

MEDIA RELEASE

BCA CONTINUES ITS DIGITALISATION PUSH WITH INDUSTRY PARTNERS

- *BCA launches an implementation plan for Integrated Digital Delivery (IDD) which fully integrates building processes and stakeholders to transform the way we build*
- *40-60 IDD projects to be implemented by 2020, involving at least 150 Singapore-based firms and developing 300-400 IDD leaders in the process*
- *IMDA partners BCA to set aside S\$4million to support the development of digital platforms that will enable construction firms to digitalise and accelerate their IDD journeys*

Singapore, 14 November 2018 - The Building and Construction Authority (BCA) has launched an Integrated Digital Delivery (IDD) implementation plan ("Plan") to encourage more built environment sector firms to go digital. The Plan is the culmination of extensive consultation with the industry, with strategic guidance from the Future Economy Council (FEC) Built Environment Sub-Committee¹ and the IDD Steering Committee².

2 IDD involves built environment sector firms and professionals using ICT technologies, solutions and platforms across the entire building process from design, fabrication, to assembly on-site, as well as operations and maintenance of buildings. IDD builds on Building Information Modelling (BIM) and Virtual Design and Construction (VDC), which has been implemented in many projects in the past few years. It will bring about benefits such as improving collaboration between

¹ The Future Economy Council (FEC) was set up to drive the growth and transformation of Singapore's economy. The FEC Built Environment (BE) Sub-committee was set up to evaluate and oversee the implementation of ITMs within the built environment cluster.

² The IDD Steering Committee provides strategic direction and guidance on the development of IDD, as well as co-lead and drive the implementation of IDD initiatives

stakeholders, improving construction efficiency, minimising costly rework, and delivering smarter buildings.

The IDD Implementation Plan

3 The three focus areas under BCA's IDD Implementation Plan are:

- Raising awareness on the benefits of IDD through demonstration projects
- Developing the IDD ecosystem, with enabling solutions, platforms and standards
- Strengthening the industry's competency in IDD

4 With the Plan, BCA targets to implement 40 - 60 IDD projects by 2020, involving at least 150 Singapore-based firms competent in IDD and developing 300 - 400 IDD professionals in the process. *Details of the Plan are in Annex A.*

Demonstrating the benefits of IDD / Industry sharing

5 For a start, BCA has worked with leading developers to identify 12 projects which will be using IDD in their design, fabrication, construction and building maintenance. These 12 projects are "live" demonstrations to show how project stakeholders can reap the benefits of IDD. One featured project is the JTC Logistics Hub @ Gul (see Annex B). More details about the 12 projects can be found in Annex C.

Developing an ecosystem with shared platforms and standards

6 As IDD is heavily driven by ICT and data, there are a wide range of application software solutions for different project parties (e.g. architects, civil engineers etc) and collaboration platforms which enable them to share common information, and at different stages of a building's lifecycle.

7 BCA will promote the use of common standards to foster collaboration, and encourage the development of solutions for specific aspects of IDD as well as platforms that allow data to be imported and exported for use across different software tools. BCA will also encourage the solution providers and project firms to embark on

Research and Innovation projects and pilots to further improve IDD solutions, standards and platforms.

8 In addition, BCA and the Infocomm Media Development Authority (IMDA) have launched a S\$4-million joint call for the development of digital platforms for the built environment sector to support construction and technology firms. Such digital platforms would better connect different players in the ecosystem and offer potential for growth of new services and business models.

9 A technology platform infrastructure can create value by facilitating exchanges among its ecosystem of users throughout the building lifecycle including digital design, digital fabrication, construction and building maintenance. This will enable firms across the construction project-cycle to communicate and exchange information with various partners and innovate by pioneering new ways to work. More details of the grant call can be found in Annex D.

Enabling IDD for the Industry

10 To help the industry go digital with IDD, the BCA Academy is offering IDD-related training programmes at various levels. These training programmes will include the application of data analytics (e.g. analysis of data to identify bottlenecks), and artificial intelligence in construction (e.g. multiple design options - optimised based on the developer's requirements - can be quickly generated based on machine learning of previous designs). These courses will help equip building professionals in Singapore with the necessary skills and expertise to execute IDD projects. More information about the new jobs in the built environment can be found at Annex E.

