

SPEECH BY BCA CEO DR. JOHN KEUNG AT THE SPM-UNISIM PROFESSIONAL TALK SERIES ON 4 JUNE 2015

Ladies and gentlemen,

1. A very good evening to you. I am very pleased to be given the opportunity in this forum to share with you some of the key challenges we face in getting our built environment future ready, and why we need to change the way we build to better meet Singapore's future needs.

2 For the last eight years or so, the built environment sector experienced a prolonged boom with construction demand more than doubled that of 10 to 15 years ago. Our construction demand reached a record high at \$38 billion last year and a projected demand of between \$26 billion to \$37 billion per year is expected for the next 5 years. This will be supported by major healthcare and infrastructure projects that are aimed at enhancing the lives of Singaporeans.

3. To support this sustained growth of the built environment sector, we must build up a competent workforce. We need to entice new entrants and talents to join the industry. While BCA has been working tirelessly with the industry associations and the educational institutions from secondary schools, ITEs, polytechnics and the universities to attract more local talent into the built environment sector, it is equally important for our built environment firms to offer a better working environment, good HR practices and career progression to retain them in our sector.

4. What then must we do to make our sector more appealing to the next generation, besides rewarding careers and good HR practices? How do we inspire the next generation to take up challenging careers in our sector? I do not have all the answers but there are a few fundamental issues that we must address as an industry. Let me elaborate.

Challenge Number One: Environmental Responsibility

5. Challenge number one. The built environment sector needs to discharge its environmental responsibility. We need to do our part to ensure that our buildings and infrastructure, new and existing, are environmentally-friendly. BCA launched the Green Mark Scheme in 2005 as an assessment system to rate the environmental friendliness of buildings. Since then, our efforts have borne fruit.

6. The number of green building projects in Singapore has grown to more than 2,300 now. This translates to about 70 million square metres of gross floor area, or equivalent to 27% of the total built-up area in Singapore. We are probably the few cities in the world, if not the only one, that have “greened” more than a quarter of its entire building stock. We have set a target of greening 80% of our entire building stock by 2030 and we are definitely on track to meeting the goal.

7. With the concerted effort of the industry, Singapore has been recognised as a regional leader, if not a global one, in the green building movement in the span of less than 10 years. In 2010, BCA became the first government agency outside of North America to be conferred the prestigious **Aspen Institute's Energy and Environment Award for our Green Building Masterplan**. In 2011, BCA bagged the inaugural Regional Leadership Award from the World Green Building Council.

8. In the Asian Green City Index 2011 established by The Economist, Singapore is **ranked 1st among cities in Asia for overall environmental performance**. Singapore is also the first country out of America and Europe to be conferred the prestigious International Star (I-Star) for Energy Efficiency Award in 2013 by the Alliance to Save Energy (ASE) as a result of our drive for green buildings and sustainable construction.

9. Our efforts on environment sustainability did not stop at the building and its performance. Minimising the impact of construction work on the surroundings is equally important. We introduced the Green and Gracious Builder Scheme in 2009 with the intent to raise the environmental consciousness and professionalism of our builders. Builders are encouraged to adopt environmental friendly and considerate construction practices to mitigate the impact caused by construction work on the environment and on the neighbourhood. Going forward, this will gain much greater importance as we build and redevelop in close proximity to existing neighbourhoods.

Challenge Number Two: Social Responsibility

10. **Challenge number two. The built environment sector needs to discharge its social responsibility.** As you know, Singapore is facing a silver tsunami – a fast greying population as our baby boomers enter their silver years. Coupled with a low birth rate, this means one in five residents will be above the age of 65 by 2030.

11. As we prepare for this unprecedented demographic challenge, an accessible and user-friendly built environment for the elderly and persons with different mobility needs becomes critically important as we aspire to be an inclusive and liveable city, such that no one gets left behind.

12. To this end, we need to move beyond accessibility and focus on Universal Design (UD), or design for everyone. In order to be a fully inclusive city accessible to all, accessibility must transcend buildings to include barrier-free connectivity between buildings, landscapes and to various transport nodes. Hence, we really need to look into good and inclusive design in all aspects of our built environment, which is the basic principle of UD. It is our duty as built environment professionals to ensure that everyone can move around independently with dignity, taking part in community activities, irrespective of their mobility needs.

Challenge Number Three: Growth and Survival of Singapore

13. **Challenge Number three.** The built environment sector has to create space for future growth and provide protection for the long term survival of our city-state, in the face of **rising sea level, land scarcity and population growth**. There is a limit to how much taller we can build or how much more space we can create through reclamation.

