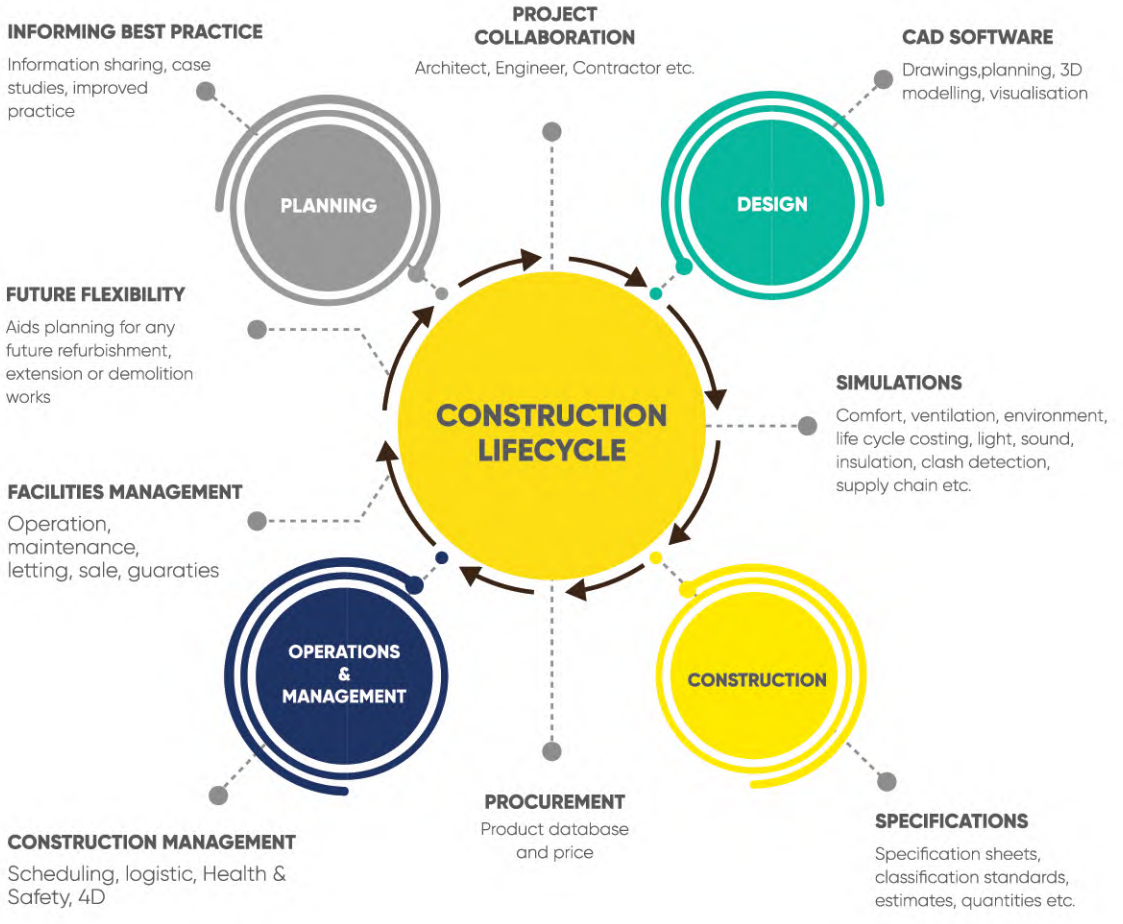



**Figure 2.** Value chain in BIM life cycle (Adapted from Speller Metcalfe, n.d.)

# NATIONAL BIM STATUS: WHERE ARE WE NOW?

The idea of implementing BIM in Malaysia was introduced by the Director of the Public Works Department (PWD) in 2007. The potential of BIM to reduce construction costs and avoid design problems in the planning phase is the main motivation behind the government's BIM implementation.In 2017, Works Minister said that the government would make BIM compulsory for all public projects valued above RM 100 million as part of their construction process by 2019. At present, a number of notable projects in Malaysia, including the National Cancer Institute in Putrajaya, the administration building of Malaysian Anti-Corruption Commissioner in Shah Alam, the administration building of Kuala Terengganu City Council and the Government Health Clinic (KK5) of Maran, have begun to use BIM.

**Figure 2.** National Cancer Institute, Putrajaya

**Figure 3.** Malaysian Anti-Corruption Commission Building, Shah Alam

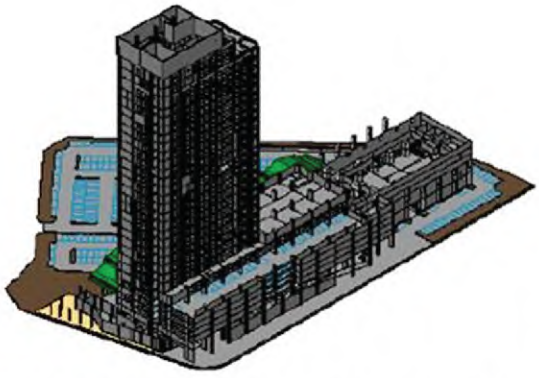


**Figure 4**. Administration building Kuala Terengganu City Council

**Figure 5.** Government Health Clinic (KK5), Maran

Recently, the private sector has embarked on BIM adoption progressively. A number of private sector projects demand for BIM in the procurement and delivery of buildings and infrastructure. BIM is proven to be a technology that will provide benefits across the construction life cycle. Malaysia's Mass Rapid Transit Corporation is one of the first organisations in Asia to leverage on BIM for its 51-kilometre Klang Valley Mass Rapid Transit (KVMRT) system's Sungai Buloh–Serdang–Putrajaya line.

The award-winning project under the Advancement in Rail and Transit Category by Bentley Systems in 2017 proves that the adoption of technology such as BIM had successfully enhanced the image and performance of companies under this project. As a result, the deployment of BIM in Malaysia is now expected to increase rapidly within a few years.

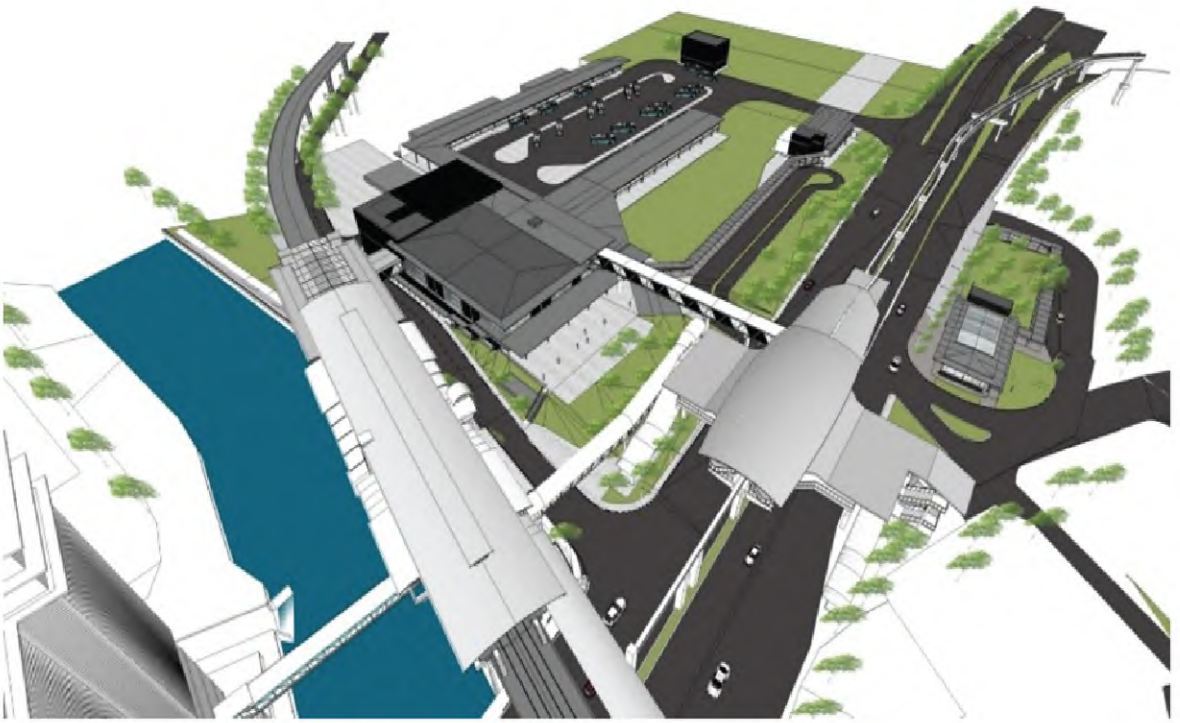


**Figure 6.** KVMRT line model built using Bentley System's Solution (Bentley & MRTC, 2017)

## CIDB, as the leader in the Malaysian construction industry, has made a step forward to adopt and promote BIM since 2011.

As a kick-off to BIM implementation in Malaysia, CIDB has organised several programmes, seminars and workshops for industry players to facilitate BIM adoption. In September 2015, the CITP was officially launched by the Prime Minister of Malaysia. CIDB, together with the Construction Research Institute of Malaysia (CREAM), has formulated a BIM handbook during a consultation with stakeholders and experts to support and deliver the objectives of BIM implementation in the CITP.

CIDB's National BIM Centre or myBIM was established as a reference centre to support BIM development and adoption and adopt modern methods as outlined in the CITP. myBIM Centre, operated by CIDB E-Construct, is a one-stop centre that provides resources for the use of BIM and related technologies in the Malaysian construction industry.


**Figure 7.** myBIM Centre officially launched by the Works Minister in 2017

## The Malaysia BIM Report 2016 was published by CIDB together with CREAM to assess the current extent of BIM adoption in Malaysia.

**This report is the first to be published on the status of BIM adoption and serves as baseline to determine BIM progress in Malaysia. The findings from this survey indicate a widespread BIM awareness among the Malaysian construction industry, and 84% of the respondents expressed willingness to adopt BIM implementation. Although we know about the extensive awareness and willingness of the industry to change for BIM, the percentage of BIM adopters (17%) is extremely low (CIDB Malaysia, 2017). This result leads to a low BIM adoption rate in Malaysia.**

**A survey conducted among Malaysian construction firms shows that several challenges hinder BIM adoption in Malaysia:**


## In summary, the transition phase towards BIM needs to be monitored and facilitated to ensure that the benefit of BIM can be maximised in the construction industry.

The limited resources to assist BIM implementation will adversely affect the implementation pace in Malaysia. That is, if a well-planned and properly implemented strategy of BIM adoption is in place, then such adoption can be achieved within a short period.

DIRECTION:

# WHERE ARE WE HEADING?

**Realising the importance of ICTs in improving productivity, CIDB believes that BIM implementation, in line with a strategic plan, is vital because it shall steer Malaysia's construction industry towards full BIM adoption. Several factors that facilitate BIM adoption in the construction industry include those in Table 2.**

**Table 2.** Enabling factors for BIM implementation

| | |
|---|---|
| People | Bridging knowledge gap, increasing capability |
| Process | Streamlined, integrated and efficient process |
| Technology | Infrastructure and correct tools |
| Policy | Clearly defined policy |

# All the factors mentioned are geared towards full BIM implementation in the construction industry.

BIM will create a new and unique working environment that will lead to improved productivity in the construction industry. The BIM Handbook will include a strategic implementation plan aiming to achieve BIM Level 2 by 2020. Figure 7 defines BIM level and the associated characteristics of each BIM model applied to the intended deliverable.

