NOW OPEN: NOMINATIONS FOR CONSTRUCTION PRODUCTIVITY AWARDS 2012
THE CPCF PRODUCTIVITY CLINIC
NEW CORETRADE COURSES

THE BIM ISSUE

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We would love to hear from you if you would like to share any best practices and latest technologies that could improve construction productivity. Please email us at bca_enquiry@bca.gov.sg

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Cover image courtesy of Rock Production Pte Ltd, CapitaLand Retail Project Management Pte Ltd, Aedas and Hexacon Construction Pte Ltd.

Clarification
On page 3, issue 8 of Build Smart (“Safety and Speed with Mech”), the images of a conventional dry-mix gunite pump and the wet-mix shotcrete pump are attributable to Grouting Engineers Pte Ltd.
Dear reader,

French writer Antoine de Saint-Exupery once said: “A goal without a plan is just a wish.” Well said indeed. For one can think and dream about something obsessively, but without taking concrete steps towards the goal, it’s just not going to happen.

For us at the Building and Construction Authority (BCA), the long-term target is to raise the productivity of the sector by up to 25% over the next ten years. One of the ways to do this is through accelerating the widespread adoption of the Building Information Modelling (BIM) technology.

So, to steer the construction industry towards higher productivity and better integration, we first set a target of getting the industry to use BIM widely by 2015. We hatched a plan to do this in the form of the BIM Roadmap. Announced earlier this year, the Roadmap serves up a platter of incentives and initiatives for construction firms keen to embark on their productivity journeys. So far, 168 firms have already benefited from the BIM Fund, which helps defray the cost of implementing BIM.

Building the capability of the industry is another key strategy that we employ to encourage BIM adoption. From workshops and seminars to competitions and internships, we have a comprehensive framework to equip the younger generation with BIM skill sets. On 31 October 2011, we convened the first three-day meeting of the International Panel of Experts (IPE) on BIM to share their insights on how their home countries have moved towards greater use of BIM in their respective built environments.

The IPE shared that standing still is not an option for Singapore’s construction sector while the rest of the world moves towards industry-wide BIM technology adoption. They noted that BCA’s initiatives will place Singapore at the forefront of BIM adoption internationally.

To make this happen, we’ll need the concerted efforts of the industry stakeholders. There’s no better way to learn than through the sharing of experiences. In this issue, we interviewed some IPE members and firms on their BIM journeys, perspectives and plans.

Looking ahead to 2012, we will continue to work closely with the industry to facilitate their BIM journeys. BCA will continue to take the lead in driving greater BIM adoption and lead the productivity movement. Here’s wishing all readers a productive year ahead!

Dr John Keung
Chief Executive Officer
BCA's BIM initiatives will make it easier for build environment businesses and professionals to harness the computer-aided building-modelling tool in their operations and work

Building Information Modelling (BIM) is an advanced computer technology that allows building performance to be simulated digitally so that design conflicts can be collectively resolved upfront to avoid costly abortive work at the construction stage.

It is widely accepted as an essential tool for built environment professionals to improve their productivity from the design to the downstream construction stages.

In Singapore, the Building and Construction Authority (BCA) implemented the BIM Roadmap in 2010 with the aim that 80% of the construction industry will use BIM by 2015. This is part of the government’s plan to improve the construction industry’s productivity by up to 25% over the next decade.

The Roadmap comprises strategies and initiatives to facilitate businesses and professionals’ transition from conventional 2D building plans to 3D models.

**Expediting BIM Adoption Industry-Wide**

BIM has been proven to save costs and time. It also improves the efficiency of manpower resources for businesses. However, BCA understands the challenges that businesses face in considering the use of a new technology in their operations.

To help and guide business owners, BCA has implemented the BIM Roadmap. Here is an overview of it.

