Autodesk Hong Kong

BIM Awards 2019

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ACKNOWLEDGEMENT

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SUPPORTING ORGANIZATIONS

AIAB Autodesk Industry Advisory Board

bSHK 型建香港

CIAT Hong Kong Centre

珠海學院 CHU HAI COLLEGE OF HIGHER EDUCATION

chArch chu hai architecture

香港資訊科技聯會 Hong Kong Information Technology Joint Council

HKIPM

HKIUS 香港管綫專業學會 Hong Kong Institute of Utility Specialists

IVE Member of VTC Group VTC 機構成員

HKIUS

公私營合作學會

CIOB THE CHARTERED INSTITUTE OF BUILDING

chartered ices

School of Architecture THE CHINESE UNIVERSITY OF HONG KONG

The Hong Kong Institute of Building Information Modelling 香港建築信息模擬學會

HK Inst E

HKIE THE HONG KONG INSTITUTION OF ENGINEERS 香港工程師學會 Information Technology Division 資訊科技分部

香港科技大學 THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

THE UNIVERSITY OF HONG KONG 香港大學 faculty of architecture 建築學院 Department of Real Estate and Construction 房地產及建設系

HKUSPACE 香港大學專業進修學院 HKU School of Professional and Continuing Education

ACKNOWLEDGEMENT

Sincere thanks to the awarded organizations - CLP Power Hong Kong Limited, Construction Industry Council & Electrical and Mechanical Services Department, HKSAR Government, Kerry Properties Limited & Sino Land Company Limited & MTR Corporation Limited, Urban Renewal Authority, Urban Renewal Authority & AECOM Asia Company Limited and the honorable mentions - Architectural Services Department, HKSAR Government, Electrical and Mechanical Services Department, HKSAR Government & WSP Hong Kong Limited, Hong Kong Housing Authority, HKSAR Government, Hong Kong Observatory, HKSAR Government, in providing such valuable information and pictures of their projects. Besides, we are extremely grateful for the contributions of the AIAB committee and members, Dr. Jack Cheng, Sr. Yvonne Cheu, Mr. Kelvin Kuo, Ir Dr Eric Liu, Ir Dr George Wong and Mr. Kevin Wong who are profiled in this booklet.

DISCLAIMER

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Our Opportunity to Build Better and Smarter

While we appreciate the award-winning projects in this booklet as outstanding achievements in the field of building and construction - which is no easy feat in and of itself, and very worthy of the accolade they are to receive - it is not only an excellence that is on display, but also an opportunity; the opportunity of transforming the way we create and build for a better and sustainable future.

Together, we stand at a unique time where we get to determine the future through the things we make and how we make them better. As we are expecting a 10-billion population by 2050, with about 400,000 people joining the middle class every day, it's time for us to get prepared for the exponential growth in dwelling demand across the globe, and how we can build up to 3,600 buildings per day in an effective and sustainable manner. Embracing the challenges that come with the development, we are to harness the power of innovation to cope with the fact that we will be having less skilled labour, scarcer natural resources, and higher demand in time efficiency and accuracy.

At Autodesk, as we uphold our commitment to drive innovation on our way to the future of making, we believe that automation is the key to the inevitability of more and the reality of less, with Connected BIM as a core manifestation of it. Today, while we are building a new world and rejuvenating the old, Connected BIM holds the promise to make both smarter and better. Facilitated by the digitalized and data-driven process, architects can now design buildings that are more energy-efficient, in a more cost-effective and environmentally-friendly manner. 3D printing, tracking of building and energy usage data with real-time insights, and closer collaboration between different stakeholders are just some of the examples of how we can make use of Connected BIM to build a better world that people deserve.

Better things, better work, a better world. When seen in this light, the awardees tonight not only exemplify excellence, but also are firm believers in seizing every opportunity to be better, with a fierce commitment to be imaginative world-changers. On behalf of the Autodesk Asia Pacific team, I would like to congratulate and salute to all the award winners, and thank the teams for sharing their inspiring experience and insights. Together, we can make anything.

Haresh Khoobchandani
Vice President of Sales, Asia Pacific
Autodesk

Embrace the power of Connected BIM for building a better world

Since the adoption of Connected BIM in China in 2016, the industry has seen robust development with 89% architects and 108% contractors involving Connected BIM as a major component of their projects. The unprecedented adoption has unleashed a new wave of opportunities for the architecture industry, with faster and bolder building made possible with the data collected, simulations created with software, and seamless connection throughout the manufacturing process. Architects and contractors can now be more ambitious and adventurous than ever, taking a leap forward to create and realize ground-breaking building structures that are a treat for the eyes as well as a benefit to the world.

As China continues to grow, urban development is driving a prominent shift in people's dwelling demands. With our vision to lead the industry towards the future of making, we are to embrace the power of Connected BIM as it enables faster approval lifecycles, real-time data harvesting and analysis, more dynamic project management processes across devices, locations and teams, as well as informed maintenance decisions and enhanced operations. This transformation is empowering us to design better and innovate faster, as we get set for tomorrow's opportunities as responsible builders and productive makers.

In this booklet, you will read accounts of this year's Autodesk BIM award-winning projects that have showcased exemplary use of Connected BIM to transform their buildings and operating processes. I hope these successful stories will help to spur talents to explore new possibilities with Connected BIM and go on to even greater achievements in their endeavours.

On behalf of the Autodesk Greater China team, I would like to congratulate all the awardees, and extend our appreciation for being inspired to the rest of us.

Richard Li
Senior Director, Greater China Region
Autodesk

Unleashing Opportunities with the Future of Smart Cities

This year's awards ceremony is yet another testament to Hong Kong upholding her status as a pioneer of BIM for over a decade, and with the innovative minds and solid foundation that we have established throughout the years, we will continue to be a beacon to our industry.

2019 has been a milestone for the industry especially the HKSAR Government has announced the establishment of the Steering Committee on Construction Innovation and Technology Fund (CITF) to support the industry on the adoption and training for BIM projects, which is instrumental for us to seize opportunities today and tomorrow. This tremendous support is pivotal to the success that we witnessed in 2019, a year that was named by the Hong Kong Construction Industry Council as the "BIM Year", which leads us to an even more promising future with vast opportunities of the Greater Bay Area.

The development of the 11 cities and their vicinities in the Greater Bay Area into a world-class hub will present us with exciting challenges and opportunities. As we embrace the future of making, BIM technology will play a vital role as we create and build smart cities, with smart and digitalized construction and building processes that enhance overall project efficiency and effectiveness. To fully grasp and realize these opportunities, the crux of the matter is to have the right people and the best talents in the driving seat, with today's showcase of the leaders and talents of an example to the rest of the industry. This takes us along the path of making better things, making things in better ways, and making work better and more meaningful.

The future of making is here. Autodesk, as one of the world's leading BIM software developers and drivers of BIM adoption, will continue to work closely with the government and its subsidiaries, in tandem with our strong customer focus, to put the best and most highly-suited software tools in the hands of our customers, so together we build a better and more sustainable future. In closing, I would like to extend my sincere gratitude to all the awardees for their encouraging achievements that have inspired all of us.

Dr Wendy Lee
Regional Manager, HK & Macau
Autodesk

Autodesk Hong Kong BIM Awards 2019

Congratulations to all winners!

AWARD WINNERS

CLP 中電

CONSTRUCTION INDUSTRY COUNCIL 建造業議會

機電工程署 EMSD

嘉里建設 KERRY PROPERTIES

SINO LAND 信和置業

MTR

市區重建局 URBAN RENEWAL AUTHORITY

AECOM

HONORABLE MENTIONS

建築署 Architectural Services Department

機電工程署 EMSD

WSP

香港房屋委員會 Hong Kong Housing Authority

香港天文台 HONG KONG OBSERVATORY

YOUNG BIMER OF THE YEAR

Ir Yuen Piu Hung, Francis

OUTSTANDING STUDENTS

Chan Sum Chau, Chen Wei Wei, Sampriti Dwivedy, Kwok Hoi Ling
The Hong Kong University of Science and Technology

AWARD WINNERS

ORGANIZATION

CLP Power Hong Kong Limited

PROJECT

Queen's Hill 132kV Substation

ORGANIZATION

Construction Industry Council

Electrical and Mechanical Services Department, HKSAR Government

PROJECT

Zero Carbon Building – Integration of BIM-AM
(Building Information Modeling – Asset Management) with IoT

ORGANIZATION

Kerry Properties Limited

Sino Land Company Limited

MTR Corporation Limited

PROJECT

Property Development at Wong Chuk Hang Station Package Two

ORGANIZATION

Urban Renewal Authority

PROJECT

Central Market Revitalisation Project

ORGANIZATION

Urban Renewal Authority

AECOM Asia Company Limited

PROJECT

Sustainable BIM FM Platform for URA (Project MK01)

COMPANY
CLP Power Hong Kong Limited

PROJECT
Queen's Hill 132kV Substation

LOCATION
Lung Ma Road, Queen's Hill, Fanling

TYPE
Transmission Substation

SCHEDULED TIME OF COMPLETION
2020

Smart BIM, Smart Team

"Smart BIM, Smart Team"

—**Yeung, Arras Yuk Yin**

Senior Project Architect
- Civil Design , CLP Power Hong Kong Limited

AUTODESK PRODUCTS USED

3DS Max

A360

Navisworks Freedom

Revit

BIM model is an effective tool to help stakeholders understanding the building design and surrounding development
Image Courtesy of CLP Power Hong Kong Limited

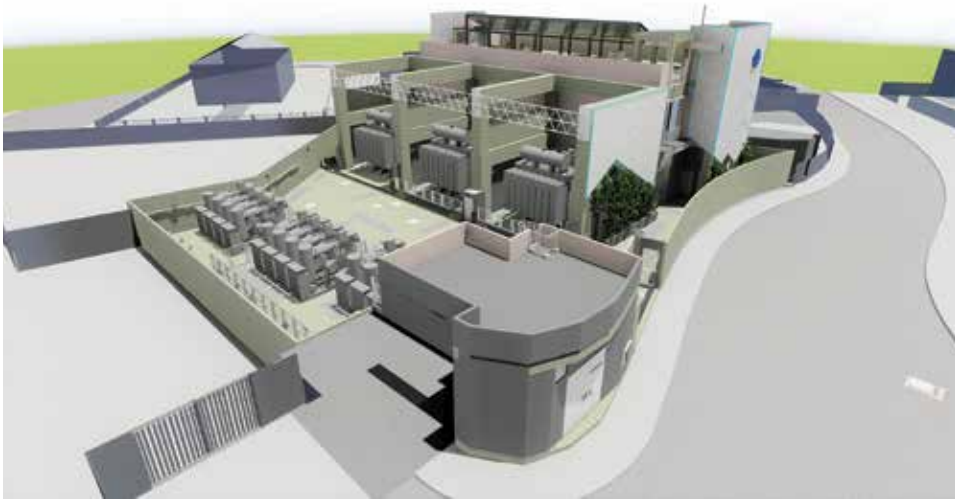
CLP Queen's Hill Substation

The new Queen's Hill substation (QUH) of CLP Power Hong Kong Limited (CLP Power) located at Lung Ma Road, Fanling is scheduled to be commissioning in the first quarter of 2020. Queen's Hill substation is a 132kV transmission substation providing electricity to support the development of the new residential areas and public infrastructure facilities in the northeast New Territories. The substation is designed to blend in with the surroundings in a sustainable way by enhancing its energy efficiency through the use of natural ventilation and light, environmentally-friendly building materials, and green coverage. Building Information Modeling (BIM) technology was also deployed to improve the safety, project management and overall cost effectiveness of the substation.

Low Carbon Substation – A Holistic Approach

Apart from our architectural concept and the cutting-edge digital technology

BIM enhances the multidiscliplinary design collaboration and effectiveness of photovoltaics operations
Image Courtesy of CLP Power Hong Kong Limited



BIM model provides an accurate sense of presence of building structure that is yet to be built
Improvement to the design can be identified easily prior to the construction
Image Courtesy of CLP Power Hong Kong Limited

we applied for this substation, a set of sustainable design and green construction practice echoing today's demand for low carbon building was adopted for this substation. With high achievement in aspect ranging from site design, materials, water and energy use, indoor environmental quality and innovative design and construction methods, a low carbon substation prototype at Queen's Hill substation was established.

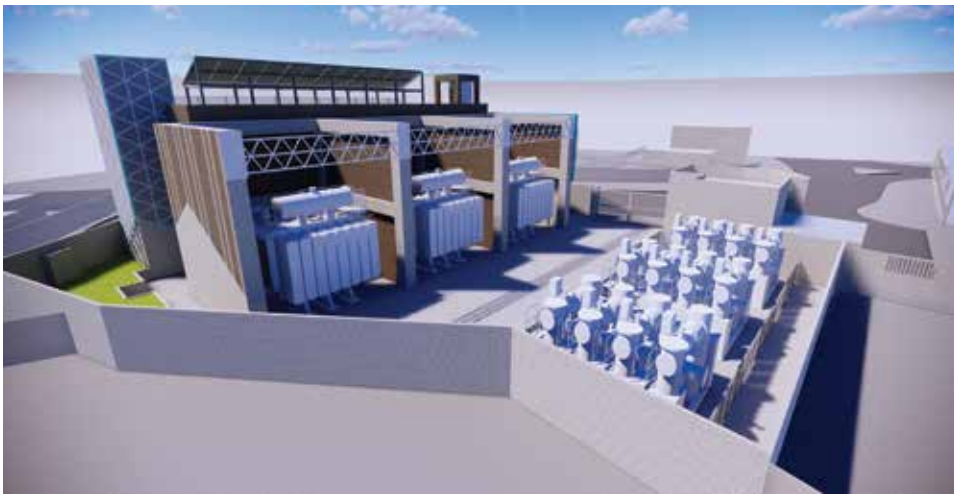
Green and Smart Use of BIM

Due to the congested site area, the substation adopts a compact yet effective design approach. BIM was deployed to improve the efficiency in design, project delivery and asset management of QUH. Numerical simulation technology was applied to determine the best shape of QUH for mitigating impacts on wind amplification, daylight factor and sun shading to neighbours. In addition, its innovative building management system (BMS) by BIM facilitates the future substation maintenance and operation by clearly showing the status and energy consumptions of individual services installations. The emerging BIM applications and numerical simulation technologies greatly improve the performance and the overall cost effectiveness of the modern substation development.

QUH is a low rise building with an open design that fully exploits the natural ventilation and daylight. The major building façade is utilised for installation of photovoltaic (PV) panels and vertical greening. PV panels in white and vivid colours are installed on the upper part of the façade, generating electricity equivalent to over 10% of annual energy consumption of the building. To avoid nuisance to the neighbours caused by reflected glare, white PV panels with textured glass surface have been used for creating a matte appearance. Each wall-mounted PV panel is 200mm away from the external wall of QUH, this gap allows ambient air circulation to cool down the PV panel system.

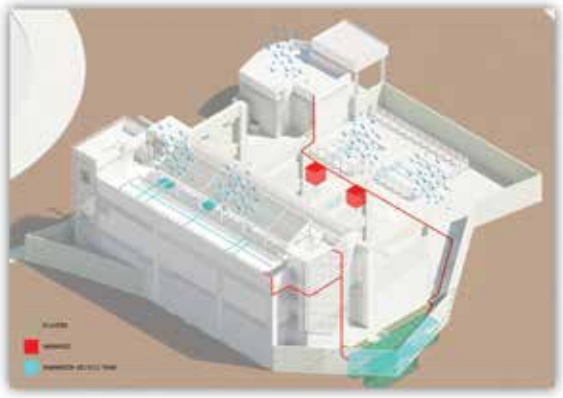
Moreover, green plantations are provided on the ground floor and lower portion of the building façade. The coloured PV installation over the building facade and the 315m^2 greenery area in QUH echoed with the "urban-rural-nature integration" design theme of the surrounding new town development. The extensive greening and paver area at QUH also improve the microclimate in the area.

The BIM process enables the collaboration of various stakeholders of the project during different project phases. For example, the plant equipment and power cable installation can be incorporated in the BIM model for ease of communication with different stakeholders during the planning and

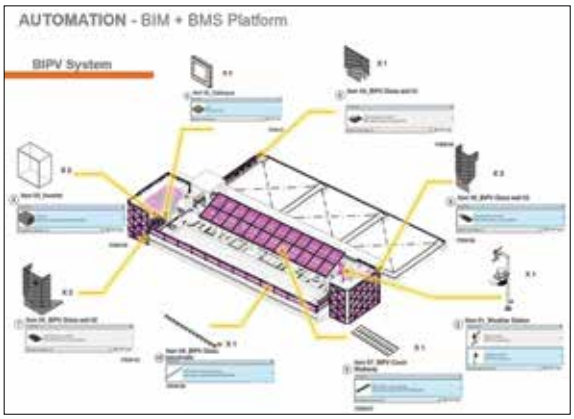


BIM enhances the multidisciplinary design collaboration and optimisation for high voltage plant equipment installation
Image Courtesy of CLP Power Hong Kong Limited

BIM enhances the multidisciplinary design collaboration and optimisation for high voltage plant equipment installation
Image Courtesy of CLP Power Hong Kong Limited



BIM enhances the multidisciplinary design collaboration and intelligent and effective operations of BMS
Image Courtesy of CLP Power Hong Kong Limited



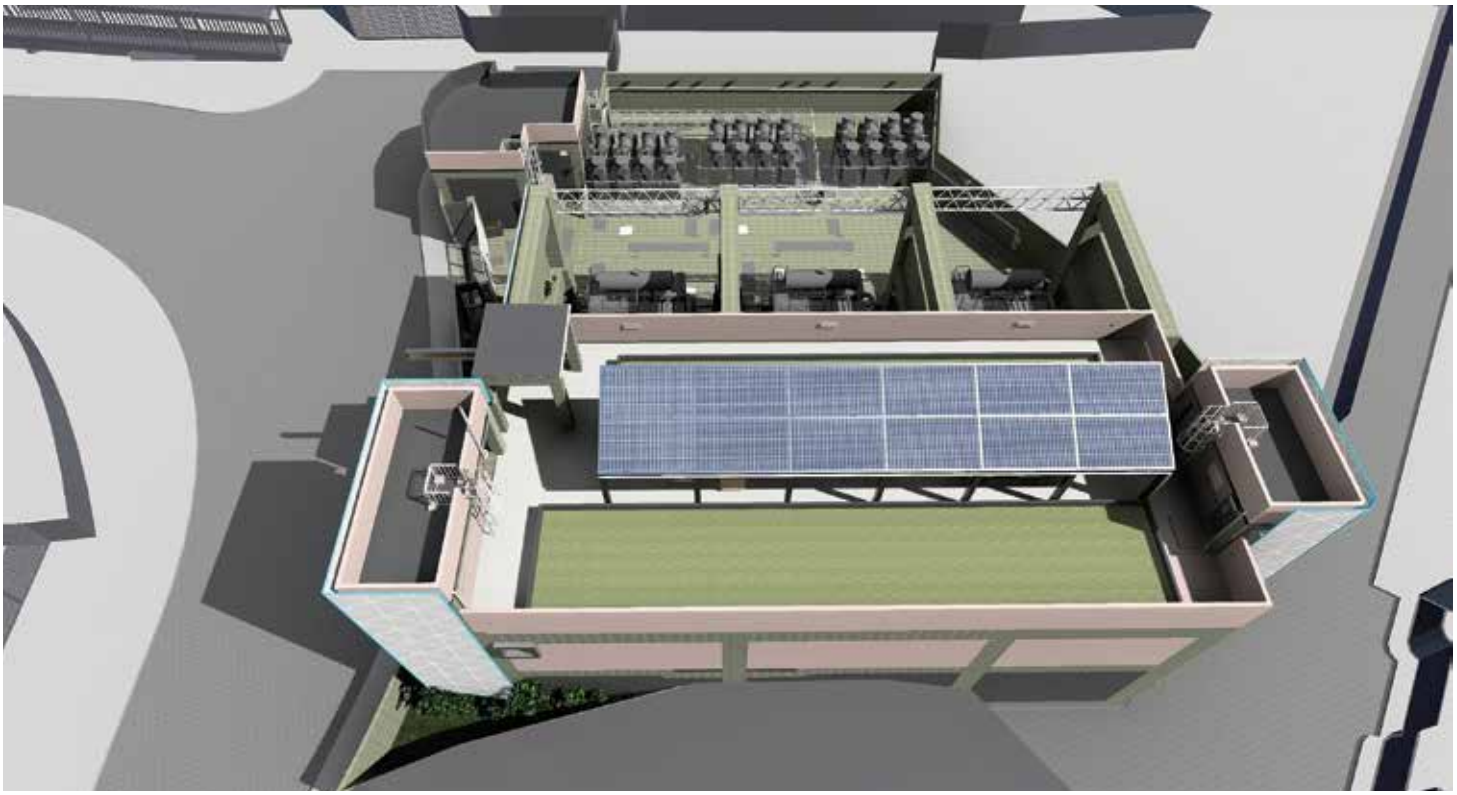
BIM enhances the multidisciplinary design collaboration intelligent and effective operations of BMS
Image Courtesy of CLP Power Hong Kong Limited

design stage. The detailed plan and information shown at the virtual 3D model can also be used for the subsequent construction work and safety planning and operational review.