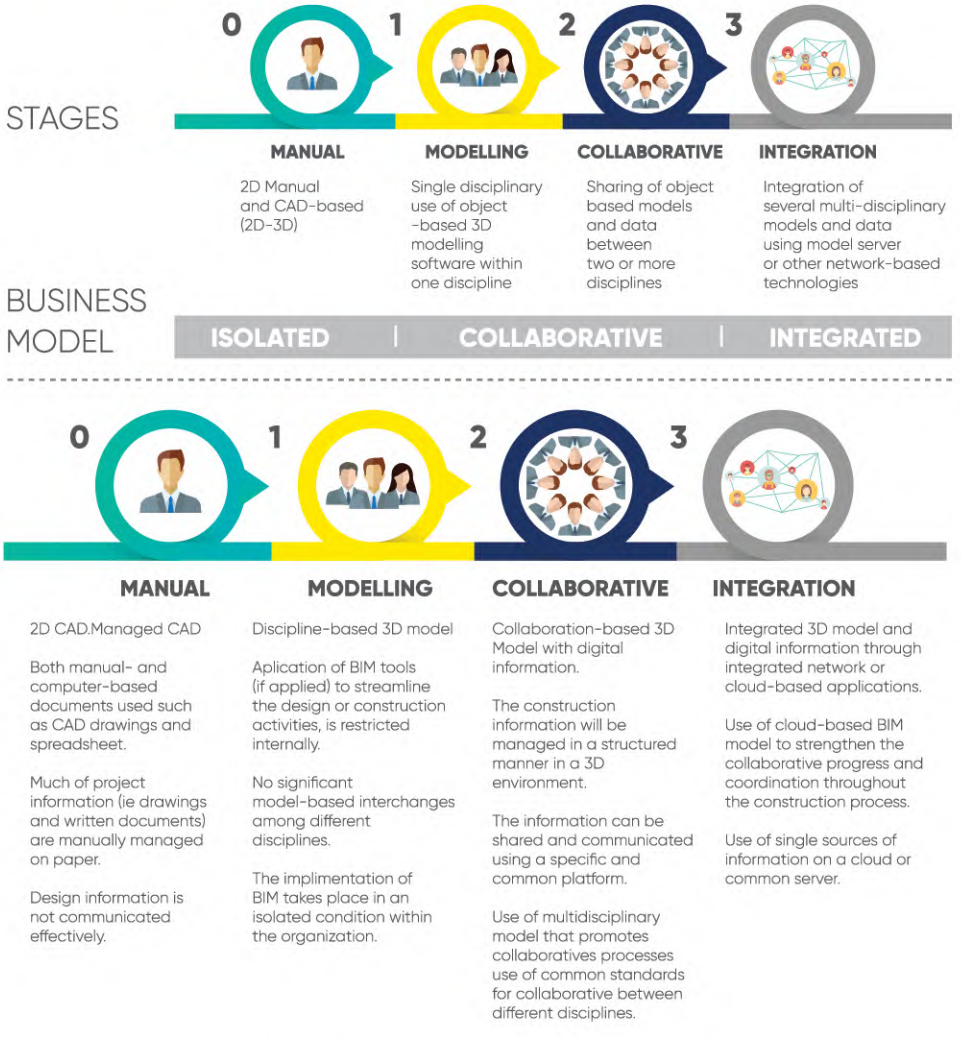
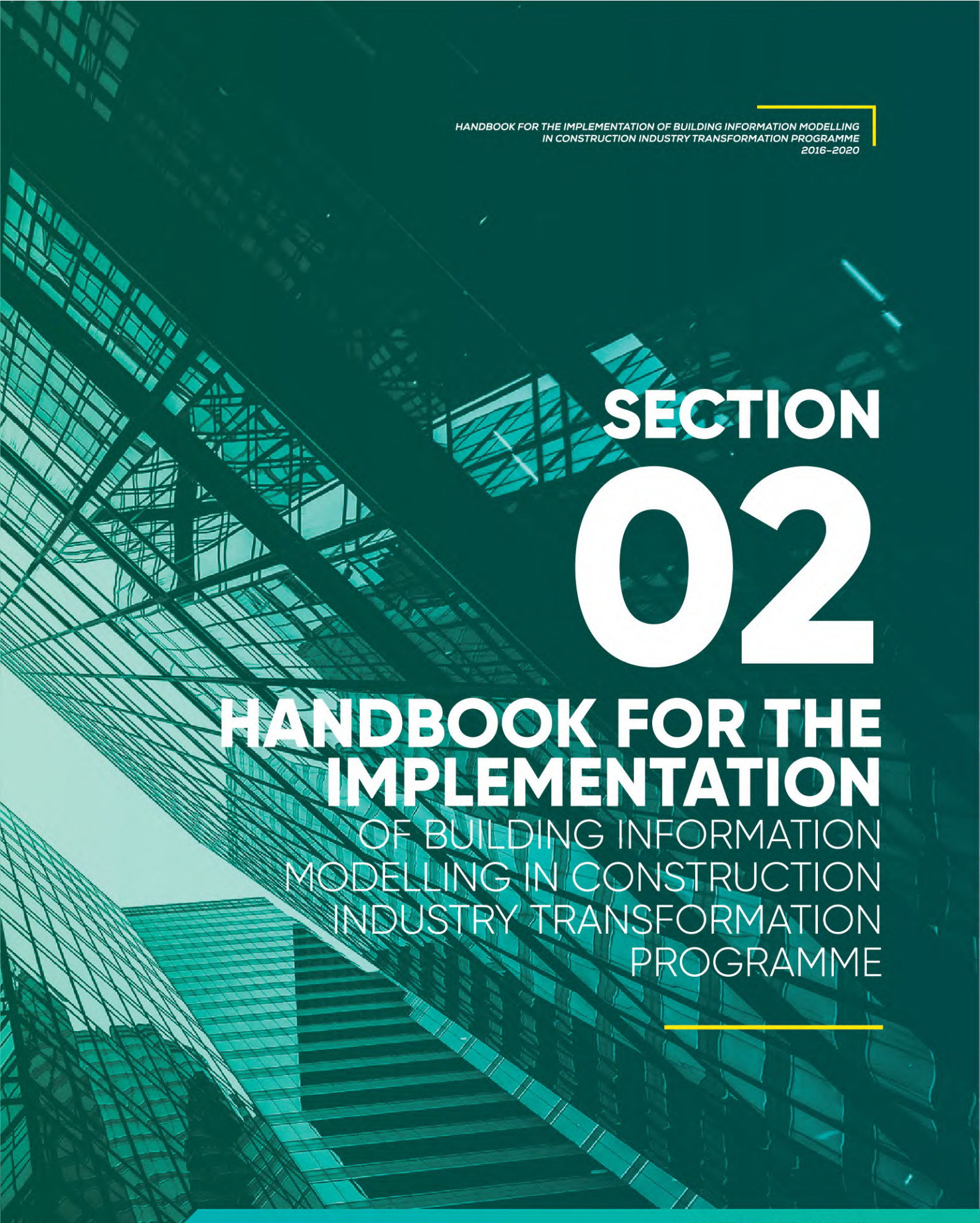



**Figure 7.** BIM level and characteristics in Malaysia

# HANDBOOK FOR THE IMPLEMENTATION OF BUILDING INFORMATION MODELLING IN CONSTRUCTION INDUSTRY TRANSFORMATION PROGRAMME 2016-2020

CIDB TECHNICAL PUBLICATION
NO 184



SECTION

# 02

# HANDBOOK FOR THE IMPLEMENTATION

## OF BUILDING INFORMATION MODELLING IN CONSTRUCTION INDUSTRY TRANSFORMATION PROGRAMME

CIDB TECHNICAL PUBLICATION
NO 184

## HANDBOOK FOR THE IMPLEMENTATION OF BUILDING INFORMATION MODELLING

# IN CONSTRUCTION INDUSTRY TRANSFORMATION PROGRAMME 2016–2020

**A handbook with a strategic and implementation plan was developed by CIDB Malaysia to realise the potential and benefits of BIM. The handbook aims to align BIM implementation with the national strategy and transform the Malaysian construction industry with the implementation of level 2 BIM maturity by 2020. The handbook will prescribe the requirements on how BIM level 2 usage will be achieved by the construction industry players along the supply chain.**

**This handbook has been developed on the basis of the CITP. The objectives of the BIM Handbook are as follows:**

a. **To respond to the changes in construction demand as envisaged in the CITP**
b. **To propose BIM strategic implementation in Malaysia as a way forward**
c. **To encourage industrial stakeholders to adopt BIM throughout the life cycle of construction projects**
d. **To build a common understanding, idea, insight, practise and shared ownership of the proposed handbook by industry stakeholders towards a successful development process**
e. **To align the BIM Handbook with international standards**

**These objectives will be achieved through the implementation of the seven pillars under the development of the BIM Handbook.**

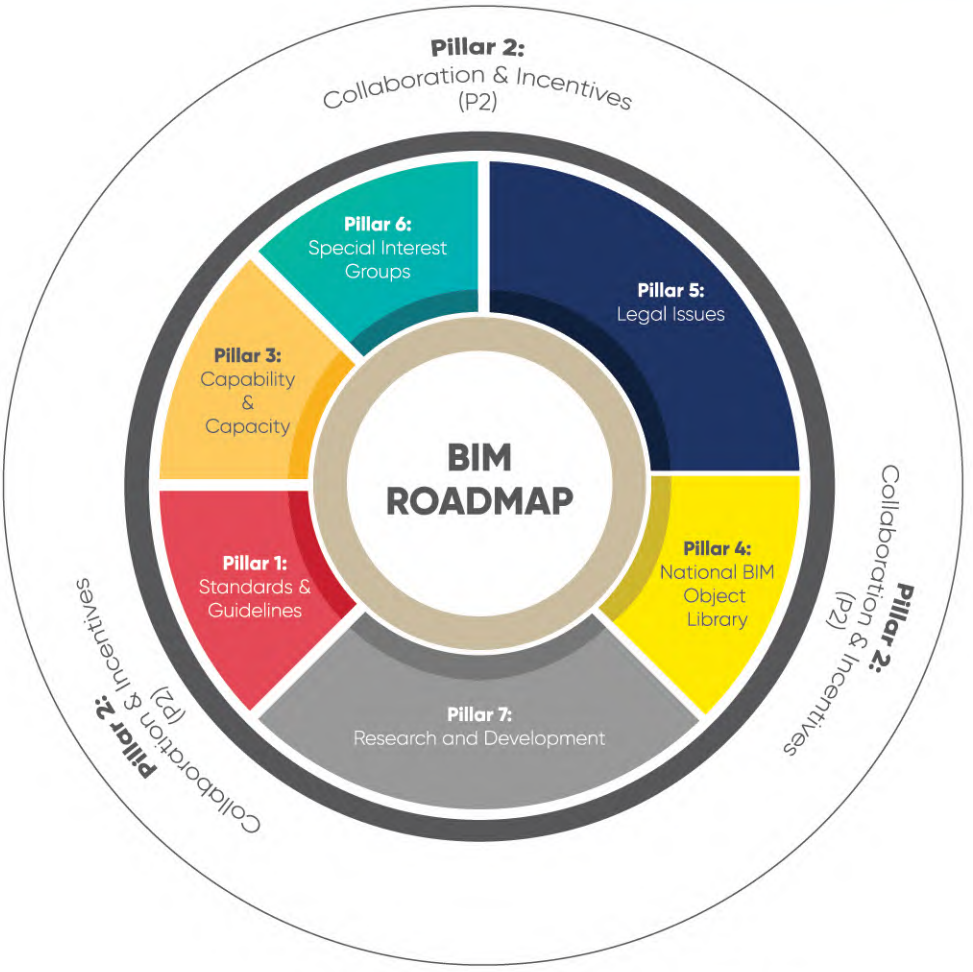



**Figure 8.** Seven Pillars of the BIM Handbook 2016–2020

## 6.1 PILLAR 1: Standards and Guidelines

The implementation of level 2 BIM maturity by 2020 requires organisations and individuals to redefine their roles and implement new process and information management requirements. A set of standards and guidelines will outline the process and information management practises required to reach level 2 BIM maturity.

Focusing on the development of Malaysia's BIM standards, the promotion and deployment of open international BIM standards is essential for interoperability. BIM standards will set the minimum requirements for the use of BIM in projects with exchange protocols to provide the full benefits of BIM over the construction project life cycle. Data from each phase of the construction project life cycle can be utilised by the construction stakeholders along the supply chain.

BIM guidelines are developed to provide the methods for the adoption of standards and best practises in a format that will assist the construction stakeholders in using BIM. BIM guidelines are used as a reference guide to understand BIM (processes and technologies) and determine appropriate BIM applications for specific purposes.

## BENCHMARKING

| | |
|---|---|
| **United Kingdom** | Developed reference for construction stakeholders to understand how to use BIM and data to improve productivity and reduce waste. BIM standards ensure the wide adoption of BIM technologies, processes and collaboration by ensuring that the same accurate data can be accessed throughout the supply chain. |
| **Hong Kong** | Established delivery standard and common practise to provide unified BIM standard/methodology/convention/required level of details that can be easily adapted to suit different projects with reasonable modification. |
| **Singapore** | Developed BIM guides consisting of BIM specifications, BIM modelling and collaboration procedures. Published a series of BIM essential guides to demonstrate good BIM practices in an illustrated, easy to read format targeting new BIM users in Singapore. |
| **Australia** | Developed national BIM guidelines based on collaborative work, open standards and global best practises. Established open standard data exchange protocols that will support collaboration and facilitate integration in the supply chain throughout the construction project life cycle |

**Note:** Brief information on BIM initiatives by other countries.

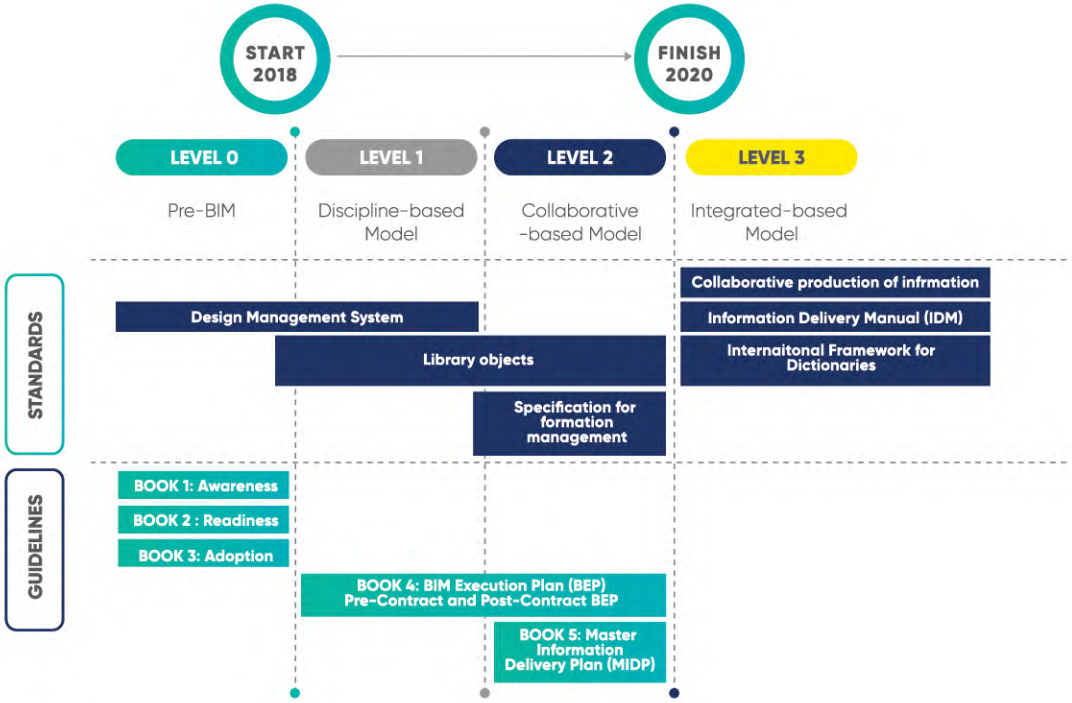



**Figure 10.** Proposed BIM standards and guidelines for the implementation of level 2 BIM maturity

To establish Malaysia's BIM standards and guidelines to align with the CITP and international equivalents (To be published by CIDB as CIS/DSM/MS)

**OBJECTIVE**

To establish the framework, guidelines and supporting documents for the integration of BIM into the construction project life cycle

# IMPLEMENTATION STRATEGY:

## Standards and Guidelines (SG1)

**To develop a framework for BIM implementation level in Malaysia**
The framework highlights BIM implementation in the construction process into a number of key levels. The framework will be referred to by construction stakeholders in implementing BIM along the construction supply chain.

| | |
|---|---|
| **Timeline** | **2018–Onwards** |
| **Lead Agency** | **Construction Industry Development Board (CIDB) Malaysia** |
| **Key Agencies** | **a) Public Work Department (PWD)**<br>**b) Professional bodies (PAM, IEM, ACEM, RISM and other relevant bodies)**<br>**c) Regulatory bodies (BEM, BQSM, BOAM)**<br>**d) Construction stakeholders** |
| **Deliverables** | **BIM management frameworks and plan of works** |
| **References** | **BIM by Scottish Futures Trust (https://bimportal.scottishfuturestrust.org.uk/level2)**<br>**BIM toolkit by NBS (https://toolkit.thenbs.com/)**<br>**Plan of Work 2013 by RIBA (https://www.ribaplanofwork.com/Default.aspx)** |

## Standards and Guidelines (SG2)

**To conduct an exploratory study and develop a series of national BIM standards and guidelines**
BIM standards: Provide standardised BIM methodologies and tools for managing construction information throughout the project life cycle and the supply chain. Collaborative working environment with standardised processes and documentation will be critical for the successful delivery of BIM. BIM standards will set the minimum requirements for the use of BIM.

