

BUILD SMART

A CONSTRUCTION PRODUCTIVITY MAGAZINE

AUG / SEP 2017

CHANGING THE WAY WE BUILD

BCA CONSTRUCTION PRODUCTIVITY AWARDS 2017

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CEO'S MESSAGE

Fellow Builders,

These are transformative times for the built environment sector! Together, we are changing the way we Build Singapore. More firms are adopting advanced construction techniques and technologies, and innovating ways to increase quality and efficiency in building.

In this issue, we zoom in on this year's BCA Construction Productivity Awards winners and find out how they have designed and built their projects faster, yet with a leaner workforce. Read about the benefits they have reaped, including a better quality, safer and improved work environment, and more efficient building processes.

The public sector is a strong supporter of our drive for better quality buildings, processes, work environments as well as productivity through their wide adoption of advanced technologies. At the 2nd session of the Public Sector Productivity Leadership Series this year, the Housing and Development Board (HDB) and industry firms shared their experiences using Design for Manufacturing and Assembly, Building Information Modelling, structural steel as well as robotics in public housing, civil engineering projects and the new State Court complex. With about a third of the \$150 million Public Sector Construction Productivity Fund committed to building projects to date, we can expect higher demand for firms equipped with capabilities and expertise in these new technologies.

As technology advances at rapid pace, firms will need to acquire a greater competitive edge to stay at the forefront of this sector transformation. BCA continues to offer funding schemes to support technology adoption and manpower capability development. Firms can sign up for our Construction Productivity and Capability Fund (CPCF) outreach programmes to find out more. I am also glad to know that our educational institutions and industry firms have been upgrading the skills of our incoming and existing workforce to keep up with new developments in the sector.

Let's continue to work closely to Build Singapore and bring our sector to greater heights!

Mr Hugh Lim

Chief Executive Officer



AND THE Platinum WINNERS ARE...



BCA CONSTRUCTION PRODUCTIVITY AWARDS

Every year, the BCA Construction Productivity Awards (CPA) recognises construction firms and industry partners for their achievements in improving productivity in their projects. This year, nine Platinum, 12 Gold and five Merit Awards were presented to firms and project teams. Congratulations to all winners! In this issue, we feature the nine who have won the highest honours for their efforts.

CATEGORIES	ADVOCATES	PROJECTS
	Recognising developers, consultants, builders and subcontractors at the individual firm level for their achievements in improving productivity.	Recognising teams that have demonstrated high levels of productivity in their projects, from the planning, design, coordination stages to the end of construction.
ASSESSMENT CRITERIA	FIRMS ASSESSED ON: <ul style="list-style-type: none"> • Buildable Design Score • Constructability Score • Productivity performance • Productivity initiatives 	BUILDING PROJECTS ASSESSED ON: <ul style="list-style-type: none"> • Buildable Design Score • Constructability Score • Simplicity of construction • Integration of design and construction • Aesthetics CIVIL ENGINEERING PROJECTS ASSESSED ON: <ul style="list-style-type: none"> • Design for ease of construction • Use of construction technology • Site management • Integration of design and construction • Adoption of innovative designs and products

ADVOCATES



City Developments Limited (CDL)

Developer Category

Scaling it up

A second-time winner, CDL initiated the use of Prefabricated Prefinished Volumetric Construction (PPVC) for what is likely the world's largest and first-of-its-kind application of full concrete PPVC for a large-scale private residential development, The Brownstone Executive Condominium. The project had building modules complete with finishing, fittings and fixtures manufactured in factories before being assembled "Lego-style" onsite. Such a method generates less construction debris, resulting in a cleaner and safer worksite, with fewer workers required onsite, and up to 40% increase in productivity can be achieved. This also brings about better quality assurance as modules are fabricated in controlled factory conditions.

Dragages Singapore Pte Ltd

Builder (Open) Category

Success across diverse projects

Among the pioneer PPVC adopters in Singapore, Dragages used this construction method in building the hotel extension at Crowne Plaza Changi Airport Hotel. The firm's other key initiatives include using Building Information Modelling (BIM) to drive more effective collaboration across the design and building processes for its Singapore Sports Hub Project. For its Venue Residences project, the team took the initiative to propose a peanut-shaped diaphragm wall that required less labour to construct.



Teambuild Engineering & Construction Pte Ltd

Builder (Open) Category

A culture of extraordinary inventiveness

Teambuild constantly leverages new technologies to improve and enhance its work processes. Besides advocating the use of Virtual Design and Construction (VDC) and BIM, the firm developed in-house mobile applications – one to facilitate quality inspections, another to improve workplace health and safety, as well as a mobile timesheet for construction workers. Teambuild has also started to develop and construct its own Integrated Construction and Prefabrication Hub (ICPH), a multi-storey advanced manufacturing facility for producing prefabricated construction. The facility will be the first ICPH in Singapore designed to manufacture PPVC modules. As the builder of The Brownstone project developed by CDL, Teambuild also provided value-added engineering solutions to ensure early project completion despite some onsite challenges.