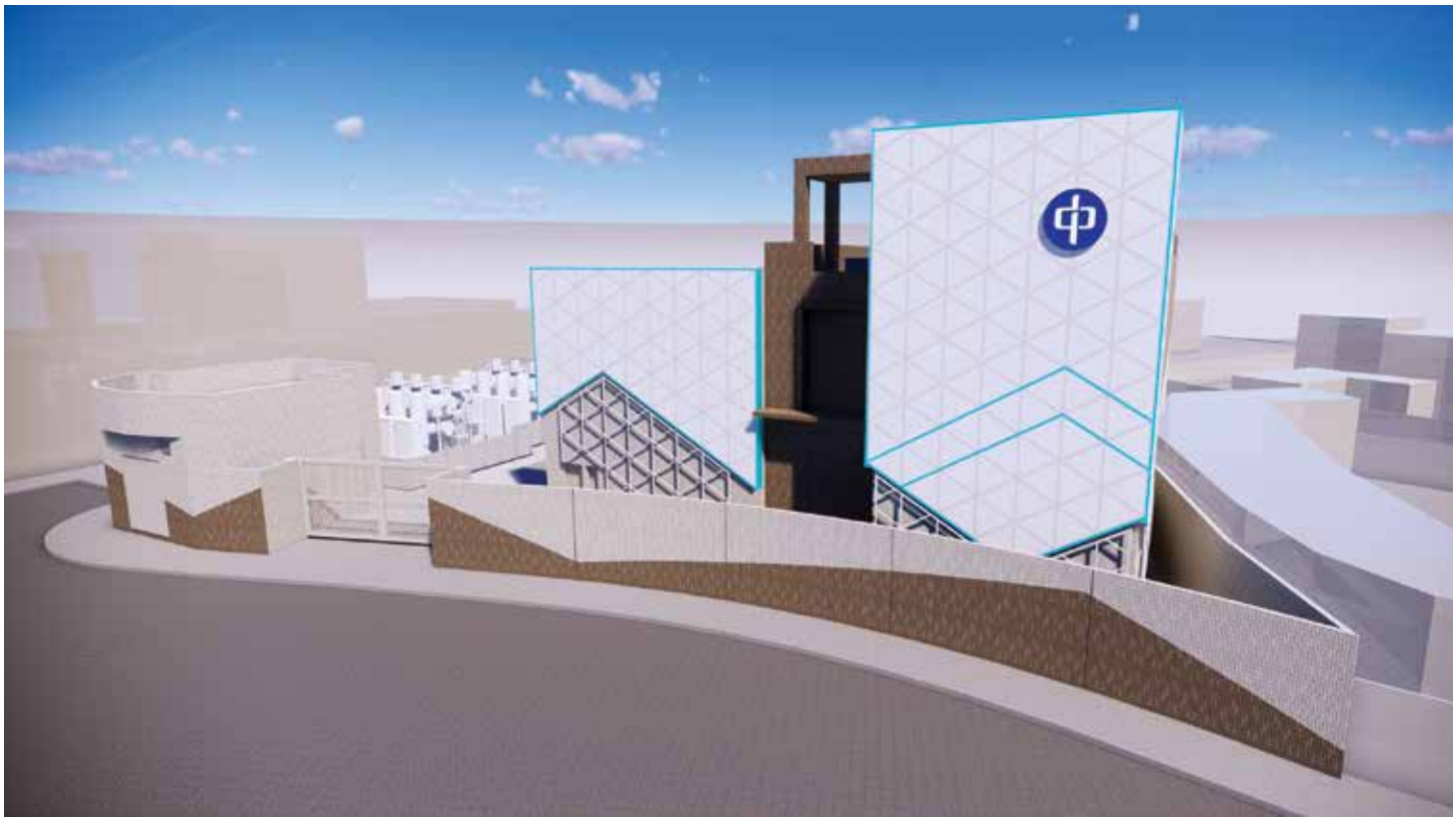
In the BIM models, users can easily understand and interpret the information which is actively linked to the relevant 3D object. Mis-interpretation of the information by users in the other project phases can be avoided.

Moreover, BIM reduces the time for retrieval of information that is passed from one project phase to other phases. All project data is defined at a level of granularity that allows for flexible tracking and retrieval of information across the lifecycle of the project without the need for regeneration of the information.

Caring for the environment is one of the core values of CLP Power. We are committed to integrate environmental protection concepts and innovative technologies into our newly developed substations to provide customers with a greener and smarter electricity supply. The award recoginsed CLP Power's commitment to promote green building design and new technology application. This project also sets as the prototype for CLP Power's future green substation.



BIM enhances the multidiscliplinary design collaboration and effectiveness of photovoltaics operations
Image Courtesy of CLP Power Hong Kong Limited



BIM model is an effective tool to help stakeholders understanding the building design and surrounding development
Image Courtesy of CLP Power Hong Kong Limited

About CLP Power Hong Kong Limited

CLP Power Hong Kong Limited ("CLP Power") is a Hong Kong utility subsidiary wholly owned by CLP Holdings Limited, a company listed on the Hong Kong Stock Exchange and one of the largest investor owned power businesses in Asia. CLP Power operates a vertically integrated electricity supply business in Hong Kong, and provides a highly reliable supply of electricity and excellent customer services to 6 million people in its supply area.

COMPANY
Construction Industry Council
Electrical and Mechanical Services Department, HKSAR Government

PROJECT
Zero Carbon Building – Integration of BIM-AM (Building Information Modeling – Asset Management) with IoT

LOCATION
Zero Carbon Park (ZCP), 8 Sheung Yuet Road, Kowloon Bay

TYPE
BIM-AM System Development for Operation & Maintenance

SCHEDULED TIME OF COMPLETION
01/2018 - 09/2019

BIM-AM for Smart Operation & Maintenance

"With the successful trial of BIM-Asset Management (BIM-AM) integration in CIC's BIM Innovation and Development Centre in 2016, CIC has collaborated with EMSD to carry out a more advanced BIM-AM integration project at our Zero Carbon Park (ZCP). With EMSD's experience in implementing BIM-AM projects, we are pleased to have successfully completed our project at ZCP this year for use as a showcase to promote to the industry the benefits of adoption of BIM-AM."

—Ir Dr Richard Pang

Director - Industry Development, Construction Industry Council

"EMSD and CIC strive to promote BIM to trade and industries in Hong Kong. In 2018, EMSD collaborated with CIC to implement the self-developed BIM-AM System in their Zero Carbon Park (ZCP). That acts as showcase to trade regarding the adoption of BIM for Asset Management in existing buildings to achieve effective workflow during building operation and maintenance stage."

—Wong Sek Cheung, JP

Assistant Director/1, Electrical and Mechanical Services Department

BIM PARTNER

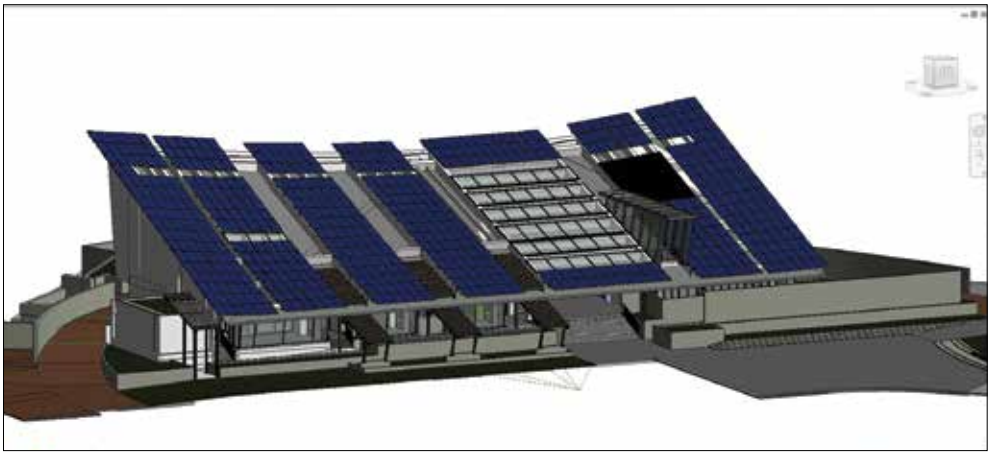
Planon Hong Kong Ltd.

AUTODESK PRODUCTS USED

BIM360

Forge

Revit



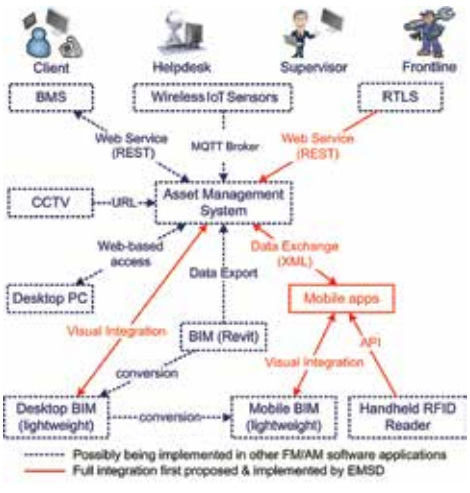
BIM model of Zero Carbon Park
Image courtesy of Construction Industry Council & Electrical and Mechanical Services Department, HKSAR Government

Project Background

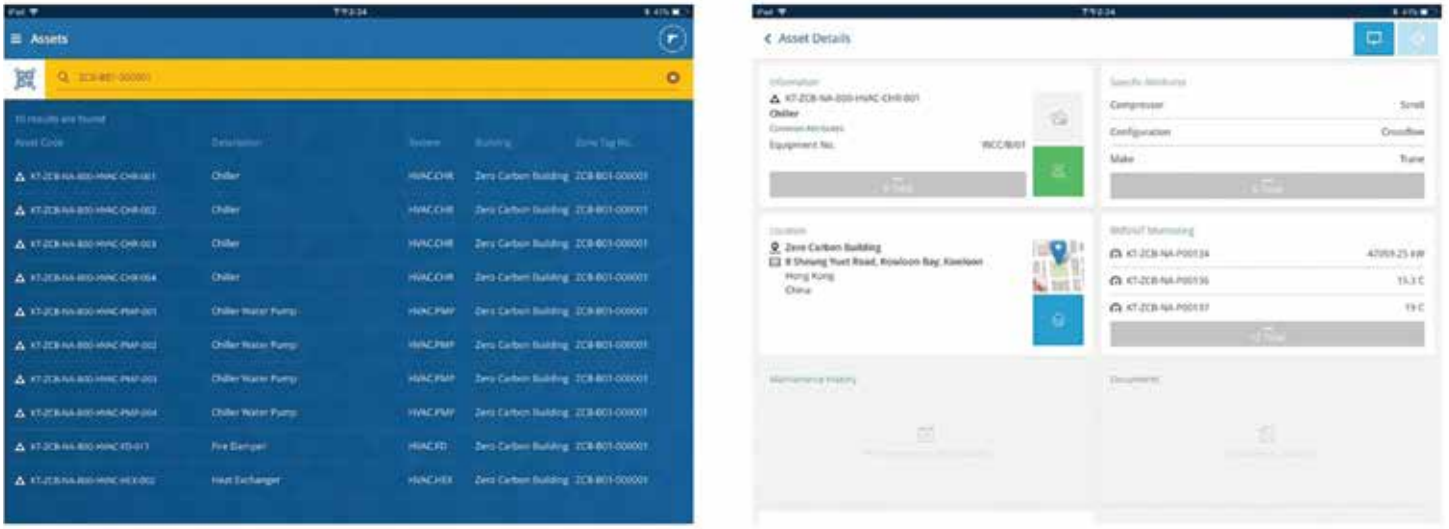
Being the largest MEP government maintenance agency in Hong Kong, EMSD currently operates and maintains more than 8,000 government buildings. In 2016, to streamline the fault localization process for Building Operation & Maintenance (O&M), EMSD and CIC developed a tailor-made BIM-AM System in which a novel architecture for managing decentralized building facilities information was proposed, by exploiting the information interoperability and reusability among Building Information Modelling, System Topology, Radio Frequency Identification technology, and real-time data acquisition system interfaces including Building Management System, IoT wireless sensors and Closed Circuit Television system. Cross-platform mobile and desktop systems have been developed based on the proposed architecture. The benefits to O&M was proven with around 15% time-saving compared with the traditional workflow.

Digital twin by the integration of BIM-AM and IoT sensors will be the next generation of E&M operation and maintenance. This assists to analyze spatial, resources and energy optimization opportunities to augment O&M effectiveness. In 2019, EMSD completed the trial to integrate BIM and LoRa technology through BIM-AM platform. With this integration, IoT sensors such as occupancy sensors and air quality sensors were deployed for smart facility management. IoT technology supplements the information which is not covered by the existing building management system to further optimize the system operation according to actual usage in real time basis to achieve better resources utilization and higher end user's satisfaction.

The BIM-AM System with the integration of IoT achieves smart facility management and smart E&M system O&M in building facilities, that acts as a microcosm of smart city infrastructure. Moving forward, the BIM-AM System will be integrated with GIS platform for viewing the building data



The BIM-AM System Architecture
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government



The User Interface (UI) of BIM-AM System on mobile device
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government

on a city-wide landscape. The outdoor IoT sensor data such as underground water flow and seashore flood monitoring water level data could also be visualized on the same BIM-AM-IoT-GIS platform to form the digital twin for better city management.

Award BIM Project

The New Opportunity of BIM Application

The use of BIM should not be limited to building design and construction processes, but also be extended to O&M stage by seamlessly conveying the necessary asset information from an as-built BIM models. Hence, EMSD has established its own BIM-AM platform by integrating the BIM models and Asset Management System in order to extend the use of the BIM for O&M stage over entire building lifecycle.

EMSD also developed an Asset Information Input Tool (AIIT), which is a web-based system, to manage, verify asset information and create asset relationship for BIM-AM. It makes use of the COBieLite to exchange the information between BIM models and Asset Management System. Besides, the asset relationship created via the AIIT facilitates remote fault diagnosis.

Integration of BIM-AM System and IoT Technology for remote monitoring
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government

CIC's Works on BIM-AM

With the first trial of BIM-AM integration in CIC's another premise – BIM Innovation and Development Centre in 2016, CIC started to examine the possibilities to carry out a more advanced BIM-AM project in the ZCP. It was known that EMSD had fruitful experience in implementing BIM-AM System since 2014. Therefore, CIC engaged EMSD to implement BIM-AM at ZCP, where is the first non-government venue with 14,700 square meters complying with the EMSD's BIM-AM Standards and Guidelines.

ZCP acts as a showcase of using BIM to facilitate the E&M O&M over the entire building lifecycle. In this project, BIM models of ZCP and its Heating, Ventilation and Air-conditioning (HVAC) system were developed by EMSD in-house staff for the implementation of the BIM-AM System, which integrated with various electronic systems such as the IoT sensors,

The BIM-AM Standards and Guidelines V1.0 & V2.0 published by EMSD
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government

Building Management System (BMS), Radio Frequency Identification (RFID) technology and Closed-Circuit Television (CCTV) systems.

Features of BIM-AM System

It is common for the facility management to manage multi-standalone systems to get useful asset data and real time E&M equipment operational status. The BIM-AM System provides a common platform to facilitate the building operation by integrating with IoT sensors, BMS, RFID/ QR code and CCTV system. Therefore, the facility management are able to manage all information in a single platform.

- With the aid of the integration of the RFID technology and QR codes, the BIM-AM System would facilitate frontline staff to efficiently and effectively locate critical equipment even if the equipment is hidden above a false ceiling or underneath a raised floor. QR zone codes are provided for each functional area. By scanning the zone code, all major E&M equipment under this zone code are identified. Also, all major E&M

The Digital Twin feature
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government

Asset fast located by QR code / RFID tag scanning
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government

equipment are provided with RFID tags for asset locating. By scanning the space with RFID gun, nearby E&M equipment are highlighted in BIM model.

- The integration with the ZCP's Building Management System (BMS) can facilitate not only remote monitoring, but also the remote control of E&M systems.
- Through the System Topology, the relationship and grouping of the major E&M assets can be identified easily that facilitates the maintenance staff to carry out fault diagnosis.
- The integration with CCTV system can facilitate the remote monitoring of real-time E&M plant operation.
- The IoT technology can supplement the information which is not covered by BMS for facility management. It can also integrate with the BIM-AM System to form a Digital Twin.

