

## TO ACES MEMBERS

7 Sep 2022

### **[for support, pls] Launch of Built Environment Industry Transformation Map (BE ITM)**

ACES is pleased to support the refreshed Built Environment Industry Transformation Map to build a world-class and resilient sector. In order to achieve this, we have to work in close partnership and collaboration with government agencies, developers, contractors, trade associations, institutions of higher learning, unions and other industry firms. Consulting engineers are key stakeholders crucial in this endeavor. We look forward to active participation and contribution from all members to drive integrated planning and design, advanced manufacturing and assembly, sustainable urban systems and create good jobs to attract and retain talents in our industry.

We are pleased to append the joint message from Minister Desmond Lee, Senior Minister of State Tan Kiat How, Future Economy Council (FEC) Urban Systems Cluster Co-Chair Liam Wee Sin and BCA CEO Kelvin Wong on the refreshed BE ITM below for your reading.

Thank You & Best Regards

**Er. Chuck Kho, ACES President | Association of Consulting Engineers Singapore | Tel: 6659 5023 | 18 Sin Ming Lane #06-01 Midview City Singapore 573960 | Email: [secretariat@aces.org.sg](mailto:secretariat@aces.org.sg) | Website: [www.aces.org.sg](http://www.aces.org.sg)**



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# BUILT ENVIRONMENT INDUSTRY TRANSFORMATION MAP

*A message from*



**Desmond Lee**  
Minister for National  
Development & Minister-in-  
charge of Social Services  
Integration



**Tan Kiat How**  
Senior Minister of State,  
Ministry of Communications  
and Information & Ministry of  
National Development, and  
FEC US Cluster Co-Chair



**Liam Wee Sin**  
Group CEO, UOL Group and  
FEC US Cluster Co-Chair



**Kelvin Wong**  
CEO, Building and  
Construction Authority

Dear Partners,

The Built Environment (BE) sector has come a long way from battling the COVID-19 pandemic and dealing with global disruptions over the past two years. Construction activity has resumed to close to pre-COVID levels, and the manpower situation has stabilised. There are several exciting, large-scale projects in the pipeline including the new Changi Airport Terminal 5 and the Paya Lebar Airbase as shared by PM Lee at the National Day Rally. The BE sector will play a crucial role in realising these plans. We are also on track to meet the projected construction demand of between S\$27 billion and S\$32 billion this year. This was possible because of the close partnership between the Government and industry partners, as well as between various stakeholders along the BE value chain.

Even as we tackled the challenges posed by COVID-19, it is important for all of us to build upon the hard-earned lessons learnt during the pandemic and press on with transformation efforts. We have made good progress under our existing efforts to transform the Construction and Facilities Management (FM) industries to be more productive and sustainable. These will stand us in good stead as we continue to reduce our reliance on migrant workers performing manpower-intensive jobs, and create good jobs to attract and retain local talent. To this end, BCA has been working with industry firms, trade associations, institutions of higher learning (IHLs), unions and government agencies to refresh our sector's transformation plans.

**The refreshed Built Environment Industry Transformation Map (BE ITM)** brings the transformation plans for the Construction and FM industries under one BE umbrella. We envision **an advanced, integrated and sustainable BE sector, comprising progressive and collaborative firms, and offering quality jobs, supported by a competent Singaporean core**. In our conversations with industry partners, stakeholders have affirmed the importance of a building lifecycle approach towards transformation, and the need to strengthen collaboration across the value chain to achieve this.

We would also like to take this chance to express our gratitude to the many partners and leaders in industry who have contributed to these efforts. In particular, we would like to thank the Future Economy Council (FEC) Urban Systems Cluster Sub-Committee for overseeing and providing valuable guidance and inputs.

We encourage all industry partners, big and small, to embark on this journey with us. The refreshed BE ITM sets out our areas of focus for the medium-term, and how we will work with all of you to achieve our shared vision. We hope that you will see the ITM as a roadmap of opportunities for you to achieve transformational growth in the years ahead. Details on the BE ITM are in the subsequent pages of this mailer.

Thank you.