PROJECTS



HAUS@Serangoon Gardens
 Residential Landed Buildings Category

EFFICIENCY IN LOW-RISE BUILDINGS TOO

All 97 landed homes in this development were built with optimal efficiency. Extensive use of precast components such as structural walls, columns and balconies contributed to savings in manpower and time. By using precast concrete, plastering works were eliminated, resulting in better-quality finishes. The team also adopted Prefabricated Bathroom Units (PBUs), which integrated waterproofing, tiling and fitting works before delivery and installation. In addition, internal staircases were designed and fabricated in steel, simplifying the assembly process, reducing the need for onsite manpower. Perimeter walls sported better finishes as a result of using off-form concrete. Other productive construction methods and equipment adopted include the strut-free open cut method for basement excavation, Mobile Elevated Working Platforms (MEWPs) and advanced system formwork for cast in-situ slabs.

DEVELOPER
 Sparkland Holdings Pte Ltd
 (City Developments Ltd)
ARCHITECTURAL CONSULTANT
 ADDP Architects LLP
STRUCTURAL CONSULTANT
 Tham & Wong LLP
M&E CONSULTANT
 United Project Consultants Pte Ltd
DESIGN AND BUILD CONTRACTOR
 Tiong Seng Contractors Pte Ltd



Rivervale Delta
 Residential Non-Landed Buildings Category > 25,000 m²

A WINNER FROM THE START

This public housing development was built with precast components for the facade, column, household shelter and more, which cut down construction time and labour needs compared to the conventional method. Using precast concrete also sped up the roof construction process and made construction simpler as most architectural features were designed with the same dimensions and sizes throughout the nine residential blocks. In addition, the use of prefabricated welded mesh reduced the need for positioning and tying reinforcement bars, again saving valuable work time. Other notable efforts from the team included providing column connection areas with wall skins to eliminate the need for external formwork, as well as using drones to monitor site progress and safety.

DEVELOPER
 Housing & Development Board
ARCHITECTURAL CONSULTANT
 ONG&ONG Pte Ltd
STRUCTURAL AND M&E CONSULTANT
 Rankine&Hill (Singapore) Pte Ltd
BUILDER
 Teambuild Engineering & Construction Pte Ltd



Crowne Plaza Changi Airport Hotel Extension
 Commercial Category

THE HOTEL THAT WAS FURNISHED BEFORE IT WAS BUILT

When the building's units were hoisted up by cranes to stack up in a "Lego-like" style, they were already fitted with tiles, wardrobes, mirrors and other fixtures. This new 10-storey business hotel is Singapore's first private sector commercial project that uses the PPVC technology for construction. The bulk of construction work was done offsite, reducing manpower required and keeping disruptions to a minimum. Also, with less need for workers to work at height, this method proved safer. The team used self-compacting concrete that eliminated the need for vibration procedures, thus reducing noise pollution to the existing hotel's guests. BIM enabled all project parties to work together seamlessly, allowing them to build and view a virtual building, and anticipate and fix issues before construction.

DEVELOPER
 OUE Airport Hotel Pte Ltd
ARCHITECTURAL CONSULTANT
 WOHA Architects Pte Ltd
STRUCTURAL CONSULTANT
 RSP Architects Planners & Engineers (Pte) Ltd
M&E CONSULTANT
 Surbana Jurong Consultants Pte Ltd
DESIGN AND BUILD CONTRACTOR
 Dragages Singapore Pte Ltd



Oasis Primary School
 Institutional Buildings Category

TOP OF THE CLASS

The upgraded Oasis Primary School was designed to sport a welcoming, cheerful and colourful atmosphere for students and staff. Extensive use of precast parts at various areas such as the classroom block, multi-purpose hall, indoor sports hall and administration block reduced onsite labour and maximised productivity. Metal roofing on steel trusses was used, with steel sections optimised and prefabricated for easy onsite assembly. Because tiling works were laid over the structural floor, there was no need for screeding, which saved time. As for walls, the team opted for drywalls that could be erected easily as internal walls between classrooms. Also, instead of copper pipes, PEX flexible water pipes were used, simplifying plumbing connection works. For more collaborative and precise planning, the project team used BIM to enhance visualisation of building details.

DEVELOPER
 Ministry of Education
ARCHITECTURAL CONSULTANT
 VivATA Pte Ltd
STRUCTURAL CONSULTANT
 DE Consultants (S) Pte Ltd
M&E CONSULTANT
 PTP Engineers Pte Ltd
DESIGN AND BUILD CONTRACTOR
 Kwan Yong Construction Pte Ltd



Yishun Community Hospital
 Institutional Buildings Category

CLEANER, FASTER, SMARTER

Due to the hospital's proximity to Khoo Teck Puat Hospital and residential buildings, it was important for construction to be completed on time, and with minimal noise and dust emissions. Using the Precast Column Structural Steel System (PCSS), columns and steel beams were fabricated offsite, increasing site productivity and quality of construction. With high-strength concrete, less concrete was required, which reduced the weight of overall PCSS superstructure works. Makibee fire-proof covering material was used instead of conventional fire-protection spray (vermiculite) steel beams. This enabled mechanical & electrical, installation and architectural works to be carried out concurrently. It also created a healthier work environment as it does not produce dust from vermiculite. Top-down construction was used for the basement, where superstructure and excavation works took place simultaneously. This method not only eliminated extensive strutting and ground anchor works; it also provided better control of ground movement during excavation. BIM, used throughout the conceptualisation to downstream operation stages, was instrumental in the team's success.