11 In addition, BCA has also released two publications to guide the industry on IDD implementation:

- The IDD Leaders' Quick Start Guide for senior management of industry firms - this guide includes the definition, scope, and benefits of IDD, an IDD case study, and essential steps to start an IDD project. The Guide can be accessed at <https://bit.ly/2DirLiv>.

- The BIM Guide for Asset Information Delivery for industry professionals - this guide informs professionals about the data needed for asset delivery and management.

12 BCA CEO Mr Hugh Lim said, "The launch of the IDD Implementation Plan is a significant milestone for the Construction Industry Transformation Map (ITM). We hope industry partners and academia will fully support this digitalisation effort to reap the full benefits of IDD. With IDD, project stakeholders can collaborate better and achieve a higher level of integration than ever before through the use of ICT and data. IDD offers to put all stakeholders on the same page from the start to the end of the building life-cycle. It will also bring about new and better jobs for Singaporeans, allowing an integration of different disciplines such as architecture, engineering, manufacturing, facility management and ICT."

13 IDD was first introduced as a key transformation area for the Construction ITM in October 2017. BCA subsequently developed the IDD Implementation Plan through a series of industry engagements, coupled with strategic guidance from the FEC Built Environment Sub-Committee and IDD Steering Committee. The engagements were based on the recommendations of an International Panel of Experts, which comprised 25 experts in construction IT from Australia, China, Denmark, the Netherlands, the UK and Singapore.

Issued by the Building and Construction Authority on 14 November 2018

Enclosed:

Annex A: The Integrated Digital Delivery (IDD) Implementation Plan

Annex B: Featured project – JTC Logistics Hub

Annex C: IDD Implementation Plan: The 12 demonstration projects

Annex D: S\$4 million to develop Construction Digital Platforms

Annex E: New jobs in the built environment

About Building and Construction Authority (BCA)

The Building and Construction Authority (BCA) of Singapore champions the development of an excellent built environment for Singapore. BCA's mission is to shape a safe, high quality, sustainable and friendly built environment, as these are four key elements where BCA has a significant influence. In doing so, it aims to differentiate Singapore's built environment from those of other cities and contribute to a better quality of life for everyone in Singapore. Hence, its vision is to have "a future-ready built environment for Singapore". Together with its education arm, the BCA Academy, BCA works closely with its industry partners to develop skills and expertise that help shape a future-ready built environment for Singapore. For more information, visit www.bca.gov.sg.

About BuildSG

BuildSG seeks to partner stakeholders closely to co-implement the Construction ITM. Its name reflects our shared mission to build Singapore for the future, and the industry we need to achieve this. BuildSG will lay the groundwork for closer collaboration with the Trade Associations and Chambers (TACs), firms, institutes of higher learning (IHLs) and unions to realise the outcomes of the ITM. BuildSG started its operations in April 2018 and comprises three centres namely – iBuildSG, weBuildSG, and SGBuilds,

Annex A

The Integrated Digital Delivery (IDD) Implementation Plan

What is Integrated Digital Delivery?

Integrated Digital Delivery (IDD) refers to the use of digital technologies to integrate work processes and connect stakeholders working on the same project throughout the construction and building life-cycle.

IDD is one of the key thrusts in the ***Construction Industry Transformation Map (ITM)***, and is aligned to the nation's efforts in transforming its construction industry by creating a highly-skilled workforce trained in use of the latest architecture, engineering, construction and operations technologies.

IDD covers four areas:

- **Digital Design** - Professionals co-ordinate during the design stage of a project such that it meets their clients' and regulatory requirements. This can include walkthroughs of a project via augmented / virtual reality, and models (including detailed data) stored on a cloud platform for easy retrieval and real-time updates.
- **Digital Fabrication** - The specifications of the components, derived from the digital design of the project, are sent to the manufacturer's offsite for production / fabrication.
- **Digital Construction** - Components can be tracked before they are delivered just-in-time for installation onsite. Information about the exact location where they are to be hoisted and assembled can be accessed by any worker on site using a smart device.
- **Digital Management** - Once the project is completed, information (including digital models) of the project can be handed over to the facilities management team. The team will have access to the information about these components on cloud platforms for easy defect management or repairs.