**OPENING ADDRESS BY MR DESMOND LEE, MINISTER FOR NATIONAL DEVELOPMENT AND MINISTER-IN-CHARGE OF SOCIAL SERVICES INTEGRATION, AT THE OPENING CEREMONY OF THE INTERNATIONAL BUILT ENVIRONMENT WEEK 2022 ON TUESDAY, 6 SEPTEMBER 2022, AT 9:00AM**

Distinguished guests

Friends, colleagues in the Built Environment sector

Ladies and gentleman

**Introduction**

1. Good morning, and a warm welcome to the International Built Environment Week 2022. I am very glad that many industry leaders, innovators, and partners are joining us, both in person as well as online, for this year's conference. It is good to see everyone, including our friends from overseas, in-person for today's event. It has been some three years since we were able to organise a physical IBEW of this scale.
2. This year's IBEW theme, "Accelerating transformation, Growing together", sets out our ambition for the way forward as we emerge from the challenges caused by COVID-19 and press on with industry transformation.

**Recovery of the BE sector**

3. But let me first begin by acknowledging that the last few years have been very difficult for all of us in the Built Environment sector. The pandemic had posed tremendous challenges, including manpower shortages, project disruptions, and cost increases and so on. It has been tough on all of us – consultants, developers, contractors, suppliers and others.
4. In Singapore, we were able to weather the storm together through close partnership and mutual support. For example, contractors implemented safe management measures quickly. Developers leaned forward to support their value chain. Consultants put in additional effort to coordinate projects and keep them going amid the tremendous challenges. The Government also implemented many support measures, such as the \$1.36 billion Construction Support Package, the Jobs Support Scheme, and unprecedented legislative intervention to keep the

industry going – for example, we imposed moratorium on legal proceedings, we mandated extension of time, we required cost sharing, and so on.

5. Our combined efforts and sacrifices and a lot of dialogues during the pandemic have resulted in encouraging signs of recovery. Construction activity has returned close to pre-COVID levels, and the manpower situation has stabilised. We are also on track to achieve BCA's projected demand of S\$27 billion to S\$32 billion this year. We are not out of the woods yet, and there are still a lot of stress in the sector.

### **Impetus for transformation**

6. There will be both headwinds and opportunities in the road ahead. As a small city-state with an open economy, we will be affected by growing geopolitical tensions, inflation, and supply chain disruptions all around the world. Furthermore, the threat of climate change is an existential issue for Singapore. That said, there are also many exciting projects in the pipeline for BE firms to explore new ways of working together and invest in the next bound of transformation. We will undertake large-scale projects in Changi Airport, Jurong Lake District, Greater Southern Waterfront, and the Paya Lebar Airbase. Some of you are already involved in the long-term concept planning for these areas.
7. Our ongoing efforts to transform will stand us in good stead as we navigate the upcoming challenges and opportunities. We worked with you to develop and launch the Construction Industry Transformation Map (ITM) back in 2017. Since then, we have made progress across all three key transformation areas in the ITM – Design for Manufacturing and Assembly (DfMA), Integrated Digital Delivery (IDD) and the push for Green Buildings.
8. DfMA and IDD have helped progressive firms mitigate the impact of the pandemic over the past two years. For example, contractors who embraced DfMA technologies were able to minimise the impact of manpower shortages and deliver projects on time. Consultants who used digital tools could collaborate seamlessly when physical meetings were not feasible. Their ability to use these technologies were driven by the fact that they and their teams in the value chain have a deep level of trust and understanding; they basically know how one another operate and have a sense of give and take, and therefore were able to make use of these tools up and down the value chain.
9. We have also raised our sustainability ambitions for the built environment, in support of the Singapore Green Plan and our net zero aspirations. Last year, we launched the latest edition of the Singapore Green Building Masterplan and set ourselves ambitious targets to accelerate the decarbonisation of our built environment. We are also happy to share our experience in sustainable

development with our international partners. I am glad to witness the signing of a Memorandum of Understanding on green buildings, between our local organisations and their Malaysian counterparts later this morning.

10. But, we want to do even better. The pandemic has prompted us to review and adjust our approach towards transforming the industry. So even as we dealt with the painful struggles during the pandemic, we wasted no time and thought about how we could hoist in the lessons from COVID-19 and position all of us in the Built Environment sector more strongly for the future, and how the sector can continue to contribute to a sustainable, inclusive, and liveable Singapore, and create good jobs for Singaporeans.
11. Over the last two years, Mr Liam Wee Sin, Group CEO of UOL Group Limited, and my colleague, Senior Minister of State Tan Kiat How, have held meetings with many of you to discuss these issues, in person as well as virtually. They spoke to architects, engineers, quantity surveyors, developers, builders, subcontractors, facilities managers, as well as those from institutes of higher learning and our trade and professional associations. I would like to thank Wee Sin and Kiat How for their unwavering dedication, and also to everyone who contributed your time and shared your views and expertise at these sessions. Your insights have helped us better understand the challenges faced by the sector. And your ideas have helped to chart the way forward.