DEVELOPER'S AGENT
 MOH Holdings Pte Ltd
ARCHITECTURAL CONSULTANT
 CIAP Architects Pte Ltd
STRUCTURAL CONSULTANT
 Beca Carter Hollings & Ferner (S.E. Asia) Pte Ltd
M&E CONSULTANT
 Parsons Brinckerhoff Pte Ltd
BUILDER
 Kimly-Shimizu Joint Venture



Design and Construction of Station at Bukit Panjang and Tunnels for Downtown Line Stage 2
 Civil Engineering Category

GOING DEEP

This \$504 million construction project comprised the design, construction and completion of the Bukit Panjang Downtown Line Station and its connecting tunnels. Initially, three stages of traffic diversions were required for waterpipe- and manhole-related works, but the design and implementation of a roundabout allowed the works to be completed in a single stage. Excavation works were accelerated, thanks to the adoption of Electronic Deck Blasting, a technique that has a depth of charge twice that of Normal Electronic Blasting. The team used a spray-applied waterproofing membrane to expedite waterproofing works for the station, tunnel walls and roof slab. BIM enabled clearer communication of construction design concepts to all stakeholders and seamless collaboration for design issues, thus reducing the need for reworks during the construction process.

DEVELOPER
 Land Transport Authority (LTA)
ARCHITECTURAL CONSULTANT
 SAA Architects Pte Ltd
STRUCTURAL CONSULTANT
 T.Y.LIN International Pte Ltd
COLLABORATING STRUCTURAL CONSULTANT
 LSW Consulting Engineers Pte Ltd
M&E CONSULTANT
 Rankine&Hill (Singapore) Pte Ltd
DESIGN AND BUILD CONTRACTOR
 Lum Chang Building Contractors Pte Ltd

MAKING BIMPACT!

LEARNING INSTITUTIONS ARE GROOMING MIGHTY TALENTS IN BUILDING INFORMATION MODELLING (BIM).

BIM is changing the way we build. The intelligent 3D modelling technology enables project teams and stakeholders to visualise the building process and collaborate seamlessly. Find out how two schools in Singapore are equipping future built environment talents with BIM skills.

BIM MODULES @ SP

School: Singapore Polytechnic
Programme: Diploma in Architecture (DARCH)
Aim: To equip DARCH students with the latest pioneering techniques and skills to support the architectural industry.



Preparation for BIM adoption started as early as 2008, where DARCH sent its teaching staff for training and competitions to understand the technology enough to integrate BIM into the curriculum. Three years later, the school's foresight was proven accurate when BCA identified BIM as "a key driver

to improve the level of integration and collaboration across the various disciplines in the construction value chain". That was when the school started to push for the full integration of BIM into its curriculum, to equip students with future-ready skills.

Today, trained by BIM managers, Year 2 and 3 students use BIM extensively as their primary modelling and visualisation tool for projects. The school also encourages students to participate in competitions, and works with industry partners to give students opportunities to gain real life BIM skills outside the classroom.



"In the future, the construction industry will fully adopt BIM as a way of collaboration and modelling. Learning BIM will help youth prepare for this."

Mathew Tee
Year 3 Student

"The biggest takeaway from the BIM modules is understanding the latest technologies and trends in architecture. I also have learnt the importance of having accurate information across all construction departments. BIM also improves working efficiency and accuracy as buildings are visualised with details before they are constructed."

Chen RanZhe
Year 3 Student

BIM MODULES @ SIT

The SIE (Building Services) programme is the first of its kind to be offered by an autonomous university in Singapore.

School: Singapore Institute of Technology
Programme: Sustainable Infrastructure Engineering (SIE) (Building Services)
Aim: To groom its students to be both practice-oriented and industry ready for the built environment.

