

# *Singapore BIM Roadmap*

*by Cheng Tai Fatt  
Building & Construction Authority*



# Target

# Why?

# Challenges & Strategies

# BIM

Singapore  
Building Information Modelling  
Roadmap

# TARGET



**Singapore Construction  
Industry to Use BIM  
Widely by 2015**



# Productivity

The background of the slide is a photograph of a bridge, likely the Helix Bridge in Singapore, showing its distinctive white, helix-shaped steel structure. A semi-transparent white rectangular box is positioned in the upper-middle section of the slide, containing the main text. The word 'Productivity' is written in a large, white, sans-serif font in the top left corner, overlapping the bridge image.

3. To address these challenges, MND/BCA have formulated a Construction Productivity Roadmap in consultation with the industry and international experts. The Roadmap aims to realise the **vision of a highly integrated and technologically advanced construction sector that will be led by progressive firms and supported by a skilled and competent workforce in 2020.**

## CONSTRUCTION PRODUCTIVITY & CAPABILITY FUND (CPCF)

### WORKFORCE DEVELOPMENT

Workforce Training & Upgrading Scheme

BCA-Industry Built Environment Undergraduate Scholarship

BCA-Industry Built Environment Diploma Scholarship & Sponsorship

Built Environment Apprenticeship

### TECHNOLOGY ADOPTION

Mechanisation Credit (Mech C)

Productivity Improvement Projects (PIP)