Potential Benefits of IDD

Time savings: Shortens target construction period

Cost savings: Reduce waste and rework, and construction costs

Maximise Value: (for developers and building owners) Maximise saleable area or floor efficiency

Improve Safety: Improve the monitoring of a site's safety

Quality: More efficient quality inspections, improved rectification of defects and more efficient management of facility maintenance

Accuracy of information: Data is captured passed on to all stakeholders

IDD Implementation Plan

Annex A

The Integrated Digital Delivery (IDD) Implementation Plan

Action Plans	Initiatives
<p>1. Implement IDD through actual projects: To develop promote IDD knowledge expertise and applications to the industry through a series of actual demonstration projects</p> <p>Targets:</p> <ul style="list-style-type: none"> - 300-400 key personnel from 2018 - 2020 - IDD competencies in at least 150 firms through 40 to 60 IDD projects 	<p>The 12 demonstration projects (Details are at Annex C).</p> <p>Targeted at senior management of industry firms, an IDD Leaders' Quick Start Guide will include the definition, scope, and value of IDD, an IDD case study, and simple steps to start an IDD project. The Guide can be accessed at https://bit.ly/2DirLiv.</p>
<p>2. Develop IDD ecosystem, solutions and standards: To develop an IDD ecosystem with enabling solutions and standards</p>	<p>BCA and the Info-communications Media Development Authority (IMDA) will jointly launch a Grant Call for the development of Construction Digital Platforms (CDP).</p> <p>This Call will encourage tech firms to work with all BE firms – from design and fabrication, construction and delivery, to maintenance – to develop IDD platforms and solutions that can address challenges specifically for Singapore's built environment and further increase the benefits of IDD, as compared to commercially-available platforms and solutions which need further enhancements as they are developed for a global market and may not address local practices or processes.</p> <p>For industry professionals, BCA has published the BIM Guide for Asset Information Delivery which will inform them about how the final stage of the IDD (i.e. asset delivery and management) can be implemented.</p>
<p>3. Ramp up competency level: To accelerate the industry's competency in IDD.</p>	<p>BCA Academy has started a series of IDD-related courses and training programmes:</p>

Annex A

The Integrated Digital Delivery (IDD) Implementation Plan

	<ul style="list-style-type: none">• Imperial College London–BCA Executive Development Programme on Design for Manufacturing and Assembly (DfMA) and IDD Leadership• Masterclass in IDD through Computational BIM• Specialist Diploma in Computational BIM (Building)• BIM for Building Lifecycle and Facility Management• Principles & Application of Data Analytics
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Integrated Digital Delivery (IDD) Implementation at JTC Logistics Hub @ Gul

About JTC Logistics Hub @ Gul



A next-generation logistics facility co-locating container depots, warehouses and a heavy vehicle park

Targeted to be completed in middle of 2020, JTC Logistics Hub @ Gul is Singapore's first high-rise multi-tenant facility co-locating Inland Container Depots (ICDs), warehouses and a heavy vehicle park. The new integrated development is set to improve operational efficiency and productivity for logistics companies, thereby catalysing the growth and transformation of the logistics industry.

Creating an innovative logistics solution

JTC Logistics Hub @ Gul represents the Government's efforts in creating an innovative and sustainable infrastructure solution for the logistics industry. ICDs are traditionally located on large open yards to accommodate the handling of large numbers of containers. The co-location of ICD operators across multi-storey, high-rise Hub will increase land productivity.

The indoor facility enables all-weather operations. The high-specification facility also provides opportunities to deploy overhead crane installation that will result in more efficient processes for ICD operators, while ensuring a safer operating environment for workers.

Increasing operational efficiency and productivity of the logistics industry

The clustering of activities within a single development will reduce traveling time between heavy vehicle parks, ICDs and warehouses, which are typically located across different locations. This improves companies' operational efficiency and productivity, and reduces their transportation costs, while addressing the industry's shortage of drivers.

Promoting industry collaboration and integration

The clustering of ICD operators and logistics companies in the Logistics Hub promotes collaboration across the value-chain. This helps to enhance operational efficiency and competitiveness of the value-chain as a whole.

The Hub also provides smaller logistics players the opportunity to be part of an integrated ecosystem to tap industry linkages and develop innovative solutions to compete beyond cost.

Specifications

Site Area	5.8 ha
Gross Plot Area	2.4
Number of Storeys	Warehouse: 8 storeys Empty Container Storage: 2 storeys
Number of Units	30 Warehouses: 2,100 – 2,800 sqm Up to 2 container depot units with up to 6,000 TEUs per floor

About JTC and Integrated Digital Delivery (IDD)

Why is IDD important for JTC?