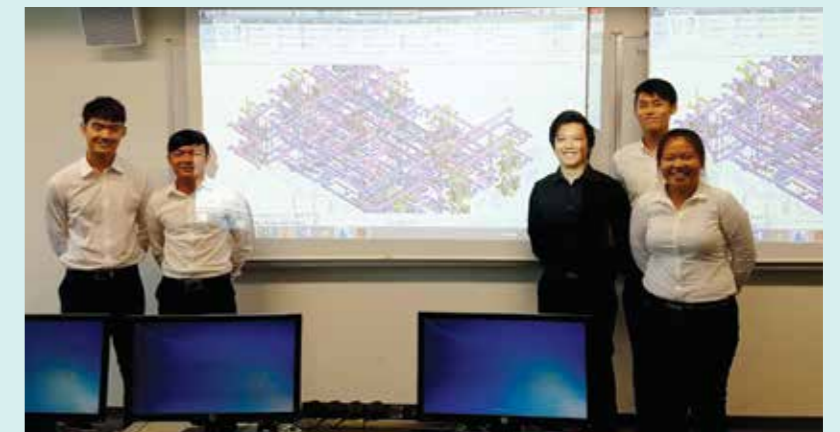
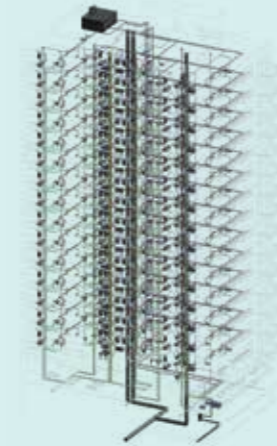
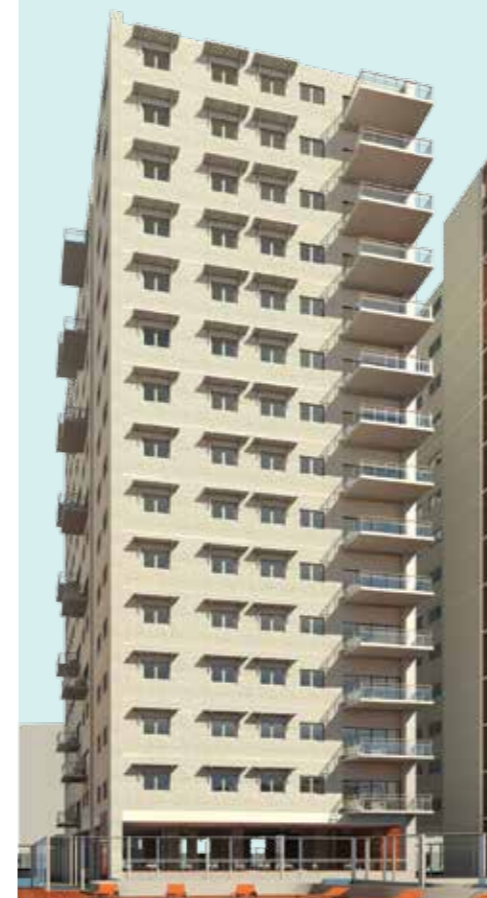
The highlight of the course is BIM but students are also trained in areas of Efficient Energy Management, Heating, Ventilation and Air Conditioning, Indoor Environmental Quality, Human Health and Comfort and Sustainable Building Engineering. Modules are taught through a blended learning approach – a combination of lectures, hands-on computer lab sessions, project assignments and guest lectures by industry practitioners. Students also participate in BIM-related research projects. The programme's 12-month Integrated Work Study Programme (IWSP) comes with the opportunity to apply BIM skills in real life industry projects – an excellent way to aid students in their transition to the workforce where experience with BIM at work will be a definite edge.

"By learning BIM, we will be able to contribute even more to the industry. BIM helps to minimise the chance of missing information when the drawing is being handed over. This results in a smoother construction process as well as higher-performance buildings."

Lau Jun Kang
Year 2 Student

"Learning BIM enhances our creativity in building and managing buildings. This would entice youths like ourselves to explore more possibilities in construction, engineering and architecture."

Meredith Wee
Year 2 Student



BIM RESEARCH PROJECT @ SIT

School: Singapore Institute of Technology
Programme: Integrated Modelling of CityGML and IFC for City/Neighbourhood Development
Aim: Six Year 2 students from SIE (Building Services)



Thanks to the BIM-related research projects available in this programme, six students got to put the BIM skills they learnt in class to the test. Under the guidance of Principal Investigator Assistant Professor Steve Kardinal Jusuf and Professional Officer/Researcher Ms Gaelle Godfroid, the

students designed a 3D model of an HDB block using BIM software like Revit and ArchiCAD, based on a site survey. While the group faced some challenges, these aspiring building professionals agreed that they gleaned knowledge and skills which would benefit them in their future careers.



“I learned a new set of BIM software skills which will be useful when I’m applying for related jobs in future. This project was no doubt a valuable experience.”

Nurul Dinayah Bte Baharudin
Year 2 Student

“The lessons allow us to gain prior knowledge on how the different BIM software complement one another to provide information at all stages of the construction process.”

Mandy Wong
Year 2 Student



Over 2,000 students are trained in BIM each year.

Today, BIM is taught at ITE, Diploma and Master degree levels, to equip new entrants to the industry with necessary BIM skills.

6 WAYS TO FIND OUT MORE ABOUT CPCF FUNDING AND BENEFITS

Since 2010, over 9,000 construction companies have benefited from BCA's Construction Productivity and Capability Fund (CPCF). The \$800 million fund comprises incentive schemes that help companies develop their workforce, adopt innovative technologies, and acquire new capabilities to support Singapore's built environment vision of achieving 20% to 30% improvement in construction productivity by 2020. BCA runs an extensive outreach campaign, in collaboration with industry partners and contractors, to help more companies get on board for a win-win outcome.

Get all your CPCF questions answered, connect and share with your industry peers and get face-to-face with the funding experts. Check these out!



1. MONTHLY PRODUCTIVITY CLINICS

Co-organised by BCA and Singapore Contractors Associations Limited (SCAL)

Talk to the experts one-on-one and find out how and which funding schemes can help you defray costs and boost productivity. Slots are limited, so sign up early!

Check out the next monthly session at <https://www.scal.com.sg/events-details/BCA-SCAL-Productivity-Clinic/>



2. SMART BUILDERS LEADERSHIP SERIES

Organised by BCA

Looking for new technology? Find out about the latest productive equipment and technologies in our bi-annual Smart Builders Leadership Series.

Find out more: <https://www.bca.gov.sg/sbls/>





3. SHARING SESSIONS WITH STAS

Join in specialised presentations, networking and discussions with people from your industry and see how you can boost your productivity and workforce capabilities with CPCF. Only for Specialists Trade Association of Singapore (STAS) members.