Building Information Modelling (BIM) Fund

### CAPABILITY DEVELOPMENT

Construction Engineering Capability Development

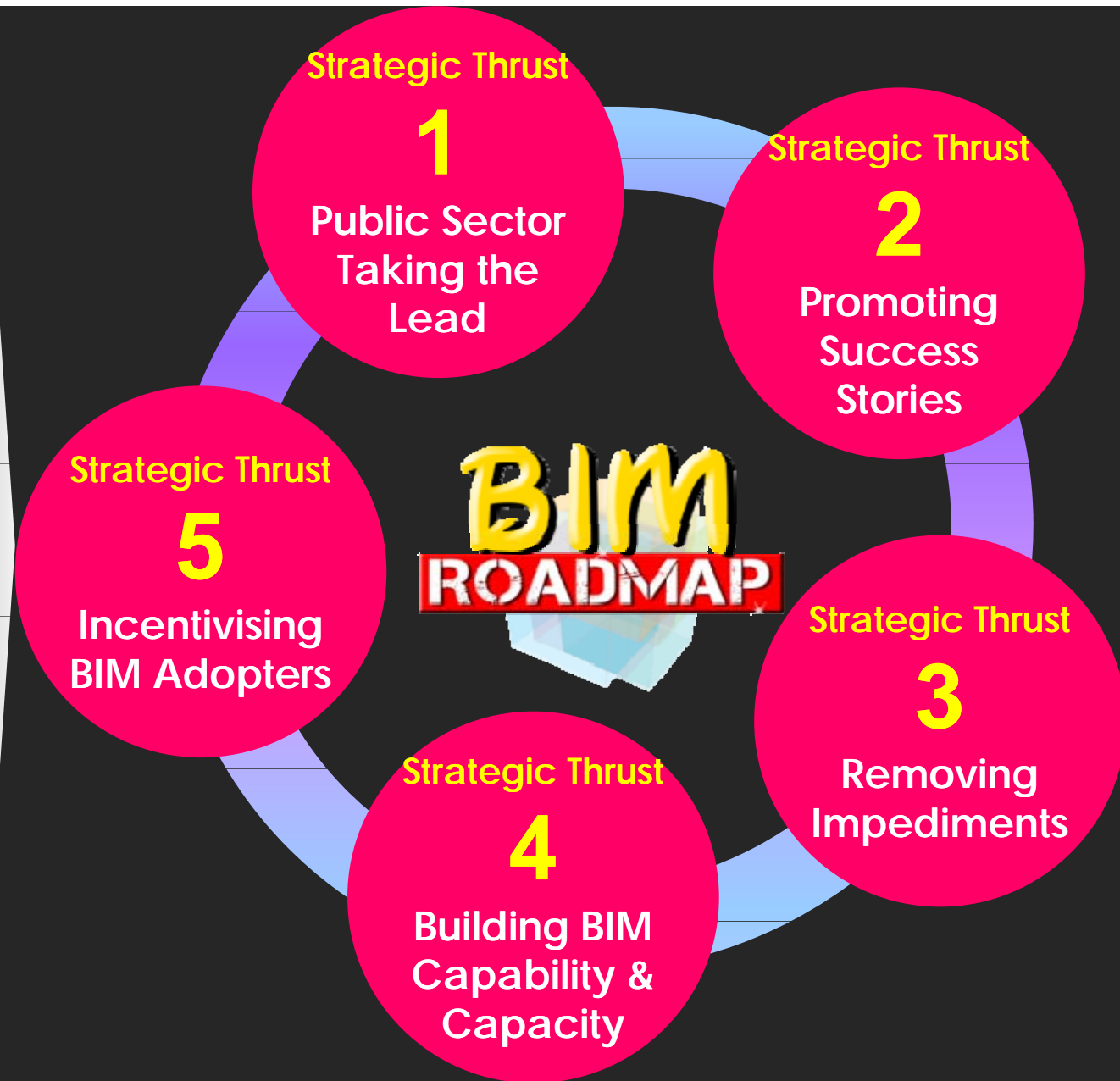
# Challenges

Lack of demand for BIM

Entrenched in the current 2D drafting practices

Lack of ready pool of skilled BIM manpower

Additional resources needed to build up BIM expertise





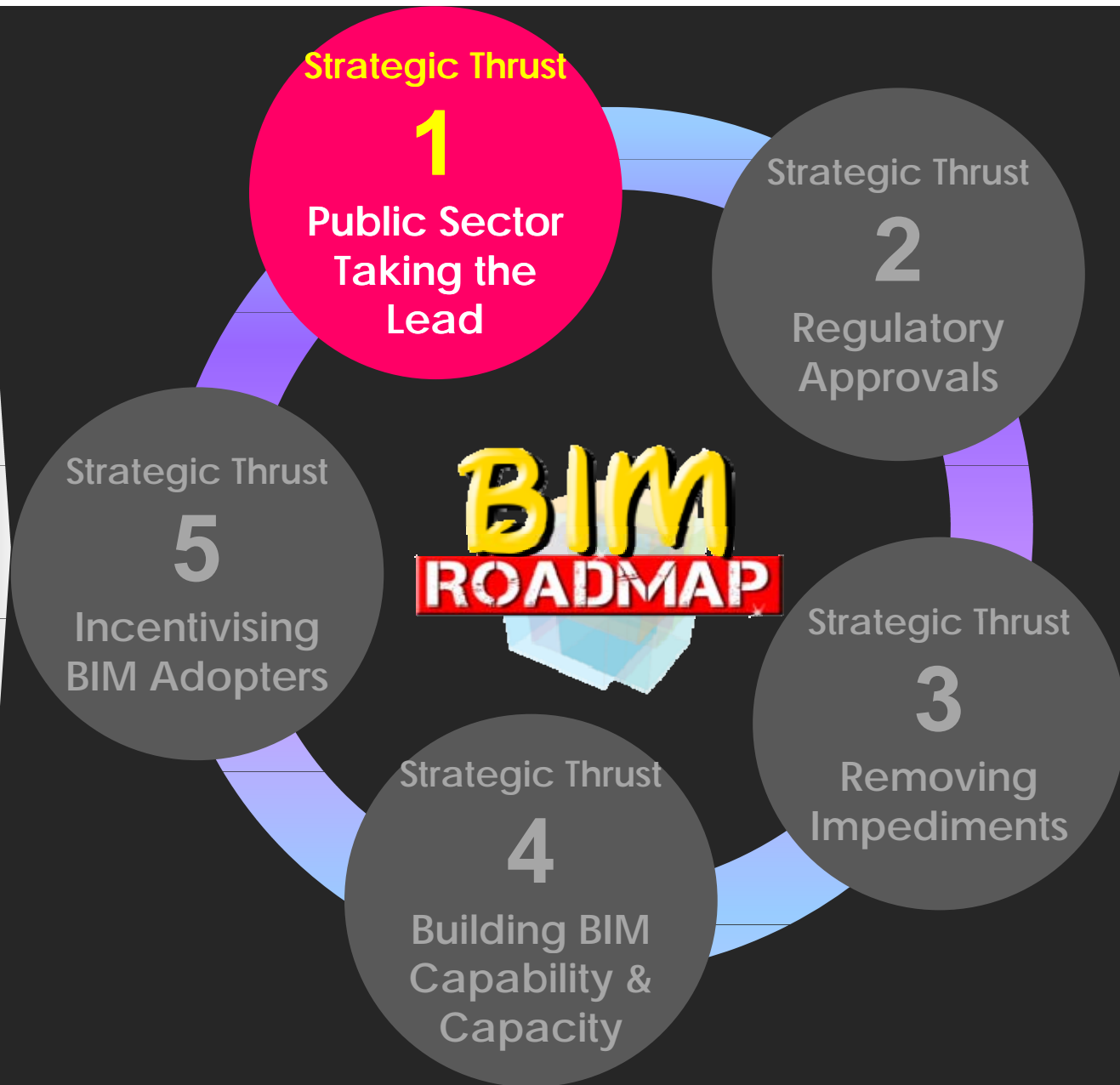
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# GLOBAL PERSPECTIVE