BIM guidelines: Provide the methods for the adoption of standards and best practises in a format that will assist the construction stakeholders in implementing BIM. Guidelines are intended to provide an in-depth look at related documents for BIM implementation and to provide guidance on how each document are intended to be used. Guidelines also serve as a reference to assist construction stakeholders in implementing BIM at different project levels (e.g. building or infrastructure), type of organisation (e.g. owner, architect, civil and structural, mechanical and electrical, contractor and others) and uses (e.g. energy analysis, BIM for the design manufacturing of IBS and others).

| | |
|---|---|
| **Timeline** | **2016–Onwards** |
| **Lead Agency** | **Construction Industry Development Board (CIDB) Malaysia** |
| **Key Agencies** | **a) Public Work Department (PWD)**<br>**b) Professional bodies (PAM, IEM, ACEM, RISM and other relevant bodies)**<br>**c) Regulatory bodies (BEM, BQSM, BOAM)**<br>**d) Construction stakeholders**<br>**e) IBS Centre**<br>**f) Department of Standards Malaysia (DSM)**<br>**g) Standard writing organisation (SWO) to be named** |
| **Deliverables** | **National BIM Standards:**<br><br>**a) Standard 1: Collaborative production of information**<br>**b) Standard 2: Design management system**<br>**c) Standard 3: Library object**<br>**d) Standard 4: Specification for information management**<br>**e) Standard 5: E-submission**<br><br>**National BIM Guidelines:**<br><br>**a) BIM Adoption: Book 1 (Awareness), Book 2 (Readiness), Book 3 (Adoption) - Completed**<br>**b) Book 4: BIM Execution Plan (BEP)**<br>**c) Book 5: Master Information Delivery Plan (MIDP)**<br>**d) Book 6: BIM for Industrialised Building System (IBS)**<br>**e) Compilation of Best BIM implementation practises in Malaysia (Pilot project and case study)** |

## References

United Kingdom BIM Level 2 Standards by BSI (http://bim-level2.org/en/; https://www.bre.co.uk/page.jsp?id=3508)

National BIM Guide by NATSPEC, Australia (https://bim.natspec.org/documents/natspec-national-bim-guide)

BIM Standards and Guidelines by Hong Kong Housing Authority (http://www.housingauthority.gov.hk/en/business-partnerships/resources/building-information-modelling/)

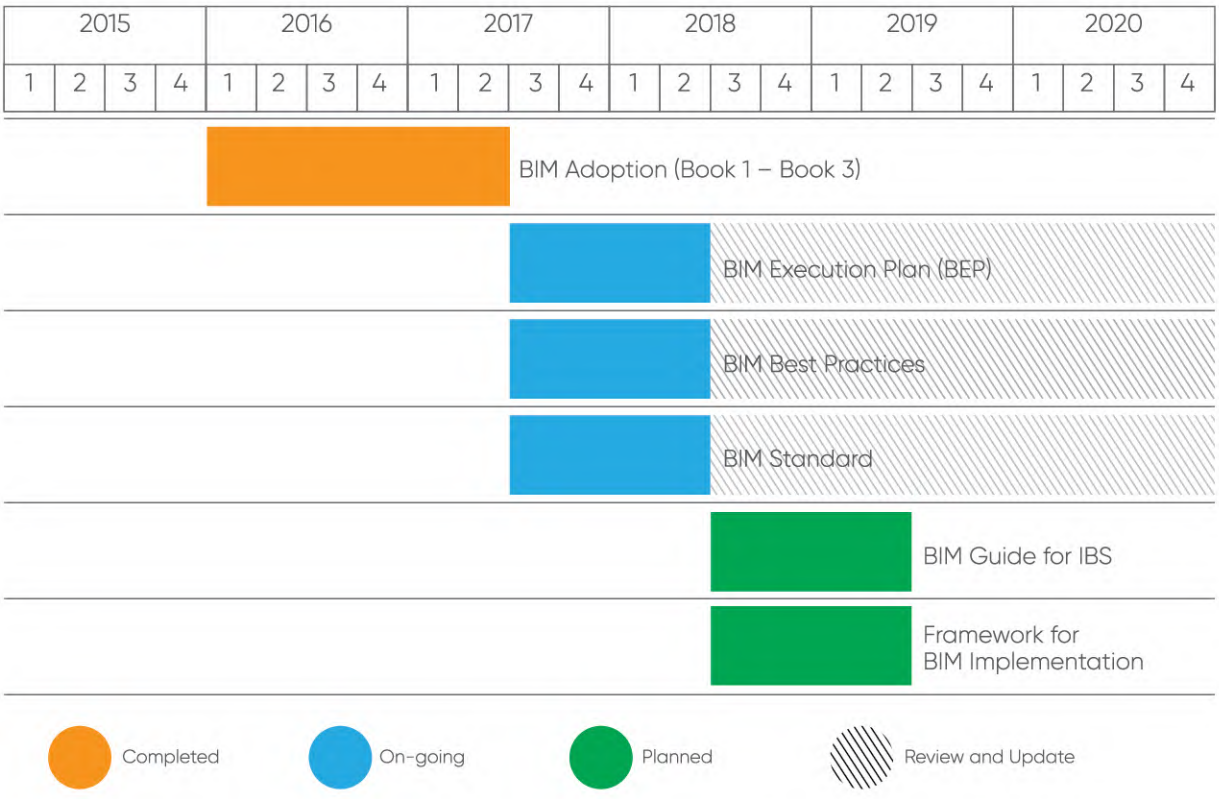
Singapore BIM Guide by Building and Construction Authority (BCA)

a) Singapore BIM Guide Version 2.0 (https://www.corenet.gov.sg/general/bim-guides/singapore-bim-guide-version-20.aspx)
b) BIM Essential Guides for:

- Adoption in organisation
- Execution plan
- Architectural consultants
- Collaborative virtual design and construction
- Design for Manufacturing and Assembly (DfMA)
- C&S consultant
- MEP consultants
- Contractor
- Building performance analysis
- Land surveyors

Ref: https://www.corenet.gov.sg/general/bim-guides/bim-essential-guides.aspx

# TIMELINE OF **ACTIVITIES:**



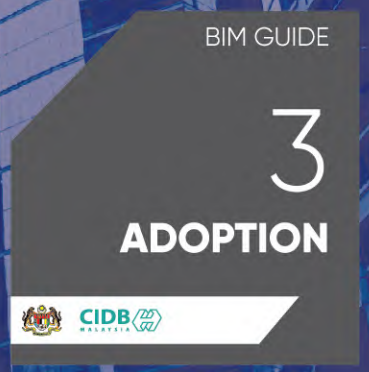

**Note:** The actual activities will be reviewed and revised by each pillars subcommittee

# ACHIEVEMENT

## Standards and Guidelines (SG2)

CIDB published the BIM Guide Series to educate construction players for the about BIM adoption in Malaysia. The BIM Guide Series of guide aims to acknowledge and promote the BIM understanding and implementation of BIM in the Malaysian construction industry (Book 1: Awareness); to equip the construction industry with the knowledge on the fundamentals of BIM (Book 2: Readiness); and to assist the construction industry in identifying the factors to consider when adopting BIM (Book 3: Adoption).






Link: https://www.mybimcentre.com.my/knowledge-base/

## 7.2 PILLAR 2: Collaboration and Incentives

**Collaboration among CIDB,; government agencies,; professional bodies,; AEC industry,; committees,; research institutions and academia; , technology providers; and vendors are crucial to the adoption of BIM adoption in Malaysia. In the international scene, Malaysia must align its strategic direction with global initiatives and directions.**

**Interdependency among various entities is required Addressing because of the importance of collaboration, interdependency among various entities is required. Interdependency requires CIDB to collaborate with key government agencies to initiate support for BIM adoption as stipulated in the CITP. Collaboration with key government agencies converge in the promulgation of laws and policies, contract and procurement and others. Collaboration with professional bodies, academia, committees, AEC stakeholders, technology providers and vendors will ensures BIM implementation at a competitive level.**

**BIM adoption in the last few recent years has greatly increased in the several countries. Rapid changes in BIM adoption requires the industry to implement BIM as early as possible. Incentivising BIM adopters will increases BIM adoption in the construction industry, thus thereby accelerate accelerating the learning curve and increasing BIM knowledge.**

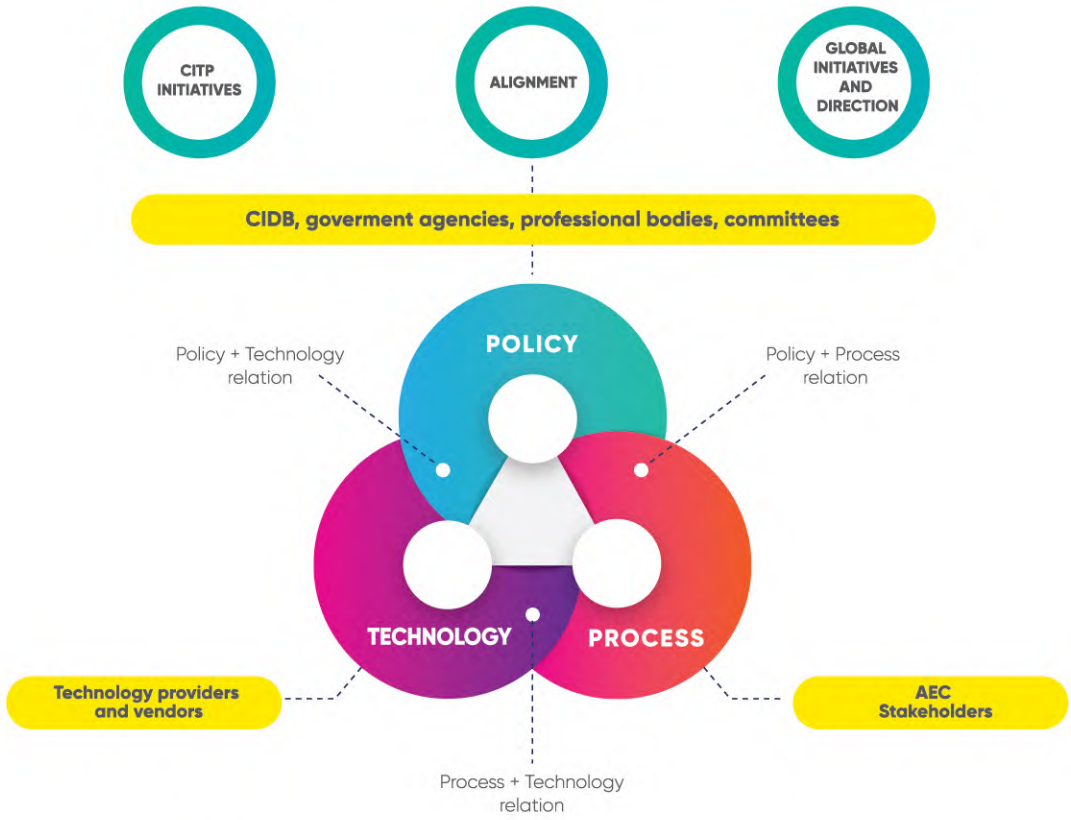



**Figure 11:** Collaborative framework for BIM adoption in Malaysia.

# BENCHMARKING

**United Kingdom** : The partnership between the UK government and the industry for their BIM programme has positioned the UK as the leading force in BIM technology and process. The UK government also recognises the value of international collaboration to coordinate global efforts in standard development.

**Hong Kong :** Under the perspective of collaboration, the following initiatives are undertaken by the Hong Kong's Housing Authority:

- Foster local collaboration across the industry (bodies and institutions) to develop and promote the necessary standards, protocols, practises, legal frameworks and educational programmes according to the industry-accepted implementation plan, timeline and scale.
- Foster international collaboration for the development of a global view of standards such as best practices/common practices.

**Singapore :** The Building Construction Authority (BCA) collaborated with Government Procurement Entities (GPEs) to request the use of BIM for their project from 2012. BCA with GPE and their industry partners worked together to prepare the new requirements. BCA also collaborated with professional and international bodies (Building SMART) to foster BIM adoption. To build BIM capability, BCA is liaising with various institutes of higher learning in Singapore to include BIM training into their formal curricula. In addition, BCA and the National University of Singapore have collaborated to set up a Centre of Excellence (CoE) for BIM.

**Australia :** Australian practitioners, developers and researchers collaborate in the development of standards and protocols for the generation and exchange of building information. Collaboration with academia and external partners has led to the development of education and applied research for BIM.