<table>
<thead>
<tr>
<th>CHALLENGES FACED BY FIRMS DURING BIM ADOPTION</th>
<th>BCA STRATEGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of demand for BIM</td>
<td>To allow the public sector to take the lead, BCA:</td>
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<tr>
<td></td>
<td>&gt; Collaborated with government procurement entities (GPEs) to request the use of BIM for their projects from 2012</td>
</tr>
<tr>
<td></td>
<td>&gt; Worked with GPEs and their industry partners in preparation for the new requirements</td>
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<tr>
<td>Entrenched in current 2D drafting practices</td>
<td>To promote success stories, BCA:</td>
</tr>
<tr>
<td></td>
<td>&gt; Established the Centre for Construction IT (CCIT) to promote BIM and guide businesses and professionals in the industry</td>
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<tr>
<td></td>
<td>&gt; Conducts seminars, workshops and conferences on the use of BIM for the industry to promote the benefits of the technology</td>
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<tr>
<td>Steep learning curve to build up BIM expertise</td>
<td>To remove impediments, BCA:</td>
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<tr>
<td></td>
<td>&gt; Developed a set of submission templates and guidelines to help professionals understand the new process of regulatory submission using BIM</td>
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<tr>
<td></td>
<td>&gt; Works with GPEs, professional bodies and buildingSMART Singapore to develop project collaboration guidelines and an object library standard</td>
</tr>
<tr>
<td>Lack of ready pool of skilled BIM manpower</td>
<td>To build BIM capability and capacity, BCA:</td>
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<tr>
<td></td>
<td>&gt; Launched short courses and the Specialist Diploma in BIM at BCA’s training arm, the BCA Academy</td>
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<tr>
<td></td>
<td>&gt; Engaged various tertiary institutions to include BIM training in their curricula</td>
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<td></td>
<td>&gt; Provides “chaperon” services to businesses who need assistance in their first BIM project implementation and regulatory submission</td>
</tr>
</tbody>
</table>

To incentivise BIM adopters, BCA:

> Introduced the BIM Fund*, which covers the costs for training, consultancy services and purchase of hardware and software for businesses and projects

* Part of the Construction and Capability Fund (CPCF) for BIM adoption
Globally, many building and infrastructure projects are undertaken by the public sector. Increasingly, the Building Information Modelling (BIM) technology is being used in these projects. Thus, the public sector plays an important role in leading the industry towards BIM adoption.

**BCA’s Public Sector Procurement Strategy**

Recognising the public sector as a catalyst for change, the Building and Construction Authority (BCA) has identified public sector procurement as an important strategy in the BIM Roadmap. To prepare our private sector agencies in leading the industry’s use of BIM, BCA has taken three key approaches for this strategy:

1) **Partnering Government Entities**

   BCA has engaged major government procurement entities (GPEs), specifically the Housing and Development Board, the Ministry of Education and the Land Transport Authority in a partnership programme.

   This programme includes conducting hands-on training for GPE officers, initiating new BIM pilot projects to define standard BIM requirements, and organising visits to study BIM usage in other countries.

2) **Training Public Sector Consultants**

   The BCA Academy has launched a number of BIM training programmes to equip public sector consultants with BIM expertise. The programmes will also be extended to contractors.

3) **Reaching out with Joint Industry Efforts**

   BCA has partnered the industry on initiatives that will make it easier for businesses and professionals to apply BIM in their projects. These include:

   - Developing BIM requirement guidelines – led by Real Estate Developers’ Association of Singapore (REDAS) and major GPEs
   - Developing regulatory approval e-submission guidelines and templates – led by all government regulatory agencies
   - Developing project collaborations and object library standards – led by buildingSMART Singapore

**How Various Governments Worldwide are Taking the Lead**

1) **United States**

   The General Services Administration (GSA) in the U.S.A. is a pioneer in advocating the adoption of BIM for public sector projects. It has also developed a suite of BIM guidelines.

2) **United Kingdom**

   The BIM Industry Working Group in the U.K. has prepared a BIM strategy to increase BIM use over a five-year period by 2016.

3) **Norway**

   The Norwegian government has stated its commitment to succeed in BIM adoption in 2010.

4) **Denmark**

   Danish state clients such as the Palaces & Properties Agency, the Danish University Property Agency and the Defence Construction Service require BIM to be used for their projects.

5) **Finland**

   Finland’s state property services agency, Senate Properties, requires the use of BIM for its projects since 2007.

6) **Hong Kong**

   Hong Kong’s Housing Authority has set a target to apply BIM in all new projects by 2014. It has also developed a set of modelling standards and guidelines for effective model creation, management and communication among BIM users.