Find out more: <http://stas.com.sg>



4. MEET BUSINESS ADVISORS

Make an appointment with a Business Advisor at one of SPRING Singapore's SME centres. Having helped many other SMEs with CPCF, your Advisor will know what's best for you.

Find out more:
www.smeportal.sg/content/sme-centre/en/locate-sme-centres.html



5. MAIN CONTRACTOR – SUB-CONTRACTORS' SHARING SESSIONS

These regular meetings bring contractors together to learn more about CPCF funding schemes and discuss productivity-related matters with BCA officers. If you are a main contractor who would like to help your sub-contractors become more productive, do contact us to arrange for a sharing session.

Find out more: [Please drop an email to bca_MechC@bca.gov.sg to find out more.](mailto:bca_MechC@bca.gov.sg)



6. PRODUCTIVITY GALLERY TOUR



See productivity solutions unfold before your eyes. The Gallery has multiple zones, with the Construction zone featuring labour-saving technologies, equipment and systems. Here, you'll also learn about the success stories of other firms and find out how you too, can optimise efficiency with CPCF.

Learn how technologies like Building Information Modelling (BIM) enable industry practitioners to build virtually before the actual construction.

Explore the various types of Design for Manufacturing and Assembly (DfMA) technologies that can reduce manpower and time needed for construction, and improve safety and quality control.

Find out more about the types of equipment available in the built environment sector that can increase onsite productivity and efficiency.

Address: BCA Academy, 200 Braddell Road, Singapore 579700
 (Please register your visit at least three days in advance.
 Email bca_productivity_gallery@bca.gov.sg to register.)

Find out more:
www.bca.gov.sg/constructionproductivitygallery



GET SUPPORT

FUNDING SCHEMES FOR TECHNOLOGY ADOPTION

FUNDING SCHEME	WHAT IS IT?	SUPPORT LEVEL
BUILDING INFORMATION MODEL (BIM) FUND	To help firms build up collaboration capabilities for BIM by defraying costs for training, consultancy, software and hardware.	Up to S\$30,000 per applicant
MECHANISATION CREDIT (MECHC)	To help contractors defray costs for leasing and purchase of equipment that enhance productivity.	Up to S\$100,000
PRODUCTIVITY IMPROVEMENT PROJECTS (PIP)	To encourage firms to re-engineer site processes or adopt labour-efficient construction technologies to improve site productivity.	Up to S\$10 million per application

"BCA's MechC scheme is beneficial for small and medium-sized enterprises (SMEs), as it supports us financially as we mechanise our work processes. After the sharing sessions, we have seen some of our sub-contractors expressing interest in the MechC scheme. We have also heard that one of them has recently purchased a machine which greatly improved his team's productivity."

Vincent Law
 Purchasing Director
 H P Construction & Engineering Pte Ltd

2ND SESSION OF THE PUBLIC SECTOR PRODUCTIVITY LEADERSHIP SERIES

THE FUTURE OF CONSTRUCTION IS HERE

The second PSPL session showcased developments that have successfully adopted DfMA and BIM-VDC technologies for a leaner, faster and more sustainable way to build.

The PSPL Series – Knowledge-Sharing for Public Agencies and Project Partners

When: 3 May 2017

Where: HDB Hub Convention Centre

More than 500 participants from public and private sector firms attended the second edition of the Public Sector Productivity Leadership (PSPL) series. With an attendance figure close to 70% higher than that of the successful inaugural event held in January, the second session showcased a diverse range of developments using DfMA technologies, such as Prefabricated Pre-finished Volumetric Construction (PPVC) and structural steel systems, which utilise prefabrication and automation to bring more work offsite. Benefits of Building Information Modelling (BIM) and Virtual Design and Construction (VDC) for infrastructure works were also highlighted. These include better visualisation, collaboration, planning and execution of construction projects with enhanced efficiency and minimised potential for rework.



Speakers (from left to right): Mr David Cho, Er Loh Kar Kheng, Mr Tan Cheow Kiak, Mr Ang Lian Aik, Ms Huang Yixiang, Mr Bhvanesvaran Muthu, Er Leow Yung Guan.

Here are the event highlights:

Key Messages from then-BCA CEO Dr John Keung

New High-End DfMA Projects Under Way

Public agencies have earmarked close to 40 projects for the adoption of higher-end DfMA technologies which include PPVC, structural steel and Mass Engineered Timber. This follows the Singapore Government's initiatives to create more opportunities and resolve regulatory hurdles in building a strong supply capacity and capabilities for DfMA adoption in the industry.

Enhancements to the Buildable Design Appraisal System (BDAS)

Changes, including raising minimum buildability standards and introduction of mandatory adoption of productive technologies, encourage more to develop building infrastructure designs that place greater emphasis on the DfMA approach.

New \$150 Million Public Sector Construction Productivity Fund (PSCPF)

Public agencies can get funding support for procuring innovative and productive solutions including DfMA technologies through the PSCPF. The Fund aims to create a strong demand for such technologies, and enable new solutions to enter and gain traction in the market.

\$800 Million to Drive Productivity and Capability

The Construction Productivity and Capabilities Fund (CPCF) offers private sector companies various incentive schemes that help develop workforce capabilities and acquire innovative solutions in their DfMA adoption journeys.

SHARING HOW THEY DID IT AND WHAT THEY LEARNED

BCA, as well as building and construction industry experts took the stage to share their experiences, knowledge and ideas on DfMA and BIM-VDC.