**Note:** Brief information on BIM initiatives by other countries.

# OBJECTIVE

**To foster collaboration between local and international bodies in the development of the BIM strategic implementation plan that contains policies, initiatives and support, contract and procurement.**

# IMPLEMENTATION **STRATEGY**

## Collaboration and Incentives (CI1)

**Collaboration with key government agencies, such as Public Works Department (PWD), local authority, relevant ministry and international stakeholders, to initiate strategic BIM implementation at the government level.**

The BIM implementation strategy in Malaysia based on the CITP is mainly driven by government agencies. Government agencies will be the driving forces for BIM delivery in Malaysia. Listed are several initiatives for strategic BIM implementation plan at the government level.

a) Provision of a financial incentive model to support BIM implementation (e.g. Government/ Client provides BIM infrastructure requirements in the form of incentives to include BIM price in contract procurement)
b) Upskilling of the construction supply chain programme for BIM implementation (e.g. training, certification and accreditation, software approval and BIM user database)
c) Regulation and implementation of level 2 BIM by PWD under the Ministry of Works
d) Setting up of recognised coordinating body to foster collaboration locally and internationally
e) Ministry's decision/Directive – Memorandum of Understanding (MoU) with agencies (PWD, Economic Planning Unit (EPU))

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Ministry of Works |
| **Key Agencies** | a) Public Work Department (PWD)<br>b) Construction Industry Development Board (CIDB) Malaysia<br>c) Economic Planning Unit (EPU)<br>d) Construction stakeholders<br>e) Ministry of International Trade and Industry (MITI)<br>f ) Malaysia Digital Economy Corporation (MDEC)<br>g) Local authorities |
| **Deliverables** | Collaboration/ MoU with key government agencies to support national BIM implementation plan (IWG 11) |
| **References** | a) Government Construction Strategy, United Kingdom (https://www.gov.uk/government/publications/government-construction-strategy-2016-2020)<br>b) Roadmap for BIM Strategic Implementation in Hong Kong's Construction Industry (http://www.hkibim.org/?p=2771)<br>c) Building and Construction Authority (BCA) BIM roadmap (https://www.bca.gov.sg/Publications/BuildSmart/others/buildsmart_11issue9.pdf)<br>d) National BIM Initiatives by BuildingSMART Australasia (http://buildingsmart.org.au/wp-content/uploads/2014/03/NationalBIMIniativeReport_6June2012.pdf) |

## Collaboration and Incentives (CI2)

**Collaboration with professional bodies and construction stakeholders to initiate strategic BIM implementation plan at the industry level.**

Collaboration between government agencies and construction stakeholders is identified as part of the key drivers for BIM implementation strategy. The involvement of construction stakeholders in supporting the national BIM implementation plan will provide equal measure of leadership in driving the agenda from all parts of the supply chain. Together with the construction stakeholders, listed are several initiatives proposed to support the national BIM implementation plan at the industry level.

a) Development of industrial BIM implementation plan for the construction industry (government and industry partnership)
b) Upskilling of the construction supply chain programme for BIM implementation (e.g. training, certification and accreditation, software approval and BIM user database)
c) Formation of Working Group, Task Group or Special Interest Group (SIG) focusing on the BIM priority area
d) Development of a set of documents to support BIM implementation (e.g. standards, guidelines and best practices)

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Ministry of Works |
| **Key Agencies** | a) Construction Industry Development Board (CIDB) Malaysia<br>b) Public Work Department (PWD)<br>c) Professional bodies<br>d) Construction stakeholders<br>e) Local authorities |
| **Deliverables** | Collaboration/ MoU with professional bodies and construction stakeholders to support national BIM implementation plan (government and industry BIM strategy task group) |
| **References** | BIM Industrial Strategy: Government and Industry Partnership (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/34710/12-1327-building-information-modelling.pdf) |

# Collaboration and Incentives (CI3)

**Collaboration with software vendors and technology developers to support BIM implementation plan in Malaysia**

Collaboration with software vendors and technology developers will ensure that the standards and software are suitable for and compatible with Malaysian practices and IFC (open BIM). The emergence of BIM provides various choices on software and technologies.

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Construction Industry Development Board (CIDB) Malaysia |
| **Key Agencies** | a) Public Work Department (PWD)<br>b) CIDB E-Construct<br>c) Professional bodies<br>d) Software vendors<br>e) Technology providers |
| **Deliverables** | Collaboration/ MoU with software vendors and technology providers |
| **References** | List of BIM software and providers (https://thebimhub.com/2015/08/17/list-of-bim-software-providers/#.WksLzt-WbIU) |

# Collaboration and Incentives (CI4)

**Initiate BIM mandatory submission process for public sector to implement and take lead**

To adopt and localise international practices for BIM implementation in Malaysia

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Ministry of Urban Wellbeing, Housing and Local Government (KPKT) |
| **Key Agencies** | a) Ministry of Works<br>b) Public Work Department (PWD)<br>c) Ministry of Finance (MoF)<br>d) Local authorities<br>e) Professional bodies<br>f) Construction Industry Development Board (CIDB) Malaysia<br>g) CIDB E-Construct |
| **Deliverables** | a) Collaboration/MoU with local authorities<br>b) Training programmes for local authorities |
| **References** | BIM e-submission requirements for plan submission to BCA (https://www.corenet.gov.sg/general/building-information-modeling-(bim)-e-submission.aspx) |

# Collaboration and Incentives (CI5)

**Collaboration with academia to develop BIM syllabus and training modules**

The establishment of BIM education at the tertiary level is necessary to develop necessary BIM knowledge and capabilities. Tertiary education institutions with support from the government and industry will provide the AEC industry with 'BIM-ready' graduates.

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Industry Centre of Excellence (ICoE)-Construction Ministry of Higher Education (MoHE) |
| **Key Agencies** | a) Construction Industry Development Board (CIDB) Malaysia<br>b) CIDB E-Construct<br>c) Professional bodies<br>d) Public and private education institution<br>e) Ministry of Science, Technology and Innovation (MOSTI) |
| **Deliverables** | Collaboration/MoU with education institutions (BIM education task group) |
| **References** | List of BIM programmes within the UK, Singapore, Hong Kong and Australia:<br>a) University of Salford, Manchester, UK (http://www.salford.ac.uk/pgt-courses/bim-and-digital-built-environments)<br>b) Hong Kong University (http://www.arch.hku.hk/programmes/rec/master-of-science-in-integrated-project-delivery/)<br>c) National University of Singapore (http://www.sde.nus.edu.sg/bimcoe/)<br>d) University of Sydney (https://sydney.edu.au/courses/units-of-study/2018/desc/desc9674.html) |

# Collaboration and Incentives (CI6)

**To provide BIM with incentives and support with the aim of helping the construction stakeholders along the supply chain in implementing BIM**

Funds and incentives will assist construction stakeholders to build up BIM capability and capacity through the following:

a) Tax exemption for BIM implementation (e.g. software purchase, hardware and training)
b) Malaysia Digital Economy Corporation (MDeC) incentive to remain and be enhanced
c) Infrastructure support – The Internet and storage capacity to cater for BIM adoption
d) Allocation of technical and financial resources/engage services to help key organisations and construction firms to kickstart projects
e) Introduction of client or building owner to the BIM Fund, which covers the costs for training, consultancy services and purchase of hardware and software for businesses and projects
f) Other incentives that are supported and approved by the government of Malaysia
g) Liaise with authorities to provide subsidised technical training programmes targeting hands-on BIM skills for small and medium enterprises

| | |
|---|---|
| **Timeline** | 2017 - Onwards |
| **Lead Agency** | Ministry of Works |
| **Key Agencies** | a) Economic Planning Unit (EPU)<br>b) Ministry of Finance (MoF)<br>c) Construction Industry Development Board (CIDB) Malaysia<br>d) Multimedia Development Corporation (MDeC)<br>e) Malaysia Administrative Modernisation and Management Planning Unit (MAMPU)<br>f) Public Work Department (PWD)<br>g) Professional bodies<br>h) Ministry of Science, Technology and Innovation (MOSTI |
| **Deliverables** | a) Collaboration/MOU to establish BIM incentives and policy for fund application<br>b) BIM Fund from tax exemption or fund should be set up by CIDB |
| **References** | Technology adoption: BIM Fund by BCA, Singapore (https://www.bca.gov.sg/BIM/bimfund.html) |

# Collaboration and Incentives (CI7)

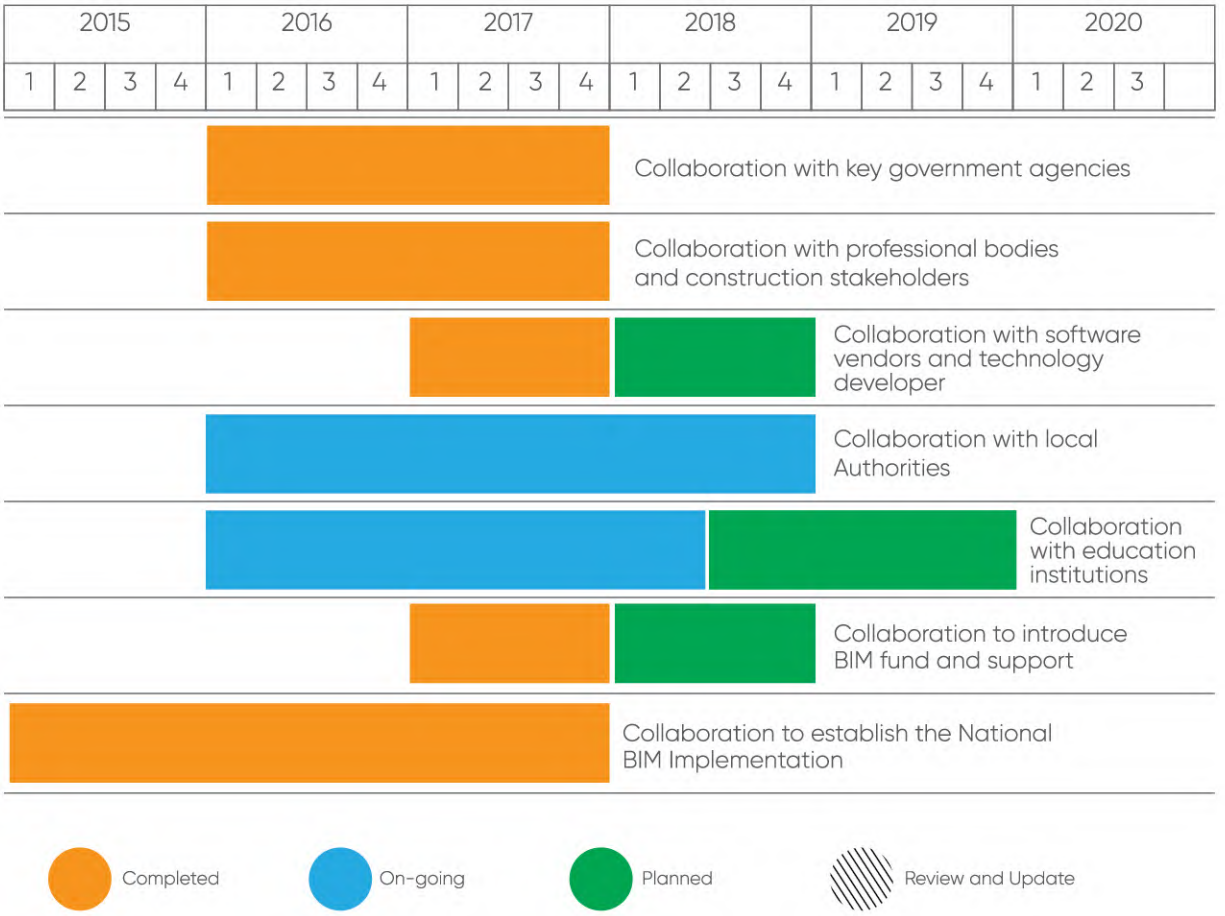
**To establish a national BIM reference centre**

A national centre will be established to support the rollout of BIM implementation in Malaysia. The central resource will be responsible for managing, coordinating and delivering BIM initiatives as stated in the CITP. With the establishment of the National BIM Centre, construction stakeholders will be offered support to embark on and implement BIM. The centre is tasked to

a) Assist construction industry players towards BIM implementation
b) Aid practitioners and other stakeholders who have interests in BIM to recognise and acknowledge BIM implementation
c) Provide BIM facilities for construction stakeholders for the purpose of training, rental, research and showcasing
d) Provide repository with a common platform to showcase and share industrial references, standards and guidelines and best practices, among others, under a single portal
e) Develop information, helpdesk and consultancy services on BIM application from an approved and recognised agency or a one-stop referral centre
f) Make provisions for future BIM implementation

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Construction Industry Development Board (CIDB) Malaysia |
| **Key Agencies** | a) CIDB E-Construct<br>b) Public Work Department (PWD)<br>c) Professional bodies |
| **Deliverables** | National BIM Centre – myBIM Centre |
| **References** | a) NBS, UK (https://www.thenbs.com/about-nbs)<br>b) BIM NATSPEC, Australia (http://bim.natspec.org/)<br>c) myBIM Centre (www.mybimcentre.com.my) |

# TIMELINE OF **ACTIVITIES:**




**Note:** The actual activities will be reviewed and revised by each pillars subcommittee

# ACHIEVEMENT

**a) Collaboration and Incentives (CI1)**

The direction of BIM implementation is aligned with the national agenda in the 11th Malaysia Plan. BIM implementation strategy in Malaysia based on the CITP is mainly driven by government agencies. IWG11 was established with the aim of facilitating BIM adoption and implementation in Malaysia


**b) Collaboration and Incentives (CI2)**

- CIDB encourages professional development through engagement with professional bodies. Up until December 2017, four professional bodies visited myBIM Centre: Pertubuhan Arkitek Malaysia, IEM, Master Builders Association Malaysia (MBAM), the Association of Authorised Land Surveyors Malaysia, Gabungan Jurutera Perunding Bumiputera Malaysia and Royal Institution of Surveyors Malaysia (RISM).

- MRT Corporation, Gamuda Land and Kwasa Land Sdn Bhd are private sectors that are currently engaged with CIDB in exchanging expertise in BIM implementation.