7) **South Korea**

   South Korea’s Public Procurement Service made the use of BIM compulsory for all projects over S$50 million and for all public sector projects by 2016.
BCA’s BIM e-submission system has been lauded as one of the major catalysts for transforming the way construction companies in Singapore think and work.

The Building and Construction Authority (BCA) led a multi-agency effort in 2008 to allow the world’s first Building Information Modelling (BIM) electronic submission (e-submission) via Construction Real Estate NETwork (CORENET).

The new BIM e-submission system streamlines the process for regulatory submission. Now, project teams only need to submit one building model, which contains all of the information needed to meet the requirements of a regulatory agency.

By standardising the way BIM models are being prepared across the industry, members of a project team can now better share their data and plans across various construction disciplines. Building professionals can also use the same BIM model to perform value-added analysis.

In 2010, nine regulatory agencies accepted architectural BIM 3D models for approval through CORENET. This was followed by the acceptance of mechanical, electrical and plumbing (MEP) and structural BIM models in 2011. To date, more than 200 projects have made BIM e-submissions.

The World Bank Group was impressed with the development and progress of Singapore’s BIM e-submission system. Autodesk has also reported that BCA’s BIM e-submission initiative is a world’s first by any government agency.

**SUCCESSFUL CASE STUDIES**

**The ArtScience Museum by Arup Singapore**

> For a complex project like the ArtScience Museum at Marina Bay Sands, Arup Singapore used BIM to develop digital models – accurate to the millimeter – that could be used by its steel fabricator. This significantly reduced the risks that client and contractor had to bear. BIM also reduced the time needed to complete the project to three months. It would have originally taken six to 12 months.

**Housing projects by the Housing and Development Board (HDB)**

> HDB has completed two housing projects that used the BIM template for modelling and regulatory submission. It also used BIM documentation for the construction’s tender. HDB achieved up to 45% savings in manpower in the preparation of building plans.
An in-depth training framework by BCA has been designed to ensure that everyone – from fresh graduates to senior managers – can acquire knowledge on BIM technology.

In the building and construction industry, the rewards of adopting the Building Information Modelling (BIM) system are endless. Yet, exploiting BIM fully can be challenging.

This has spurred the Building and Construction Authority (BCA) Academy to develop a training framework to accelerate the BIM adoption process and help companies achieve longer-term productivity gains from BIM.

Collaborating with Institutes of Higher Learning (IHLs)

To effectively familiarise the construction industry with BIM, BCA is tying up with various IHLs in Singapore to incorporate BIM training into their formal curricula. This is expected to produce a steady stream of BIM-ready graduates within three to four years. To learn more about BCA’s initiatives with IHLs, turn to page 6.

BIM Certification Course for Practitioners

Currently, BIM software training being carried out by BIM vendors places more emphasis on software functionalities and less on practical applications.

This lack of knowledge in a project context has been addressed by the BCA Academy this year through its launch of two training and certification courses for industry practitioners. These courses aim to bring BIM practitioners across all levels up to speed with the usage of BIM technology in a practical environment.

A BIM-Ready Future

To ramp up BIM capability within the industry over a two-year timeframe, BCA is also working with various professional bodies such as the Singapore Contractors Association Limited and the Singapore Institute of Architects to roll out discipline-specific training.

BCA is optimistic that as more and more training workshops become available through various channels, a community of BIM experts can be harnessed to drive up the proficiency levels of BIM across the industry.
RAISING A BIM-COMPETENT WORKFORCE

BCA’s collaboration with various learning institutes ensures that graduates are well equipped with BIM expertise when they enter the industry.

Students in tertiary institutes will now receive training on the Building Information Modelling (BIM) technology. The Building and Construction Authority (BCA) is working with various institutes to develop comprehensive training programmes – from workshops and seminars to competitions and internships – that can equip the building professionals of tomorrow to be proficient in BIM.

The BIM training in the institutes strengthens collaboration between students and professionals, and raises BIM proficiency among professionals.

Since the launch of BCA’s BIM Roadmap, firms are now more aware of how BIM can improve construction productivity. In this way, demand for professionals with BIM expertise will continue to grow.