## Statsbygg, Norway

2010: Requires IFC/BIM for new buildings

## Norwegian Defence Estates Agency

Is running 3 BIM pilots

## U.S. GSA

## U.S. Army Corp of Engineers

2008 : Mandatory BIM for government projects

## UK

2016: Mandatory BIM for government projects > £5 million

## Hong Kong

2014/15: Mandatory BIM for all new HKHA projects

MTR remodelled existing projects for sustainability & FM

## Korea

2012: Public Procurement Service will fully adopt IFC-based open BIM

## Senate Properties (property services agency), Finland

2007: Requires IFC/BIM in its projects and intends to have integrated model-based operation in future

## Singapore

2013: BIM Submission for Regulatory Approval

2012: BIM as part of public sector building project procurement

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# PUBLIC SECTOR TAKING THE LEAD

**For Government Procurement Entities (GPEs)**

**2010-2012**

**GPE Pilot Projects**  
**GPE Engagement**

**2012 and beyond**

**GPE to stipulate BIM as  
part of project  
requirements**

# MANDATORY BIM SUBMISSION

**July 2013\***

Architecture Submissions for all new building projects > 20,000 m<sup>2</sup>

**July 2014**

Engineering Submissions for all new building projects > 20,000 m<sup>2</sup>

**July 2015**

Architecture & Engineering Submissions for all new building projects > 5,000 m<sup>2</sup> – 80% target

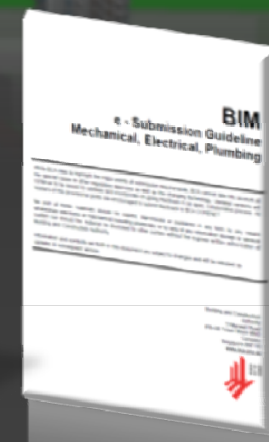
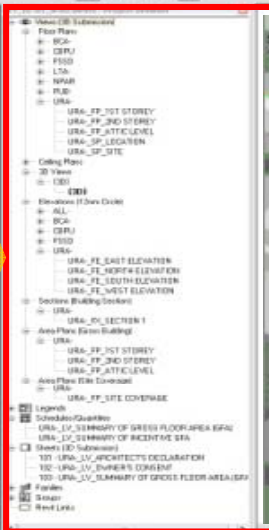
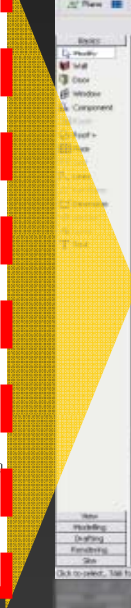
\*From 1<sup>st</sup> July 2013 – 31 Aug 2013, 100% of QP working on building projects > 20k m<sup>2</sup> could meet the architectural BIM e-submission requirements

## Templates for BIM submissions

## Guidelines for BIM submissions

## Step-by-Step Guides/Tips & Tricks

## Add-On Modules



Templates  
for BIM submissions

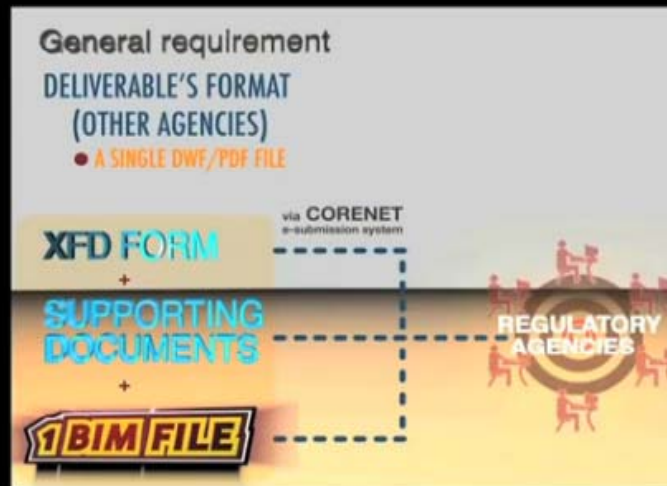
Guidelines  
for BIM submissions

Step-by-Step  
Guides/Tips & Tricks

Add-On Modules



*E-learning*



CHAPTER 1: CUSTOMISATION

CHAPTER 2: GETTING STARTED

CHAPTER 3: PROJECT ELEVATION/DATUM LEVEL

CHAPTER 4: SITE CONFIGURATION

CHAPTER 5: GFA TABULATION

CHAPTER 6: SITE & SITE COVERAGE TABULATION (ONLY AFFECTING SITE PLAN)

CHAPTER 7: ANNOTATION & SYMBOLS

CHAPTER 8: A&A WORKS/RE-SUBMISSION/AMENDMENTS

CHAPTER 9: ENDORSEMENT & DATA INFORMATION

CHAPTER 10: EXPORT/PUBLISH TO DWF

2:51 / 6:46





Templates  
for BIM submissions

Guidelines  
for BIM submissions

Step-by-Step  
Guides/Tips & Tricks

Add-On Modules

**SIACAD Buildability Scores BIM**

File COP Help

For BScore (3)