Significant Improvement via BIM-AM Adoption

This project demonstrates the below benefits of using BIM technologies for asset management during the O&M stage:-

- Estimated 15% time saving for O&M workflow
- Fast locating asset
- Remote fault diagnosis
- Asset data and documentation can be well-organized on a unified platform

Way Forward

With the completion of ZCP's BIM-AM project, CIC and EMSD plan to make use of this platform to promote the BIM-AM principle to the industry, so that more stakeholders could understand how we could enhance productivity in the O&M stage by using the BIM technologies.

CONSTRUCTION INDUSTRY COUNCIL 建造業議會

機電工程署 EMSD

The BIM project in Zero Carbon Zone implemented by EMSD and CIC
Image courtesy of Construction Industry Council & Electrical and Mechanical Services Department, HKSAR Government

About Construction Industry Council

The Construction Industry Council (CIC) was formed on 1 February 2007. CIC consists of a chairman and 24 members representing various sectors of the industry including employers, professionals, academics, contractors, workers, independent persons and Government officials.

The main functions of CIC are to forge consensus on long-term strategic issues, convey the industry's needs and aspirations to Government, as well as provide a communication channel for Government to solicit advice on all construction-related matters. In order to propagate improvements across the entire industry, CIC is empowered to formulate codes of conduct, administer registration and rating schemes, steer forward research and manpower development, facilitate adoption of construction standards, promote good practices and compile performance indicators.

CIC has set up Committees, including Committee on Building Information Modelling, to pursue initiatives that will be conducive to the long-term development of the construction industry. Please visit www.cic.hk for further details.

About Electrical and Mechanical Services Department, HKSAR Government

The Electrical and Mechanical Services Department (EMSD) of the HKSAR Government discharges its services to the public in Hong Kong via two separate teams: Regulatory Services and Trading Services. Our Regulatory Services team regulates electrical, mechanical and gas safety, and railway safety, as well as energy efficiency, via law enforcement and public education. It also monitors the technical performance and development plans of the electricity supply companies, and gives professional and technical support to the Government's wide range of safety and environmental initiatives from time to time. Our Trading Services team provides electrical and mechanical, electronic engineering and building services to government departments and public bodies. The team serves diverse client venues including the airport, hospitals, schools, security forces, transport and highways, port and harbour, government offices and law court buildings as well as public recreational and leisure facilities, with the ultimate goal of improving the quality of life for the public.

COMPANY
Kerry Properties Limited
Sino Land Company Limited
MTR Corporation Limited

PROJECT
Property Development at Wong Chuk Hang Station Package Two

LOCATION
Depot of Wong Chuk Hang Station, Wong Chuk Hang, Hong Kong

TYPE
Residential Development

SCHEDULED TIME OF COMPLETION
2023

Real Practice of Adopting BIM with Integrated Project Delivery

"If Building Information Modelling & Management (BIM) is about the process cross along the project life-cycle, Integrated Project Delivery (IPD) is about the approach to link up the people to make the process run smoothly. By combination of applying BIM with IPD, you will experience a different BIM project."

—Isaac Lee

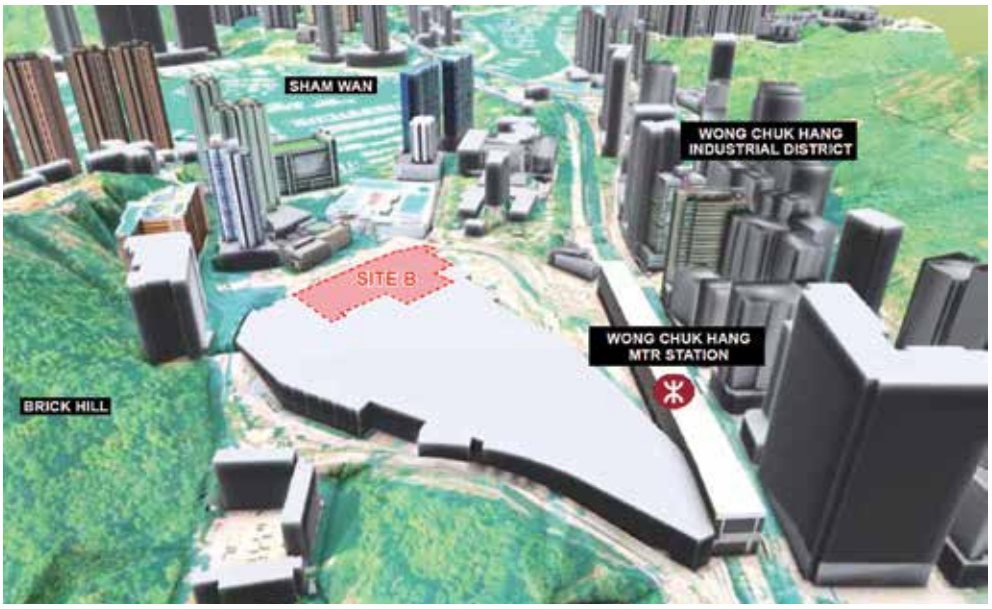
BIM Manager - Kerry Properties (H.K.) Limited

BIM PARTNERS

P&T Architects and Engineers Limited
Siu Yin Wai & Associates Limited
Meinhardt (M&E) Limited
WSP Asia Limited

AUTODESK PRODUCTS USED

3ds Max
AutoCAD
BIM360
Infrawork360
Navisworks
Revit



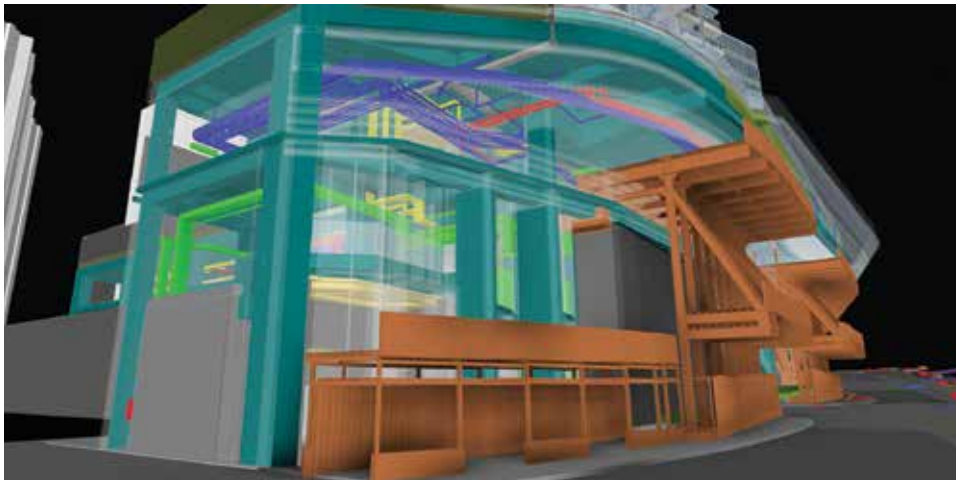
Site Record Model of WCH
Image courtesy of Kerry Properties Limited & Sino Land Company Limited & MTR Corporation Limited

Kerry Properties Limited (KPL) has been adopting Building Information Modelling (BIM) since 2006, resulting from the benefits of BIM Usage such as reducing re-work, better predictability, reducing errors, etc. From the past BIM project experiences, it was found that the core value was not grounded to the working team or to the project directly due to the fragmental execution process to treat the information and model, so Kerry's Project Management Team has an intention to take this project as a pioneer to experiment of implementing BIM process entirely cross along the project life-cycle of this property development.

"The objective is to integrate the objectives and responsibilities of all stakeholders across the entire BIM spectrum in order to bringing out the true potential in application of BIM." said Executive Director – Mr. Wilkie Lee from the Project Management Department of Kerry Properties (H.K.) Limited.

When it comes to transforming the process to break through the traditional workflow such as implementing BIM, resource investment is inevitable whether government or developers as the top of supply chain.

Coordination Workshop of Integrated Design BIM team
Image courtesy of Kerry Properties Limited & Sino Land Company Limited & MTR Corporation Limited



Large Scale of Podium Structure
Image courtesy of Kerry Properties Limited & Sino Land Company Limited & MTR Corporation Limited

Project Background

Site B of Wong Chuk Hang Station Property Development (WCHB) is a joint venture residential development among Kerry Properties Limited (KPL), Sino Land Company Limited (SINO) and MTR Corporation Limited (MTRC). The Kerry's Project Management Team was entrusted as the Project Manager, delivering the project with high standards in quality design, construction and sustainability.

This project is located at the south-western part of the Wong Chuk Hang Station Property Development, designated for private residential purposes. This project occupies an area of approximately 92,000 square feet and will generate a permissible GFA of approximately 493,000 square feet.

There are three major challenges in this project to be dealt with. First, all consultants are required to create their own design model and coordination with each other in the design stage. Secondly, there is large scale of cantilevered podium structure on top of the depot, pedestrian walkway and road. Thirdly, the coordination to the connection with adjacent packages is critical to fulfill the consistency of landscape design to get the design approval.

BIM Partners Involved - "Design in BIM"

As mentioned earlier, full BIM will be adopted from initial design stage to operational stage. The Project Management team set the objective with the BIM Uses for each design consultant in the design stage.

Design in BIM is one of specific requirements for the consultants to engage in this project with a view to ensuring the integrated design and collaborative BIM coordination which can be reached at a high-level.

BIM Project Management

The mentioned specific BIM requirement earlier, it implied that all parties must be BIM capable even for Kerry's project management team.

Layout Plan for indicating Adjacent Site
Image courtesy of Kerry Properties Limited & Sino Land Company Limited & MTR Corporation Limited

For the entire BIM processing in design stage, there were many types of BIM software used by the consultants as they possess different skills on it and BIM maturity. Naviswork is a helpful tool which was used, helping a lot in federating the BIM model in different types of format.

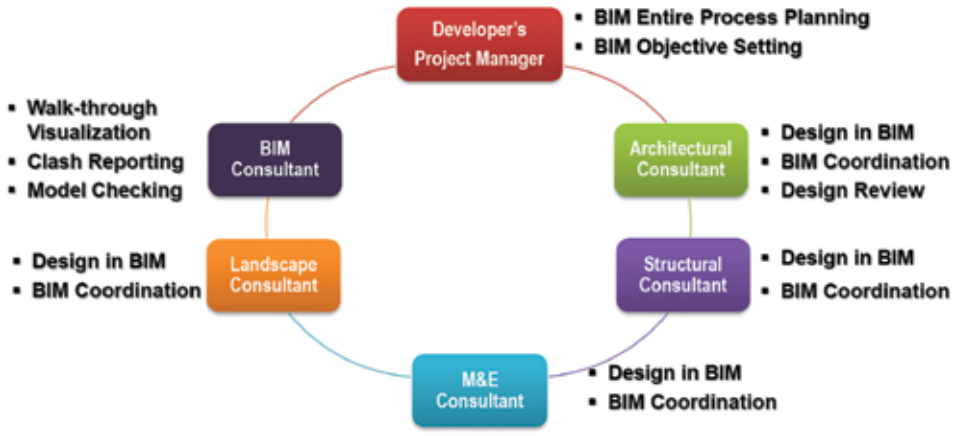
Information exchange is a critical part within the project management with BIM, so the team made use of BIM360 as a collaboration platform for sharing real-time design and construction model & information. In addition, another software - BIM Track was applied for better monitoring and recording the changes among the various design versions.

Objectives setting for the BIM Uses cross the phases - "make use of the model"

"Right people makes right things by using right tools" is a simple but important concept in BIM Planning. In design stage, the project team aims at enhancing the efficiency of the workflow for the design approval on the one hand. On the other hand, its target is to optimise design through BIM Coordination.

Site Record Model is not only for site analysis only

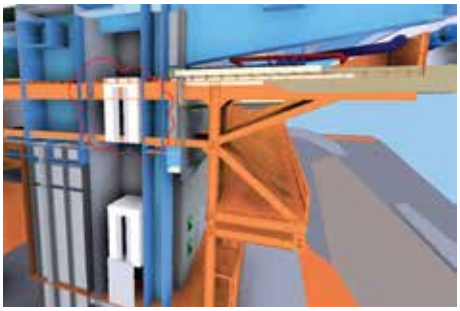
The site record model was generated by using unmanned aerial vehicle to



BIM Goal Setting for All consultants in design stage
Image courtesy of Kerry Properties Limited & Sino Land Company Limited & MTR Corporation Limited

Using Drone to obtain the Site Information
Image courtesy of Kerry Properties Limited &
Sino Land Company Limited & MTR Corporation Limited

Captures from the integrated design review for Entrance
Image courtesy of Kerry Properties Limited &
Sino Land Company Limited & MTR Corporation Limited



BIM Coordination for the Design of Temporary Work
and Permanent Structure
Image courtesy of Kerry Properties Limited &
Sino Land Company Limited & MTR Corporation Limited

record the site information. Apart from using record for site analysis, the captured information such as 360 image was integrated to study the views for evaluating the value of the units to go for alternative design proposal if necessary, hence, improving the quality of design.

"Entrance Promenade" analysis

Landscape design is another challenging task in this project as mentioned. In addition to using tradition workflow for landscape design presentation, "Entrance Promenade" analysis was applied for integrated design review with architectural design, landscape design and surrounding site condition, providing the full picture of design

BIM Added value Application - Virtual Spatial Mock Up
Image courtesy of Kerry Properties Limited &
Sino Land Company Limited & MTR Corporation Limited

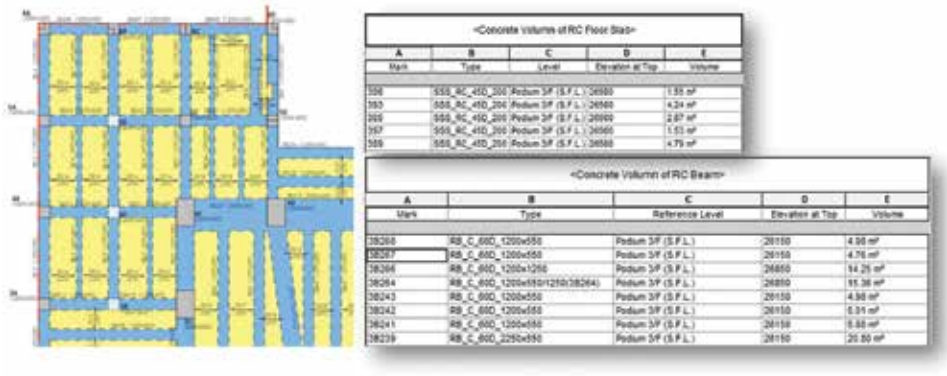
instead of fragmented perspective views for imaging the design. Thus, the gap between conceptual design and final product can be further narrowed and the given comments can be taken in appropriate steps straightly.

Virtual Spatial Mockup

Virtual Spatial Mock-Up (VSMU) is developed and applied in this project for validating the spatial feeling of the design instead of conventional physical timber mock up. It a foreseeable trend of application with BIM which is one of the ways for design review.

Through VR's equipment like goggles or immersive CAVE system to let project team review the design in virtual environment, it brings a lot of benefits such as no limitation and cost for the site; Model can be updated anytime upon receiving comments; Environmental friendly - Zero wastage; Resolving the problem of the Shortage of Skilled-workers, VSMU allows to provide more design options, by comparison to traditional physical mock-up.

Through the experience of implementing BIM with integrated project delivery (IPD) approach in this awarded project, it is a successful case to demonstrate that is the way out to gain the value of BIM to the team, project and company.



5D-Quantities Taking off for cross checking the BQ result
Image courtesy of Kerry Properties Limited & Sino Land Company Limited & MTR Corporation Limited

嘉里建設
KERRY PROPERTIES

SINO LAND
信和置業

MTR

Bird-eye view for the Development Project of Wong Chuk Hang Site B
Image courtesy of Kerry Properties Limited & Sino Land Company Limited & MTR Corporation Limited

About Kerry Properties Limited

Kerry Properties Limited (HKEx: 683), incorporated in Bermuda with limited liability, is a leading property investment and development company in Mainland China and Hong Kong. Leveraging on its decades of experience, expertise and brand equity in property development, the Group focuses on building high-quality residences and mixed-use projects in prime locations of the major cities. It also owns and operates a premier investment portfolio of office, commercial and residential properties in prestigious neighbourhoods. Kerry Properties acts on principles of fairness and integrity, and values the many relationships developed with staff, suppliers, partners, government agencies, and other key stakeholders.

About Sino Land Company Limited

Sino Land Company Limited (HKSE: 083), is one of the leading property developers of Hong Kong and a constituent member of the Hang Seng Index. With footprints spanning Hong Kong, Mainland China, Singapore and Australia, the Group's core business of developing properties for sale and investment is complemented by a full spectrum of services ranging from hospitality to property management, car park management, cleaning and environmental services and security services.

A committed corporate citizen, Sino Land has been made a constituent member of the Hang Seng Corporate Sustainability Index Series since 2012.

About MTR Corporation Limited

The MTR Corporation was established in 1975 with a mission to construct and operate, under prudent commercial principles, an urban metro system to help meet Hong Kong's public transport requirements. MTR is regarded as one of the world's leading railway operators for safety, reliability, customer service and cost efficiency.

COMPANY
Urban Renewal Authority

PROJECT
Central Market Revitalisation Project

LOCATION
80 Des Voeux Road Central and 93 Queen's Road Central, Hong Kong

TYPE
Revitalisation Project

SCHEDULED TIME OF COMPLETION
2021

Full Building Life Cycle Approach with Open BIM and Open Data Concept

"Central Market was the icon of building innovation more than eighty years ago when it was amongst the first to adopt reinforced concrete and other passive environmental design features for public enjoyment of a hygienic and airy market environment. Through the application of BIM initiatives for survey, documentation, design & construction coordination and management, it was resurrected from its past life when building records were irretrievable, to sustained future use by the public."