BCA’S BIM INITIATIVES IN SCHOOLS

Institutes of Higher Learning (IHLs)

> Since last year, twice-yearly dialogue sessions have been held to update students about the latest technological advancements within the construction industry.
> BCA has partnered IHLs – such as universities, polytechnics and Institutes of Technical Education – to include BIM training in their architecture and engineering curricula.
> BCA has also conducted seminars, talks and guest lectures on BIM with IHLs throughout the year.
> Under the Centre for Construction IT (CCIT), BCA has enrolled students from IHLs in an internship programme to raise their professional expertise in BIM.

Graduating Students

> BCA organised intensive BIM training to equip graduating students with the BIM skills before they enter the industry. Such BIM training comprises essential knowledge on BIM software, regulatory submission processes and industry best practices.

Outreach

> BIM competitions will be held annually to increase awareness among industry professionals. Competitions held this year by BCA included Singapore’s first nationwide BIM Competition and the International BIM Buzz@Singapore 2011.
> Other BIM programmes for schools include nurturing BIM experts among students, organising BIM seminars and workshops and facilitating sharing sessions by industry professionals.

NEW

The Specialist Diploma in BIM

The Specialist Diploma in BIM, developed by the BCA Academy and launched this year, is a five-month part-time programme that aims to impart in-depth knowledge on BIM fundamentals.

It also develops strategic skills for BIM project planning and implementation. The focus is on BIM applications for effective design analysis, productive design and construction coordination and holistic facility management.

Mr Karthik Venkatesan, currently in the first intake of the programme, said: “The course materials, case studies and information on industry standards have been really useful for my job.” Mr Venkatesan is currently a BIM Process Manager at Crown Systems.

“I was taught in detail on every stage of how BIM can be applied in various projects,” he said.

For enquiries, please call 6248 9999 or email bca_academy@bca.gov.sg
MAXIMISING BIM INTEGRATION WITHIN THE PROJECT TEAM

Defining the roles and responsibilities of team members involved in BIM usage can help companies make full use of BIM technology.

Applying the Building Information Modelling (BIM) software to old processes will not reap the benefits immediately. It can be counter-productive if BIM implementation is not supported by new workflow.

Institutions in the U.S.A., Finland, Norway, Korea and Australia have published guidelines to improve BIM work practices. Their research highlights the importance of defining the roles and responsibilities of all project members in their application of BIM.

By defining the roles and accountability, a project can improve its productivity and profitability quicker (see Fig.1: The MacLeamy curve explains that it is less costly to make design changes during the early part of a project).

The guidelines include these main topics:

1. BIM Modelling Requirements

BIM facilitates a seamless workflow as it stores functional data across different stages of a project. With proper modelling requirements, professionals involved in the project can build up the model with the right information for effective collaboration.

With the information, tedious analysis is now possible. The guidelines suggest that a common list of analyses could be performed, including site analysis, energy study and cost estimates. This helps the project team to work out solutions that are more efficient and less costly, resulting in construction works that are of higher quality.

2. BIM Process Requirements

The BIM Process Requirements helps the project team to resolve coordination issues during project meetings. It allows the project team members to share their knowledge and expertise across various disciplines when they base their discussion on a constant model.

3. Project Execution Plan

BIM Project Execution Plan sets goals that fit into the project schedule and scope of work. It enables model sharing and encourages collaboration across the entire team and various disciplines. This way, the team can resolve issues quickly and facilitate documentation of its project execution for future reference and learning.

BIM Usage Guidelines for Singapore

The Building and Construction Authority (BCA) and our industry partners are working on a set of guidelines unique to our context in Singapore. The table below shows the guidelines that are currently under development:

<table>
<thead>
<tr>
<th>Project Phases</th>
<th>BIM Key Activities</th>
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<tbody>
<tr>
<td>BIM Project Execution Plan</td>
<td>Agreement with all project partners</td>
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<tr>
<td>Provisional Planning Phase</td>
<td>&gt; Needs and objectives</td>
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<td></td>
<td>&gt; Site model</td>
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<tr>
<td></td>
<td>&gt; Space and massing</td>
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<td>&gt; Structural system</td>
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<td>&gt; M&amp;E system</td>
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<td>&gt; Outline planning permission</td>
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<td>&gt; Budgetary</td>
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<td>Written Permission Phase</td>
<td>&gt; Architectural design</td>
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<tr>
<td></td>
<td>&gt; Written permission</td>
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<tr>
<td></td>
<td>&gt; M&amp;E design</td>
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<td></td>
<td>&gt; Structural design</td>
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<td>&gt; Cost planning</td>
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<td>&gt; Programme planning</td>
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<td>Building Plan Phase</td>
<td>&gt; Architectural detailed design</td>
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<td></td>
<td>&gt; M&amp;E system detailed design</td>
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<tr>
<td></td>
<td>&gt; Structural system detailed design</td>
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<td>&gt; Coordination model</td>
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<td>&gt; Pretender estimate</td>
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<td>&gt; Contract pricing</td>
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<td></td>
<td>&gt; Authority clearances</td>
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<tr>
<td>Contract / Construction Phase</td>
<td>&gt; Construction management / detailed activity programme</td>
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<tr>
<td></td>
<td>&gt; Document control</td>
</tr>
<tr>
<td></td>
<td>&gt; Procurement management (resource, labour, plant, material)</td>
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<tr>
<td></td>
<td>&gt; Construction model / digital fabrication model</td>
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<tr>
<td></td>
<td>&gt; Progress monitoring / payment</td>
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<tr>
<td></td>
<td>&gt; Authority clearances</td>
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<tr>
<td>Final Completion Phase</td>
<td>&gt; As-built model</td>
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<tr>
<td></td>
<td>&gt; Asset tagging</td>
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<tr>
<td></td>
<td>&gt; Authority clearances</td>
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<tr>
<td></td>
<td>&gt; Handling / Taking over</td>
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</table>

Institutions in the U.S.A., Finland, Norway, Korea and Australia have published guidelines to improve BIM work practices.
SCAL members can now receive one-to-one consultation services when they apply for support from CPCF

Members of the Singapore Contractors Association Limited (SCAL) that wish to receive support from the Construction Productivity and Capability Fund (CPCF) can now get fund application help in the form of a one-to-one consultation service. This new service, known as the CPCF Productivity Clinic, is a collaboration between SCAL and the Building and Construction Authority (BCA).

During the CPCF Productivity Clinic, BCA officers will be present to provide one-to-one discussions, clarification and application services. The clinic will be limited to a maximum of 10 companies per session and will be on a first-come-first-served basis.

Under CPCF, there are the Mechanisation Credit (MechC), the Productivity Improvement Projects (PIP) and the Workforce Training and Upgrading (WTU) schemes.

Interested to attend the consultation service? Firms must first be registered under SCAL. The sessions will be held at SCAL Multi Purpose Hall, 1 Bukit Merah Lane 2, Construction House, Singapore 159760.

Get recognised when you go the extra mile in prioritising productivity at work

The Building and Construction Authority (BCA) is now inviting nominations for the second Construction Productivity Awards (CPA). This annual prize honours companies and industry practitioners for achieving outstanding improvements in productivity at the company and project levels.

For more information, please contact:

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Ms Kristy Lee ☎: 6325 5011
✉: kristy_lee@bca.gov.sg

For more information or to register for the CPCF Productivity Clinic, please contact:
Mr Chow Chang See from SCAL
Tel: 6278 9577
Email: chowchangsee@scal.com.sg
Or fax your enquiry to 6273 3977
We share case studies from the U.S.A., the U.K. and Singapore of companies that have benefited from the use of the Building Information Modelling (BIM) technology.

**U.S.A.**

> **Turner Construction**

Turner Construction is one of the early adopters of BIM in the U.S.A. It was ranked as the top contractor in BIM Adoption in 2009 in a survey done by Building Design+Construction. Turner has since handled over 140 BIM projects with a contract value worth more than US$30 billion.

**How it is using BIM:** Turner has experienced BIM staff at all levels to perform tasks such as constructability reviewing, cost estimating, scheduling, 4D modelling and laser scanning to derive savings for each project. The firm is also stretching the use of BIM beyond its visualisation and clash detection capabilities to explore integrated project delivery and lean construction.