### **Refreshed BE ITM**

12. In particular, what you have affirmed is the importance of transformation and collaboration throughout the Built Environment value chain. In fact, the Built Environment sector is different from other sectors of the economy – it is one that is long and inter-related and requires a deep vein of trust running through from end to end for projects to succeed. It is only when all stakeholders – whether you are a developer, designer, builder, or facilities manager – commit to transforming together that we can achieve decisive change. This will also allow us to maximise synergies and reap the full benefits of digitalisation, productivity, and sustainability as a sector.
13. This is a key concept in the refreshed BE ITM that we are launching this morning. We are not starting from scratch. This refreshed Built Environment Industry Transformation Map builds on the progress that we have made under the Construction ITM and our Facilities Management (FM) transformation plans. But we will now do much more to integrate all of these efforts, and adopt a building lifecycle approach towards transformation. Let me share these plans that we develop collectively as a sector, not by the Government alone, but by the Government in close partnership with the industry, academia, researchers and our

union leaders. Let me illustrate what we mean by adopting a lifecycle building approach to transforming our sector.

### **Transforming planning and design**

14. First, we looked at the **planning phase**. We found that we can do more to create the right environment for collaboration before work even begins. We launched the Construction ITM in 2017 and I was involved in that. Upon rolling it out and getting feedback, we realised that to be able to make plans at the earlier stages, we need to make sure the environment is right for collaboration.
15. That is why we are encouraging the industry to adopt collaborative contracting practices. This involves a re-design of conventional contracts to incentivise parties to work together and develop joint solutions to meet shared project goals. In doing so, we aim to build trust and facilitate more equitable risk-sharing between stakeholders. Some of our public sector projects, such as the JTC Punggol Digital District project, are already piloting aspects of collaborative contracting. These contracts include clauses that establish regular workshops and meetings as well as early warning mechanisms to strengthen communication between stakeholders. These encourage and enable upstream identification of issues and provide a platform to facilitate joint problem solving and faster dispute resolution. To date, seven agencies have identified nine upcoming public sector projects to pilot collaborative contracting.
16. This is new to many of us, but it has been practised in some other jurisdiction with good results. Many of you say it ultimately depends on your relationship with the parties who you are working with. The feedback we have gotten is that the way in which you structure your contract through relationships and legal relationships, can foster or impede the establishment of such relationships.
17. Then, we moved on to the **design phase**. Under the Construction ITM, we promoted the adoption of technologies, such as 3D Building Information Modelling (BIM). Consultants could collaborate with each other to produce detailed BIM models, which could then be passed on to contractors and even facilities managers to guide construction and maintenance. This process is enabled by what we call a “digital spine”, linking stakeholders throughout the project, or by way of what we call integrated digital delivery (IDD).
18. That is the theory. But we found that the data standards used by different parties along the value chain were sometimes incompatible, not interoperable. This created extra work in “translating” the data for different purposes. Or worse, you create one model, you junk it and create another one for another purpose.

19. Hence, we have worked with the industry to develop Common Data Environment (CDE) data standards for all Built Environment stakeholders to adopt. We were tussling between being overly descriptive and getting locked in by certain platforms and technologies, versus being so open to the market and as a result we have all sorts of interoperable issues and not being able to maximise this digitalisation effort. So, we will drive the adoption of these standards through the new CORENET X platform, which we are currently working on. All BIM submissions for development projects via CORENET X will be required to comply with these standards. I spoke about CORENET X at IBEW last year, and you can look forward to the launch of this new system in the second half of next year. We expect to increase our IDD adoption rate by Gross Floor Area (GFA) for new developments from 34% today to 70% by 2025.
20. There is already evidence that adopting a more integrated approach to design has great potential for the sector. For instance, Penta-Ocean Construction and Arup are the contractor and consultant for JTC's Offshore Marine Centre 2 project. Both parties standardised the information requirements and data environment for the project right at the start. This was facilitated by digital delivery specialists, such as Ms Michelle Lee. As a Digital Delivery Manager with Penta-Ocean Construction, Michelle helped to establish a Common Data Environment not only between the builder and the consultant, but also with the project's facilities managers further downstream. Ultimately, this allowed the facilities managers to provide early inputs to the design to enhance the practical maintainability of the building, and the builder to take quick, precise information from the BIM model directly from Arup for construction planning.
21. In sum, we can achieve more by working together upstream to optimise downstream processes in construction and maintenance. This is our first key transformation area, or what we call "integrated planning and design".