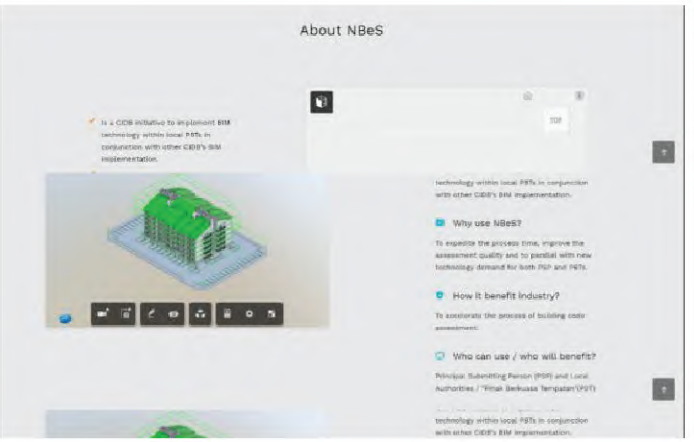
**c) Collaboration and Incentives (CI4)**

The national BIM e-submission system was developed by CIDB through myBIM. In 2017, CIDB in collaboration with four selected local authorities (Putrajaya Corporation, Majlis Pebandaran Petaling Jaya, Majlis Perbandaran Kangar and Majlis Bandaraya Melaka Bersejarah) established the pilot project for BIM-based submission.


**d) Collaboration and Incentives (CI5)**

- CIDB promotes knowledge sharing in the practical use of BIM at higher education institutions. Up until December 2017, myBIM Centre was visited by six local universities. myBIM continuously plays important roles as a bridge between universities and the industry by providing a knowledge-sharing platform.

- Industry–academia linkages for BIM implementation was established by CIDB through myBIM. The first myBIM satellite was established at UMP in 2016. In 2017, four public universities collaborated with myBIM as satellite university partners: Universiti Malaysia Perlis, Universiti Teknologi Malaysia, Universiti Malaysia Sabah and Universiti Sains Malaysia.




**e) Collaboration and Incentives (CI7)**

On the 20th of November 2017, CIDB launched Malaysia's first one-stop myBIM Centre as the national centre of BIM adoption reference for the industry to promote and increase the level of BIM adoption and provide training in BIM adoption. The new myBIM Centre is equipped with up-to-date facilities, including large-capacity training venues and updated software and hardware. The centre is also open for industry players at affordable training fees. Moreover, the myBIM Centre web portal was developed and has been made accessible to the public via www.mybimcentre.com.my.

## 7.3 PILLAR 3: Capability and Capacity

CITP aims to transform the Malaysian construction industry with the implementation of level 2 BIM maturity by 2020. Crucial to the achievement of this target is the development of the BIM capability and capacity of construction stakeholders in implementing BIM. Trainings and education programs are important in BIM implementation due to the process and technological changes within the organisation (Khosrowshahi & Arayici, 2012). Strategies related to training and education should be provided to the construction stakeholders in the supply chain with the required knowledge and skills to deliver level 2 BIM. Accreditation for professionals and projects will demonstrate the competency and skills of the industry in delivering BIM. The section below explains in detail the strategies and activities in developing BIM capability and capacity for construction stakeholders in Malaysia.

**a) BIM education**

The establishment of BIM education programmes for professionals and apprentices will keep the construction industry informed about the BIM implementation. Collaborative BIM environments will combine groups of varying skill sets, such as architects, engineers, quantity surveyors, contractors and facility management leaders. BIM education at the tertiary level will provide construction stakeholders with 'BIM-ready' graduates.

**b) BIM training**

BIM training programmes should be able to provide construction stakeholders with knowledge and skills in implementing BIM. The process of implementing BIM needs to be carried out methodically through organisational changes. The BIM implementation process (divided into three aspects: policy, process and technology) at different BIM levels (pre-BIM level to Integrated-based model) will assist construction stakeholders in reaping the benefits of BIM and increasing capability and capacity.

**c) BIM competency certification and accreditation**

Accreditation programmes will certify individuals and organisations in delivering BIM according to requirements and best practices. As BIM emerges and continues to control the process in the industry, accreditation will provide assurance to employers and clients that accredited projects and professionals have met all the criteria and requirements set by the recognised body. A system of certification and accreditation of qualified BIM users who have successfully undergone training will motivate others to adopt BIM technology for their projects. As such, competent BIM users in the construction industry and their demand will grow exponentially with the passage of time.

## BENCHMARKING

**United Kingdom** : In line with the UK Government Construction Strategy, the Cabinet Office and BIS have implemented a long-term programme to embed the use of BIM across centrally procured public construction projects. The UK government has developed several programmes for developing BIM capability with the aim of becoming a globally recognised leader in BIM application in the construction industry (HM Government, 2012).

**Hong Kong :** The Hong Kong Construction Industry Council outlined several activities to support BIM implementation (Council, 2013). Under the perspective of promotion and education, the Hong Kong Housing Authority offers institutional support and promotional activities. The professional organisations are the key players in BIM implementation that will promote the idea and opportunities to clients and organisation members and marshal their members' responses to the BIM challenge and its adoption. To expedite the building of BIM capacity and capability, universities/training institutes will provide sufficient training courses at various levels. Furthermore, a BIM course will be added to the degree and diploma course curriculum.

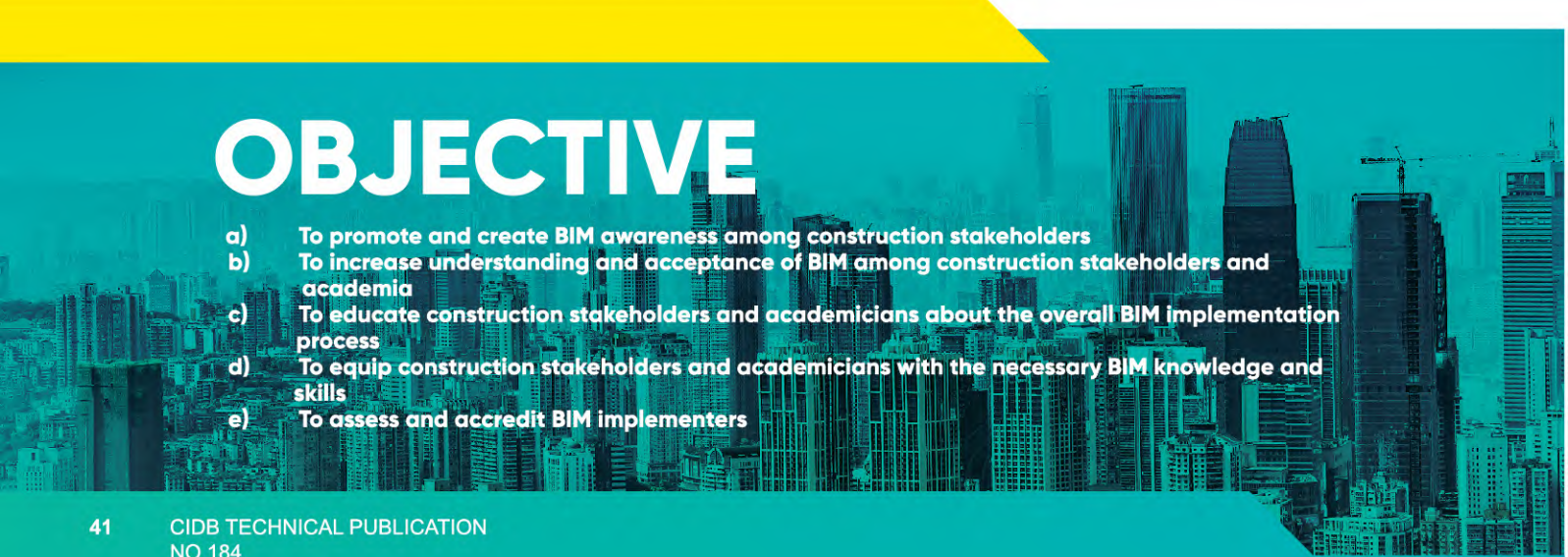
**Singapore :** In building capability and capacity, the strategies below were formulated by BCA.

- Launch short courses and a specialist diploma in BIM at BCA's training arm (the BCA Academy).
- Convince various tertiary institutions to include BIM training in their curricula.
- Provide 'chaperon' services to businesses.

**Australia :** Under the education work programme, the deliverables below were set up by BuildingSMART Australasia.

- Develop and deliver a BIM awareness and promotion programme for key government and broad industry participants.
- Encourage the inclusion of BIM as a collaborative technology in professional education and vocational training in the tertiary sector.

**Note:** Brief information on BIM initiatives by other countries



## OBJECTIVE

**a) To promote and create BIM awareness among construction stakeholders**
**b) To increase understanding and acceptance of BIM among construction stakeholders and academia**
**c) To educate construction stakeholders and academicians about the overall BIM implementation process**
**d) To equip construction stakeholders and academicians with the necessary BIM knowledge and skills**
**e) To assess and accredit BIM implementers**

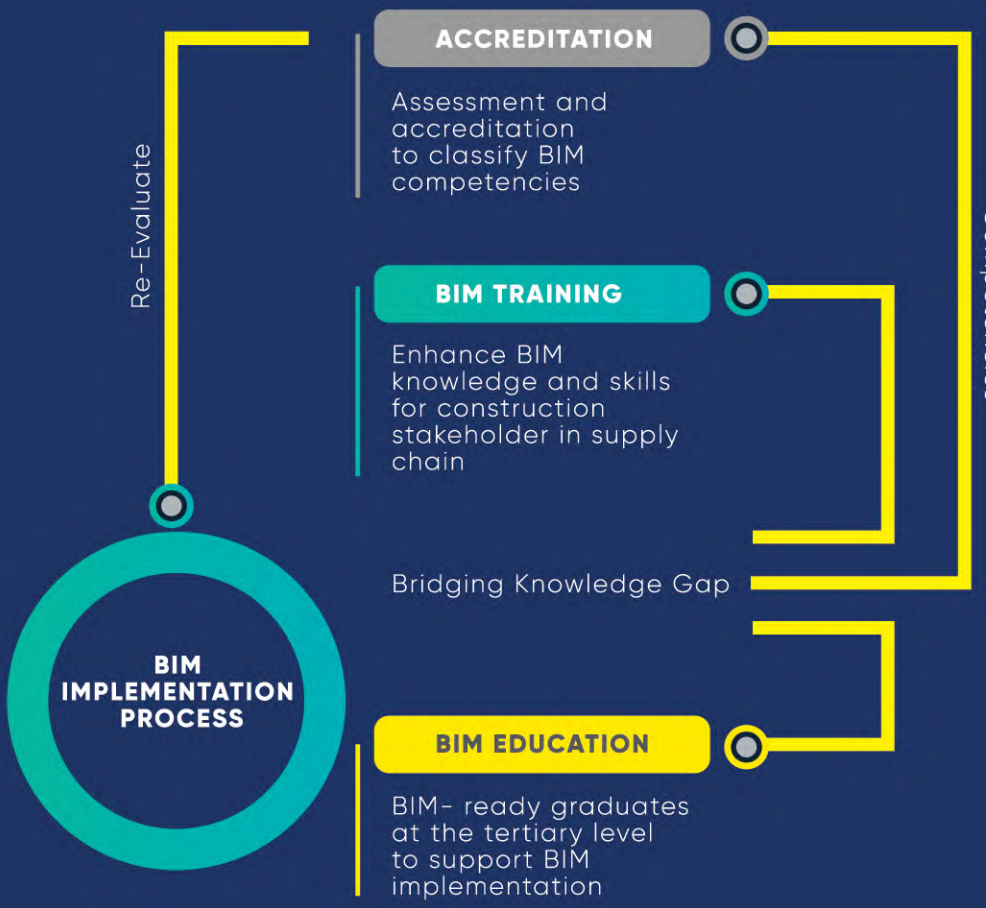



**Figure 12:** Strategic framework for BIM capability and capacity programmes

# IMPLEMENTATION STRATEGY

## BIM Capability and Capacity (CC1)

**Facilitate the sharing of BIM knowledge through a series of events and conferences**

Plan and organise a series of events aimed at promoting, disseminating and developing BIM knowledge for the construction stakeholders in Malaysia in collaboration with relevant parties. The organised events will showcase recent developments and insights into the future of BIM in Malaysia. Themes for events and conferences need to be changed periodically to align with the national implementation level and global BIM transformation.

**Table 3:** Proposed events to facilitate the sharing of BIM knowledge and potential collaborators

| Deliverable | Collaborators | | | | | |
|---|---|---|---|---|---|---|
| | Professional Bodies | Government Agencies / Ministry | MOSTI | MoHE & and University | Media Partners | Software and Technology Provider |
| a) International BIM conference (once every two years) and local BIM conference (yearly)<br>- e.g. International BIM Day, National BIM Road Show, BIM Summit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| b) Regular seminars, web seminars (webinar) and workshops<br>- Specific topics to disseminate information based on recent development and process | ✓ | ✓ | | | | ✓ |
| c) BIM competition every year at industry and university levels | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| d) Media promotions (e.g. BIM Idol, BIM awards, BIM competitions and news) through newspapers, broadcasts and social media, websites and road shows | ✓ | | | | ✓ | ✓ |
| e) BIM awards (architects, engineers, quantity surveyors and facility management leaders) yearly for industry recognition<br>- Recognition for BIM users | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Construction Industry Development Board (CIDB) Malaysia |
| **Key Agencies** | a) CIDB E-Construct<br>b) Public Work Department (PWD)<br>c) Professional bodies |
| **Deliverables** | Refer to Table 3 |
| **References** | a) BIM Show Live, UK (http://www.bimshowlive.co.uk/)<br>b) BIM webinar portal (https://thebimhub.com/webinars/; https://www.autodesk.com/campaigns/connected-bim-webinar-series)<br>c) BIM competition (http://bustler.net/competitions/5733/2018-bim-contest)<br>d) BIM award (http://www.bimshowlive.co.uk/bim-awards-finalists/) |

## BIM Capability and Capacity (CC2)

**Publish periodicals or a series of reading materials related to BIM**

Regular BIM publications keep the construction stakeholders informed and updated through magazines, newsletter, reports, articles and journals.