—Lawrence Mak

General Manager (Planning & Design), Urban Renewal Authority

BIM PARTNERS

AGC Design Limited
AECOM Asia Company Limited
Ove Arup & Partners Hong Kong Limited
Rider Levett Bucknall Limited
Global Virtual Design and Construction Limited
Yau Lee Construction Company Limited
Shui On Construction Company Limited
Vircon Limited

AUTODESK PRODUCTS USED

BIM 360 Doc
CFD
Dynamo
Navisworks
Recap
Revit

BIM model of Central Market Revitalisation Project
Image Courtesy of Urban Renewal Authority

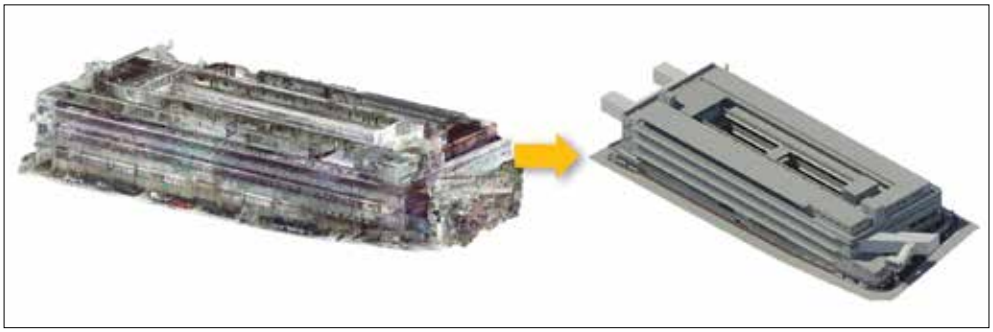
As part of the "Conserving Central" initiative proposed in the 2009-10 Policy Address, the Urban Renewal Authority was commissioned by the HKSAR Government to revitalize the Central Market, a grade 3 historic building.

The Project involves the alteration and addition works for conservation and adaptive reuse of the existing reinforced concrete market building which is more than 80 years old. A minimum intervention approach is adopted to conserve the Central Market without affecting the existing foundation, structure and façade as well as architectural and historical significant building elements.

The Main Challenges for Revitalisation of Central Market

Central Market is a "Streamline Moderne" architectural style building built in 1930s, and has been used as a wet market building until the 1990s when the government constructed the Mid-levels Escalator System in Central and the market was decommissioned.

As the building was built in the 1930s, no existing building record or structural plans were available for design reference. BIM technology was adopted to first assist proper documentation of the existing historical building and to improve the effectiveness in "change management" with respect to time, cost and quality.

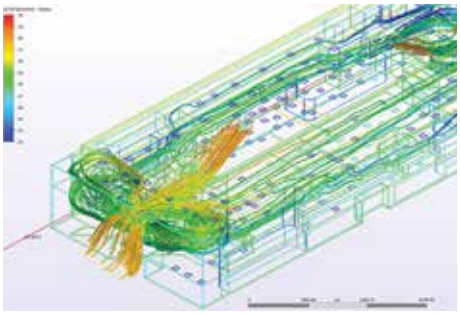


3D laser scanning of historical building to establish point cloud model and BIM model verification.
Image Courtesy of Urban Renewal Authority

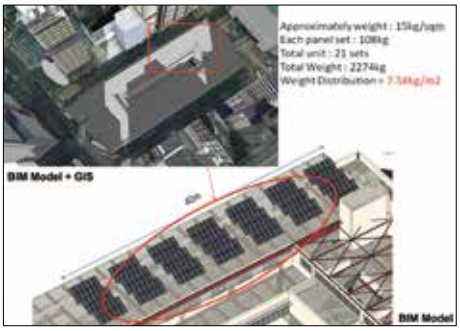
BIM in Full Life Cycle Management

The "Full Life Cycle Management" approach enables application of complex models with full sets of data (graphical, geographical and technical data) and provides a virtual document of the project which empowers the owner / operator with the ability to manage building throughout the building's life cycle.

To extend the use of 3D geometry applications, 3 higher dimension applications were also adopted to enhance the project's full life cycle management:



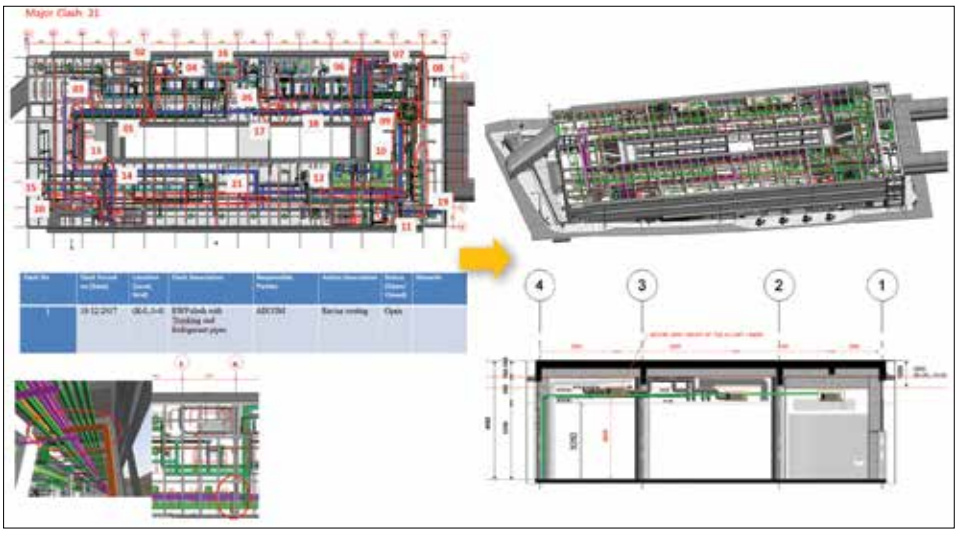
CFD analysis for optimal MVAC design effectiveness and open space simulation.
Image Courtesy of Urban Renewal Authority



BIM + GIS simulates solar path for optimal location of PV solar panels.
Image Courtesy of Urban Renewal Authority

As-bulit BIM Model updated based on as-bulit laser scan data for proper documentation.
Image Courtesy of Urban Renewal Authority

Full building life cycle approach with open BIM, open data concept from design to management.
Image Courtesy of Urban Renewal Authority



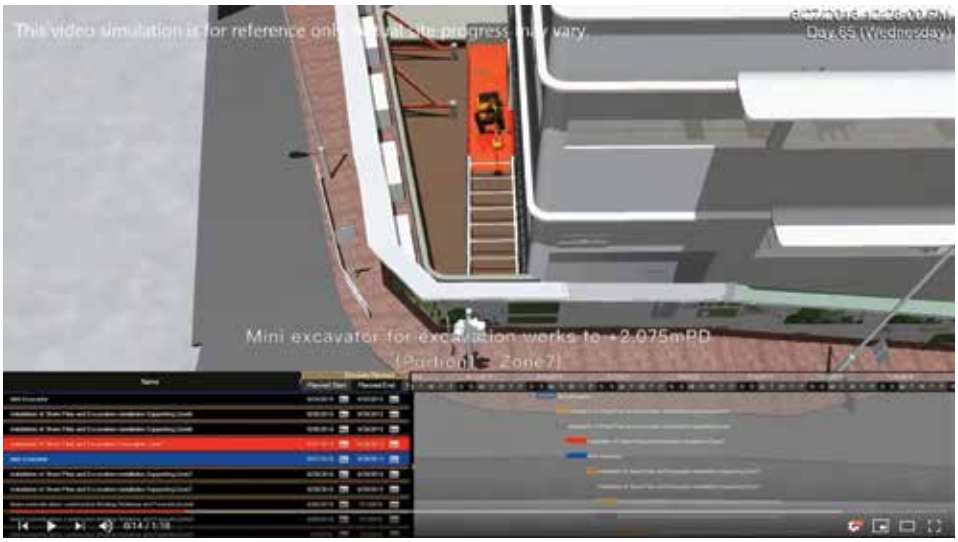
Zero Clash Model incorporating various architectural, structural and MEP elements for production of tender drawings.
Image Courtesy of Urban Renewal Authority

Design and Build BIM Model: The Main Contractor took over the tender model for further updating, enhancement and 3D design coordination.
Image Courtesy of Urban Renewal Authority

4D BIM - Virtual construction simulation and planning;
5D BIM - Cost management; and
6D BIM - BIM enabled facility management.

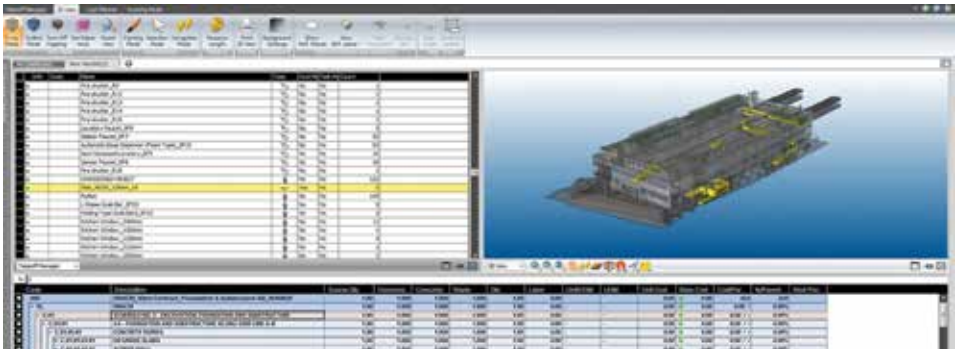
Information during design and construction stages were recorded in the BIM model, upon completion of construction, comprehensive BIM information will be migrated to facility management system.

In addition, BIM enables energy performance evaluation for design optimization of the overall building environmental performance and waste minimization, hence reducing the building's carbon footprint throughout it's life cycle.



4D animation showing important construction sequences for construction planning and public presentation.
Image Courtesy of Urban Renewal Authority

Phase planning 4D model adopted in the project for planning and construction programme monitoring.
Image Courtesy of Urban Renewal Authority



Tender model imported for cost estimation; Model based Quantity Take Offs were adopted for tender.
Image Courtesy of Urban Renewal Authority

Common Data Environment

The whole project is conducted under a Common Data Environment (CDE) by utilizing Network Attached Storage (NAS) and BIM 360 Autodesk Cloud Solution as project management tools to share, view, markup, manage drawings, documents and models in order to facilitate daily project administration and coordination.

Workflow for Implementation of BIM in Full Life Cycle Management

Prior to the commencement of design stage, CAD drawings from the project team were incorporated for model build up and they were used for comparison with 3D point cloud model obtained via laser scanning for verification and fine tuning in order to ensure the contents are correct to facilitate the detailed design development for each discipline. Through 'Big Room' concept for meetings, the 3D model was used to facilitate the team for better presentation, visualization and understanding of various issues throughout meetings. Clash analyses were also performed during design stage to assist the project team for early design review to minimize on-site abortive works.

4D & 5D BIM

Adopting 4D and 5D BIM initiatives can also assist in quantity take off, cost estimation and work sequence planning during tendering and construction stages.

6D BIM

Early adoption of Cobie system during modeling will also speed up the process for 6D BIM-FM (Facility Management) implementation during the operation stage. To ensure a seamless transition between project parties from design to construction and even future operation stages, the project team recognized the importance to adopt OPEN BIM as a universal approach for design and construction workflows, which provides a common platform for effective communication.

市區重建局
URBAN RENEWAL AUTHORITY

Central Market Revitalisation Project
Image Courtesy of Urban Renewal Authority

About Urban Renewal Authority

The Urban Renewal Authority was established in May 2001 under the Urban Renewal Authority Ordinance enacted in July 2000, having the responsibility of improving the standard of housing and the built environment of Hong Kong by undertaking, encouraging, promoting and facilitating urban renewal. A comprehensive and holistic approach is adopted to rejuvenate older urban areas by way of Redevelopment, Rehabilitation, heritage pReservation, Revitalisation and Retrofit (the 5R business strategy).

COMPANY
Urban Renewal Authority
AECOM Asia Company Limited

PROJECT
Sustainable BIM FM Platform for URA (Project MK01)

LOCATION
Mongkok, Hong Kong

TYPE
Operation and Management with BIM

SCHEDULED TIME OF COMPLETION
2019 / 2020

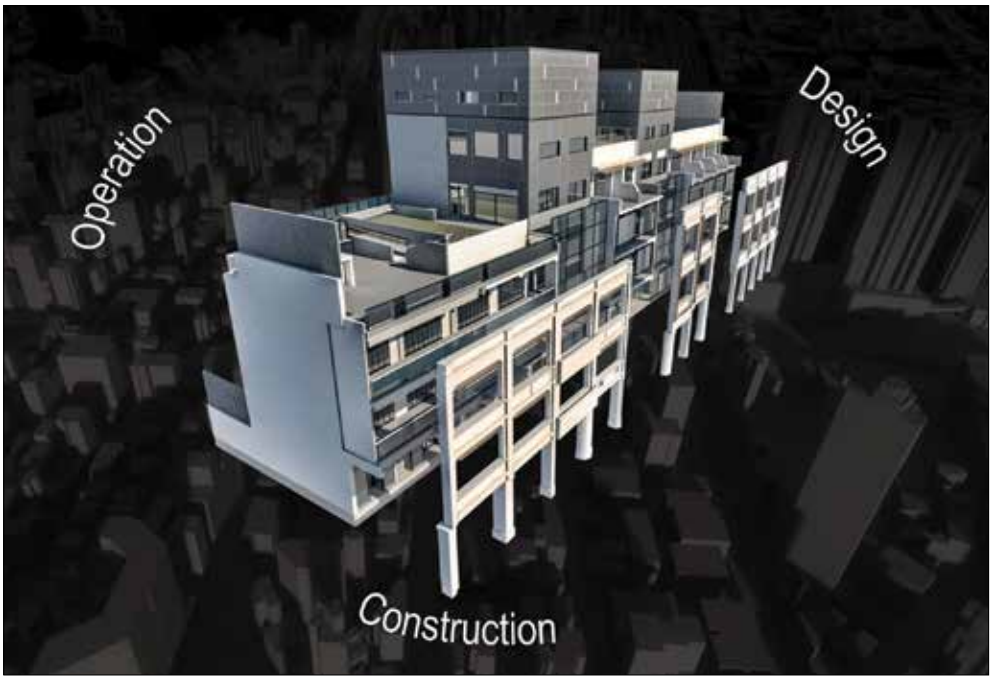
Sustainable BIM FM Platform for URA (Project MK01)

"Championing the use of new technologies and applications, the Urban Renewal Authority (URA) has an ambitious road map in adoption of BIM. We advocate to adopt BIM in design, construction and operation stages of our development projects. The BIM-FM platform provides a real-time facility management system by manoeuvring freely through the BIM, FM and BMS data on an integrated platform that could effectively and efficiently serve all URA projects."

—Eric POON Shun-wing
Director, Works and Contracts, Urban Renewal Authority

BIM PARTNER
Lexco Limited

AUTODESK PRODUCTS USED
Forge
Navisworks
Revit



BIM Uses in Design, Construction and Operation
Image courtesy of Urban Renewal Authority and AECOM Asia Company Limited

Hong Kong is heading its development towards smart city by enhancing innovation and technology in our living and business environment. One of the Smart Government's initiatives is to adopt the use of BIM in the building life cycle: Design, Build and Operate. Project MK01 is URA's first project to use BIM as a tool in enhancing design coordination, crashes prevention in construction, quality buildings, and operational efficiency of facilities management (FM).

This project has leveraged several Autodesk BIM technologies across the project life cycle. To improve the operation efficiency, the URA has appointed AECOM to develop a centralized BIM-FM platform on Autodesk Forge which acts as an important role of integration among as-built BIM, the Building Management System (BMS) data and the Internet of Things (IoT) systems that are installed on site. With the latest BIM technology provided from Autodesk, it offers a sustainable and expandable solution to achieve better building maintenance and property management for building a quality city.

BIM Project Management

The BIM model can truly replicate the as-built environment. Thanks to the Autodesk products such as Revit and Navisworks, the related information was digitized thus design coordination and facility management were facilitated. The BIM models ensure that the contractors can understand the construction details and thus provide a more accurate estimation for the works. The building services and smart sensors /controllers installation requirements can also be reviewed. In this way, clashes can be avoided, and maintenance space can be reserved, which is very useful for this conservation project

Mobile Integration for Work Order Execution and Monitoring
Image courtesy of Urban Renewal Authority and AECOM Asia Company Limited

Retain the Facade and historic elements of pre-war buildings
Image courtesy of Urban Renewal Authority and AECOM Asia Company Limited

with limited headroom from the existing architectural design.

In the O&M stage, the centralized BIM-FM platform is a sustainable solution for managing MK01 facilities and it is designed to be expanded to all other URA Projects. This platform integrates the as-built BIM and the BMS data from the IoT systems installed on-site. It also monitors all the equipment history, layout change and status update etc. With IoT systems installed on-site, they are connected to the BMS which can monitor and manage all building facilities such as CCTV, pumping, lighting and wireless door contact system. By analysing the real time signals collected from the BMS, a preventive maintenance programme can be identified and carried out before failure.

Involvement across Multiple Phases of the Building Life Cycle

During the design and construction period, BIM connects and facilitates the project collaboration and helps to shorten the construction period by providing more accurate and reliable information to contractors. The BIM workflow is extended with Autodesk Revit and Navisworks which allows inter-disciplinary review. The Coordinated Services Drawing (CSD) workflow can be improved by the 3D visualized environment, and clash detection can be easily identified.

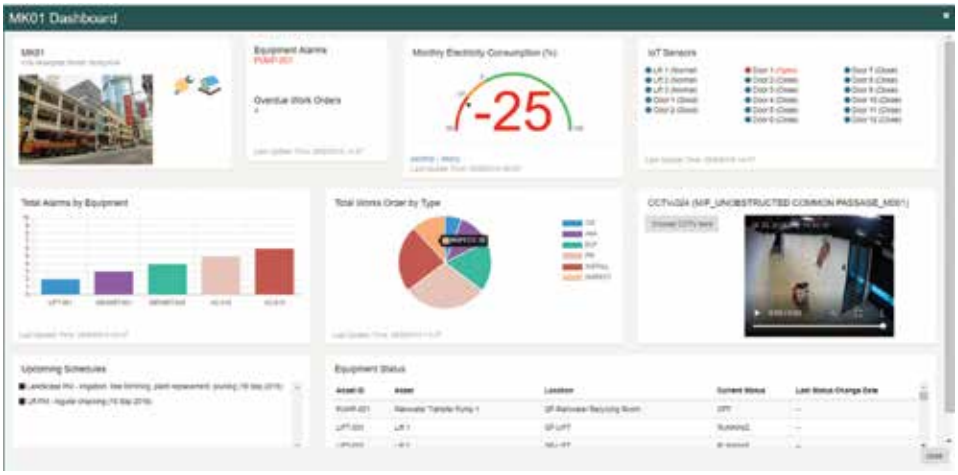
During the O&M Stages, with the centralized BIM-FM platform, site officers can retrieve maintenance and equipment information effectively within the system, often without being on-site, assess what the problem is and how it can be solved. This usage is extended to field inspection with mobile device as it is more convenient to manage the entire field maintenance procedures. For example, work order execution workflows can be tracked by the field team and be monitored from officers through the centralized BIM-FM platform. This clarity of schedule allows better use of resources and long-term planning.