14. We are now actively looking at downward expansion, as in underground development. Our buildings have already gone deeper. For example, ION Orchard has four levels of basement; Jewel Changi Airport which is currently under construction will span five basements. In fact, we have ventured even deeper – the Jurong Rock Cavern located on Jurong Island, which is as high as a 9-storey building, lies 130 metres beneath.

15. Going forward, we need to build a more extensive network of underground facilities. This will bring about immense challenges to the technical expertise and creativity of our built environment professionals.

16. That's not all. With global warming and the threat in rising sea level in the long run, we are also gearing up our coastal protection efforts. We are in the process of carrying out studies to assess the impact of rising sea level on Singapore and what can be done to fortify our coastline and our city-state against this longer term threat.

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Challenge Number Four: Info-comm Technology and the Smart Nation

17. **Challenge Number four.** The built environment sector needs to harness the power of information technology in future-proofing our built environment. Over the past 10 years, information technology (IT) has transformed our world and the way we work.

18. Microsoft made computers accessible to all, Apple redefined mobile technology and the proliferation of social media is transforming the social landscape and the way in which we communicate. IT has also changed the way we work – with laptops, smartphones and tablets. We are now able to work anytime and anywhere, overcoming temporal and geographical boundaries without losing connectivity. We have driverless trains. Now, driverless cars are also being tested.

19. We witnessed how IT has revolutionised the computer industry, the communications industry and the transport industry; what about the built environment industry? Well, the short answer is Info-comm Technology (or ICT) has the potential to make every city smarter.

20. Technology, particularly information technology, is key to the “Smart City” concept which embraces the use of ICT tools to make the city a more inclusive, sustainable and liveable one. A Smart City consists of infrastructure fitted with sensors that

can communicate remotely with other connected devices. Together, these connected devices form the vast Internet of Things (IoT).

21. IoT is a computing concept that describes a future where every day physical objects embedded with connectivity will be connected to the Internet and are able to identify themselves to other devices.

22. It is with the IoT in mind that Singapore gears up to be the first Smart Nation in the world – a nation where people live meaningful and fulfilled lives, enabled seamlessly by technology.

23. However, we cannot have a Smart Nation without Smart Buildings. So, as far as the built environment sector is concerned, where do we start?

24. Well, first thing first – 3D Building Information Modelling (BIM for short). BIM now provides a common platform that enables all data to be stored in a cloud, to ensure all team members have access to the latest updates.

25 Through 3D BIM, it identifies potential clashes, minimises abortive work and increases efficiency, thus allowing construction to reach new heights in collaboration. Upon project completion, such benefits will then be passed on to clients as the product that they will receive is an information-rich building. This will assist facilities management and operation over the life-cycle of the building.

26. Understanding such productivity benefits for the entire value chain, BCA has incentivised the industry to adopt BIM and also made it mandatory for design submissions for new buildings to use BIM since July 2013. Going forward, we will work with the industry to encourage the adoption of

collaborative BIM and Virtual Design and Construction (VDC) to make full use of the power of ICT in our sector.

27. Indeed, since last year, the BCA Academy has started to run VDC courses for CEOs and the technical professionals in the built environment sector with the Stanford University's Centre for Integrated Facility Engineering (CIFE). We intend to train up hundreds, if not thousands, in the industry to build up our info-comm capability for a smart construction sector.

Challenge Number Five: Changing the Way we Build

28. **Challenge number five.** The built environment sector needs to change the way we build. Ever since the first Construction Productivity Roadmap was launched in 2011, we have seen improvement in adoption rates for key productive technologies, including drywall, system formwork, prefab structural and wall systems. The Construction Productivity and Capability Fund (CPCF) saw more than \$280 million of funding support being committed, benefitting almost 6,000 firms.

29. Site productivity, which is defined as the floor area completed per manday, has also been improving at an increasing rate - an average of 1.4% per year for the last four years. This also translates into manpower and construction time savings at the project level. Taken together, these trends demonstrate that the industry is responding positively to the measures under the 1st Roadmap.

30. Just three months ago, **BCA launched the second Construction Productivity Roadmap with two key focus areas – higher capital investment and a higher quality workforce.** The second Roadmap also comes with the 2nd tranche of the CPCF -- **\$450 million for the next three years.**

31. While we still encourage a higher degree of technological adoption on-site, the second Roadmap pushes for a much wider adoption of off-site manufacturing and on-site assembly, or Design for Manufacturing and Assembly (DfMA).