**U.K.**

> **Laing O’Rourke**

Laing O’Rourke is the largest private contracting firm in the U.K. In 2011, Laing won the hotly contested £300 million Cheesegrater tower project in London because of its expertise in BIM. Laing has made the use of BIM compulsory for all its new projects.

**How it is using BIM:** Besides its main operations, Laing uses BIM for refurbishment and restoration works, including projects in transforming Manchester’s iconic landmarks, the Central Library and the Town Hall Extension. It has developed BIM models that are sophisticated enough for use in operation and maintenance tasks after the construction is completed.

**SINGAPORE**

> **Hexacon Construction Private Limited**

Established in 1983, Hexacon Construction is a contractor company with headquarters in Singapore. It started to apply BIM for its operations in early 2009 and has since been continuously building its internal BIM capabilities.

**How it is using BIM:** Hexacon uses BIM for planning and communication of its construction processes. With BIM, Hexacon’s drawing and drafting processes are now more effective and productive. It helps its project team to increase its ability to coordinate, detect and avoid design problems.

> **Kimly Construction**

Established in 1965, Kimly Construction manages both public and private construction projects. Vermont@Cairnhill, a design-and-build project with three blocks of 158 residential units, was a project supported by BCA’s BIM Fund. Kimly started with no BIM knowledge. With the help of the BIM Fund, it took the bold step to use BIM, and is now equipped with the expertise in managing projects using the technology.

**How it is using BIM:** Kimly uses BIM to streamline its construction process. The company is able to save 20% of the time spent on construction documentation, which includes converting 2D drawings into 3D BIM models. It has saved recasting costs and avoided project delays thanks to early clash detection made possible through BIM.

> **Tiong Seng Holdings Limited**

Tiong Seng Holdings Limited is a leading building construction and civil engineering contractor in Singapore. The organisation took time to study the potential benefits of using BIM and how the technology can complement its goals and vision.

**How it is using BIM:** Besides its main operations, Laing uses BIM for refurbishment and restoration works, including projects in transforming Manchester’s iconic landmarks, the Central Library and the Town Hall Extension. It has developed BIM models that are sophisticated enough for use in operation and maintenance tasks after the construction is completed.

> **Woh Hup**

Woh Hup is a leading construction and civil engineering specialist in Singapore. It is an early BIM adopter which applied for the BIM Fund.

**How it is using BIM:** Woh Hup used BIM to resolve constructability issues for the erection of the complex roof crown in its Reflections at Keppel Bay project. With 3D BIM models, Woh Hup obtained the set-out points in three dimensions accurately. It was also able to locate and design the supporting stumps, and resolve clashes early. With the experience from this project and the equally challenging Gardens by the Bay assignment, it is now more confident in using BIM for its subsequent projects. Woh Hup is currently applying BIM for the construction of a new building above an existing Mass Rapid Transit (MRT) structure.
Panel experts give their opinions on BCA's BIM Roadmap

At a Building Information Modelling (BIM) seminar held in November 2011, internationally renowned experts from Germany, Norway, South Korea, the U.S.A. and the U.K. gave their recommendations on the implementation of BIM in Singapore.

Build Smart presents their thoughts about the role of the Building and Construction Authority (BCA) in promoting BIM among the industry in Singapore.

**Professor Stephen Lockley**
Professor of Building Modelling, School of the Built and Natural Environment, Northumbria University, U.K.

Singapore is very proactive in driving BIM adoption island-wide. What you tend to find in other countries is that the governments take a “carrot and stick” approach. What I like about BCA’s plan is that you are engaging the industry and treating them as a partner rather than forcing them to make the transition. I think it’s unique that BCA is mandating the e-submission process as well. It’s going to be interesting.

Although BCA is policing, it is also supporting and educating. It’s a more positive approach of doing things. That’s the spirit needed for BIM. You are providing help and good guidance that will deepen the industry’s knowledge.

**Professor Inhan Kim**
Chief Vice-chairman, buildingSMART Korea Kyung-Hee University, South Korea

I think Singapore always leads in this area! In Korea, it is going to be a big leap for us to achieve a BIM roadmap.
Very seldom do we see public agencies offering such a specific BIM training curriculum, the way that BCA Academy has done so. It’s very structured.