Engineer Leow Yung Guan, Deputy Director, HDB



Mr Bhvanesvaran Muthu, General Manager, Teambuild Construction



Ms Huang Yixiang, Deputy Director, BCA



Mr Tan Cheow Kiak, Project Director, Woh Hup

HDB and Teambuild Share their Productivity Journeys

Deputy Director of Housing Development Board (HDB) Er Leow Yung Guan shared HDB's efforts in increasing construction productivity for public housing developments through the adoption of DfMA, BIM and robotics. He also presented HDB's productivity milestones, from modularisation and standardisation in the 1970s to the more advanced PPVC projects today.

Teambuild Construction, one of the first in Singapore to adopt concrete PPVC systems, recounted its experience of designing and producing PPVC systems. Using case studies of the company's past projects, Mr Bhvanesvaran Muthu, General Manager, spoke on how the company went from first to the current third generation system. He also elaborated on the improved design and productivity observed with each upgrade.

Driving BIM-VDC Technologies in Singapore

Building technologies such as BIM-VDC have improved construction productivity as well as collaboration across the construction chain. Ms Huang Yixiang, Deputy Director of BCA, emphasised the benefits of BIM-VDC and spoke about BCA's efforts to drive such implementation in the industry.

Mr Tan Cheow Kiak, Project Director of Woh Hup, then took the stage to share his company's experience with BIM-VDC. Using Woh Hup's Tanjong Katong MRT Station project as a case study, he explained how adopting this collaborative 3-D visualisation modelling technology helped to ease site planning for congested areas.



Engineer Loh Kar Kheng, Vice President, CPG Consultants



Mr David Cho, Vice President, Samsung C & T

Reinforcing Productivity Efforts with Structural Steel

Vice President of CPG Consultants Er Loh Kar Kheng and Vice President of Samsung C&T Mr David Cho explained how using a structural steel system plays a part in smarter and faster construction, using their ongoing construction project for the new State Court complex as a case study. The pair also shared on how this technique helps to improve site safety and minimise inconvenience to the public.

Panel Discussion: A Lively Exchange of Knowledge and Ideas on DfMA and BIM-VDC

Participants engaged in a dialogue session where they raised key questions about productivity technologies to the panel of experts. One of which was on the cost premium of adopting these technologies. In response, Mr Bhvanesvaran of Teambuild highlighted the option of having production factories outside of Singapore to defray PPVC adoption costs, while Mr David of Samsung C&T advised firms to consider the potential benefits such as significant time and manpower savings. Mr Tan Cheow Kiak, representing Woh Hup, added that the company saw substantial value in utilising the BIM technologies and thus invested in building up its in-house BIM capability spearheaded by 13 BIM managers.

UPSKILLING WORKERS: GOING ABOVE AND BEYOND



Some companies are going the distance in building their pool of highly-skilled workers. Here's why.

A multi-year journey to grow Singapore's construction workforce into a highly-skilled one is transforming the building sector. We look back at the two-year upgrading phase from 1 January 2015 to 31 December 2016, where companies were required to upskill at least 10% of their Basic Skilled (R2) Work Permit Holders (WPHs) to Higher Skilled (R1) status. More than 10,400 firms had upgraded over 80,000 workers within that period. Three companies tell us about the support they received in their upskilling efforts, the benefits that manifested, and why they strive to do even more.



"We are now able to build up our pool of CoreTrade workers. This has and will further improve our site productivity."

Ms Kinki Loh

Senior HR Executive
Kay-Link Construction Pte Ltd



"We recognise raising our workers' competencies as a strategy to stay competitive in this challenging economy, and will continue upgrading our workforce."

Ms Juslene Aw

Group HR & Admin Manager
Kok Tong Construction Pte Ltd



"Funding support from the WTU Scheme, lower levy rates and the longer allowable employment period for R1 workers were a great help in our upskilling efforts!"

Ms Goh Pei Shan

Admin & HR Manager
Koh Kock Leong Enterprise Pte Ltd

Raised Capabilities, Better Retention

The training and skills assessment programmes necessary to upgrade an R2 WPH to R1 status typically cost around \$1,000. To help firms defray the costs of upskilling their workers, BCA's Workforce Training & Upgrading (WTU) Scheme co-funds up to 80% of the course and testing fees. And Kay-Link Construction Pte Ltd (Kay-Link) is among over 9,000 construction companies in Singapore that have utilised the funding support and seen productivity benefits unfold.

Having more R1 WPHs was a great boon for the company as it helped in retaining higher-skilled workers, says Ms Kinki Loh, Kay-Link's Senior HR Executive. Thanks to the 22-year allowable employment period for R1 WPHs (compared to 10 years for most R2 WPHs), Kay-Link is able to retain its trained and experienced workers for longer periods. "Our site productivity has improved, as our skilled and experienced workers are better able to guide their newer co-workers with the site work," adds Ms Loh.

Kay-Link has already upskilled 25% of its workforce, a figure far beyond the minimum requirements. However, having seen the returns, the company is set to enhance its workers' capabilities even more.

Higher Competencies, More Savings

Earthworks specialist Kok Tong Construction Pte Ltd (KTC) has seen improved productivity since it upgraded some of its workers' capabilities.