22.64

Buildability Score

Required: 77

Achieved: 23

eBAS 3.0

For BScore score: 89

**PART III: COMPUTATION OF BUILDABLE DESIGN SCORE**

Project Reference No.	BS	SS	WS	BF	Blk
0	0.00	36.00	0.00	36.00	

Block No./Name: FOR BSCORE

Please indicate other typical blocks (if any):

**Structural System**

Labour Saving Index (a)	Area (m²) (b)	% Area (c)	Buildable Design Score (a) x (c) x 50
1.1 Full precast	1.00		
1.2 (a) Precast column/wall with flat plate and no perimeter beams	0.95		
1.2 (b) Precast column/wall with flat plate and perimeter beams (beam depth ≤ 600mm)	0.85		
1.2 (c) Precast column/wall with flat plate and perimeter beams (beam depth > 600mm)	0.80		
1.3 (a) Precast column/wall with flat slab and no perimeter beams	0.90		
1.3 (b) Precast column/wall with flat slab and perimeter beams (beam depth ≤ 600mm)	0.80		
1.3 (c) Precast column/wall with flat slab and perimeter beams (beam depth > 600mm)	0.75		
1.4 Precast beam and precast slab	0.90		
1.5 Precast beam and precast column/wall	0.90		
1.6 Precast column/wall and precast slab	0.90		
1.7 Precast slab only	0.70		
1.8 Precast column/wall only	0.70		
<b>Sub Total Area for Precast System</b>			
<b>2.2 STRUCTURAL STEEL SYSTEM (applicable only if steel decking or precast slab is adopted)</b>			
2.1 Steel beam and steel column (without concrete encasement)	0.95		
2.2 Steel beam and steel column (with concrete encasement)	0.85		
<b>Sub Total Area for Steel System</b>			
<b>3 CAST IN-SITU SYSTEM</b>			
3.1 (a) Flat plate with no perimeter beams	0.90		
3.1 (b) Flat plate with perimeter beams (beam depth ≤ 600mm)	0.80		
3.1 (c) Flat plate with perimeter beams (beam depth > 600mm)	0.75		
3.2 (a) Flat slab with no perimeter beams	0.85		
3.2 (b) Flat slab with perimeter beams (beam depth ≤ 600mm)	0.75		
3.2 (c) Flat slab with perimeter beams (beam depth > 600mm)	0.70		
3.3 One-directional beam	0.70		
3.4 Two-directional beam	0.45		
<b>Sub Total Area for Cast In-Situ System</b>			
<b>4 ROOF SYSTEM</b>			
4.1 Integrated metal roof on steel truss	0.90		
4.2 Metal roof on steel truss or timber truss	0.85		
4.3 Tiled roof on steel beam or precast concrete beam or timber beam	0.75		
4.4 Metal roof on cast in-situ beam	0.60		
4.5 Tiled roof with cast in-situ beam	0.55		

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# PROMOTING SUCCESS STORIES

BIM ROADMAP  
BUILDING BIM CAPABILITY  
AND CAPACITY  
THE SINGAPORE CONSTRUCTION  
PRODUCTIVITY WEEK 2013

**build smart** JUN 2013

Building and Construction Authority

We shape a safe, high quality, sustainable and friendly built environment

A CONSTRUCTION PRODUCTIVITY MAGAZINE



**BIM - THE WAY FORWARD**

BuildSmart Development  
Image courtesy of Capitaland and CapitalMile Asia



## BIM LEADERS IN STRUCTURAL ENGINEERING

Hear from two companies in Singapore that are leading the way in harnessing BIM technology

Build Smart speaks to two local engineering companies on how they have successfully implemented Building Information Modelling (BIM), and on how the technology has benefited their work processes and productivity



Dr Teoh Eng Hin  
Executive Director, AECOM

AECOM is a Public Sector Panel of Consultants (PSPC)

**Q** What are the initial challenges faced when adopting BIM, and how did you overcome them?

**A** The first hurdle was the lack of both engineers and drafter. We recruited an experienced person to look into the training and requirements.

## BIM LEADERS IN ARCHITECTURE

Hear from three firms in Singapore who are using the emerging technology to design, collaborate and build smart

We hear you: Building Information Modelling (BIM) implementation can be a challenge, but BIM technology has also numerous advantages. Three local architecture firms share with us their experiences of transitioning into BIM and how they have benefited from the technology.

For these companies, BIM is not just a technology to produce 3D models or high quality visualisations. The value of BIM really lies in its ability to generate critical information for early decision. With the knowledge, these architectural firms have been empowered to become master builders as they use the data to facilitate collaboration, smarter construction and integrated work processes.