Keep encouraging continuous education, where people can return to school to advance themselves and work with the universities. Explore ways that you can continue advancing the knowledge of BIM know-how, which can be done through constant reporting and benchmarking.

Considering that this is your first step, I can say that there has been tremendous success.

Dr Calvin Kam
Consulting Assistant Professor, School of Engineering, Stanford University, U.S.A.
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Dr Ing. Marcus Schreyer
Head, Technical IT Applications, Max Bögl’s Corporate Development, Germany

My impression of Singapore’s BIM Roadmap is that it is really not a concept by a public institution, but a business plan of a corporation. It’s very comprehensive and complete. Take this as a compliment!

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Keep encouraging continuous education, where people can return to school to advance themselves and work with the universities. Explore ways that you can continue advancing the knowledge of BIM know-how, which can be done through constant reporting and benchmarking.

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Swee Hong Engineering Construction Pte Ltd is a well-known civil engineering company in Singapore. But what makes it a leader in the industry is its aim to be at the forefront of technology and advancement.

Assistant Director of Swee Hong Mr Kenneth Lim said: “We embrace technologies that will increase productivity and, in turn, ensure on time, on target and on budget delivery for all projects we undertake.”

Swee Hong’s move towards using Building Information Modelling (BIM) technology was a natural progression. In 2009, the company first started exploring three-dimensional visualisations. Eventually, it realised that more can be gained with the actual data retrieved from the three-dimensional BIM models. The data can help the company detect clashes, calculate accurate quantities and improve collaboration among project parties. These benefits convinced Swee Hong to start its BIM journey in 2010.

How BIM Benefited Swee Hong

Since 2010, Swee Hong has already adopted BIM for a spectrum of projects such as Gardens by the Bay and the construction of sewers at Tuas. It also used BIM for tendering for projects such as the Tuas West Mass Rapid Transit (MRT) extension, the vehicular underpass construction and the Nicoll Highway road widening.
“BIM produces accurate project models and construction schedules. It is equally capable of keeping information up-to-date and accessible in an integrated digital environment. All these help our engineers, contractors, developers, owners and other stakeholders to have a clear vision of our projects, reduce expenses and costly mistakes and make informed decisions faster,” said Mr Lim.

“It’s also time-efficient as errors can be detected at an early stage and be corrected. With better visualisation, communication and simulation, there is enhanced judgement of projects,” he explained.

Using BIM to their clients’ benefit has also been an important milestone for Swee Hong. “With BIM, our clients can better appreciate the end-result of various projects. There is also more understanding of our work methods and processes during the tender presentation and interview stages. Decision-making is expedited,” said Mr Lim.

Recalling the company’s previous ways of doing things, Mr Lim said: “Our methods of calculation were still very traditional then. You can see rolls of paper piling up in the office!”

The Process of BIM Adoption

Having gone through the process of coming up with its own integrated BIM solution to fit the company’s needs, Mr Lim believes that the right implementation of the technology reaps limitless benefits.

“It was through the testing of different kinds of solutions that we finally decided to have our own integrated BIM solution. This encompasses a few selected applications into one process,” said Mr Lim.

For Swee Hong, BIM was a S$1 million investment which included hardware and software upgrades and staff training. “This investment means time savings for us,” said Mr Lim. “And saving time helps us save future costs.”

But the company’s efforts were no bed of roses as change is always difficult to embrace. Swee Hong had to overcome a few challenges. To use BIM effectively, the company had to overhaul its workflow and operating procedures – from the project tender to the execution stage. It also had to encourage a change in mindset and systems among its staff, allow them the time to adapt to new procedures and attend training in BIM.

“Companies differ in their organisational structures, cultures, target markets and operational processes. These differences will affect how a BIM implementation plan is designed. There is no generic approach to implementation, especially in the civil engineering field,” explained Mr Lim. “In fact, there is no magic button to it. To make BIM a success, everyone from CAD operator to chief engineer will have to change the way they think, build and work. It will require learning, patience and a can-do attitude from everyone.”

The Future of BIM

Mr Lim believes BIM technology in future will harness the concept of mobility. “I would like to call it ‘BIM Mobility’, where you can control data, review projects and simulate planned activities on the move,” he said.