- JTC, as Singapore's lead industrial infrastructure developer, plans to leverage IDD to develop more sustainably, productively, safely and efficiently, as well as address challenges across the industrial infrastructure value chain.
- Through IDD, JTC aims to digitalise the information & activities across the industrial infrastructure value chain (Design, Construction, Operation).
- This allows JTC to perform data-driven decision making at the design, construction and operation stages of a building's life cycle.

How is JTC implementing IDD across the industrial infrastructure value chain?

- Two important facets of IDD implementation are the digitalisation of information and activities across the value chain, as well as the upskilling of manpower to support IDD.
- *End-to-End Digitalisation:* For IDD implementation, it is critical for a Common Data Environment to exist across the industrial infrastructure development value chain, i.e. Design, Construction and Operation, enabling the sharing & use of data & information across the value chain.
- *Upskilling of Manpower:* It is also critical to upskill our people and adapt our processes to implement IDD. This also includes stakeholders across the value chain, e.g. architects, builders, suppliers, contractors, etc.

What are some examples of IDD implementation in JTC Logistics Hub @ Gul?

i. Defect Management System

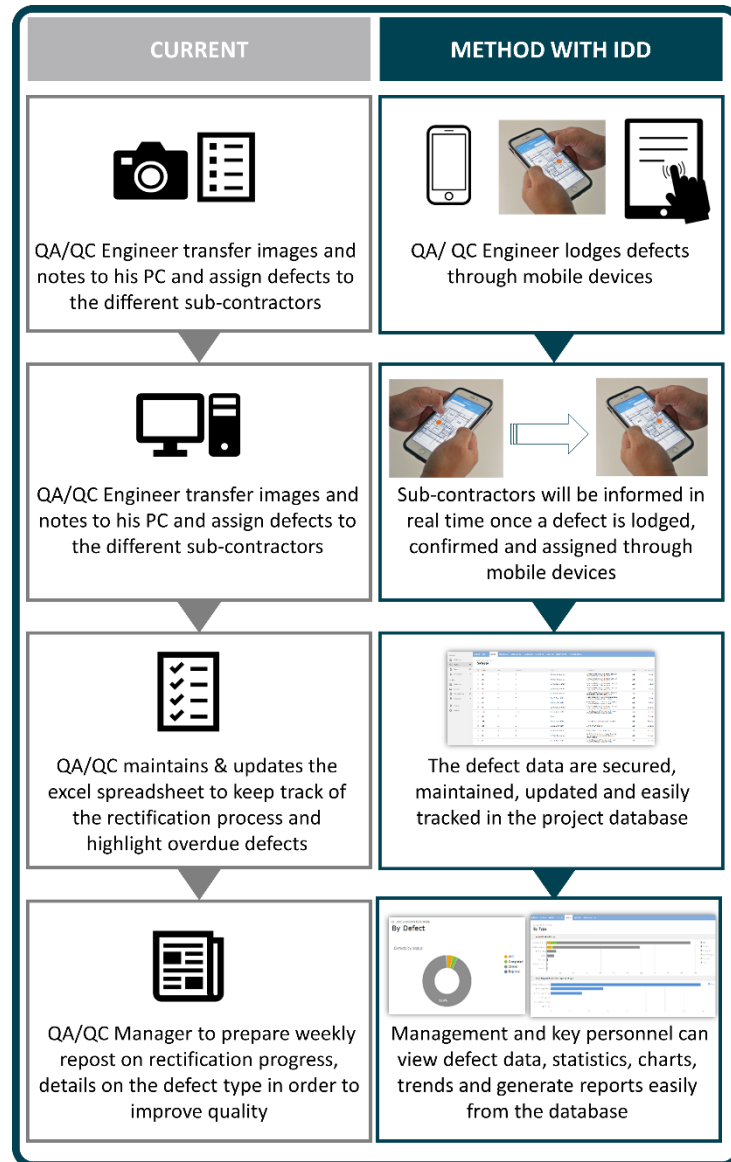
Digital and mobile-based defects management system that allows for real-time reporting, tracking and follow-up of defects at the construction site.

The benefits include:

- Easy steps to lodging quality related issues digitally – fast & more efficient;
- The generation of useful statistics use for analysis and planning purposes.