As you will discover, BIM implementation is as much about investing in people and processes as it is about technology. Full support from the senior management of the company is crucial to move the implementation forward. The selection of a room BIM team with members who are eager to learn and who have a positive mindset to build internal BIM capability is another secret ingredient in the recipe for BIM success.

ONG&ONG Pte Ltd

Tai Lee Siang, Group Managing Director, and Daniels Chandra, BIM Director

ONG&ONG tapped into BIM for one of its pilot projects at Kung Chong Rd. The 300' Design solution project involved the use of BIM/Revit. It was a big challenge as many in the team were inexperienced BIM/Revit users. However, the firm eventually improved productivity for architecture.



Tai Lee Siang  
Group Managing Director

ONG&ONG



**Q** What are the initial challenges faced when adopting BIM, and how did you overcome them?

**A** Implementation of BIM was our first challenge. Overcome this, we adopted a centralised approach by setting up a specialist department within our organisation to handle its implementation.

It, there were costs involved in adopting BIM. However, through BCA's BIM Fund, we were able to set up a room comprising 10 dedicated BIM practitioners for staff training. We are also upgrading our company's IT infrastructure to accommodate the increasing use of BIM-related equipment.

The biggest challenge is to find people with BIM capabilities and design experience. Instance, it is very difficult to convince our seasoned designers to adopt BIM due to their preference for and familiarity in working with traditional CAD system. On the other hand, signers with less experience are more willing to learn BIM. Overcome this, we send staff for regular training conducted by our in-house IT specialists or external firms.



Ms Quek Chay Hoon, General Manager, Projects  
Wing Tai Property Management Pte Ltd

**Q** How has BIM helped in enhancing the developer aspects of your projects?

**A** Our designers are able to better visualise the interior and exterior views of a building to minimise design error, mitigate buildability and ensure safety of construction.

Without a doubt, there is also improved coordination across different disciplines in a single model, which helps us resolve clashes between design elements at an early stage. Early co-ordination and clash resolution remove the need for much abortive work on the part of contractors.

All these lead to savings in time, where plans, elevations and section drawings can be generated easily, and where there is speedier delivery of



Daniels Chandra  
BIM Director

## BIM LEADERS IN PROPERTY DEVELOPMENT

Hear from two developers that have adopted BIM successfully, and their plans for the way forward

City Developments Limited and Wing Tai Property Management Pte Ltd are household names in the real estate industry. But how do they fare when it comes to adopting Building Information Modelling to improve their productivity?

Mr Lawrence Leong, Manager in the Projects Division of City Developments Limited, and Ms Quek Chay Hoon, General Manager of Projects in Wing Tai Management, walk us through their company's BIM implementation process, highlighting the benefits, challenges, and the future of BIM.



Mr Lawrence Leong, Manager, Projects Division  
City Developments Limited



# PROMOTING SUCCESS STORIES

- 2011
  - 1<sup>st</sup> Singapore BIM Competition
- 2012
  - 2<sup>nd</sup> Singapore BIM Competition
- 2013
  - 3<sup>rd</sup> Singapore BIM