According to its Group HR & Admin Manager Ms Juslene Aw, work is now delivered with better quality, which reduces construction time and wastage of materials. Ms Aw also shares that KTC is now able to deploy its R1 workers more flexibly, as they are now skilled in more areas of work. On top of productivity improvements, the company saw cost savings – thanks to levy savings of up to \$400 per R1 worker per month, adds Miss Aw.

It's no surprise that KTC is looking forward to upskill even more of its R2 workforce. Moving on, the company hopes to upgrade the capabilities of 100 to 200 of its workers every year.

Stronger Workforce, Bigger Projects

Civil engineering firm Koh Kock Leong Enterprise Pte Ltd (KKL) upgraded a quarter of its R2 workforce over the two-year upgrading phase – which was beyond the 10% minimum requirement.

Ms Goh Pei Shan, KKL's Admin & HR Manager, cites the WTU's co-funding scheme for course fees, and reduced levies and longer maximum employment periods for R1 workers as the company's top motivations for taking the leap.

This upgrade exercise is a boon for KKL, as it better able to meet its customers' requirements on deploying CoreTrade workers onsite, for projects that require manpower with specific skills.

Minimum R1 Requirement in a Nutshell

You might have heard much about this over the past two years, but here's a quick recap.

1. Construction firms were required to upskill at least 10% of their R2 WPHs to R1 status by the end of 2016.

2. Criteria for skill upgrade include:

- Local construction experience
- Skills assessment
- Fixed monthly salary of at least \$1,600

CRITERIA	CORETRADE SCHEME	MULTI-SKILLING SCHEME		DIRECT R1 SCHEME	MARKET BASED SKILLED FRAMEWORK
		SKILLED BASED	NON-SKILLED BASED		
WORK EXPERIENCE (CONSTRUCTION SECTOR)	4 years	4 years	6 years	Not applicable	6 years
SKILLS ASSESSMENT (TEST)	Passed	Passed	Completed ² selected safety courses	Passed ³ at higher skilled level	Not applicable
FIXED MONTHLY SALARY ¹	Not applicable	Not applicable	Not applicable	\$1,600	\$1,600

¹ "Fixed monthly salary" means the sum of basic monthly salary and fixed monthly allowances.

² Completed 120 hours of training in approved safety-related courses OR obtained WSQ Advanced Certificate in Workplace Safety & Health

³ SEC (K) or equivalent trade test

3. Firms face these implications if they fail to meet the R1 requirements:

- From Jan 17: Will not be allowed to hire new R2 WPHs
- From Jan 18: Will not be allowed to renew existing R2 work permits, plus the above implication
- From Jan 19: Will be required to release excess R2 WPHs, plus the above implications

Have questions about the Minimum R1 Requirement?

Find out how you can get help.



1 Visit the Ministry of Manpower's 'Work Permit Online for businesses and employment agencies' portal

Here, you can track the number of workers you need to upgrade, as well as the status of your R1 workers. <http://www.mom.gov.sg/eservices/services/wp-online-for-businesses-and-employment-agencies>

2 Find out from BCA

Need clarifications on upgrading your workforce? Find out more from this resource guide https://www.bca.gov.sg/CoreTrade/others/Upgrade&RetainYourWorkers_27102015.pdf or email BCA_enquiry@bca.gov.sg to get your doubts cleared!