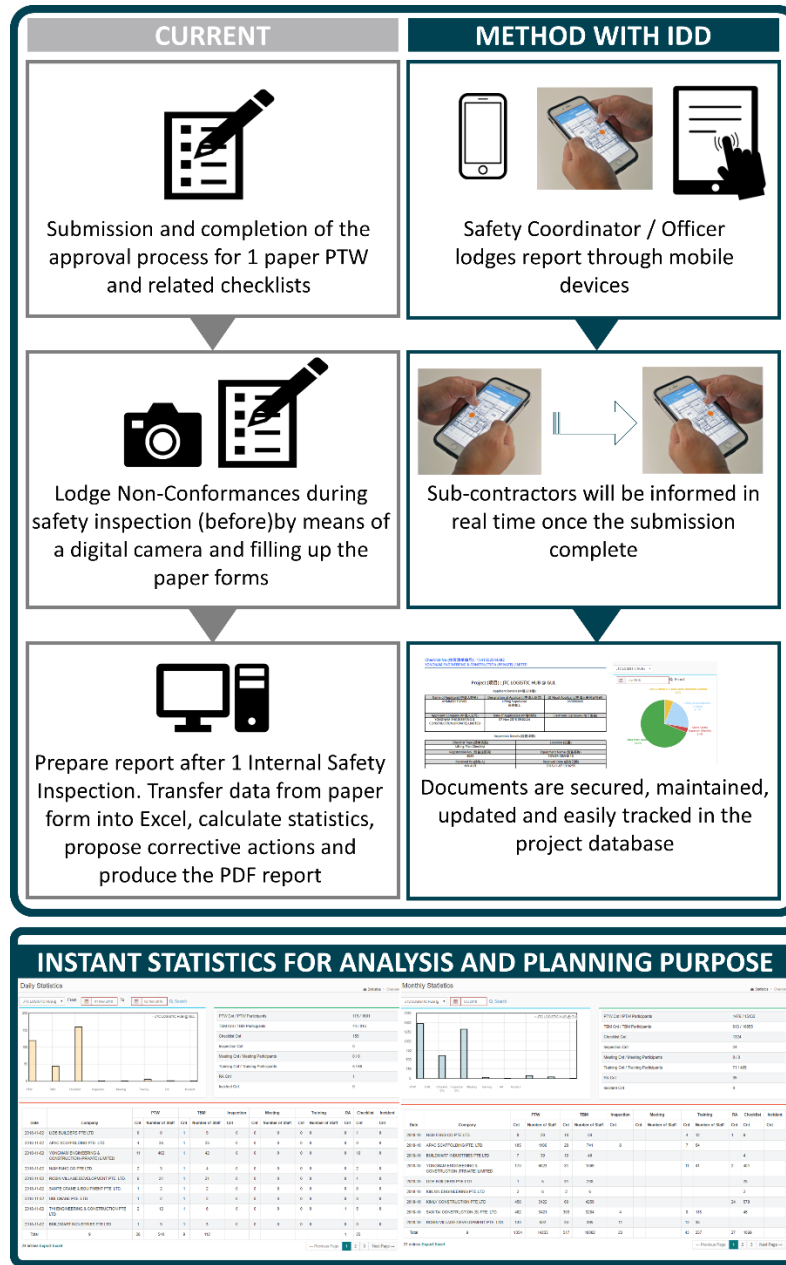
The **features** are:

- Photos can be taken to identify the type of defects and locations with drawings attached for ease of tracking.
- Work can be assigned on the spot with starting / completion date and with the relevant sub-contractors.
- Work inspection forms/ checklist are being attached to mobile apps for ease of inspection on site.
- After rectification is completed, digital signature can be submitted for acknowledgement.



ii. Safety Management System




Digital and mobile-based safety reporting system that allows for real-time reporting, tracking and follow-up of safety issues at the construction site.





iii. BIM (Building Information Modelling)-based Digital Logistics Management

JTC and Nanyang Technological University (NTU) have developed an integrated digital logistics management solution that leverages Building Information Modelling (BIM). This end-to-end solution manages logistics from prefabrication plant to the construction site. It combines multiple systems and data while enabling greater precision during construction. Together with Kimly Construction, JTC is implementing the solution is at the JTC Logistics Hub @ Gul.