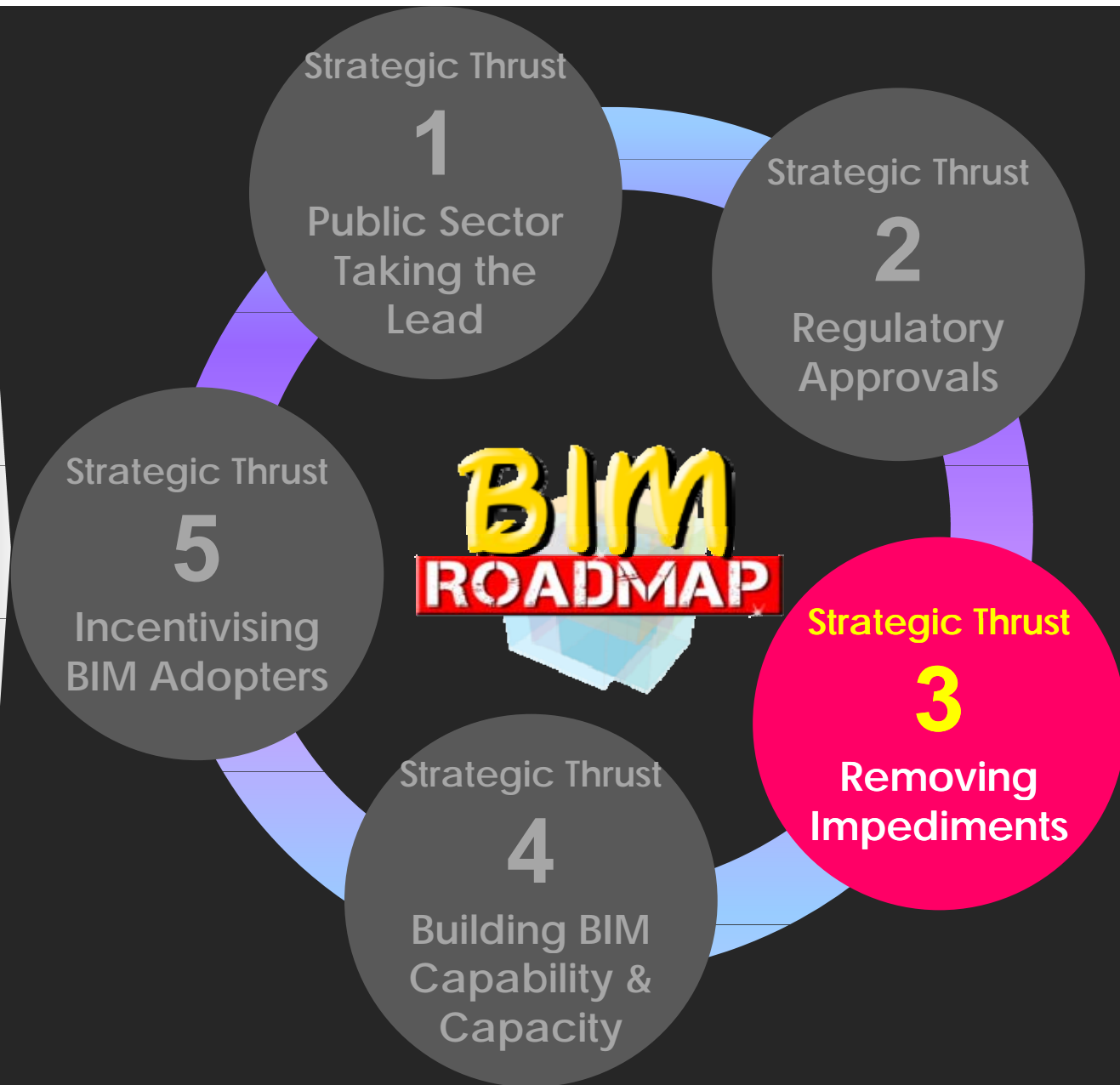
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# REMOVING IMPEDIMENTS

## - National BIM Leadership through the BIM Steering Committee

- Develop and use local BIM standards
- Advise on effective implementation of BIM

- BIM Guide Workgroup

- Legal & Contractual Workgroup

- Inter-disciplinary Workgroups

## - Growth of BIM communities



Association led

**BMF**

BIM Manager Forum

Cross-discipline

**SINRUG**

Singapore Revit User Group

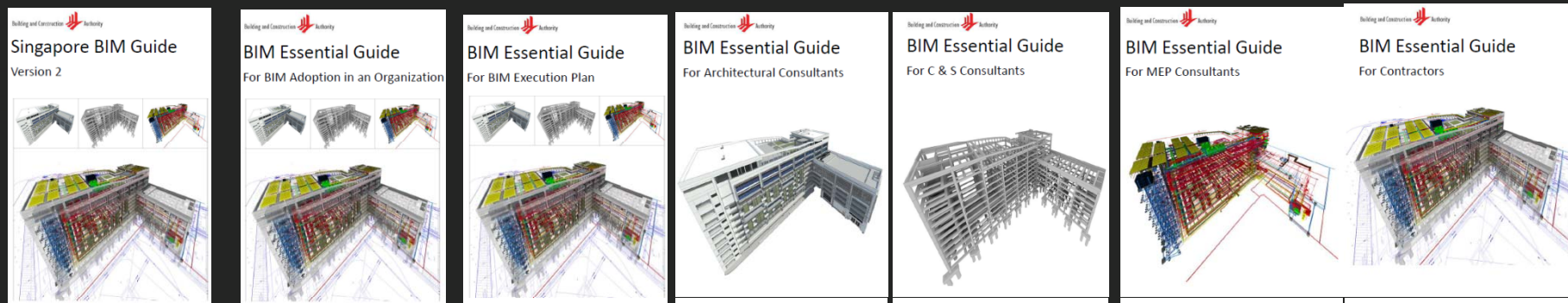
Users led

**AUTODESK**  
BIM Clinic

Vendor led

# REMOVING IMPEDIMENTS

Launch of Singapore BIM Guide V2 and BIM Essential Guides  
on 1<sup>st</sup> Aug 2013



<http://bimsg.wordpress.com/singapore-guide/bim-guide/>

<http://bimsg.wordpress.com/singapore-guide/essential-guides/>

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# CENTRE FOR CONSTRUCTION IT (CCIT)