Collaboration between Multi-Disciplinary Project Stakeholders

The as-built BIM has rich information about assemblies and equipment including manufacturer, cost, description, etc. They are critical for generating more accurate costs and improving overall O&M efficiency. The centralized BIM-FM platform on Autodesk Forge integrates BMS and BIM through IoT and provides real time notifications of incidents to team members. This ensures that the engineer, the field team and the contractors are receiving the same latest information. Data can be retrieved easily whenever the field team has doubts on the specification. Officers can make queries through the platform and create work order when necessary. It contributes on the efficiency of the work progress.

Lighting Panel Control with BIM in Autodesk Forge
Image courtesy of Urban Renewal Authority
and AECOM Asia Company Limited

Building Services CSD Coordination with BIM
Image courtesy of Urban Renewal Authority and AECOM Asia Company Limited



Management Dashboard for Different Projects in Centralized BIM-FM Platform
Image courtesy of Urban Renewal Authority and AECOM Asia Company Limited

BIM of Pre-war Shophouses in Autodesk Forge
Image courtesy of Urban Renewal Authority and AECOM Asia Company Limited

Innovative BIM Application

The as-built BIM model developed by Revit is managed in the centralized BIM-FM platform. It is integrated with BMS as a control panel to control the site equipment such as CCTV and lighting panel. This can save the labour effort for the field team and the operation cost for maintenance in a sustainable way. It also optimizes building performance of the assets by analysing the savings of various facility improvements.

With cloud technology, we integrate BMS and BIM and receive real time information through IoT systems, with the sensors in different sites and projects. When there is a signal caused by failure or abnormal reading, an alert will be sent to the centralized BIM-FM platform. Maintenance staff can prepare contingency plans and measures before arriving on the spot. As a result, the efficiency and effectiveness can be significantly improved.

Application of Autodesk Cloud Solutions

This one-stop BIM-FM solution implemented a totally cloud architecture with the different components,

- Autodesk Forge as the core BIM platform,
- Raspberry Pi as an IoT gateway for BMS to communicate with the server and database,
- LoRa acts as the communication protocol with other sensors such as door contact, odor level and ventilation status in washroom and
- Microsoft Azure as the server to host the Autodesk Forge, management dashboard and the SQL database.

This cloud architecture includes Autodesk Forge as it can easily transfer, replicate and integrate with other BIM-FM projects in the future. Forge also offers expandable and easily reproduced versions of the current environment which do not need to relocate and reinstall in the physical server. Under this cloud architecture, BIM, BMS and IoT are connected for asset/ facility management, preventive maintenance and corrective maintenance management including a workflow for fault reporting and monitoring.

Other Significant Improvements to highlight

The inter-discipline implementation, operation and management knowledge showcased in this project prompted URA to connect everything together through BIM, BMS and IoT systems.

URA has since mandated the implementation of 'smart buildings' to improve its residential, commercial and mixed projects and maintenance program. They have the vision and are expecting more seamless connectivity in all aspects of their operations from a smart building to a smart community. In the future, the current centralized BIM-FM platform in MK01 will be integrated to all other URA self-developed projects.

Championing the use of new technologies and applications, the Urban Renewal Authority (URA) has an ambitious road map in adoption of BIM. They advocate to adopt BIM in design, construction and operation stages of their development projects. The BIM-FM platform provides a real-time facility management system by manoeuvring freely through the BIM, FM and BMS data on an integrated platform that could effectively and efficiently serve all URA projects.

市區重建局
URBAN RENEWAL AUTHORITY

AECOM

As-Built BIM Model of the Verandah Type Pre-war Shophouses in Mong Kok
Image courtesy of Urban Renewal Authority and AECOM Asia Company Limited

About Urban Renewal Authority

The Urban renewal Authority was established in May 2001 under the Urban Renewal Authority Ordinance enacted in July 2000, having the responsibility of improving the standard of housing and the built environment of Hong Kong by undertaking, encouraging, promoting and facilitating urban renewal. A comprehensive and holistic approach is adopted to rejuvenate older urban areas by way of Redevelopment, Rehabilitation, heritage pReservation, Revitalisation and Retrofit (the 5R business strategy).

About AECOM Asia Company Limited

AECOM, which was established in 1986, is a premier, fully integrated professional and technical services firm positioned to design, build, finance and operate infrastructure assets around the world for public- and private-sector clients. With nearly 100,000 employees – including architects, engineers, designers, planners, scientists, management and construction services and information technology professionals – serving clients in over 150 countries around the world, of which more than 4,500 employees working in Hong Kong, AECOM is ranked as the #1 engineering design firm by revenue in Engineering News-Record magazine's annual industry rankings, and has been recognized by Fortune magazine as a World's Most Admired Company. AECOM provides a blend of global reach, local knowledge, innovation and technical excellence in delivering customized and creative solutions that meet the needs of clients' projects. From creating new buildings and communities, to enhancing public space, to engineering, energy, transportation, utility systems, Building Information Modelling (BIM), Facility Management (FM), Building Management System (BMS), and IT solutions for the company's vision to make the world a better place.

HONORABLE MENTIONS

ORGANIZATION

Architectural Services Department, HKSAR Government

PROJECT

Lung Tsun Stone Bridge Preservation Corridor

ORGANIZATION

Electrical and Mechanical Services Department, HKSAR Government

WSP Hong Kong Limited

PROJECT

EMSD Headquarters - Customer Services Centre (CSC)

ORGANIZATION

Hong Kong Housing Authority, HKSAR Government

PROJECT

Modular Flat Design in Public Housing Developments
- Adopting BIM for Collaboration and Integration

ORGANIZATION

Hong Kong Observatory, HKSAR Government

PROJECT

Development of a three-dimensional (3-D) Building Information Model (BIM) for the Hong Kong Observatory's (HKO) Tate's Cairn Weather Radar Station (TCWRS) for enhancing education, training, calibration and maintenance of the radar system.

AIM --Archaeological Information Modeling
Unveil the Covered Remnants through BIM

COMPANY
Architectural Services Department, HKSAR Government

PROJECT
Lung Tsun Stone Bridge Preservation Corridor

LOCATION
Kai Tak Development Area

TYPE
Public Open Space

SCHEDULED TIME OF COMPLETION
Tentative: 2025

建築署
Architectural Services Department

About Architectural Services Department, HKSAR Government

Architectural Services Department (ArchSD) performs the following three core functions in relation to Government-owned and Government-funded facilities:

1) Monitoring and advisory services;

2) Facilities upkeep; and

3) Facilities development.

ArchSD commits to provide quality services to the public and explore every opportunity to integrate innovative and sustainable elements into its projects for the betterment of the society with due consideration on cost effectiveness. In recent years, ArchSD projects received some recognition including but not limited to the Hong Kong Institute of Architects Annual Awards, the Hong Kong Institute of Landscape Architects Design Awards, Quality Building Award and Green Building Award.

BIM PARTNERS

Archaeological Assessments Limited

Building Information Technology Limited

Ove Arup & Partners Hong Kong Limited

AUTODESK PRODUCTS USED

Navisworks

Recap

Recap 360

Revit

Project Description

This project is a proposed development in Kai Tak Development Area with significant archaeological content. The project aims to provide a landscaped open space within a 30-metre wide Preservation Corridor for heritage conservation and public appreciation of the Lung Tsun Stone Bridge remnants in situ at Kai Tak. The remnants were backfilled with soil and were fully covered in 2012 by CEDD. No remnants can be seen currently on site.

As there are remnants in the site, a Heritage Impact Study is required to assess the archaeological impact arising from the design and construction and to propose any necessary mitigation measures at the design stage for the approval by Antiquities Advisory Board.

Project Challenges

A big challenge of the project is to carry out archaeological study based on the unexposed remnants and to design an effective exhibition area for the remnants.

The archaeological study has to be carried out with minimized archaeological excavation and remnants exposure to minimize damages and weathering on the remnants. Accurate estimation on the impact of the construction works on the remnants without exposing the remnants are critical.

Coupled with these technical difficulties, the level of excavation, the location of viewing decks and the form of remnants display are in responsive location with sophisticated setting out.

Solutions for challenges

It is the local industry's practice that archaeological study is carried out by exposing the remnants for coordination on site.

In the process of archaeological study, exposing the remnants in early stage would easily cause damages and weathering of the remnants; if exposing the remnants in late stage, it would however attract a higher tender price due to the higher risk associated with the uncertain underground situation.

With the help of BIM, the project team could carry out detail archaeological study in early stage without exposing the remnants. Hence, in the early design stage, the project team has worked out the detailed design of the remnants displaying method rather than just conceptual design in the normal trade practice. All design details could be considered and well-coordinated in the design stage to achieve the buildability and constructability of the work. It is expected that the high accuracy of the archaeological study, design and quantification can lower contractor's risk and lead to a lower tender price.

How does BIM benefit the project?

The project team's access to the archaeological study in details during the early design stage will improve the constructability of the archaeological displaying system; minimizing abortive work and variation and achieving cost effectiveness of the whole project.

As the design of this project has been developed by BIM, it is anticipated that all appropriate information developed during design and construction stages is integrated in the BIM model which will be passed on for asset management. This facilitates easy retrieval of the information and hence efficient use of BIM data in asset management stage.

Better with BIM

1. BIM is an unique tool for analysis of archaeological works and remnants display.
2. BIM unveils the remnants more accurately off site without exposing the remnants on site.
3. 3D Visualisation in design stage and tender drawings allows better communication with future users, project teams and tenderers.
4. Problems are realised and resolved at project early stage before tendering.

BIM is a tool for carrying out effective Archaeological Investigation and designing an effective remnant displaying open space, collaborating multi-disciplines, enhancing current practise with BIM technology and visualized experience.

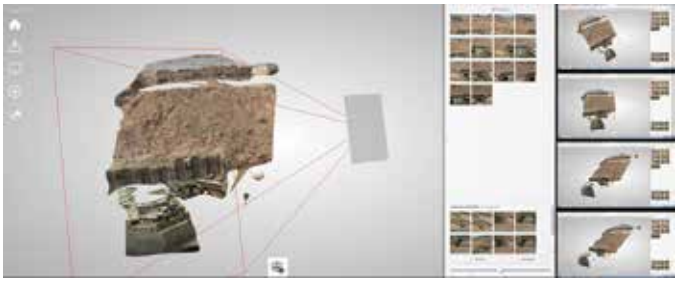
Rendering image for overall view of Lung Tsun Stone Bridge Preservation Corridor
Image Courtesy of Architectural Services Department, HKSAR Government

Rendering image for Remnants of Lung Tsun Stone Bridge Preservation Corridor
Image Courtesy of Architectural Services Department, HKSAR Government

Existing condition of Kai Tak Development
Image Courtesy of Architectural Services Department, HKSAR Government

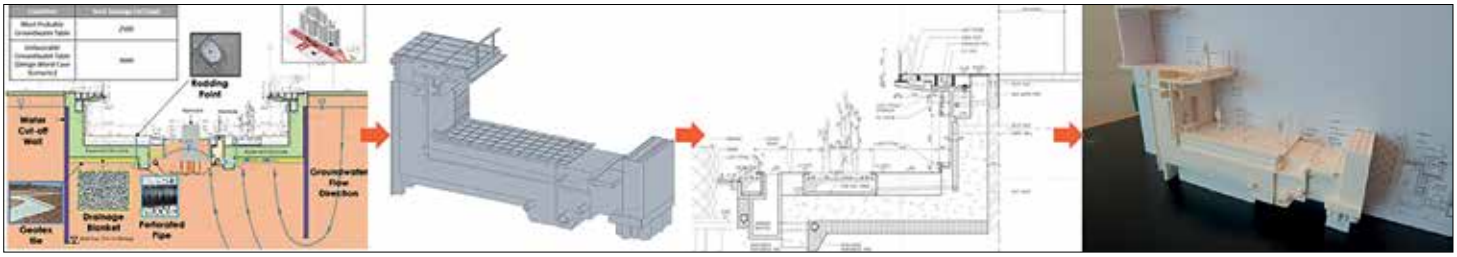
Old photo of Lung Tsun Stone Bridge Preservation Corridor
Image Courtesy of Architectural Services Department, HKSAR Government

Point Cloud Scanning the Profile of Remnants on Site by CEDD and Documenting the information of Remnants in BIM Model using Autodesk ReCap.
Image Courtesy of Architectural Services Department, HKSAR Government



For area which is difficult to draw point cloud information, photo montage was adopted to reinstate the remnants outlook using Autodesk ReCap 360.
Image Courtesy of Architectural Services Department, HKSAR Government

3D model of the remnants
Image Courtesy of Architectural Services Department, HKSAR Government



3D printing models show high accuracy and enhance communication with client, stakeholders and the public.
Image Courtesy of Architectural Services Department, HKSAR Government

COMPANY
Electrical and Mechanical Services Department, HKSAR Government

WSP Hong Kong Limited

PROJECT
EMSD Headquarters - Customer Services Centre (CSC)

LOCATION
Customer Services Center (CSC), 4/F, EMSD Headquarters, 3 Kai Shing Street, Kowloon Bay, Hong Kong

TYPE
Renovation

SCHEDULED TIME OF COMPLETION
06/2017 – 08/2018

The first completed project using EMSD BIM-AM Standard in whole BIM life-cycle

About Electrical and Mechanical Services Department, HKSAR Government

EMSD discharges its services to the public in Hong Kong via two separate teams: Regulatory Services and Trading Services. Our Regulatory Services team regulates electrical, mechanical and gas safety, and railway safety, as well as energy efficiency, via law enforcement and public education. It also monitors the technical performance and development plans of the electricity supply companies, and gives professional and technical support to the Government's wide range of safety and environmental initiatives. Our Trading Services team provides electrical and mechanical, electronic engineering and building services to government departments and public bodies with the ultimate goal of improving the quality of life for the public.

About WSP Hong Kong Limited

WSP is one of the world's leading engineering professional services consulting firms, bringing together approximately 49,000 talented people globally. We are technical experts who design and provide strategic advice on sustainable solutions, engineering projects that will help societies grow for lifetimes to come.

WSP BIM team is one Hong Kong's leading BIM professional, with a team of 60 BIM specialists, we offer wide range of BIM services to our clients including BIM Management, Consultancy, Standard setup and training.

BIM PARTNERS

39 Plus Limited

Au Chow Electrical Company Limited

Planon Hong Kong Limited

AUTODESK PRODUCTS USED

Autodesk COBie Extension for Revit

BIM360

Navisworks

Recap Pro

Revit

Project Description

EMSD published the first BIM-AM Standards and Guidelines in 2017. To prove its practicality, EMSD chose a renovation project, which is the new Customer Services Centre (CSC) with 380 sq.m. on 4/F of EMSD Headquarters, as a pilot project to fully comply with the EMSD's BIM-AM Standards and Guidelines. BIM technology was adopted starting from design stage to building operation & maintenance stage. The EMSD's BIM-AM Standards and Guidelines were part of the Employer's Information Requirement (EIR) for BIM construction during the design stage.

Project Challenges

Despite of small project scale, this project had been set an aggressive schedule since the CSC needed to be launched on time for its business operation. Secondly, this project was the pilot project adopting the BIM-AM Standard as EIR, some appointed parties were not fully familiar with the requirement and had reluctance to adopt the BIM.

With the mindset of "Begin with the end", EMSD intended to use BIM not only for design analysis and construction coordination, but also the use of as-built BIM models for its BIM- Asset Management (BIM-AM) System with the integration of various electronic systems, including RFID technology and IoT sensors.

Solutions for challenges

To ensure effective project implementation under this tight schedule, a Common Data Environment (CDE) was setup up with using Autodesk BIM360 platform so all appointed parties could share data in real-time and well organized manner. A compressive BIM Project Execution Plan was prepared to explicitly explain to all parties by showing the way of BIM implementation.

Apart from workflow, some BIM-enabled productivity tools were adopted that includes a real time game engine to visualize the design instantly and Revit plug-in to improve drawing production. Furthermore, in order to improve effectiveness in preparing Asset Data complying BIM-AM Standards, a web-based productivity plug-in was developed to reduce the time for data inputting.

How does BIM benefit the project?

During design and construction stages, BIM has been fully used and a number of benefits were realized. For example, design analysis such as lighting analysis and barrier free analysis were performed so that end users without technical knowledge could easily understand the design and E&M system operation.

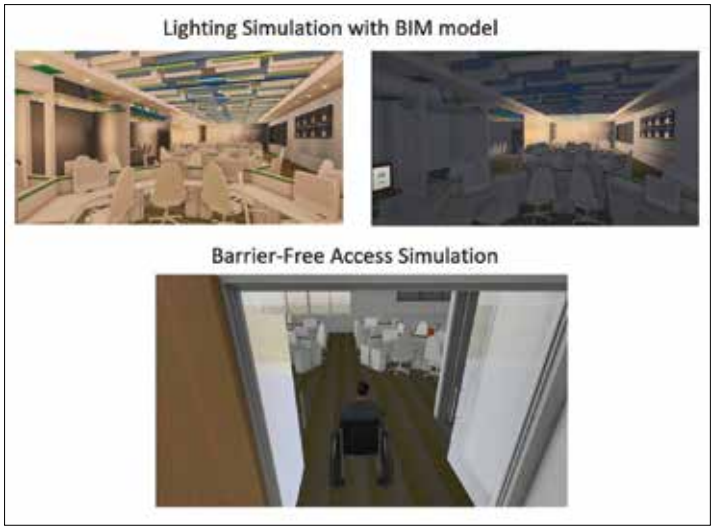
Upon completion of the project, a completed BIM model with Asset Data was successfully obtained to form an Asset Information Model (AIM) for building operation. The integration of AIM and IoT technology could achieve smart facility management, including smart toilet management and smart meeting room & carpark reservation, towards Smart Building initiatives.

Better with BIM

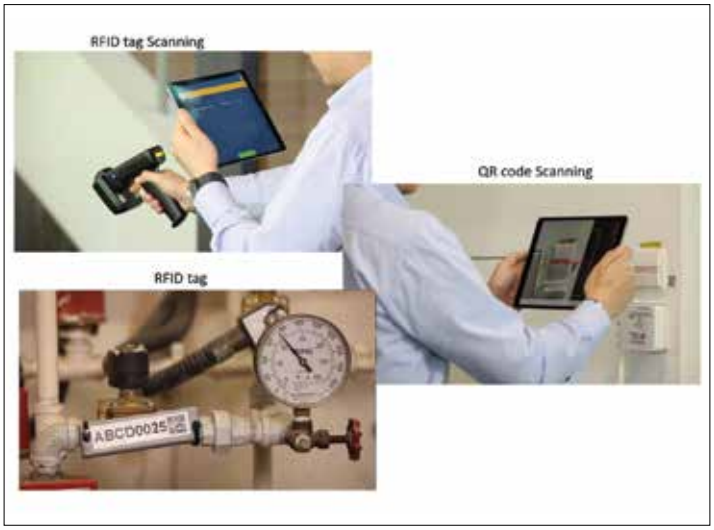
With the mindset "begin with the end", a completed AIM model was successfully obtained for smart asset management with the integration of RFID and IoT technologies. The new concept of BIM-AM-IoT was introduced so it gives a new dimension to users in making better decision in building operation according to actual spatial utilization.