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Construction Industry Development Board (CIDB) Malaysia |
| **Key Agencies** | a) CIDB E-Construct<br>b) Public Work Department (PWD)<br>c) Construction Research Institute of Malaysia (CREAM)<br>d) Professional bodies |
| **Deliverables** | Malaysia BIM publication/reference |
| **References** | BIM Hub (https://thebimhub.com/resources/) |

# BIM Capability and Capacity (CC3)

**Development of BIM education programme (Integrated Construction Studio)**

BIM education programmes at the tertiary level need to be developed in an integrated learning environment. A BIM-integrated learning environment will assist educators in developing curricula that integrate important aspects, such as BIM processes, various project roles, collaboration and leadership development, as well as multiple professional backgrounds. The initiatives proposed for the development of the BIM education programme are listed below.

a) Development and inclusion of BIM syllabus in undergraduate and postgraduate degree programmes (built environment and engineering courses)

Phase 1: Development of syllabus for discipline (collaboration with professional bodies)

Phase 2: Integrated environment

b) Provision of incentives for BIM infrastructure (hardware and software) for universities and training centres

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Industry Centre of Excellence-Construction (ICoE) Ministry of Higher Education (MoHE) |
| **Key Agencies** | a) Construction Industry Development Board (CIDB) Malaysia<br>b) Professional bodies<br>c) Public Work Department (PWD)<br>d) Public and private education institutions (university, polytechnic, vocational)<br>e) Ministry of International Trade and Industry (MITI)<br>f) Economic Planning Unit (EPU)<br>g) Software vendors<br>h) Technology providers |
| **Deliverables** | a) BIM skills and knowledge for the future<br>b) BIM syllabus for university tertiary level |
| **References** | a) BIM education in the UK (http://www.minnd.fr/wp-content/uploads/2016/08/EDUBIM2016_05_03_Education-in-UK.pdf)<br>b) BIM education report (https://media.thebimhub.com/user_uploads/baf_bim_education_report_2015.pdf) |

Quick Info

**About** 20 public universities, 33 private universities and university colleges, 22 polytechnic collegess, 37 community colleges and 500 private colleges were are listed under the Mministry of Higher Education (MOE).

**Aim:** To produce 300–600 skilled BIM users per year based on the number of students produced by respective schools (engineering and built environment).

# BIM Capability and Capacity (CC4)

**Development of BIM upskilling programme for construction supply chain**

The BIM upskilling programme for construction supply chain aims to enhance the knowledge and skills of construction stakeholders towards BIM implementation in Malaysia. The continuous upskilling of the existing workforce will equip construction professionals with excellent knowledge and skills, thus enabling them to deliver level 2 BIM. BIM upskilling programmes will be achieved through the following:

a) Development of teaching and training programme for professionals
b) Development of national BIM training modules, documentation and training in multi-professional backgrounds (e.g. architecture, engineering, quantity survey, facility management)
c) Modification of methods and continuing professional development programmes by professional bodies to support knowledge and skills development in BIM delivery
d) Initiate train-the-trainer programmes

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Construction Industry Development Board (CIDB) Malaysia |
| **Key Agencies** | a) CIDB E-Construct<br>b) Professional bodies<br>c) Construction stakeholders<br>d) Akademi Binaan Malaysia (ABM)<br>e) Software vendors<br>f) Technology providers |
| **Deliverables** | a) Increase knowledge and skills of construction stakeholders in implementing BIM<br>b) Trained personnel:<br>• BIM Modeller: 300–600/year<br>• BIM Coordinator: 50–100/year<br>• BIM Manager: 5–10/year |
| **References** | BIM upskilling course (https://www.bimupskilling.com/course/) |

# BIM Capability and Capacity (BCC5)

**Development of BIM certification programmes**

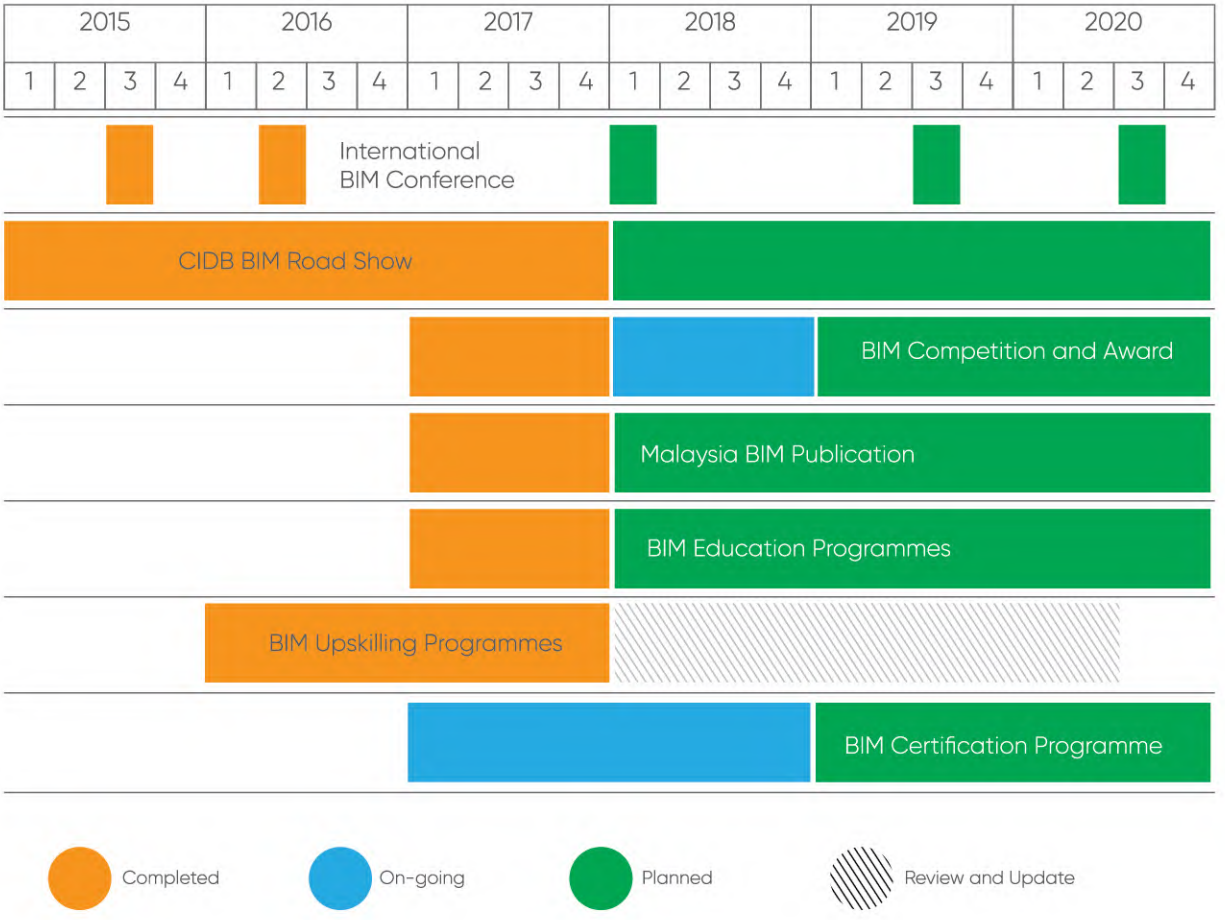
BIM certification programmes aim to assess and evaluate BIM competency at different levels (e.g. individual, organisation and project levels) in accordance with the requirements of the delivery of level 2 BIM. The assessment and accreditation scheme will be achieved through the following:

a) Establishment of accreditation body to assess and evaluate completed BIM projects and users and carry out certification
b) Alignment of Malaysia's BIM implementation with international standards
c) Fostering of international collaboration for the development of a global view of standards, such as best practices/common practices

Recommendation: Provide certification of software implementation within Malaysia to improve and certify the compliance with local codes, legislation and standards

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Construction Industry Development Board (CIDB) Malaysia |
| **Key Agencies** | a) CIDB E-Construct;<br>b) Public Work Department (PWD)<br>c) Professional bodies |
| **Deliverables** | Malaysia BIM certification programme |
| **References** | BSI BIM certification (https://www.bsigroup.com/en-GB/Building-Information-Modelling-BIM/) |

# TIMELINE OF **ACTIVITIES:**




**Note:** The actual activities will be reviewed and revised by each pillars subcommittee

# ACHIEVEMENT

**a) BIM Capability and Capacity (BCC1)**

- BIM Day was organised by CIDB in 2014 with the aims of raising industry awareness and understanding BIM implementation. The BIM Day recorded a number of 1195 attendees from 2014 to 2016 (1st BIM Day in 2014: The Future is Here; 2nd BIM Day in 2015: Cradle-to-cradle Construction through BIM; 3rd BIM Day in 2016: Live in Action).

- A series of BIM road shows throughout Malaysia was organised by CIDB from 2014 to 2017. The main objective was to introduce BIM practice and create awareness among construction stakeholders. A total of 3108 participants in the BIM road shows were recorded from 2014 to 2017.

**b) BIM Capability and Capacity (BCC2)**
The first edition of myBIM Magazine was published in November 2017.

**c) BIM Capability and Capacity (BCC3)**
Since 2016, myBIM Centre has closely collaborated with ICoE-Construction MoHE and myBIM Centre East Coast at ICoE BIM Lab University Malaysia Pahang to train graduating students all over Malaysia. The signature ICoE programme, namely, BIM Technical Training, is a 12-day intensive training targeted at the BIM competency-level modeller. The training uses the CIDB Module and embeds BIM-based projects with real data as part of the exposure to increase graduate employability.

**d) BIM Capability and Capacity (BCC4)**

- The BIM training programme was initiated in 2016 and has since produced more than 1000 personnel. myBIM and ICOE will continue to upskill the existing workforce in 2018 until 2020 through myBIM Centre and myBIM Satellite. The training programme covers three levels of competencies (BIM Modeller, BIM Coordinator and BIM Manager) that are delivered via seven modules.
- In 2017, CIDB trained 1328 personnel (BIM Manager: 15; BIM Coordinator: 6; BIM Modeller: 1123; and BIM Concept and Theory: 184).

## 7.4 **PILLAR 4:** National BIM Object Library

The National BIM Oobject Llibrary enables BIM users to share and download BIM objects for various comprehensive systems and products. The eEstablishment of this platform with robust support from the industry will become the primary source of standard and proprietary BIM objects. In order Tto provide common quality standards in BIM, a comprehensive BIM library with specific requirements is needed to provide common quality standards in BIM. The specific requirements will ensure that all objects with the correct information can be delivered to the design team.

## BENCHMARKING

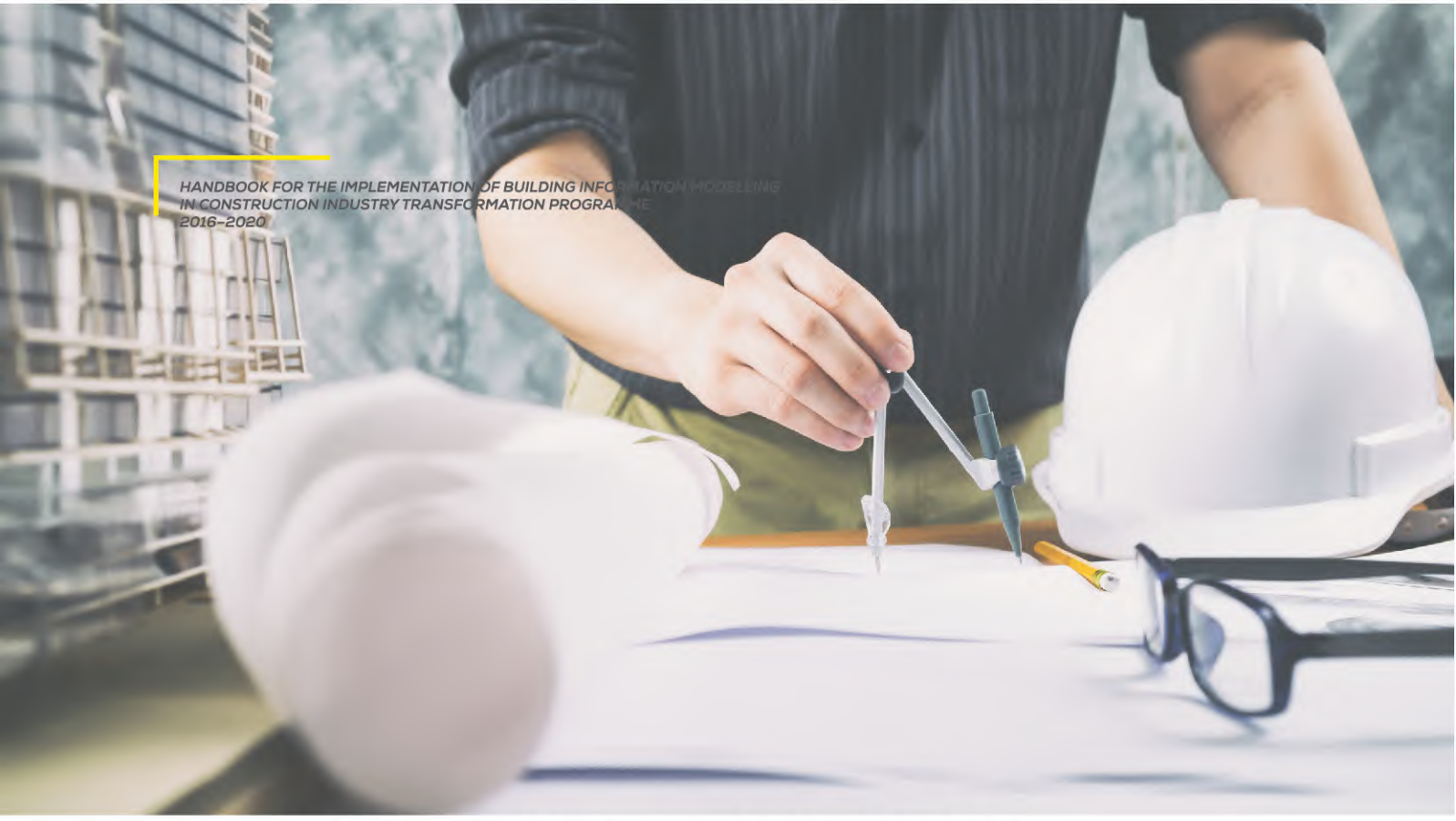
| | |
|---|---|
| **United Kingdom** : | NBS provides an extensive collection of both generic and manufacturer BIM objects ranging from building fabric systems to mechanical and electrical objects. The library was developed to meet the requirements of internationally -recognised NBS BIM object standards. |
| **Hong Kong :** | To enhance collaboration, the Hong Kong's Housing Authority will operate a repository library for to showcaseing and sharing documents, standards and, best practices, etc. among others, under a single portal. |
| **Singapore :** | The removal of impediments will require the BCA to collaborate with GPE's, professional bodies and BuildingSMART Singapore to develop project collaboration guidelines and an object library standard. |
| **Australia :** | Under the work programme on product data and BIM libraries, BuildingSMART Australia will enable progressive access to an Australian library of generic BIM objects and information for manufactured products that comply with Australian BIM standards.. |

**Note:** Brief information on BIM initiatives by other countries.

# OBJECTIVE

a) To create a universally accessible library with comprehensive information along the value chain with 'open BIM' format

b) To add value object information in the models



# **IMPLEMENTATION** STRATEGY

## National BIM Object Library (NBL1)

**Develop BIM objects library standard**

The BIM objects library standard will be developed to comply with Malaysian standards and specifications. The library will define high quality and consistency in BIM objects, which are established by each construction industry domain. A repository library with a common platform will be operated to showcase and, share industrial references, standards and guidelines and best practices, etc.among others, under a single portal.