He added: “What I would also like to see more of is the advancement of emergent 6D life-cycle management, which uses the model to perform activities related to post-construction management of a facility. Hopefully, there will be 7D, 8D and many more Ds to come as well!”
Chidambaram has been in the construction industry for 15 years, but his best working experience yet is his current role as Building Information Modelling (BIM) Consultant at the Building and Construction Authority’s (BCA’s) Centre for Construction IT.

“Every day here has been memorable for me,” said Chidambaram. “I now have much wider exposure to the construction industry.”

As BIM Consultant, Chidambaram works fast-paced days. Because he needs to manage a wide range of tasks, he has to be both people-oriented and technically competent.

His day-to-day work involves providing technical support and training to BIM users and developing standards for the industry. With that, BIM Consultants must keep up-to-date on the latest technologies.

“To be at the forefront of technology, I meet people and visit online forums and interest groups. I also make use of social media,” said Chidambaram.

For Chidambaram, the most exciting part of the job is when he gets to meet people from all aspects of the industry. A large part of his work scope requires him to carry out BIM outreach, training and guidance.

“I particularly enjoy teaching BIM to students from different levels of the industry,” he said. “It’s rewarding when they appreciate what they’ve learnt!”

A challenge arises when Chidambaram faces resistance from users when they are encouraged to use BIM for their work. However, he is positive about BIM because he has witnessed how the industry is increasingly ready – even eager – to embrace it. “The early adopters are progressing and are now moving towards implementing downstream applications of BIM,” he said.

Chidambaram’s role as BIM Consultant is about promoting the technology to companies. Having managed BIM projects for more than 11 years, he believes in the tool because of its benefits: improved productivity, reduced costs and better collaboration among project team members across various disciplines.

“These benefits give an edge to our local industry when we compete for international projects,” he highlighted. “BIM also strengthens a company’s overall positioning.”
When Tian Ai Ling was given an opportunity in her company Beca Carter to take on a new role, she immediately grabbed the opportunity. The role of CAD/BIM Manager is attractive to Ai Ling because of her interest in BIM. Ai Ling has been working on BIM-related projects for more than three years – including her current role at Beca Carter. Managing a CAD team, ensuring CAD/BIM standards, solving problems from the BIM working process, and evaluating new software are some of her main responsibilities.

“The key requirement in this job is passion. I have a passion to be a leader, to try new things and to inspire people,” Ai Ling enthused.

“On the other hand, there are challenges such as meeting tight deadlines set by clients, managing changes in the projects and coping with a shortage of manpower during busy periods,” she said.

With more than 15 years of building and construction experience, Ai Ling noticed that technology is often the driver for change in the industry. “Engineering design and CAD tools have improved the working process a lot. Now, architects and engineers are more creative than ever and are creating even more challenging works,” she said.

“As for BIM technology, it has undeniably expanded the industry’s skill set,” said Ai Ling. “Today, many professionals have adopted it. BIM technology has become very critical. The main challenge now is to attract the best talents to harness BIM tools. Future professionals in BIM will have a very stimulating and interesting role.”
The Construction Supervisor role can now be certified under CoreTrade

The Construction Registration of Tradesmen, or CoreTrade in short, is a workers registration scheme administered by the Building and Construction Authority (BCA) for skilled and experienced construction personnel in key construction trades.

Under the Building Control (Amendment) Act 2007, licensed Class 1 General Builders are required to deploy a minimum number of registered CoreTrade personnel in their projects that are at a value of $20 million and more. This applies to new building works, addition and alteration works and civil engineering works.

The upcoming mandatory new courses are part of the enhancement to the CoreTrade Scheme catering for the new class of CoreTrade personnel – Construction Supervisors. This new CoreTrade category will be registered under three main clusters, namely:

> Structural Supervisor
> Architectural Supervisor
> Mechanical and Electrical Supervisor

For more information, call the BCA Academy at 6248 9999. You can also email our friendly staff at bca_academy@bca.gov.sg.
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> Workshop on Site Management of Precast Concrete Construction

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> Reinforced Concrete Supervision
> Plumbing Technology
> Electrical Technology

Certificate courses (Tradesmen / Foremen)
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