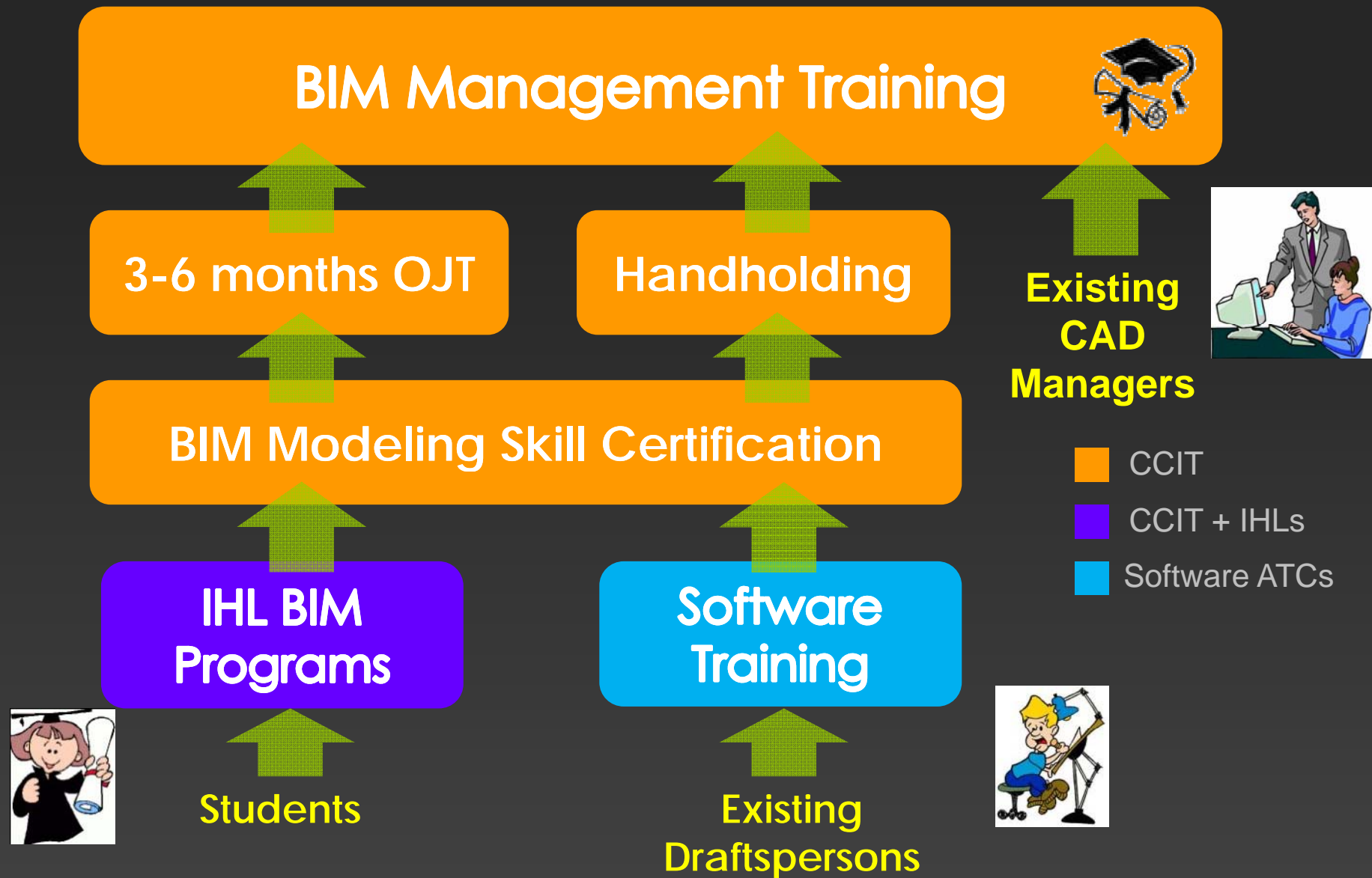
Outreach Programs

Chaperon/Handholding

Trainings

Standards

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# EQUIPPING EXISTING PRACTITIONERS

Roles of BIM Sponsors  
Critical Success Factors

BIM Planning Course  
(Building Developers and  
Facility Managers)

Project Collaboration

Certificate Course:  
Team Based Reengineering

Company Deployment &  
Project Execution

Specialist Diploma in BIM

Certificate Course:  
BIM Management

Regulatory Submission

BIM e-Submission Training

Creating & Maintaining  
Models + e-learning

Certificate Course:  
BIM Modelling

For more details:  
<http://www.bcaa.edu.sg>

# EQUIPPING FUTURE GENERATIONS



Awareness Seminars



BIM Curriculum



Graduation Workshops



Competitions

Students' Expert Program

Internship Program



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Strategic Thrust  
**5**  
Incentivising BIM Adopters