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Construction Industry Development Board (CIDB) Malaysia |
| **Key Agencies** | a) CIDB E-Construct<br>b) Construction Research Institute of Malaysia (CREAM)<br>c) Professional bodies<br>d) Trade association<br>e) Manufacturers and vendors –- construction international bodies |
| **Deliverables** | Malaysia National BIM Objects Library |
| **References** | NBS National BIM library (https://www.nationalbimlibrary.com/) |

# National BIM Object Library (NBL2)

**Provide BIM objects and library cloud services, which to will be incorporated under the National BIM Centre**
The development of the BIM object library cloud will enable users to download, create and edit designs directly within the cloud services platforms or apps. The development of the cloud services platform will require support in terms of research, funding and infrastructure.

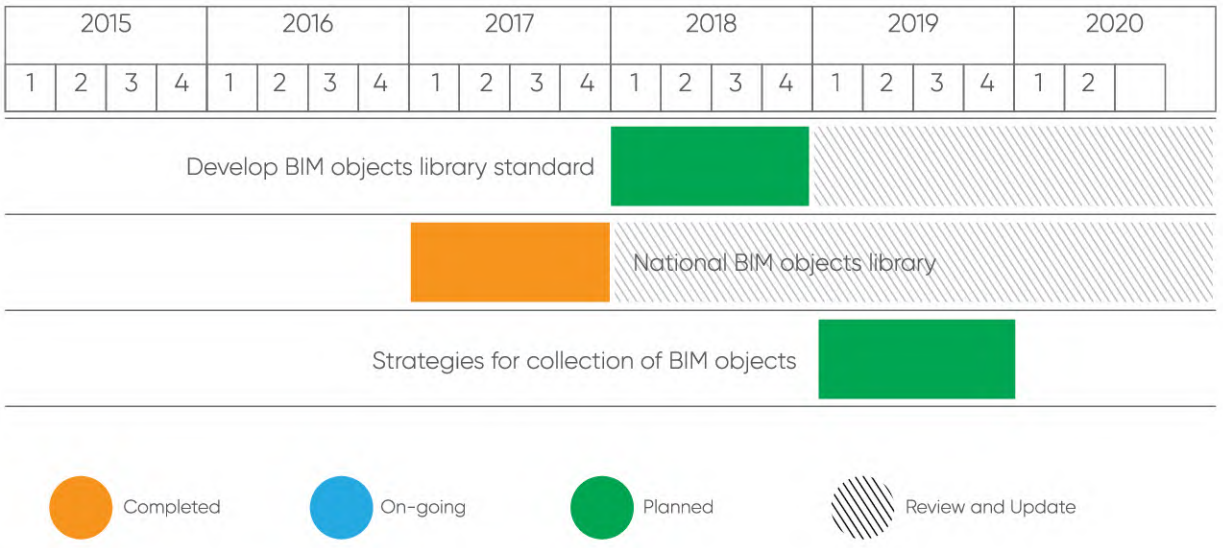
| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Construction Industry Development Board (CIDB) Malaysia |
| **Key Agencies** | a) CIDB E-Construct<br>b) Professional bodies<br>c) Trade association<br>d) Manufacturers |
| **Deliverables** | Improved and advance infrastructure |
| **References** | BIMobject Cloud (http://info.bimobject.com/bimobject-cloud) |

# National BIM Object Library (NBL3)

**Strategies for the collection of BIM objects**
To formulate strategies (voluntary) to and encourage the collection of BIM objects (from users and manufacturers) in the National BIM Objects Library using BIM the National BIM Oobjects Llibrary standard.

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Construction Industry Development Board (CIDB) Malaysia |
| **Key Agencies** | a) CIDB E-Construct<br>b) Professional bodies<br>c) Trade associations<br>d) Manufacturers |
| **Deliverables** | Digital BIM objects catalogue for construction products |
| **References** | a) myBIM National BIM Library (https://www.mybimlibrary.my)<br>b) NBS National BIM library (https://www.nationalbimlibrary.com/) |

# TIMELINE OF **ACTIVITIES:**

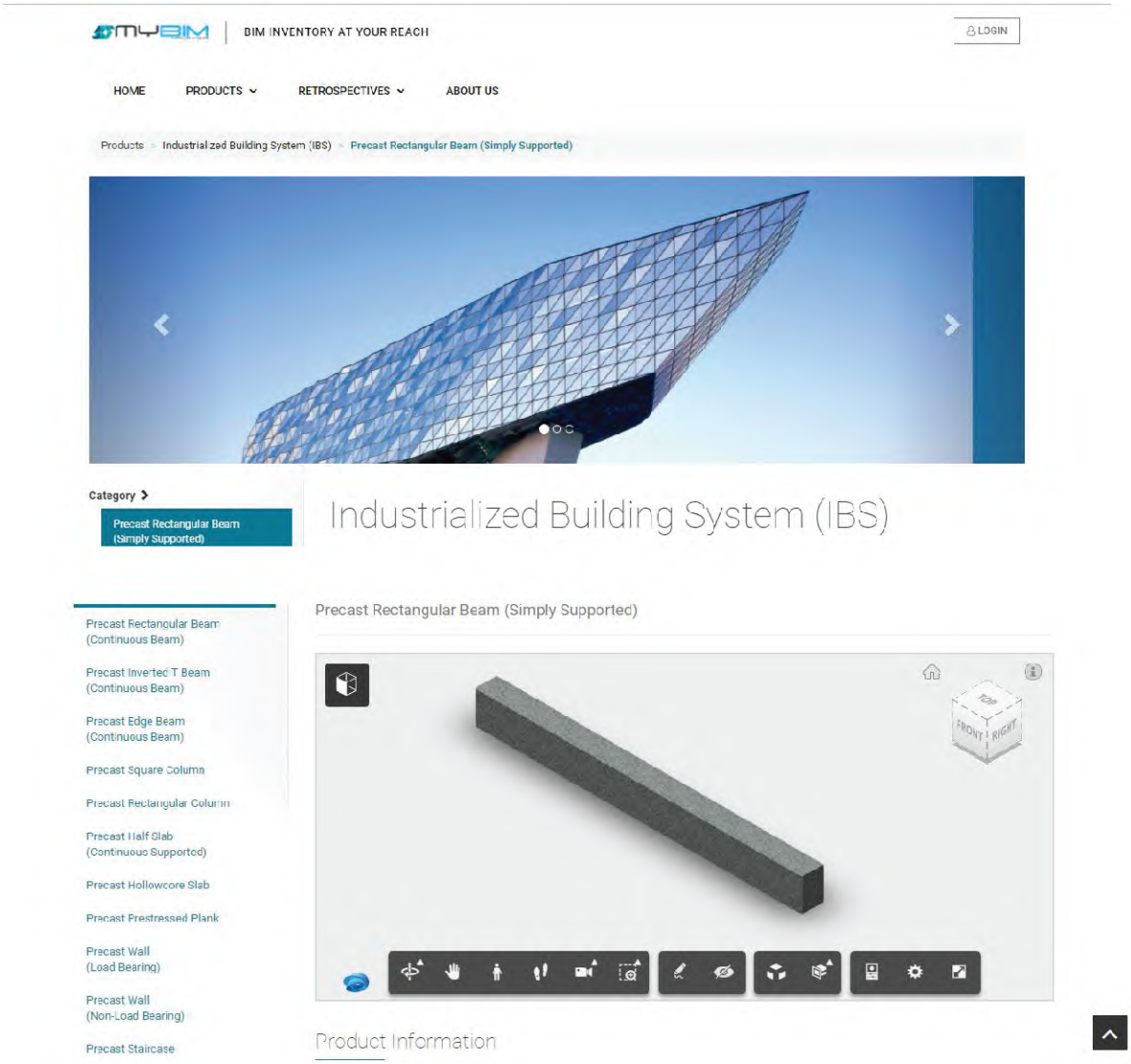



**Note:** The actual activities will be reviewed and revised by each pillars subcommittee

# ACHIEVEMENT

**National BIM Object Library (NBL2)**

The BIM objects library or the known as myBIM-library was developed in 2017. The myBIM-library is a portal cum digital library portal with a comprehensive compilation of generic and manufacturers' BIM objects of generic and manufacturers ranging from , including architectural, structural, mechanical and electrical objects. Up until December 2017, 700 Industrialised Building System (IBS) components and 6,000 medical components are have been made available to for download in the library.



## 7.5 **PILLAR 5:** Legal Issues

The consideration of legal issues and risks associated with the BIM working process will ensure the collaboration within the construction industry able to collaborate without any concern about worry of adverse legal consequences. The legal framework around BIM needs to be developed and defined comprehensively to support the delivery of BIM at all levels. Consideration The consideration on of legal issues and risks requires an in--depth understanding to give clear justification of the BIM process, procurement and project management.

# BENCHMARKING

**United Kingdom** : The BIM protocol published by the Construction Industry Council (CIC) provides a legal framework to facilitate and promote the use of BIM. The protocol will be used on in all common construction contracts and to support the BIM working process at level 2.

**Hong Kong :** Under the perspective of legal and insurance, below are the initiatives taken by the Hong Kong's Housing Authority are listed below:

- To review procurement practice and contract provisions
- To review IP right and data ownership

The Hong Kong's Housing Authority will adopt strategic risk management in BIM implementation. A commission legal service to drafts BIM-specific contractual provisions (avoidsing aggressive use of disclaimers, indemnification, and non-reliance clause) that aim to eliminate, limit or manage the risks associated with BIM.

**Singapore :** To address the legal implications of BIM, the BIM Steering Committee (BIMSC) set up by the Building and Construction Authority (BCA) have has developed BIM Particular Conditions as a reference document. This document seeks to assure users of BIM that the traditional allocation of risks and liability will not be changed.

**Australia :** The Australian Institute of Architects (AIA) and Consult Australia developed BIM, Legal and Procurement to consider legal issues in the context of the BIM- enabled procurement model. Four areas were considered important in the document, which are namely, : Intellectual Property; ‚Professional IIndemnity,; Stakeholders' responsibilities and Viable Procurement Options.

**Note:** Brief information on BIM initiatives by other countries

# OBJECTIVE

**To support the legal aspect of working using BIM.**

# IMPLEMENTATION **STRATEGY**

## Legal Issues

**Review and develop legal documentation for BIM implementation**

To review and develop a legal framework for BIM implementation, which consists of and is not limited to the following:

a) Contractual documents
b) Intellectual property rights and ownerships
c) Risk associated with the supply chain
d) Risk and liability
e) Model security
f) Use of data
g) Insurance

| | |
|---|---|
| **Timeline** | 2018–Onwards |
| **Lead Agency** | Royal Institution of Surveyors Malaysia (RISM) |
| **Key Agencies** | a) Ministry of Works<br>b) Public Work Department (PWD)<br>c) Construction Industry Development Board (CIDB) Malaysia<br>d) Professional bodies<br>e) CIDB E-Construct<br>f) Construction Research Institute of Malaysia (CREAM)<br>g) Standard Malaysia<br>h) Society of Construction Law<br>i) Government agency<br>j) Local governments<br>k) Universities<br>l) MyIPO |
| **Deliverables** | a) Legislation and recommendation regarding BIM implementation in Malaysia<br>b) Harmonisation of document of contract (BIM and IBS implementation) |
| **References** | a) Construction Industry Council BIM Protocol (https://www.thenbs.com/knowledge/what-is-the-cic-bim-protocol)<br>b) BIM Particular Conditions by BCA, Singapore (https://www.corenet.gov.sg/media/1170529/bim-particular-conditions-version-2.pdf)<br>c) AIA-CA BIM, Legal and Procurement Report (https://bim.natspec.org/resources/bim-topics/36-protocols-contracts-addenda/214-protocols-contracts-addenda) |

# TIMELINE OF **ACTIVITIES:**

| 2015 | | | | 2016 | | | | 2017 | | | | 2018 | | | | 2019 | | | | 2020 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |

Legal framework for BIM Implementation

Completed  On-going  Planned  Review and Update

**Note:** The actual activities will be reviewed and revised by each pillars subcommittee

## 7.6 **PILLAR 6:** Special Interest Groups (SIGs)

Special Interest Groups (SIGs) provide a platform for people to discuss and share opinions or knowledge. This platform provides updates, latest news, manuals, videos, interactive online trainings and other services. Technology changes rapidly, and as such, people need to be able to view and discuss current trends in technology if they are to be at the forefront. SIGs indirectly promote BIM, hence facilitating the broadening of BIM knowledge.