### **Transforming construction**

22. Next, let's look at the **construction phase**. Firms that have leveraged DfMA technologies such as Prefabricated Prefinished Volumetric Construction (PPVC) have produced some good results. Hence, we will continue to mainstream DfMA as the default method of construction.
23. That is why we have enhanced the Buildability Framework over the years and raised our requirements to promote the use manpower-efficient designs and technologies. We must do so. We aim to be less reliant on low-skill foreign manpower and really go upskill and up the value chain in construction technology. Our latest move is to require all large building projects to adopt DfMA technologies from April this year.

24. We will also continue to support you in this DfMA journey. You will not walk alone. For instance, we recently extended the Productivity Innovation Project (PIP) scheme, which co-funds up to 70% of the cost premium of DfMA technologies. This includes funding for equipment and systems required in Integrated Construction Prefabrication Hubs, or ICPHs. Firms can continue applying for support under PIP until March 2024. These measures will help us increase of DfMA adoption by GFA from 44% today to 70% by 2025.
25. However, we can do more to maximise the benefits of shifting construction activities to off-site, factory-like settings. For example, we can incorporate more automation and robotics into the production of precast and PPVC modules, to deliver greater manpower savings and achieve even higher productivity. So in addition to pushing for DfMA, we want to strive for “**advanced manufacturing and assembly**”, which is our second key area for transformation.
26. We want to enable this via establishing Integrated Construction Parks, or ICPs, in Singapore. ICPs will co-locate different construction facilities such as the aggregate terminals, aggregate storage yards, Ready-Mix Concrete (RMC) batching plants and ICPHs. By bringing these facilities closer together, co-locating them together, we can achieve greater efficiencies in producing construction components. For instance, raw materials like cement, sand and granite can be transported to the RMC batching plants using mechanised conveyor systems, rather than hauling them across the island in lots of vehicles. This saves time and money, and I am sure that the different people running the different aspects of the ICPs can work together, plan together and coordinate together for maximum effect. Production facilities such as ICPHs will be allocated a longer tenure than typical traditional yards, so that the operators can invest in advanced technologies to operate in a much more productive manner.
27. We will be trialling the ICP concept at Jurong Port (JP) before looking into how this concept can be further replicated in other locations. The Jurong Port Integrated Construction Park will progressively begin operations at the end of this year.

### **Transforming operations and maintenance**

28. Last but not least, we looked into **the operations and maintenance** of buildings. This part of the building lifecycle is often overlooked, even though it encompasses most of a building’s lifespan. As our buildings age, we will need to do more to upkeep them to ensure that they continue to be safe to use and remain energy efficient. We will also need to address the challenges of our ageing workforce.
29. One way to achieve all of these aims is to adopt Smart FM technologies. For instance, Smart FM sensors can track and optimise the use of resources including



energy and water. They can also provide immediate and detailed information on incidents for facilities managers to respond to in a timely manner. In fact, with data and sensors, with predictive technologies and machine learning, you can aim to intervene and prevent downtime.

30. The Government will continue to take the lead on this front by adopting Smart FM in our public buildings. Under the first Construction ITM, we had initially set a target for 25% of public buildings by GFA to adopt Smart FM by 2025, and 50% by 2030. We have decided to aim for a more ambitious target of 80% of public buildings adopting Smart FM by 2030. In addition, we are setting a new target for 40% of private buildings by GFA to adopt Smart FM by 2030.
31. There are also opportunities to leverage Smart FM technologies to do more. FM firms can harness efficiencies from managing different FM services on an integrated platform, and aggregating FM services across different buildings. This is what we call Integrated FM (IFM) and Aggregated FM (AFM).
32. While IFM and AFM adoption are still nascent regionally, some of our local stakeholders have already taken bold steps to stay ahead of the curve because they know this is the way to go. One example is Certis, one of our first movers. It has implemented IFM in the management of Jewel at Changi Airport. Jewel has complex operations, being co-located with one of the busiest airports in the world and having unique features such as an indoor forest and a giant waterfall vortex. But Jewel's maintenance team is kept lean and efficient through the integration of security, building maintenance and guest services through Certis's integrated platform. This allows professionals such as Rajesh S/O Kantilal Rashiwala, a Smart Operations Centre Operator, to monitor the status of all building facilities through the platform and direct FM, security, or guest services to respond to any issues that might arise. To our overseas friends, I hope you can find some time to visit Jewel while you are here, or check-in early on your flight home and spend some time at Jewel.
33. To firms that are keen to develop IFM and AFM capabilities, I am pleased to share that the \$30 million IFM and AFM grant that we announced in Parliament earlier this year is open for applications from today. Interested building owners and FM firms can approach BCA for more details on how to apply.
34. As we improve building management via IFM and AFM, and lower building emissions with our moves under the Singapore Green Building Masterplan, we aim to create "**sustainable urban systems**". This is our third key area for transformation.