	Features	Benefits
 RFID tagging of individual precast components	Live tracking of individual precast component status from manufacturing to installation.	Tracking of precast components with RFID reduces uncertainties and streamlines coordination works that results in up to 20% man hours saved
 Integrating RTK-GNSS and BIM to guide precast installation	Real Time Kinematic – Global Network Satellite System (GNSS) data is integrated to BIM which allows computation of efficient lifting path guides in 3D	Crane operators are guided by monitors displaying BIM to handle and install building components accurately
 High-definition cameras mounted on cranes	High-definition cameras with clear zoomed-in imaging and zero latency stream	Crane operators have more viewing angles to eliminate ‘blind lifting’ and make lifting works safer and more efficient

 Web-based dashboard	Displays real-time status updates of precast elements, live stream of cameras, machinery productivity and scheduling	Digitalised processes allows real-time project information to be transparent and readily available to stakeholders via web and mobile devices.
 Progress updates in BIM model view	Statuses of individual precast components are represented in project's 3D BIM using different colours.	Enhanced visualisation of overall construction progress in 3D BIM view and colour codes.

JTC's Spokesperson Quote:

“Digitalisation is an important direction in the future of the building and construction industry. Integrated Digital Delivery is one key application of digital technology to integrate the entire value-chain of construction from design to project implementation to downstream maintenance. JTC is working on using it as an enabler to forge partnerships to bring automation, robotics and sustainable technologies to the building life cycle. This will raise productivity and make the construction industry more appealing to the new generation of workforce. It will also help us develop more sustainable industrial estates for the future”.

Mr Heah Soon Poh
Asst. CEO, Engineering & Operations Group, JTC

About JTC

Set up in 1968, JTC is the lead government agency responsible for the planning and development of industrial infrastructure to support and catalyse the growth of industries and enterprises in Singapore. Landmark projects by JTC include the Jurong Industrial Estate; the Jurong Island for energy and chemical industries; business and specialised parks such as the International and Changi Business Parks, Seletar Aerospace Park and Tuas Biomedical Park; a work-live-play-&-learn development called one-north; next generation districts including Jurong Innovation District and the Punggol Digital District, as well as the Jurong Rock Caverns, Southeast Asia's first commercial underground storage facility for liquid hydrocarbons. JTC also develops innovative space such as the JTC Surface Engineering Hub, JTC MedTech Hub, JTC Food Hub @ Senoko, and TimMac @ Kranji which incorporate innovative features and shared infrastructure and services to enable industrialists to start their operations quickly and enhance productivity.

For more information on JTC and its products and services, please visit www.jtc.gov.sg.

Kimly's Spokesperson Quote:

"Integrated Digital Delivery enables us to better visualise, coordinate, communicate and construct together with all stakeholders. With benefits from data farmed for predictive analytics, increased safety, and better cost management through lesser wastage, productivity throughout the value chain is raised as all stakeholders are able to perform efficiently and effectively. Kimly Construction is committed to this IDD journey as it will be a value proposition to our clients and partners. IDD is also one of the key thrust of the Construction ITM, and we will continue to develop our capabilities in this area."

Mr Roy Khoo
Director, Kimly Construction

About Kimly Construction

Kimly Construction was founded in 1965 and first started out by carrying out Alteration & Addition (A&A) works managed by the Singapore Public Works Department (PWD). We quickly built a reputation of doing good quality work with integrity, which led Kimly to be awarded numerous contracts from the PWD. Kimly Construction Pte Ltd was incorporated in 1975.

Building on our initial success, Kimly ventured into larger building projects in the 1980s. Ranging from public projects for PWD, JTC, Ministry of Defence (MINDEF) and Ministry of Education (MOE), to other private residential and industrial projects. In the 1990s, Kimly was at the forefront of undertaking Design & Build (D&B) projects adopted by private developers and government agencies.

Today, Kimly is one of the most progressive builders in Singapore. We are constantly moving forward with the adoption of advanced technologies and continuously developing our project management capabilities.

Kimly continues to build upon our track record by constantly striving to ensure high standards of quality and safety. We execute every project with accountability and work closely with our clients and partners to build strong lasting relationships.