# OBJECTIVE

a) To coordinate sharing of knowledge and learning among members
b) To provide a discussion or forum or platform for BIM
To promote BIM case studies, best practices and integration of completed projects

# IMPLEMENTATION **STRATEGY**

## Special Interest Group (SIG1)

**To establish a BIM focus group (to be detailed out) to gather feedback and input on BIM development and implementation from SIGs.**

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Pertubuhan Arkitek Malaysia (PAM) |
| **Key Agencies** | a) Construction Industry Development Board (CIDB) Malaysia;<br>b) Public Work Department (PWD)<br>c) CIDB E-Construct<br>d) Construction stakeholders<br>e) Professional bodies<br>f) Universities |
| **Deliverables** | Malaysian BIM focus group |

## Special Interest Group (SIG2)

**To establish BIM communities (e.g. BIM Archi SIG, BIM C&S SIG, BIM MEP SIG, BIM QS SIG, BIM FM SIG and BIM GIS SIG)**

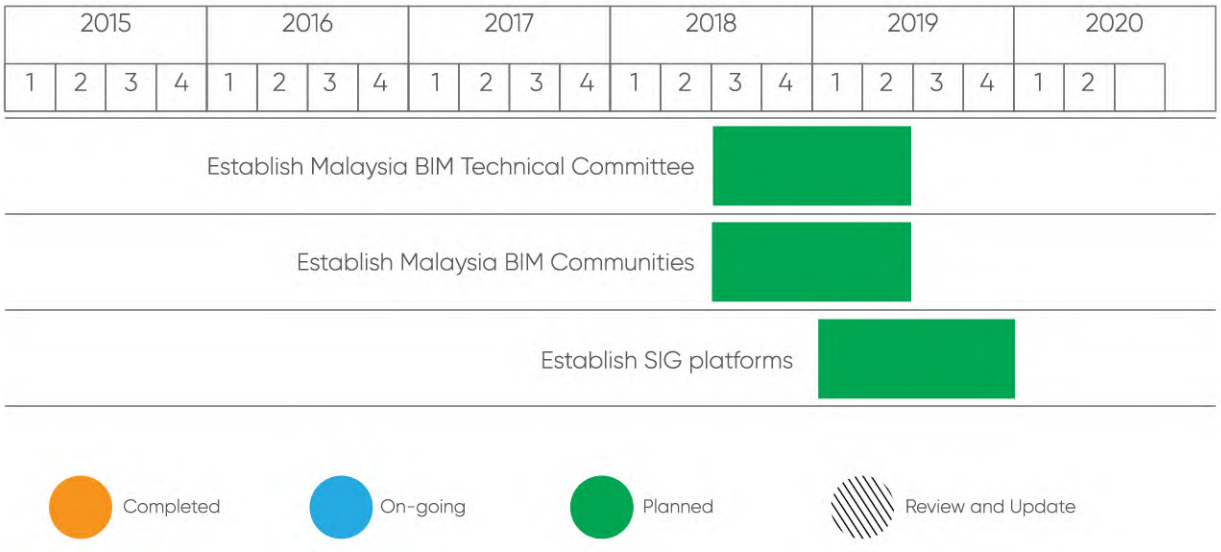
| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Pertubuhan Arkitek Malaysia (PAM) |
| **Key Agencies** | a) Construction Industry Development Board (CIDB) Malaysia<br>b) Public Work Department (PWD)<br>c) Construction stakeholders<br>d) Professional bodies |
| **Deliverables** | Malaysia BIM special working/interest group, academia, user groups and vendors |

## Special Interest Group (SIG3)

**myBIM Centre to establish SIG platforms (face-to-face and virtual)**

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | CIDB E-Construct |
| **Key Agencies** | a) Construction Industry Development Board (CIDB) Malaysia<br>b) Software vendors<br>c) Technology providers |
| **Deliverables** | SIG platforms |

# TIMELINE OF **ACTIVITIES:**




**Note:** The actual activities will be reviewed and revised by each pillars subcommittee

## 7.7 PILLAR 7: Research and Development

The rapid evolution of new tools and technologies in the construction industry requires extensive research and development. With the increasing digitalisation of the industry and rapid evolution, the shift towards the application of IT and digital construction will bring significant changes in all aspects of the construction industry ecosystem.

BIM has emerged as the latest technology that will advance the construction industry towards digitalisation. Despite the massive growth of BIM across the globe, research focusing on BIM is still lacking. Comprehensive research that covers all the research deficiencies will ensure significant potential and benefits in using BIM.

# OBJECTIVE

**a)To improve construction industry efficiency and productivity through BIM**

**b)To promote BIM innovation in construction industry**

# IMPLEMENTATION **STRATEGY**

## Research and Development (R&D)

**To establish a research centre for digital construction in Malaysia**

The centre will be established to deliver digital initiatives and provide the construction industry with an innovative method of construction in the future. Over the next decade, BIM technology will evolve and become a key component of Industrial Revolution 4.0 (IR 4.0). This centre will play important roles in preparing the industry for the revolution of digital construction.

**Research Themes and Titles:**

i. Technical and technology:

- Sustainability, BIM life cycle costing, productivity and supply–demand of BIM from the industry
- BIM value for each user (architects, engineers, quantity surveyors, contractors and facility man agement leaders)
- Knowledge transfer programme in BIM (the industry tables the issues – technical) so that research on technical needs is customised for global competitiveness (current technology and knowledge used)
- Simplified BIM process
- Development of new BIM application/software that suits Malaysian context and requirement
- Development of cloud computing, online submission and other technologies with enhanced cooperation and collaboration among different processes and stakeholders

ii. Financial:

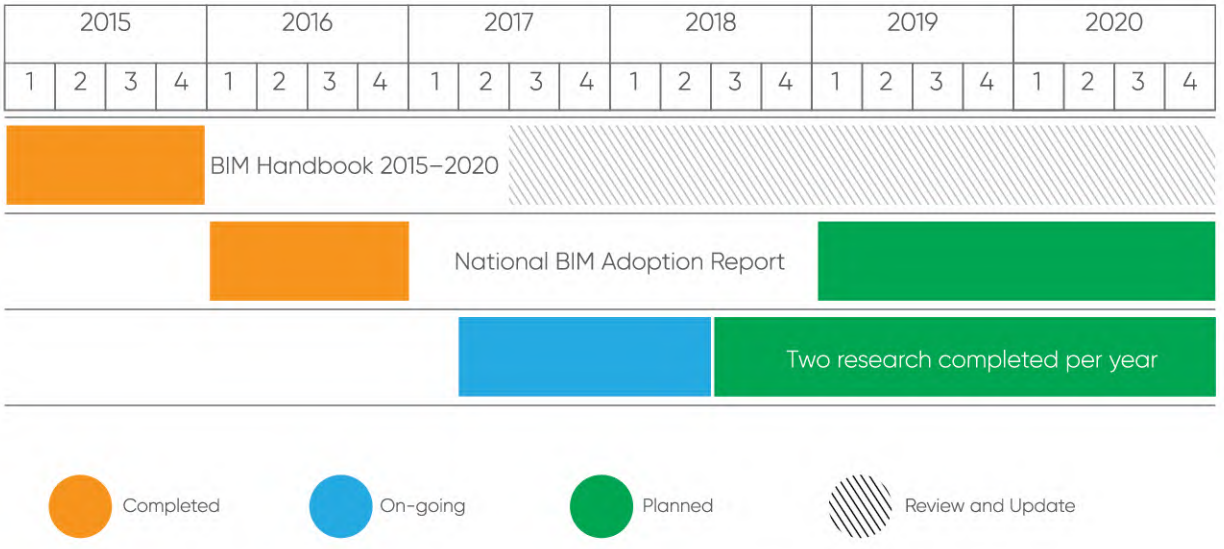
- BIM financial implication
- Non-financial implication
- Cost–benefit analysis of BIM
- Measurement of return on investment on BIM for building and infrastructure projects

**Note:**

- Activities to meet industry requirements
- Customisation to suit our local practice
- Research cluster: process, technical, technology and people aspects (coordinate with CITP)

| | |
|---|---|
| **Timeline** | 2015 - Onwards |
| **Lead Agency** | Construction Research Institute of Malaysia (CREAM) |
| **Key Agencies** | a) Construction Industry Development Board (CIDB) Malaysia;<br>b) CIDB E-Construct<br>c) Public Work Department (PWD)<br>d) Construction stakeholders<br>e) Public and private education institutions<br>f) Software vendors<br>g) Technology providers |
| **Deliverables** | Malaysia CoE for Digital Construction |

# TIMELINE OF **ACTIVITIES:**




**Note:** The actual activities will be reviewed and revised by each pillar subcommittee.

# ACHIEVEMENT

**a) Handbook for BIM Implementation in CITP.**

To support and deliver the objectives of BIM implementation in the CITP, CIDB and CREAM have formulated a BIM handbook in consultation with stakeholders and experts.

**b) National BIM Report 2016**

The National BIM Report 2016 is the first national report published by CIDB Malaysia together with CREAM to gauge the level of BIM adoption in the Malaysian construction industry. The report serves as a baseline to provide a critical reference point to assess the changes and effects that are crucial in determining the progress of BIM in Malaysia.

.


Link:
http://www.cidb.gov.my/images/content/penerbitan-IBS/BIM-REPORT.pdf

## 7.8 RECOMMENDATION

The BIM Handbook initiatives can be achieved by continuous monitoring, evaluation and modification. The success of BIM implementation in Malaysia should be measured consistently and in accordance with the milestones given. Monitoring deliverables for each pillar will lead to the appropriate course of action recommended. The outcomes for each pillar will be evaluated and modified to suit current needs and demands. This continuous process is crucial and could be done through the following cycle process.

| | |
|---|---|
| **Monitor** | Monitor the overall deliverables for each pillar. |
| **Evaluate** | Evaluate the outcomes. |
| **Modify** | Modify components and elements in each pillar to suit current needs and demands. |

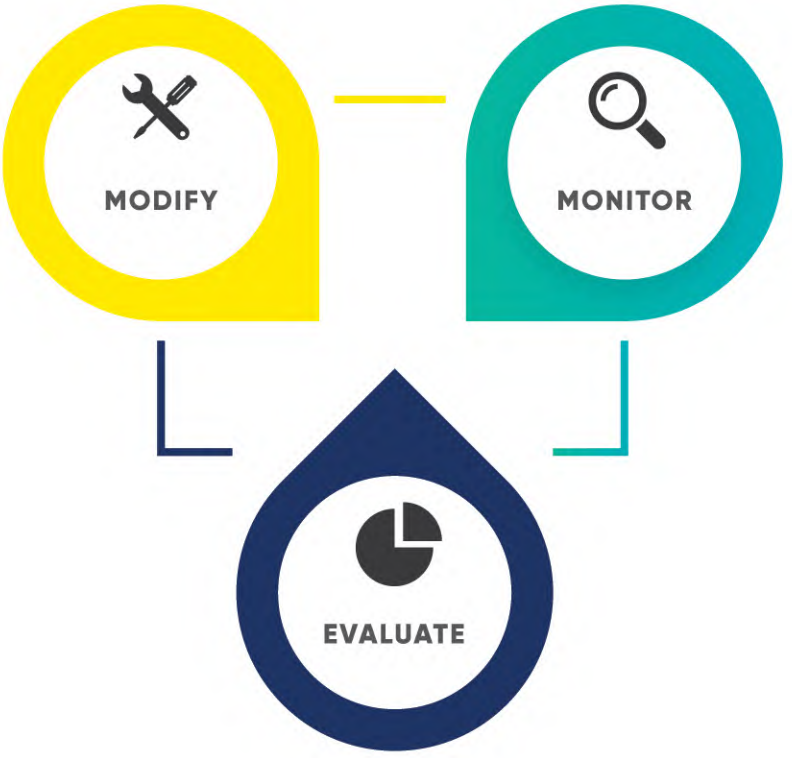



**Figure 13:** BIM Handbook cycle process of measurement

# 8.0 THE STEPS AHEAD

The following probable actions are suggested to address the needs of construction project stakeholders in adopting and implementing BIM in their projects.

1. To establish a comprehensive document of BIM standards/codes/guidelines/specifications or best practices to which the industry stakeholders can adhere
2. To engage professional institutions in developing the readiness of the industry to carry out the BIM agenda
3. To establish a method for collaboration using multiple compatible BIM platforms
4. To encourage knowledge sharing among clients, consultants and contractors in the application of BIM in their projects
5. To promote the benefits and value of BIM to senior management officials of various construction organisations (public and private) in Malaysia
6. To promote the global competitiveness of BIM in Malaysian construction industry

The systematic rollout of BIM adoption combines several approaches from passive stance to assertive actions. Policy actions to support the adoption process need to be developed collaboratively between public and private sectors. This approach will develop mutual trust among stakeholders with the same vision in achieving BIM level 2 implementation by 2020. A dynamic BIM ecosystem has been created by CIDB to support BIM implementation in Malaysia.


**Figure 14:** CIDB BIM ecosystem

# REFERENCES


- Autodesk. (2012). A framework for implementing a BIM business transformation, 1–12.
- Bentley, & MRTC. (2017). Malaysia ' s Mass Rapid Transit Corporation taps the power of Microsoft Azure, 1–5.
- CIDB Malaysia. (2015). Construction Industry Transformation Programme 2016-2020. https://doi.org/10.1007/s13398-014-0173-7.2
- CIDB Malaysia. (2016). BIM Guide Malaysia. Retrieved June 1, 2017, from http://www.bimcenter.com.my/bim-guide/
- CIDB Malaysia. (2017). Malaysia Building Information Modelling Report 2016. Kuala Lumpur. Retrieved from http://www.cidb.gov.my/images/content/penerbitan-IBS/BIM-REPORT.pdf
- Council, H. K. C. I. (2013). Final Draft Report of the Roadmap for BIM Strategis Implmenetation in Hong Kong's Construction Industry.
- HM Government. (2012). Building Information Modelling. Industrial Strategy: Governement and Idustry in Partnership, Vol.1, 1–22. https://doi.org/10.1016/j.aei.2007.03.001
- Khosrowshahi, F., & Arayici, Y. (2012). Roadmap for implementation of BIM in the UK construction industry. Engineering, Construction and Architectural Management, 19(6), 610–635. https://doi.org/10.1108/09699981211277531
- SpellerMetcalfe. (n.d.). BIM LIFECYCLE | Speller Metcalfe. Retrieved January 13, 2018, from http://www.spellermetcalfe.com/bim/bim-lifecycle

CIDB MALAYSIA

# BUILDING INFORMATION MODELLING (BIM)

HANDBOOK FOR THE IMPLEMENTATION OF BUILDING INFORMATION MODELLING IN CONSTRUCTION INDUSTRY TRANSFORMATION PROGRAMME 2016-2020

9 789670 997346

ISBN 978-967-0997-34-6