The asset data in AIM together with the operational data from IoT enable us to explore the application of big data analysis for smart building development.

The BIM project of Customer Services Center in EMSD Headquarters
Image Courtesy of Electrical and Mechanical Services Department, HKSAR Government and WSP Hong Kong Limited



BIM enabled Lighting and Barrier-free access Simulations
Image Courtesy of Electrical and Mechanical Services Department, HKSAR Government and WSP Hong Kong Limited



Fast Asset Locating with the use of QR codes and RFID Technology
Image Courtesy of Electrical and Mechanical Services Department, HKSAR Government and WSP Hong Kong Limited

The User Interface of Smart Toilet Management System in EMSD Headquarters
Image Courtesy of Electrical and Mechanical Services Department, HKSAR Government and WSP Hong Kong Limited

Data Analysis Dashboard of the Smart Toilet Management System
Image Courtesy of Electrical and Mechanical Services Department, HKSAR Government and WSP Hong Kong Limited

COMPANY
Hong Kong Housing Authority, HKSAR Government

PROJECT
Modular Flat Design in Public Housing Developments
- Adopting BIM for Collaboration and Integration

LOCATION
Hong Kong

TYPE
Public Housing Development

SCHEDULED TIME OF COMPLETION
End of 2019

Modular Flat Design (MFD) in Public Housing Developments - Adopting BIM for Collaboration and Integration

香港房屋委員會
Hong Kong Housing Authority

About Hong Kong Housing Authority, HKSAR Government

The Hong Kong Housing Authority (HA) was established in 1973 under the Housing Ordinance with the Housing Department (HD) as her executive arm to help the Government achieving its policy objective on public housing. The HA provides subsidized public rental housing to low-income families, and to help low to middle-income families gain access to subsidised home ownership. Approximately 30% of the Hong Kong population is now living in public rental housing units.

To meet the increasing demand for public housing flats, the HA adopts site specific design approach to fully utilize the potential of each public housing site and designs standard Modular Flat Design (MFD) units to maintain high quality in standardization and buildability to meet varying configuration requirements of different building blocks.

BIM PARTNER

isBIM Limited

AUTODESK PRODUCT USED

Revit

Project Description

The MFD units are the major components of each public housing block. With the collaboration between the HA's Development and Standards (D&S) Section and the Quantity Surveying (QS) Sections and the assistance of a BIM consultant (isBIM), BIM models of different standard MFD units are developed for the integrated purposes of design, drawing production, cost estimating and quantity take-off (QTO). The MFD BIM models form a library of standard flat units, allowing easy updating upon design enhancement and estimating the corresponding cost implications. The parametric MFD BIM models are readily adopted by project teams in different public housing projects which can speed up both the design and tendering processes.

Project Challenges

The major challenge is to have all stakeholders collaboratively establishing the standard approach of modelling (SAM) to determine what and how the geometric and non-geometric information to be provided in the MFD BIM models. The level of information has to suit design and drawing production by design professionals and cost estimating and QTO by quantity surveyor at different project stages while keeping the file sizes at a workable level and user friendly.

Another great challenge is the necessity to change mindset and practice of project teams in adoption of the MFD BIM models including the new collaboration workflow, the ownership of models, the rights and liabilities of model authors and users, the coordination of disciplinary models and the ways to apply the MFD BIM models in assembling domestic blocks in projects.

Solutions for challenges

Different disciplines comprising architect, structural engineer and building services engineer in the HA worked in full collaboration with the assistance of a BIM consultant to develop their own disciplinary models and then regularly integrate the models to form the federated models of MFD units. The design professionals also worked closely with quantity surveyor to agree on the modelling approaches and the incorporation of non-geometric design information to facilitate extraction of information from models for BIM-based cost estimating and QTO. SAM was established and the BIM workflow of applying the MFD BIM models in projects was also developed through mutual undertaking and close coordination.

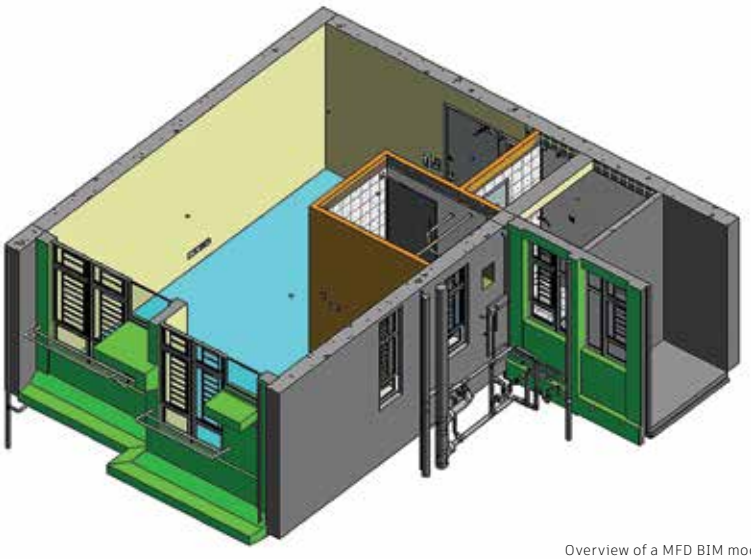
With the repetitive features of MFD and the established SAM, the adoption of the MFD BIM models enhances the efficiency of assembling site specific design domestic blocks in projects and extracting well-defined dimensional information for budget control and cost management.

How does BIM benefit the project?

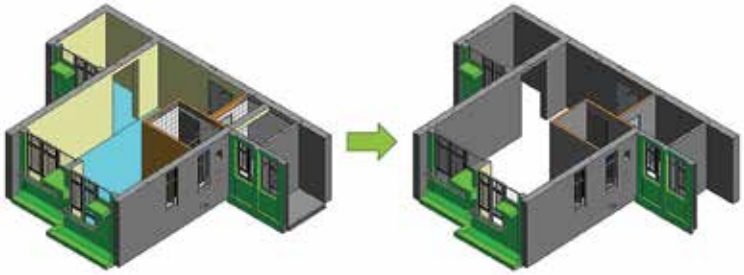
BIM is a good platform for information exchange and management. The MFD BIM models facilitate the sharing of MFD information among project team members throughout the whole workflow. Regular integration of disciplinary models into a federated model enables clashes, omissions and errors to be identified effectively in early stage. The Design Options function enables achieving creation of 36 MFD BIM models to represent 86 flat types for better file management and maintaining consistency across models when updating. The adoption of Workset allows smooth navigation of the federated models and also effectively addresses the concern of discipline liability, category, file sizes and visualization of models at different stages in the project life cycle. Parametric families allow flexibility to modify the MFD BIM models to suit different site specific designs. The design information and well-defined dimensional information can be readily extracted in Revit schedules in a systematic manner for quantity surveyor to carry out budget control, cost management and tender documents preparation.

Better with BIM

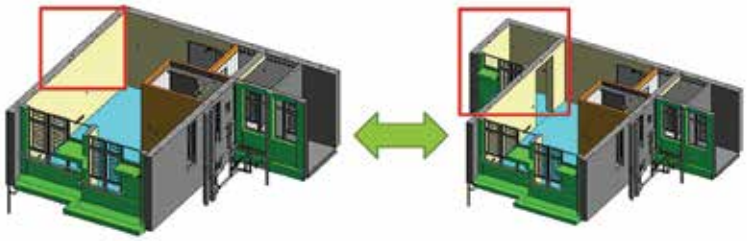
The development of MFD BIM models can be readily adopted by the project team of each public housing project, which can save time in design, modelling, cost budgeting and cost management, and tender preparation. The sharing of MFD BIM models to project teams not only can drive BIM adoption of in-house professional teams but also of our external professional service providers. It is a further step forward of transformation of our work process to digitized workflow.



Overview of a MFD BIM model
Image Courtesy of Hong Kong Housing Authority, HKSAR Government

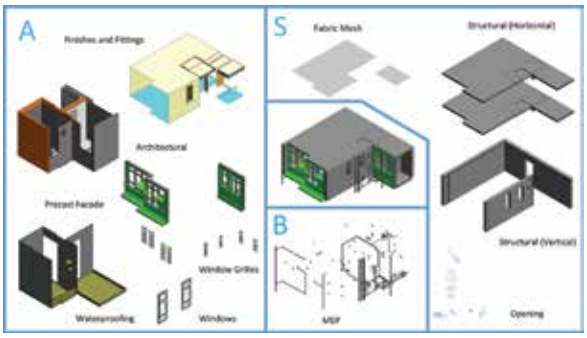


Dynamic management of BIM models by Workset
Image Courtesy of Hong Kong Housing Authority, HKSAR Government

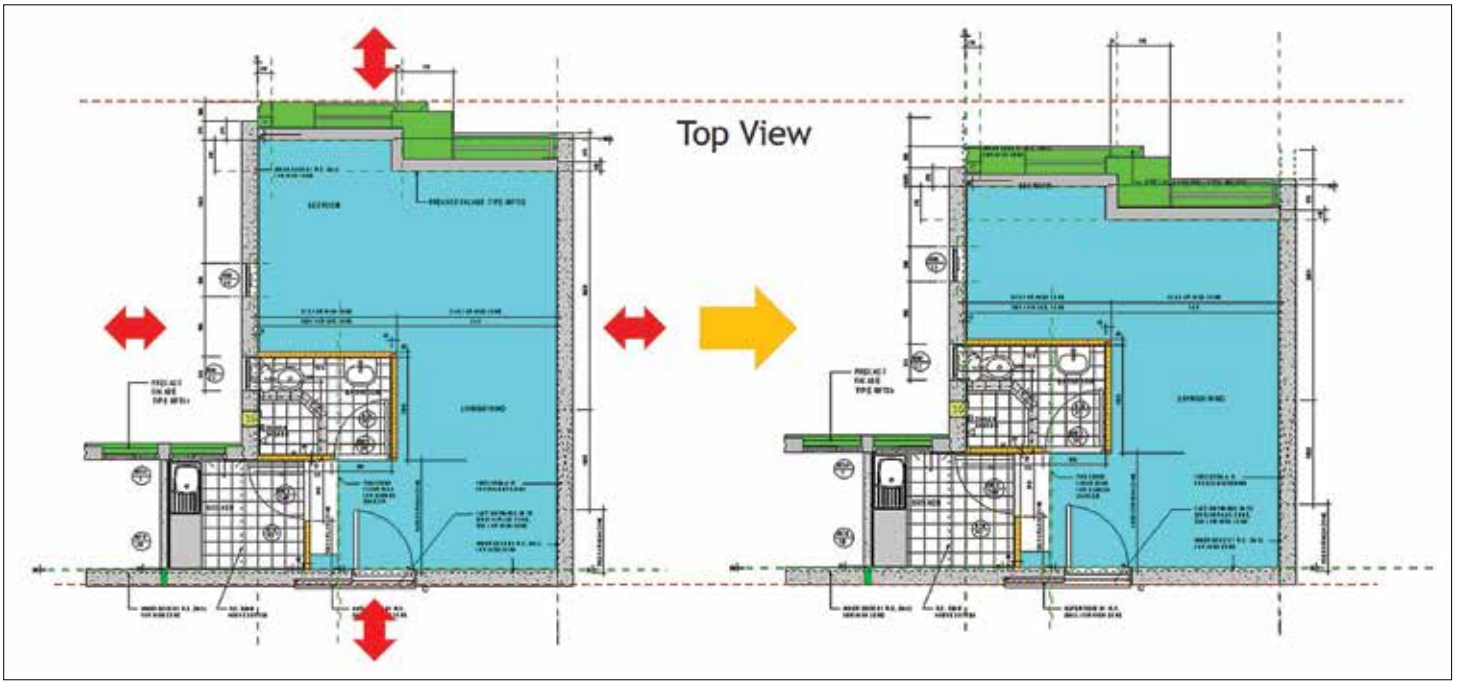


Dynamic management of BIM models by Design Options
Image Courtesy of Hong Kong Housing Authority, HKSAR Government

Typical MFD flat types as basic units of a public housing block
Image Courtesy of Hong Kong
Housing Authority, HKSAR Government



Components of a federated MFD BIM model
Image Courtesy of Hong Kong Housing Authority, HKSAR Government



Readily adjustment of flat layout through Alignment Constraints
Image Courtesy of Hong Kong Housing Authority, HKSAR Government

Using BIM to support radar system operation

COMPANY
Hong Kong Observatory, HKSAR Government

PROJECT
Development of a three-dimensional (3-D) Building Information Model (BIM) for the Hong Kong Observatory's (HKO) Tate's Cairn Weather Radar Station (TCWRS) for enhancing education, training, calibration and maintenance of the radar system.

LOCATION
Tate's Cairn Weather Radar Station

SCHEDULED TIME OF COMPLETION
Around 8 months from January to August 2019

香港天文台
HONG KONG OBSERVATORY

Project Description

A weather radar is a highly complex system comprising many electronic and mechanical components. Some are embedded items and it is impractical to retrieve them for visualization. This poses difficulty to train maintenance staff to understand radar operation including the functions of various components, cable connections between different radar equipment and the flow of radar signals. The BIM model helps to resolve the above problems, allowing greater flexibility and enhancing efficiency in conducting staff training and radar maintenance.

Project Challenges

A weather radar comprises many specialized mechanical and electronic components. Different operational procedures in handling these components are involved in performing maintenance. The BIM project for TCWRS needed to cover these procedures which made the development task very challenging. Also, the project was rather pioneering in nature as there was little reference of applying BIM technology to support radar operation and maintenance. With a lack of BIM experience, HKO had to devise project objectives so that the BIM model developed could be used for meeting a multitude of operational needs.

Solutions for challenges

Both the HKO management and front-line radar maintenance staff coordinated closely in formulating the detailed requirements of the BIM. Many photos, drawings and technical documentation of the radar system were pulled together and conveyed to the modellers for developing the BIM model. As some technical aspects of radar operation such as transmission of radar pulses were difficult to be visualized via 2-D photos and drawings while the BIM contractor did not have the relevant professional knowledge, the BIM development had to go through many iterations so that the model could be made correct to the satisfaction of HKO.

How does BIM benefit the project?

The BIM model enabled easy understanding of radar operation. Through graphical simulations, a 3-dimensional perspective could be provided for HKO staff to appreciate the process of performing maintenance such as replacement of embedded critical component which was not conducted regularly. The BIM provided an effective and flexible way of training maintenance staff without the necessity of going to the radar site and switching off the radar to conduct training. The latter would generate downtime and affect the real-time radar operation. The BIM also helped to assess risk when planning to perform installation of various radar equipment or station facilities.

Better with BIM

In addition to enhancing staff training and operational maintenance, the BIM provided a more realistic virtual tour of the TCWRS. Visitors could virtually walkthrough the TCWRS and visualize from a 3-dimensional perspective the different functions and components of a radar system for gaining a better understanding of radar operation. HKO staff and other contractors could familiarize themselves quickly with the radar site environment when planning for site works. As the expected lifespan of a radar was over 15 years, the BIM developed for the TCWRS was a useful asset to HKO for continual improvement of radar maintenance and station management.

About Hong Kong Observatory, HKSAR Government

The Hong Kong Observatory (HKO) is the official meteorological authority in Hong Kong, responsible for monitoring and forecasting weather, and issuing warnings on weather-related hazards. The Observatory also monitors and assesses radiation levels in Hong Kong, and provides other meteorological and geophysical services to meet the needs of the public and the shipping, aviation, industrial and engineering sectors. The Observatory's vision is to be a model of excellence in protecting lives and building together a better society through science.

The Observatory currently operates two long-range Doppler weather radars at Tai Mo Shan and Tate's Cairn respectively for monitoring inclement weather such as rainstorms and tropical cyclones. The existing radar at Tate's Cairn is the fifth radar installed at the site and the first one was installed in 1959. It is also the first dual-polarisation Doppler weather radar installed in Hong Kong, capable of monitoring hail and rainfall rates.

BIM PARTNER

isBIM Ltd

AUTODESK PRODUCTS USED

A360

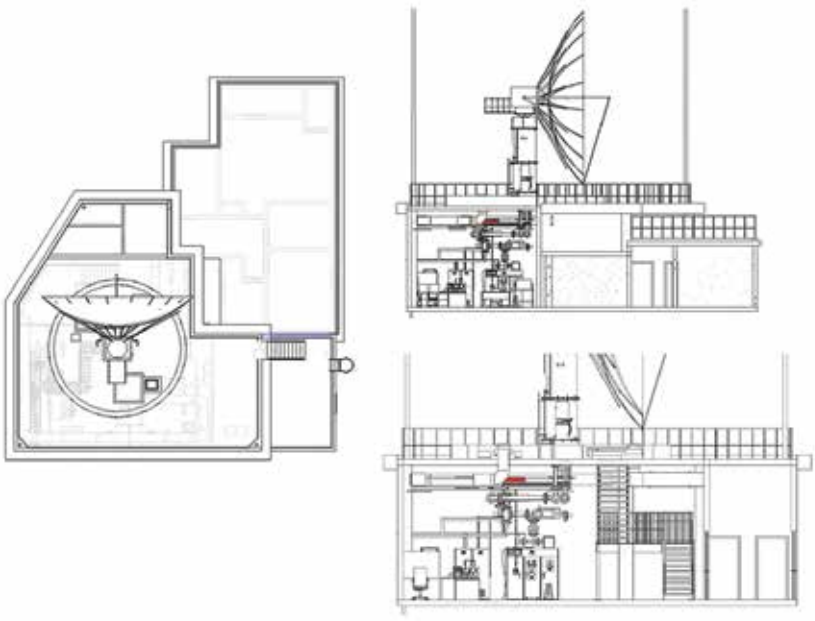
BIM 360 Glue

Navisworks

Revit

The BIM model of TCWRS. Figure inset shows the equipment room setting inside TCWRS.
Image Courtesy of Hong Kong Observatory, HKSAR Government

Simulation of radar pulse transmission, flow of radar signal and product generation.
Image Courtesy of Hong Kong Observatory, HKSAR Government



Plan and elevation views of TCWRS exported from the project BIM model.
Image Courtesy of Hong Kong Observatory, HKSAR Government

Performance specifications of critical radar equipment embedded in the BIM model.
Image Courtesy of Hong Kong Observatory, HKSAR Government

HKO staff conducted in-house training on radar maintenance procedures.
Image Courtesy of Hong Kong Observatory, HKSAR Government

ADVISORS' COMMENTS - INTRODUCTION

This year, we are extremely honoured to receive the invaluable support from the local supporting organisations and overseas BIM advisors. Locally, an advisory panel was formed by the representatives of local supporting organisations to discuss and review the selected projects, and their comments were consolidated and recorded. In addition to the comments of the selected projects, the overseas advisors also shared with us about the BIM development in other parts of the world.