Healthcare

1. Health Sciences Authority Building
Developer: MOH
2. Kallang Polyclinic and Long Term Care Facility
Developer: MOH

Industrial

3. JTC Logistics Hub @ Gul (Refer to Annex B)
Developer: JTC
4. JTC Cleantech 2 Blk B @ Jurong Innovation District
Developer: JTC

Community

5. Bukit Canberra
Developer: SportSG
6. Punggol Town Hub
Developer: People's Association

Educational

7. BCA Academy Phase 2
Developer: BCA
8. Tahir Foundation Connexion
Developer: SMU

Commercial – Mixed Development

9. PSA Liveable City
Developer: PSA

Residential

10. Tampines N6C4-5
Developer: HDB
11. Sloane Residences
Developer: TSky Balmoral
12. Condominium development at Hillview Rise
Developer: Hong Leong Holdings and Hong Realty

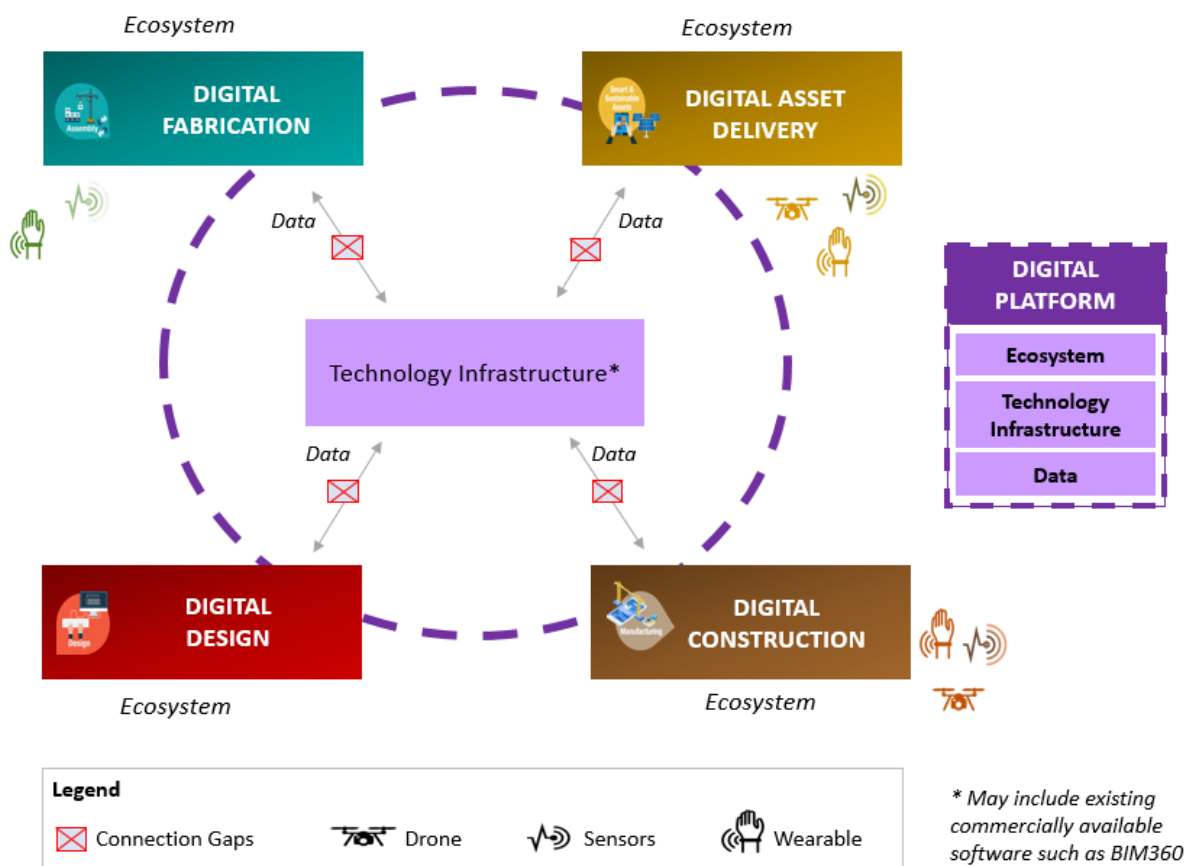
\$4 million to develop Construction Digital Platforms

In support of the Integrated Digital Delivery (IDD) and aligned to BCA's Industry Transformation Map (ITM), IMDA and BCA announced a joint S\$4 million technology call to develop construction digital platforms that help construction firms to digitalise and accelerate their efforts towards the IDD vision.

Construction digital platforms

The digital platform includes three fundamental aspects – Integration of an ecosystem, software and usage of data. With a relevant business model, the digital platform can help these companies digitalise and benefit from the digital platform itself.

For example, data exchanged between various firms can augment the supply chain management through improved Just-in-Time (JIT) delivery and reduce cost.