NO.	DATES	EVENT	VENUE	ORGANISER	CONTACT PERSON & DETAILS		
1	25 Aug 2017 29 Sep 2017 14:00 - 17:00	BCA - SCAL Productivity Clinic	Singapore Contractors Association Limited (SCAL) Construction House, 1 Bukit Merah Lane 2, Singapore 159760	BCA and SCAL	Ms Jeanette 6278 9577 jeanette@scal.com.sg		
2	26 & 27 Sep 2017	BIM Quantity Take Off	BCA Academy, 200 Braddell Road	BCA Academy	Corporate Services (Marketing) 6248 9824 bca_academy@bca.gov.sg		
3	27 - 29 Sep 2017	Project Management					
4	29 Sep 2017	Advanced Construction Technology - Innovative Prestressed Support (IPS) NEW					
5	2 - 5 Oct 2017	Certification Course in BIM Management					
6	6 Oct 2017	Inter-Agency Coordinating Committee (IACC) Engagement Seminar 2017 NEW Updates on Recent Changes in Regulations & New Policies					
7	3 Oct - 14 Nov 2017 (12 evenings)	Project Management for Professionals in the Building and Construction Industry					
8	17 Oct 2017	Experiential Workshop	The Wisteria	BCA	BCA_SCPW@bca.gov.sg		
9	23 Oct 2017	Workshop on Regional Perspectives in Design for Manufacturing and Assembly (DfMA)	BCA Academy, 200 Braddell Road				
10	24 Oct 2017	Official opening ceremony of the Singapore Construction Productivity Week (SCPW) 2017	Singapore EXPO				
11	24 Oct 2017	SCPW 2017: BIM Awards Ceremony					
12	24 Oct 2017	SCPW 2017: International BIM Competition Prize Presentation					
13	24 - 26 Oct 2017	SCPW 2017: BuildTech Asia and Guided Tours				BCA and Sphere Exhibits buildtechasia@sph.com.sg	
14		SCPW 2017: Productivity Technology (ProTech)				BCA BCA_SCPW@bca.gov.sg	
15		SCPW 2017: SCAL Productivity & Innovation Awards (PIA)				BCA and SCAL BCA_SCPW@bca.gov.sg	
16	24 & 25 Oct 2017	SCPW 2017: Build Smart Conference				BCA	BCA_SCPW@bca.gov.sg
17	25 Oct 2017	SCPW 2017: National BIM Shoot-Out Prize Presentation					
18	25 Oct 2017	SCPW 2017: Institutes of Higher Learning (IHL) Productivity Workshop					
19	25 Oct 2017	SCPW 2017: Good Quality Practices Workshop					
20	26 Oct 2017	SCPW 2017: IHL Productivity Race					
21	26 Oct 2017	SCPW 2017: IHL Productivity Challenge Prize Presentation					
22	26 Oct 2017	SCPW 2017: SCAL Built Environment Summit		SCAL			
23	1 & 2 Nov 2017	Managing Project Teams Effectively	BCA Academy	Corporate Services (Marketing) 6248 9824 bca_academy@bca.gov.sg			
24	7 Nov 2017	Good Industry Practices (Drywall Installation including Wet Areas Application)					
25	14 Nov 2017	Good Industry Practices (Timber Flooring)					
26	Starting in Jan 2018 (Application closing on 27 Oct 2017)	Specialist Diploma in Virtual Design & Construction					
27	Starting in Jan 2018 (Application closing on 27 Oct 2017)	Specialist Diploma in Lean Construction			BCA Academy, 200 Braddell Road		
28	Starting in Jan 2018 (Application closing on 27 Oct 2017)	Specialist Diploma in Design for Manufacturing & Assembly	BCA - University of Newcastle	Ms Bernice Ang (Programme) / Ms Zhuo Xiuyun (Enrolment) 6248 9944 / 6248 9881 bernice_ang@bca.gov.sg / zhuo_xiuyun@bca.gov.sg			
29	(Full-time - 10th Intake) Starting on in Oct 2017 Application closing date: 8 Sep 2017	Bachelor of Construction Management (Building) (Honours)_FULL TIME (awarded by The University of Newcastle, Australia)					



SINGAPORE CONSTRUCTION PRODUCTIVITY WEEK 2017

Embracing Innovation, BUILDING OUR FUTURE

24 - 26 OCT 2017
SINGAPORE EXPO HALL 3 & MAX ATRIA

For more details on SCPW, scan:



SAVE THE DATE

2017 KEY EVENTS

SCPW Official Opening Ceremony

Build Smart Conference
• A key conference featuring topics on construction productivity and digital transformation of the industry

SCAL Built Environment Summit 2017
• A conference by SCAL to share on the future of construction and the roles of the leaders across the built environment value chain as Singapore prepares for the future economy

24 Oct
TUE

25 Oct
WED

26 Oct
THU

BuildTech Asia
• A leading regional trade show for the building and construction industry

BuildTech Asia Guided Tours
• Personalised guided tours of BuildTech Asia organised for industry leaders, Government agencies, overseas delegates and students from Institutes of Higher Learning

Productivity Technology (ProTech) Demonstration
• A showcase of Modular Prefabricated Mechanical, Electrical and Plumbing (MEP) systems

Good Quality Practices Workshop & Exhibit
• A workshop on good practices in the industry and showcase of projects with good CONQUAS (Construction Quality Assessment System (Singapore)) scores

Experiential Workshop is on 17 Oct *Pre-event*
• An experience sharing session including sharing by project team and site visits to local Prefabricated Prefinished Volumetric Construction (PPVC) project adopting game changing technologies.

International Events



Government BIM Symposium 2017

(By invitation only)

• The Government BIM Symposium 2017 aims provides a platform for government bodies around the world to share about their BIM implementation strategies and experiences.

A Regional Perspective on DfMA

• Happening on 23 October, this SCPW pre-event engages international experts and industry stakeholders in a knowledge sharing workshop on DfMA technologies.

Events for IHLs (Institutes of Higher Learning)



• SCPW provides engaging and interactive platforms to instill productivity awareness among tertiary students and help them identify productive technologies and systems

Productivity Race & Productivity Challenge

Productivity Workshop & Tour

International BIM Competition

National BIM Shoot-Out

Organised by



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CONSTRUCTION PRODUCTIVITY AND CAPABILITY FUND (CPCF)



WORKFORCE TRAINING AND UPGRADING (WTU) SCHEME

Facilitates upgrading of workforce at all levels by co-funding up to 90% of the cost for selected skills assessment and training courses*



MECHANISATION CREDIT (MECHC) SCHEME

Provides assistance to builders to defray up to 70% of equipment costs*



PRODUCTIVITY INNOVATION PROJECT (PIP) SCHEME

Provides assistance to companies to defray up to 70% of the cost for adopting more productive work processes*



SCHOLARSHIP AND SPONSORSHIP PROGRAMMES

In partnership with built environment firms, BCA will co-fund scholarship and sponsorship programmes at the undergraduate, diploma, ITE, supervisory and foreman levels*



BUILDING INFORMATION MODELLING (BIM) FUND

Co-funds up to 70% of the supportable cost incurred by firms when leveraging BIM technology to improve multi-disciplinary collaboration*

**Terms and conditions apply.*

For more information, please visit www.bca.gov.sg/CPCF/cpcf.html