ADVISORY PANEL

Dr. Jack C.P. CHENG
Chairman
Autodesk Industry Advisory Board

Sr. Dr. Calvin Keung
Honorary Secretary
bSHK

Simon James Gallagher
Chairman
Chartered Institute of Architectural Technologists, Hong Kong Centre

Dr. Francis Chan
Chair of Internal, External Affairs and Professional Standards
Hong Kong Institute of Project Management

Zico Kwok
Past President
Hong Kong Institute of Utility Specialists

Desmond Leung
Group Admin
Hong Kong Revit User Group

Walter CHAN
Chairman
Institution of Public Private Partnerships

Dickson Mak
Associate Director
Strategic Building Innovation · BIMScore

Daniel Sum
Chairman
The Chartered Institution of Civil Engineering Surveyors – Hong Kong Region

Wong Yuen Hung, Froky
Board Member (2019 - 2021)
The Hong Kong Institute of Building Information Modelling

Ir Lee Yuen Fai
Education Director
The Hong Kong Institution of Engineering Surveyors

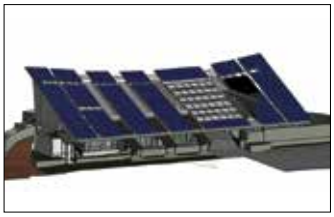
Ir Lui Wai Kau, Raymond
Committee Member of Information Technology Division
The Hong Kong Institution of Engineers (IT division)

ADVISORY PANEL - AWARD WINNERS

CLP Power Hong Kong Limited

Queen's Hill 132kV Substation

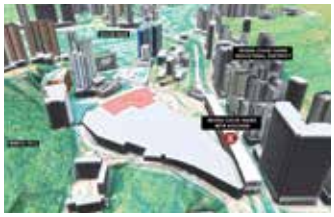
CLP's new Queen's Hill substation (QUH) is located at Fanling. This is a 132kV transmission substation constructed to supply electricity and serve the region's future electrical demand. QUH is an environmentally friendly building, qualified as Provisional Platinum in HK Beam Plus Assessment, which is the highest rating assessment. The BIM technology provides environmental performance analysis and simulations on energy use, sun shading, natural ventilation, light pollution, etc. All involved parties across the substation's life cycle can retrieve the project information and data from the BIM model, this results in less misinterpretation and time to regenerate or reformatting the project information.



Construction Industry Council & Electrical and Mechanical Services Department, HKSAR Government

Zero Carbon Building – Integration of BIM-AM (Building Information Modeling – Asset Management) with IoT

Zero Carbon Building (ZCB) is the first non-government venue complying with the EMSD's BIM-AM Standards and Guidelines. It acts as a showcase to demonstrate that the use of BIM to facilitate the operation and maintenance management (O&M) stage over entire lifecycle in existing buildings for the industry and public. Three major fields that comply with the guidelines are 'Standardize all asset information', 'Incorporate and maintain a record with important assets' and 'Interface with BMS, RFID/QR code technology and CCTV'. EMSD has also innovated a web-based system named 'Asset Information Input Tool' (AIIT) to manage, verify asset information and create corresponding asset relationships for BIM-AM.



Kerry Properties Limited & Sino Land Company Limited & MTR Corporation Limited

Property Development at Wong Chuk Hang Station Package Two

This residential project is located at the southwestern part of the Wong Chuk Hang Station and three developers are involved. The major challenge is to collaborate with different parties and the BIM 360 cloud platform provides the way out. The project team has discovered the new application of BIM technology by doing 'Virtual Spatial Mock-Up (VSMU)' instead of traditional timber mock-up, by the advantage of no constraint on time and space, design changes can be done quickly without construction wastages, it requires less manpower to produce the virtual mock-up comparing to the physical one.

Urban Renewal Authority

Central Market Revitalisation Project

Central Market was built in 1930s which is a grade 3 historic building. Urban Renewal Authority was commissioned by HKSAR Government to revitalize the Central Market. A large-scale addition and alternation works were required for the existing building. BIM technology was adopted to store and recreate the new information for the building. The project team optimized the design by using the new model to conduct Computational Fluid Dynamics (CFD) analysis to check the environmental performance. BIM 360 cloud platform was used as Common Data Environment (CDE) for design review, site inspection and quick reference tool for site workers.

Urban Renewal Authority & AECOM Asia Company Limited

Sustainable BIM FM Platform for URA (Project MK01)

The greatest challenge of the project is to strike a balance between redevelopment and preserving original architectural features. The project is comprised of Grade 2 pre-World War II verandah-type shophouses in Mong Kok, with a mix of residential and commercial purposes. The BIM model can truly replicate the as-built environment. In the O&M stage, Autodesk Forge is used as the core technology with integration of IBM's Maximo to establish the centralized BIM-FM platform. All the as-built BIM, BMS data from the IoT systems are integrated into the platform and it also monitors all the equipment history, layout change, and status update, etc. In the long-term, this platform is sustainable and will be expanded to all other URA Projects.

ADVISORY PANEL - HONORABLE MENTIONS

Architectural Services Department, HKSAR Government

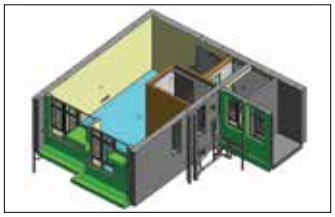
Lung Tsun Stone Bridge Preservation Corridor

This project is a proposed development in Kai Tak Development Area with significant archaeological content - Lung Tsun Stone Bridge (LTSB). 3D views of the remnants could be captured from the BIM model and presented on drawings such that other project team members and the contractor could understand the design easily and hence avoiding misunderstanding and reducing the risk of damaging the remnants.

Electrical and Mechanical Services Department, HKSAR Government & WSP Hong Kong Limited

EMSD Headquarter - Customer Services Centre (CSC)

This is a small renovation project chosen to prove the EMSD BIM-AM standards and guidelines are practical. BIM technology was being used throughout the entire renovation, starting from the design stage to as-built stages. RFID and IoT systems were established to link BIM to reality. The RFID tag code was recorded to the model in design stage thus the maintenance workers can track the equipment quickly at work.



Hong Kong Housing Authority, HKSAR Government

Modular Flat Design in Public Housing Developments - Adopting BIM for Collaboration and Integration

The Modular Flat Design (MFD) units are the major components of each public housing block. BIM is a good platform for information exchange. The BIM models of MFD can be easily updated both in design and cost estimation. It helps to enhance the efficiency in design and tender preparation processes.

Hong Kong Observatory, HKSAR Government

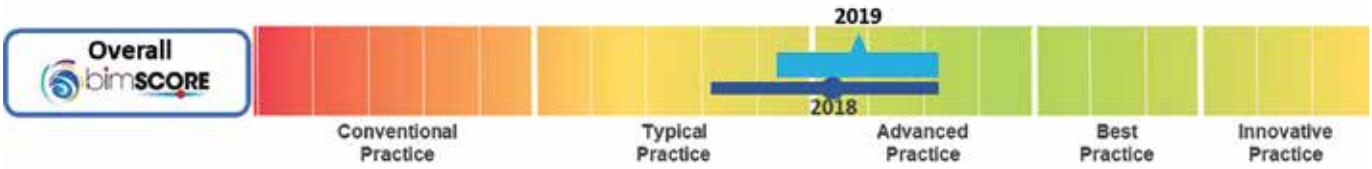
Development of a three-dimensional (3-D) Building Information Model (BIM) for the Hong Kong Observatory's (HKO) Tate's Cairn Weather Radar Station (TCWRS) for enhancing education, training, calibration and maintenance of the radar system.

This is a new application of Weather Radar and BIM. Unlike a conventional building structure, it is not a common standard practice and is more difficult to develop a BIM for a radar system. The use of BIM facilitated the implementation of paperless workflow in radar maintenance work and time-saving in performing routine maintenance could be achieved.

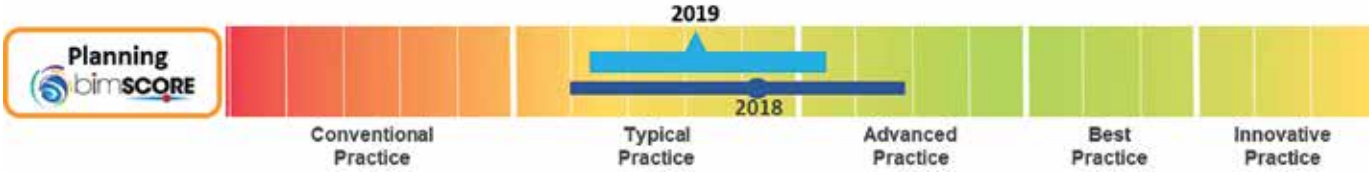
Dr. Calvin Kam

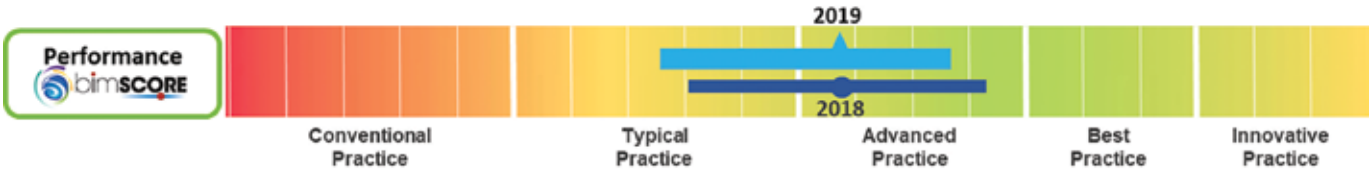
Overview

The 2019 Hong Kong BIM Awards honour a diverse set of projects that champion a variety of leading-edge and creative BIM-enabled processes and applications supported by well-informed planning and team collaboration. The winning projects have leveraged BIM to innovate and achieve successful outcomes across a range of projects - ranging from a Grade 3 historic building to an electrical substation, and to Zero Net Carbon Emission Building. Some of the 2018 Hong Kong BIM Award winners such as the Urban Renewal Authority and CLP also repeat as awardees again in 2019, while expanding on the boundaries in BIM strategy and BIM applications to pioneer new BIM-based technologies for better project performance. Applying our Strategic Building Innovation (SBI) bimSCORE evaluation framework for a preliminary assessment based on the evidences provided in the submissions, we have benchmarked this year's winners against our global knowledge base of hundreds of projects from over 16 countries using our 5 maturity tiers ranging from "Conventional" to "Innovative" practices. Within the global context, 2019 winners fit between "Typical" and "Advanced" Practices. The winning projects are further analysed with respect to the bimSCORE four evaluation areas of Planning, Performance, Adoption, and Technology. The figures below illustrate the Overall bimSCORE and four area scores of the 5 winning projects in 2019, referenced against the performance of the 2018 awardees.



*** Projects were evaluated based on the materials submitted by the applicants without interviews.*



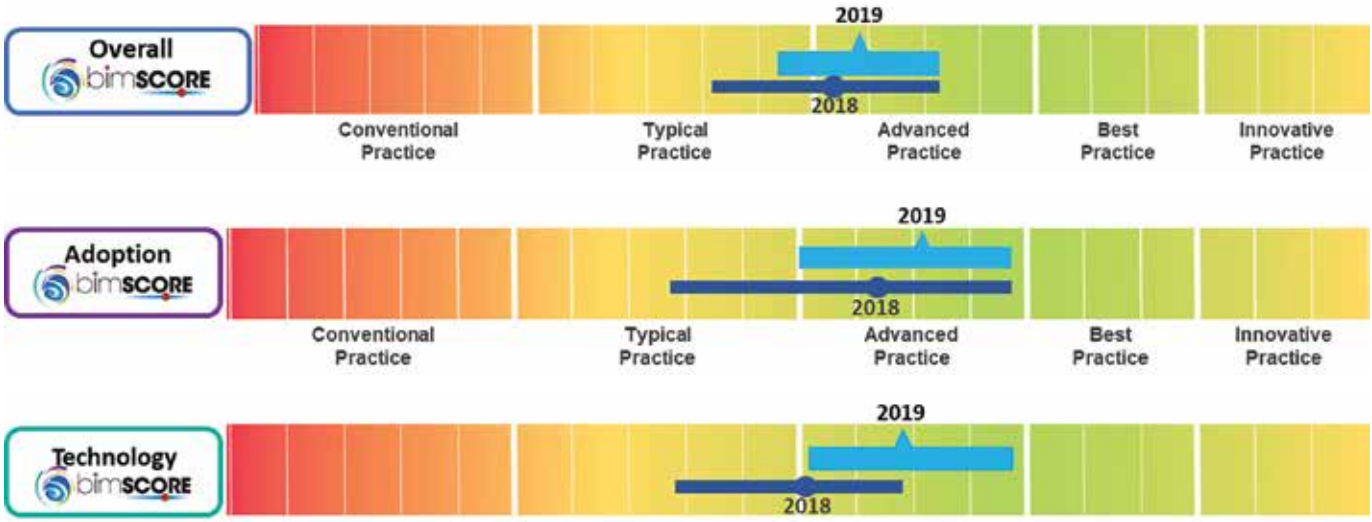


Planning and Performance

Planning for BIM implementation requires targeting objectives for success, supporting achievement with the needed tools and training, technical processes, and developing standards to guide an integrated project team. ***Performance*** monitoring of objectives is enabled through BIM and increased automation in quantitative tracking of project performance metrics to inform design and project management decisions.

The award winners recognize the importance of the alignment of BIM capabilities among project stakeholders. **Kerry Properties Ltd, Sino Land Company Ltd and MTR Corporation Ltd** conducted BIM-based process planning and BIM objective setting at the beginning of the project. They required all stakeholders to be BIM capable and arranged in-house BIM training for the project team in advance. **Electrical & Mechanical Services Department** adopted BIM-AM Standards and Guidelines in collaboration with the **Construction Industry Council** as a showcase to demonstrate the BIM complementation during operation and maintenance (O&M) stage. **Urban Renewal Authority & AECOM Asia Company Ltd** sets the expectation of championing the implementation of BIM-enabled new technologies, smart building approaches to become respective leaders in the marketplace. **Urban Renewal Authority** developed full building life cycle management approach with Open BIM and Open Data Concept. **CLP** organized BIM training on construction method and virtual environment to ensure project team's BIM capabilities. **CLP**, **Electrical & Mechanical Services Department** and **Kerry Properties Ltd, Sino Land Company Ltd and MTR Corporation Ltd** recorded metrics to quantify BIM benefits, e.g., 45% more construction safety, 15% time saving for O&M workflow and 2 months' reduction in design review and approval.

Some variations were observed among different projects in the Planning and Performance area, ranging from lower "Typical" to upper "Advanced" practice on the global scale. Organizations are therefore encouraged to establish BIM-based objectives, give recognition to exemplary projects that demonstrate auditable, repeatable, and objective quantification of benefits and develop respective quantifiable measures of success to track project performance and realize continuous improvement throughout the project lifecycle.



Adoption and Technology

Adoption of BIM is measured across the project lifecycle (design through operations) and project stakeholders (designers, builders, owners and agencies) to understand the degree of BIM implementation. ***Technology*** considers the informed selection of BIM analyses and tools that are supported by interoperable information exchanges and information-rich models.

We have witnessed a growth in effective BIM-based multi-disciplinary coordination among different stakeholders across multiple project phases, with deeper level of technology integration. **CLP** implemented BIM as the single source of truth for all the decision-making processes covering Design Coordination, Cost Planning, Safety Analysis as well as Programme Development (4D BIM) by leveraging improved collaboration and communication among all the stakeholders. **Urban Renewal Authority** implemented BIM + GIS for sunlight orientation study and advocated for open data concept during the full building lifecycle to achieve various objectives from Quantity Take-Off, to Cost Estimation, to Progress Tracking, to finally support the BIM-based Facility Management. **Urban Renewal Authority & AECOM Asia Company Ltd** integrated Building Management System (BMS) with BIM and enabled real time information access through IoT systems to help better prepare contingency plans in advance. **Kerry Properties Ltd, Sino Land Company Ltd and MTR Corporation Ltd** performed Virtual Spatial Mock-Up (BIM + Virtual Environment) for simultaneously design review and update. **Electrical & Mechanical Services Department** took the lead in BIM for Asset Management efforts by developing an in-house Asset Information Input Tool (AIIT) integrated with Digital Twin to support remote triangulation, monitoring and diagnosis of the major Electrical & Mechanical assets.

The overall 2019 HK BIM Awardees have shown improvement over the 2018 HK BIM Awardees with less variance. Projects owners are encouraged to take lead in fully engaging other stakeholders for periodical BIM-based collaborative sessions to ensure alignment among team members on project objectives, progress, priorities, challenges and resolutions. It is also recommended to better balance breadth and depth of BIM uses in response to the project and client objectives, as well as project team and market capability. Project team shall further master concepts such as Level of Development (LOD) and Model Development Specification (MDS) to enable a just-enough and fit-for-purpose modelling process.

Dr. Calvin K. Kam
PhD, AIA, PE, LEED AP
Founder and CEO, Strategic Building Innovation · bimSCORE
Adjunct Professor Center for Integrated Facility Engineering, Stanford University

Dr. Calvin Kam is the Founder of Strategic Building Innovation (SBI) and bimSCORE.com - the "GPS Navigator" for any enterprise or project team charting courses for construction innovation. SBI was invited to present and facilitate at both the 2014 and 2015 APEC workshops and to author APEC publications. Dr. Kam teaches undergraduate, graduate, and professional courses and leads research as an Adjunct Professor at Stanford University's Center for Integrated Facility Engineering, where he partners with industry members in areas such as Building Information Modeling, Virtual Design and Construction as well as Smart and Sustainable Developments. Calvin was a former National Chairman of the Center for Integrated Practice and the Technology in Architectural Practice Knowledge Community (supported by 10,000+ professionals) with the American Institute of Architects, for which he had also served on the Board Knowledge Committee.