Strategic Thrust  
**1**  
Public Sector Taking the Lead

Strategic Thrust  
**2**  
Regulatory Approvals

Strategic Thrust  
**3**  
Removing Impediments

Strategic Thrust  
**4**  
Building BIM Capability & Capacity



**Funded >500 Firms  
Committed >\$12mil**

**Construction Productivity &  
Capability Fund (CPCF)**

## **Building Information Model (BIM) Fund**

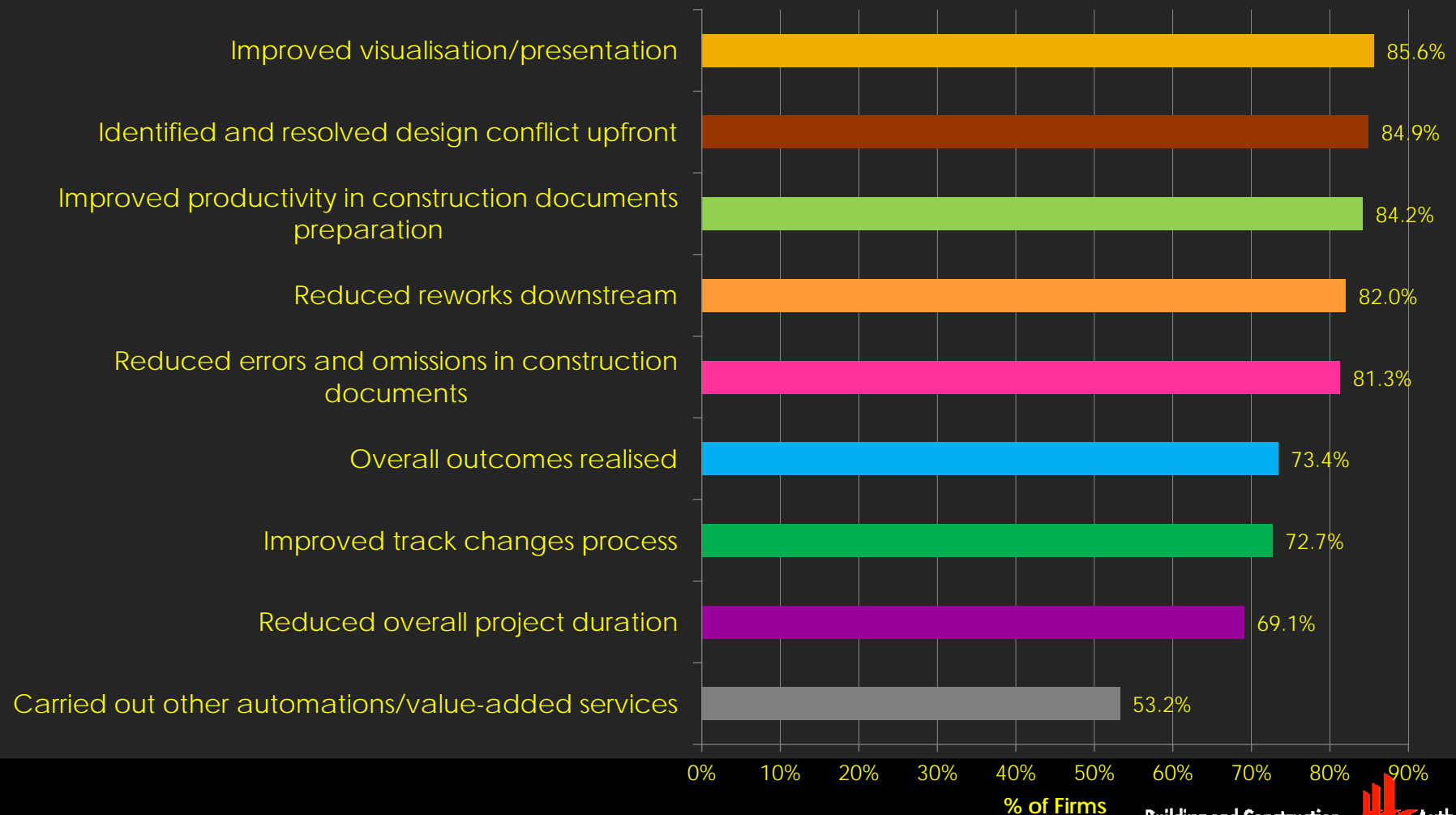
**Firm Level Scheme**  
**50%** of supported items  
capped at **\$20k** per  
application

**Project Collaboration  
Scheme**  
**50%** of supported items,  
or  
capped at **\$35k** per  
discipline

Help defray cost of software, hardware, training, manpower & consultancy

For more details: <http://www.bca.gov.sg/BIM/bimfund.html>

# IMPROVEMENTS MADE





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Public sector taking the lead

Promoting success stories

Removing impediments

Building BIM capability & capacity

Incentivising BIM adopters

## Strategies



# Key Recommendations

Public Sector Leadership

BIM for Facility & Asset  
Management

Accelerating Process  
Transformation

Strengthening Centres of  
Excellence for BIM R&D

Public sector taking the lead

Promoting success stories

Removing impediments

Building BIM capability &  
capacity

Incentivising BIM adopters

Strategies



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