32. DfMA covers a wide continuum of prefabrication. At the lower end, we have components such as wall systems including drywall and precast walls – resulting in trade level savings. Volari is an example of a residential project that adopted such components – with 65% manpower savings at trade level for drywall, and another 50% manpower savings at trade level for precast wall.

33. Moving further up the spectrum, we have integrated components such as Prefabricated Bathroom Units bringing together more than 13 trades into a controlled manufacturing environment. Manpower savings of up to 60% can be achieved at the trade level, across multiple trades, as can be seen in projects like H2O Residences and Serangoon @ Haus.

34. At the highest end of the continuum, fully integrated components, or Prefabricated Pre-finished Volumetric Construction (PPVC) modules, can be manufactured in factories complete with internal finishes, fixtures and fittings.

These modules are then transported to site to be installed in a Lego-like manner, resulting in up to 40% manpower savings achieved at the project level. Such improvement at the project level is much more impactful than having improvement in just some trades in a project.

35. To get the industry to step up on capital investment and push for DfMA, we adopted a two-prong approach. Firstly, the public sector which makes up half of the construction demand for the next five years, must take the lead. Secondly, we will encourage greater private sector adoption through incentives and other measures.

36. For the public sector, the concept of DfMA is not new. HDB has led the advent of precast since the 1970s. In more recent years, it has adopted precast facades with cast-in windows, drywalls and is now moving towards volumetric construction. NTU is one of the leaders adopting PPVC in the on-going NTU North Hill Hostel project, and could also be the

first to adopt Cross Laminate Timber (CLT) for its sports hall. LTA is another progressive agency that adopts prefabrication for its projects, ranging from tunnels to depots. More recently, they are also piloting trenchless construction using a non-circular Tunnel Boring Machine in pedestrian subways.

37. BCA collaborates with all these major public agencies closely to develop and customise their respective productivity roadmaps. With these roadmaps, these agencies could take a proactive approach to achieve productivity improvements and adopt game-changing technologies where feasible.

38. In addition to the roadmaps, it is also necessary to place greater emphasis on productivity in public procurement. Public procurement rules have been and are being tweaked to give tendering advantage to progressive consultants and builders where productivity components in their tender submissions will now carry much more weight at the expense of price.

39. That's not all. Let me cite another example. Developers are now required to adopt specific productive technologies for projects on Government Land Sales (GLS) sites. Currently, Prefab Bathrooms have already been made mandatory for all residential GLS sites. Last year, we have released the first two GLS sites with mandatory PPVC adoption, one at Yishun and the other at Jurong West. Meanwhile, it is heartening that progressive developers such as City Developments Limited are also introducing the use of PPVC in its new executive condominium project, The Brownstone.

40. We will continue to work with other agencies and roll out more government land sale sites for such developments. PPVC is expected to bring productivity improvements of up to 30-50% in terms of manpower and time savings at the overall project level. It will also bring about greater automation, hence more stringent quality control, whilst introducing intangible benefits like the reduction of dis-amenities such as noise and dust during construction, safer workplaces and better quality homes.

41. Such game-changing technology will effectively transform the way construction is carried out. Other innovations that may potentially change the way construction is done today include construction robotics (tiling robots), 3D printing, and even the Unmanned Aerial Vehicle (UAV) equipped with video cameras. Such cameras can help us perform visual analytics of site progress, safety monitoring, quality control, activity analysis, amongst many other uses.

42. However, technology adoption is only part of the story. To sustain the movement of changing the way we build, we need people, talents and professionals.

43. We will need to bring in more young talents to be industry change leaders. In the last few years, we brought in more than 1,500 locals for the industry to take up built environment courses and careers through the scholarship and sponsorship programmes at undergraduate, diploma and ITE levels.

44. We will continue to work with industry partners to attract even more to join and stay on in built environment careers. For the next three years, we intend to bring in another 2,000 local talents into the industry. At the worker level, we will also provide funding support to speed up the upgrading of our basic-skill workers to higher-skill R1 workers to anchor the workforce.

Conclusion

45. In conclusion, for Construction 2020, I have outlined the 5 key challenges facing the built environment sector. Our sector has to discharge its primary environmental and social responsibilities. It has to create space and safeguard for the future growth and long-term survival of Singapore. It also has to harness the full power of info-comm technology and change the way we build. I believe these are also the very challenges that could inspire our next generation to take up a career in the built environment sector.

46. Indeed, the built environment that we see today is not something that happened by chance. It is the relentless effort of thousands and thousands of professionals and workers working diligently to make it a reality within a generation. If we want to continue to make Singapore a liveable and vibrant city that is well known internationally and one where our future generations call home, we have to keep up our efforts to future-proof our built environment.

Thank you.