S\$4 million to develop Construction Digital Platforms**1. Requirements of a construction digital platform:**

- The proposed construction digital platforms should support the integration of at least one aspect of the IDD that addresses the gap in the built environment.
- The proposed digital platform must enable interoperability of data through established open data formats commonly adopted in the construction industry.
- In addition, the proposed digital platforms should enable firms to collaborate and allow innovative solutions and other third party solution providers to plug in through open applications programme interface (APIs*)

2. Proposals for construction digital platforms:

- Singapore-based technology firms are encouraged to submit proposals that will identify new business models, develop new revenue streams, and create greater business opportunities for the built environment sector.
- Technology providers will be able to collaborate with built environment industry practitioners to develop technology-enabled business models and co-innovate construction digital technologies.

More information on the CFS can be found at www.imda.gov.sg/digital-platforms.

Submissions open from 18 November 2018 and close on 15 March 2019.

About Infocomm Media Development Authority (IMDA)

The Infocomm Media Development Authority (IMDA) will develop a vibrant, world-class infocomm media sector that drives the economy, connects people, bonds communities and powers Singapore's Smart Nation vision. IMDA does this by developing talent, strengthening business capabilities, and enhancing Singapore's ICT and media infrastructure. IMDA also regulates the telecommunications and media sectors to safeguard consumer interests while fostering a pro-business environment. IMDA also enhances Singapore's data protection regime through the Personal Data Protection Commission. For more news and information, visit www.imda.gov.sg or follow IMDA on Facebook [IMDAsg](#) and Twitter [@IMDAsg](#).

Digitalisation brings new exciting opportunities to Built Environment careers



Yve Xu

Manager (BIM)

Future of Building & Infrastructure (JTC)

Skills

- Information Delivery Framework
- Project Process Planning
- BIM IT Architecture

The impact of IDD on her work:

- With her experiences as a mechanical engineer doing design management, Yve also learnt about digitalisation through implementing BIM for her organisation.
- She meets the needs of JTC, as a developer, such that her organisation can deliver Building and Infrastructure (B&I) information digitally and accurately at both corporate and project level. This allows JTC to plan, create and maintain different space types required by their target tenants to carry out their businesses.



Gerard Teo

Head of VR

ID Architects

Skills

- Workflow and Process Optimisation
- Computational Design
- Technology Development and Application

The impact of IDD on his work:

- With his experiences in using Computational BIM, which requires him to acquire new programming skills, Gerard converts design considerations into programming rules, automating and speeding up the process of generating various design options for his client.
- This has helped his project team to arrive at designs that meet all design considerations, limitations and compliance to rules very fast.



Colin Yip

Professional Engineer and Buildings Digital Lead,
Arup Singapore

Skills

- Automation Process Planning
- Computational Design
- Database Management

The impact of IDD on his work:

- With his knowledge on BIM and programming, Colin optimises various structural design options while meeting all design considerations, limitations and compliance to rules.
- This has helped to cut down on the use of construction materials. He also uses programming techniques to streamline the design and documentation workflow in his organisation.



Michelle Lee

Digital Delivery Manager
Penta-Ocean Construction

Skills

- Digitalising Process Workflows
- R&D for Application of Technology to Construction
- Developing In-House Training for Digital Transformation

The impact of IDD on her work:

- With her knowledge in BIM and geology, Michelle makes use of digital terrain models to set out key coordinates on site accurately.
- This has greatly improved the preparation and execution processes of underground excavation works.
- The same digital terrain model is also used for planning the rest of the on-site activities.
- Michelle can also simulate construction sequencing of works so that all works are run smoothly on site.



Sutini Charidi

BIM Co-ordinator, Kimly Construction

Skills

- Virtual Design and Construction Co-ordination
- Computational BIM
- Management of BIM datasets

The impact of IDD on her work:

- With her knowledge in architecture and BIM, Sutini creates and presents 3D models of architectural installations to the construction teams, allowing them to have a better understanding of the steps involved during installation.
- This has helped to avoid potential site issues before actual construction begins. Her work has also improved the team's visualisation and understanding of the processes involved.

For IDD, what new skills will the professionals of tomorrow need?

Architects and Engineers	- Building Information Modelling - Data analytics
Fabricators	- Building Information Modelling - Data analytics
Builders	- Building Information Modelling - Data analytics - Operating a drone
Facilities managers	- Building Information Modelling - Data analytics - Operating a drone