### **A value-chain approach for driving transformation**

35. I have shared the specific strategies and measures that we will implement at different stages of the building lifecycle. But we will need to adopt a more ambitious approach in transforming the value chain as a whole, and push for best-in-class outcomes in projects.
36. Last year, I shared that the Government was developing a scheme to facilitate value chain transformation across the Built Environment sector, called the **Growth and Transformation Scheme**, or GTS. This is to encourage developers and their value chain partners of consultants, contractors and sub-contractors to adopt a longer-term view to strengthen capabilities and working relationships over multiple projects. This is both novel and complex. There is a need to navigate different business priorities, practices, and capabilities across various stakeholders.
37. Over the past year, we have worked with developers who have expressed interest in the GTS to refine the scheme further. Together, we have developed a set of outcomes that GTS projects will need to meet. For instance, alliances under the GTS will need to adopt advanced construction methods and digital technologies and achieve 35% in site productivity gains over 2010 levels. This is about double the current industry average. They must also achieve at least 20% in productivity gains from the adoption of advanced FM technologies. In addition, they need to attain the Green Mark Platinum Super Low Energy Standard for their projects and incorporate maintainability considerations in building designs.
38. Beyond meeting best-in-class project outcomes, GTS alliances will also need to implement workforce development initiatives across their value chain. This includes identifying the gaps and opportunities in firms' HR capabilities and putting in place measures to attract and retain talent.
39. BCA will continue to work with interested developers and their value chain partners on potential needle-moving initiatives under GTS, and firm up the alliances in due course. Do approach my colleagues in BCA to find out more about GTS and the value chain approach for transformation.

### **Vision for the BE Sector**

40. Before I conclude, let me summarise what we hope to achieve with our refreshed BE ITM. It is a set of strategies, developed by us collectively, that will guide the development of our Built Environment sector in the years to come. It is also a roadmap of opportunities that all firms, big or small, can look forward to.
41. Through the Built Environment ITM, we aim to build up a sector that is productive and resilient, contributes a more sustainable environment that promotes well-being

and combats climate change, and possesses deep capabilities to support our domestic demands, as well as those of international markets in time to come.

42. These outcomes can only be realised if all stakeholders in our sector commit to transformation together. I am encouraged that there are already many passionate people leading the charge today. In fact, we are recognising four projects that have attained high standards in sustainability, productivity, and digitalisation with the new Built Environment Transformation Award today. To the teams and leaders involved in these projects, I commend you for taking bold, decisive actions to innovate and build up new capabilities in the sector. You have certainly set a high bar for all of us to follow.

43. On our part, the Government will be there to support you along the way, whether by driving lead demand through public sector projects, or providing incentives and grants to spur transformation.

### **Conclusion**

44. In conclusion, I would like to thank the IBEW team from BCA and our partners for putting together an exciting line-up of activities this week. I am confident that the talks by the industry experts will inspire new ideas and provoke some of us to take action. Please visit the BCA booth at the exhibition hall on the ground floor to find more about on the refreshed BE ITM.

45. I look forward to your continued partnership as we accelerate our transformation efforts. It has been a tough two years, but those two years have not been spent in vain. Through the trials and turbulations, through the deepest moments of the crisis that our construction sector faced, I would like to believe that we have built a deeper relationship and understanding of one another, and a common recognition that for our sector to be able to not just do well, but also to weather future crises of this scale or bigger, we need to transform, we need to make use of digitalisation, underpinned ultimately by human factors, like trust, understanding, collaboration and the sense that we can only succeed if we work together.

46. To our overseas friends, we also invite you to explore opportunities with us as our BE sector continues to grow, mature, and innovate.

47. With this, I wish everyone a fruitful and rewarding International Built Environment Week 2022. Thank you and have a good day.

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