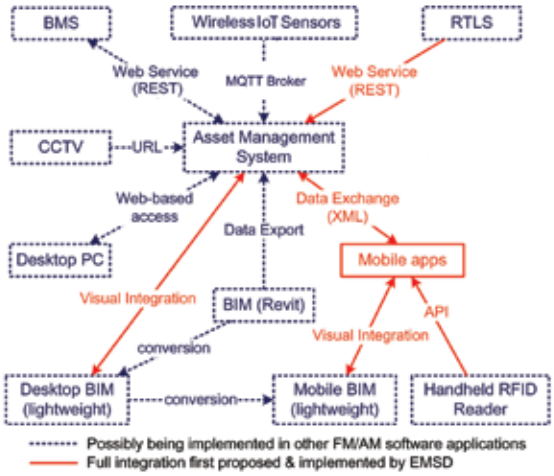
Since 2009, Calvin has been advising the U.S. General Services Administration as a Senior Program Expert advising its National BIM Program that he co-founded in 2003. In 2011, Singapore government's Building & Construction Authority appointed Calvin as an international expert to advise its construction productivity and BIM roadmap. In 2013, China's National BIM Union and Standard appointed Calvin as the only international Honorary Director to advise the international harmonization and collaboration of its nationwide BIM standards/development. In 2015, Calvin was appointed an Expert Advisor to the Shanghai government's BIM advancement center.

A recipient of various honors/awards including ENR's "20 under 40" and BD+C's "40 under 40", Calvin is a Registered Architect, Professional Engineer, and LEED AP in USA with Ph.D. from Stanford University. Dr. Kam has presented at 100+ industry events/universities across 18 countries and regions and published a number of book chapters and journal publications. Calvin has served as an Expert Advisor of the Hong Kong AIAB BIM Awards since 2008.

Ir Yuen Piu Hung, Francis
BEng, MPhil, MHKIE, MIET

Ir YUEN is currently an electronics engineer in BIM Sub-division at Electrical and Mechanical Services Department (EMSD). He joined the EMSD of the Government of HKSAR in 2012, and obtained his corporate membership of HKIE in Information Discipline in 2018. He is responsible for consultancy and project management services of electronic and IT systems, in particular the feasibility study, design and development of BIM - asset management (BIM-AM) system and formulating the EMSD BIM-AM Standards and Guidelines.

Ir YUEN and his team members received the Certificate of Merit in "The HKIE Innovation Awards for Young Members 2016 - An Invention" and the Honourable Mention in the "Autodesk Hong Kong BIM Awards 2016". He also co-authored a technical paper relating to BIM-AM that was published in IEEE CASE 2016. He was one the inventors of the Hong Kong patent for the EMSD BIM-AM System granted in 2017.



The novel framework for BIM-AM System
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government

Smart BIM-AM Journey

Reasons of the Innovation:

BIM is being increasingly adopted for buildings design and construction to facilitate coordination works, however, there are a few studies of its application in the long lifecycle of buildings operation and maintenance (O&M). Albeit that there are researches involving information exchange between BIM and facility management / asset management system with Building Management System or Radio Frequency Identification integrated, they are in essence not considered as full and seamless integration among BIM, facility management / asset management software and multiple O&M related systems in terms of their integration diversity and extent.

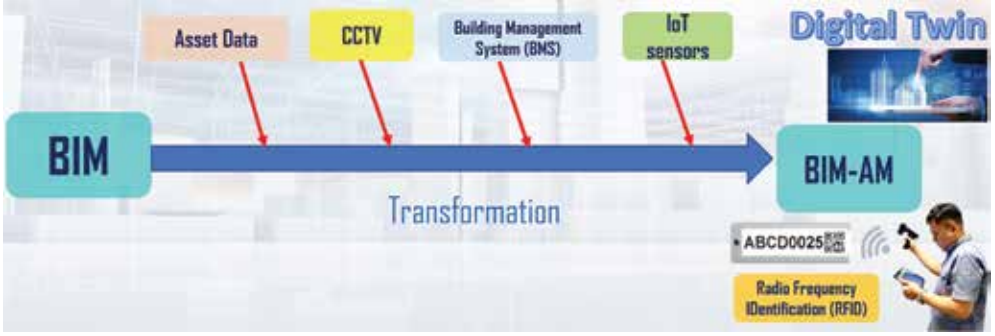
Concept of the Innovation:

An integrated BIM-AM System which enables visual cross-reference from real-world objects to BIM model and even to their asset attributes, maintenance history, O&M manuals, asset relationships, live views of Closed Circuit Television (CCTV) system, real-time data from Building Management System (BMS), wireless Internet of Things (IoT) sensors as well as location information from a Real Time Location System (RTLS) on one single integrated mobile platform with the aid of Radio Frequency Identification (RFID) scanning technology has been developed.

Challenges:

During the implementation of the BIM-AM System, two key challenges were encountered. The first key challenge to overcome was data interoperability. When data from different software programs (e.g. BIM model, BMS, IoT sensors, AM system, work order management system) were exchanged and presented in the same platform, an effective process had to be established to extract, store, exchange, and associate the data to ensure interoperability. At the same time, specifications for information exchange defining communication and data protocols among systems had to be developed to enable effective interoperability.

The second key challenge to overcome was asset information requirements for MEP systems. A set of specification defining major asset types, general attributes, specific attributes, and naming conventions had to be developed since

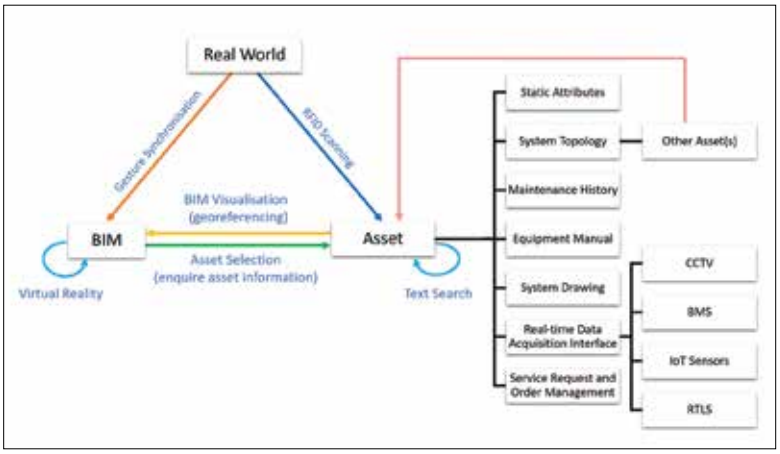


Transformation from BIM to BIM-AM
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government

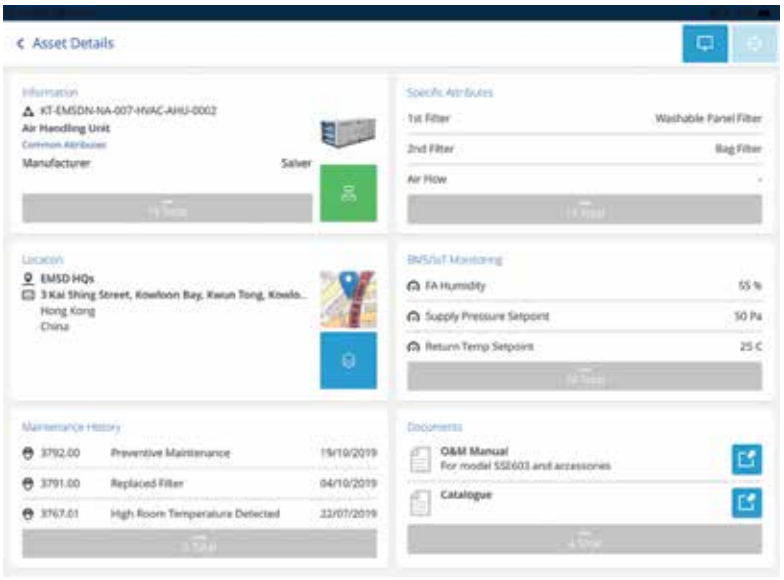
most of the existing BIM standards or guidelines focus on the Level of Development of a BIM object at different phases. While there are general requirements on the Level of Information of a BIM object at different phrases, no comprehensive asset information requirement per equipment type could be found in the available BIM standards and guidelines at the time when the BIM-AM System was developed.

Outcomes and Sustainable Development:

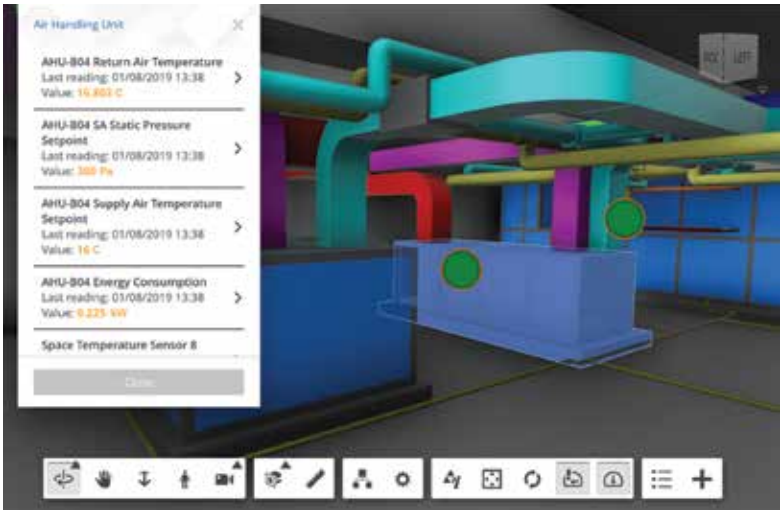
The project team have proved the novelty, originality, capability and potential towards smart O&M of the BIM-AM System through implementation at various venues and an 8-year Hong Kong patent of the BIM-AM System was granted in 2017. The BIM-AM System features multiple O&M tools in a single integrated application, offering real-time O&M information sharing and exchange capabilities, thus making system handover and O&M much more efficient and effective. Currently, they are further enhancing the BIM-AM System as well as the EMSD BIM-AM Standards and Guidelines after trial in some pilot projects.



A graphical summary of BIM-AM System features
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government



Asset Details of an AHU
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government



BMS point status overlay for monitoring a chiller plant room
Image courtesy of Electrical and Mechanical Services Department, HKSAR Government

Chan Sum Chau, Miro
Chen Wei Wei, Vivian
Sampriti Dwivedy
Kwok Hoi Ling, Helen

INSTITUTION
The Hong Kong University of Science and Technology

PROJECT NAME
Integrating BIM and IoT for Facility Management

PROJECT LOCATION
The Hong Kong University of Science and Technology

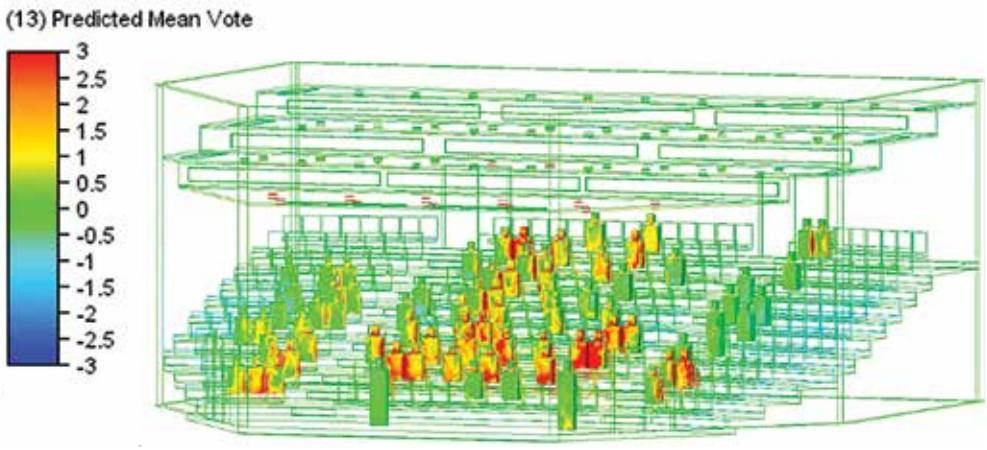
TYPE
Operation and Maintenance

AUTODESK PRODUCTS USED

A360

CFD

Revit



Predicted Mean Vote Result from CFD
Image courtesy of The Hong Kong University of Science and Technology

Integrating BIM and IoT for Facility Management: Smart Facility Management for a Smarter Campus

LT-J BIM Model
Image courtesy of The Hong Kong University of Science and Technology

Project Background

Facility managers all over the world as they try to balance occupant comfort and energy consumption, where comfort and energy savings are often inversely related. Currently, they balance this trade-off by automating the building systems to maintain a constant temperature and maximized ventilation conditions during the day despite the space, function and usage of the facilities, and then power down during off-hours. While this makes some energy savings, it often leads to an uncomfortable environment and wastage of energy. Instead, a more rigorous approach can be considered with the growth of Internet of Things infrastructure and Building Information Modelling technology.

Project Challenges and Solutions

The Facility Management Office (FMO) at HKUST also faces the same dillema of balancing energy usage and user comfort. Hence, keeping in line with the sustainable smart campus initiative at HKUST the project team have conducted this research to assess how BIM and IoT can be integrated to improve facility management on campus. The main idea is to leverage the complementary strengths of BIM and IoT technology and propose an advanced building automation system (BMS) for facility management (FM). In this project, two main improvements are proposed to the current BMS. Firstly, it includes a visualized building model that can easily retrieve instant sensor data from different systems in the building by using BIM. Secondly, it allows an automated decision-making process, which is derived from data-driven machine learning models, on HVAC system that could satisfy thermal comfort of occupants under minimised energy consumption.

How does BIM help for your project?

By using BIM, it links the data to the reality. In this project, Revit was used to build a digital twin of LTJ in HKUST. Instead of looking at numbers in the traditional BMS, the visualized model can give the facility managers a better picture of the building they are managing. They can interact with the virtual model and get up-to-date information with the integration of data from IoT devices embedded in the building. BIM also gives a chance for new people to the industry or business people who are not professional facility managers to quickly pick up the information they want. On the other hand, BIM also helps to do the analysis. In this project, Autodesk CFD was used to conduct various simulations under different conditions. It quantitatively presents user thermal comfort. It also helps to save much more resource and time for doing on-site tests.

ABOUT AIAB

AIAB (Autodesk Industry Advisory Board) is formed by a group of experts who are willing to share their valuable experience from Building, Civil, Media and Entertainment industry.

Mission

Autodesk Industry Advisory Board (AIAB) is an informal and non-profit making interest group that acts as a bridge between the industry and Autodesk for solid and bidirectional communications. AIAB, as its title suggests, has an advisory role. Its main objectives include, but not limited to:

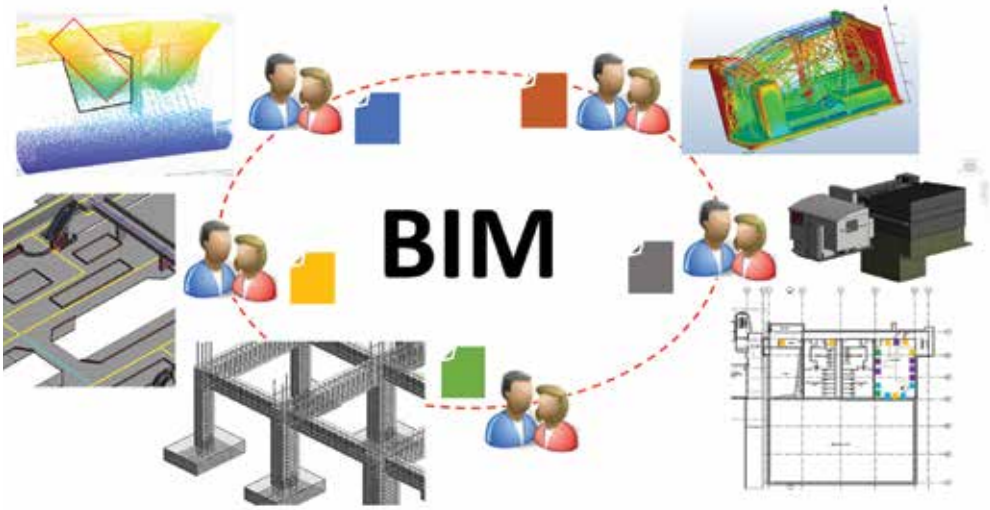
- **Act as a platform for technology exchange and experience sharing**
- **Advance the professional standards on Autodesk products**
- **Express and share opinions and views on technology development**
- **Promote the development, usage and awareness of design technology in HK, mainland China and Macau**
- **Provide cross-border technology exchange/visit**
- **Provide latest technology update**

Want to know more about AIAB?
Please visit: http://www.aiab.org

Dr. Jack C.P. Cheng
PhD MPhil BEng MHKIBIM MHKICIM MASCE CCBM CAP

Dr. Jack Cheng is currently the Chairman of Autodesk Industry Advisory Board (AIAB). He is an Associate Director of GREAT Smart Cities Institute, Director of BIM Lab, Director of RFID Center, and Associate Professor in Civil and Environmental Engineering at the Hong Kong University of Science and Technology (HKUST). He teaches BIM, Construction IT and Construction Management at HKUST. A graduate of Stanford University, Dr. Cheng focuses on research areas in BIM, 3D GIS, Internet of Things (IoT), artificial intelligence and big data, construction informatics and management, green buildings, and sustainable construction. He is currently Chairman of Hong Kong Construction Industry Council BIM Standards (Phase 2) Task Force, Chair of ASCE Global Center of Excellence in Computing, President of ASCE Greater China Section, Hon. Treasurer of HKIBIM, and Editor or Editorial Board Member of several international journals. He has received the Construction Industry Outstanding Young Person Award in 2019. He is an author of over 200 refereed publications in international journals and conferences.

Collaborative BIM



People in the BIM community have started to focus on not only modeling of building information in digital representation, but also management of building information for the entire built asset. BIM can support beautiful visualization and sophisticated analyses, which could be performed individually. But as we collaborate using BIM across individuals, organizations, disciplines, lifecycle stages, and/or devices, sharing, integration and management of BIM models and the data inside are important.

For successful BIM collaboration, three elements are critical - (1) tools, (2) standards/ execution plans, and (3) incentives. Firstly, we need platforms (e.g. cloud-based solutions) and infrastructure (e.g. Internet bandwidth) to support smooth and efficient BIM information sharing and management. Issues such as access rights and model versioning should also be considered in the solutions, like BIM360. Secondly, consistency and common understanding are needed for seamless and effective collaboration. Clear descriptions among the whole team on data models and deliverables, hardware and software, LOD definition, structures and roles of the team, BIM workflows, etc. are helpful to avoid unnecessary miscommunication and mistakes. Thirdly, enough incentive should be provided to encourage sharing, integration and management of building information across organizations. Both contracts and bonus could be possible approaches, yet the setup and implementation are often project-specific and hard to standardize.

In summary, we shall extend from using BIM in silos on individual basis, to using BIM in collaborative manner towards the concept of integrated digital delivery. BIM collaboration and information management in AECO applications have been studied and adopted in some BIM projects already. But there are still much room for development, improvement and standardization, which require our collective efforts to achieve in the future.

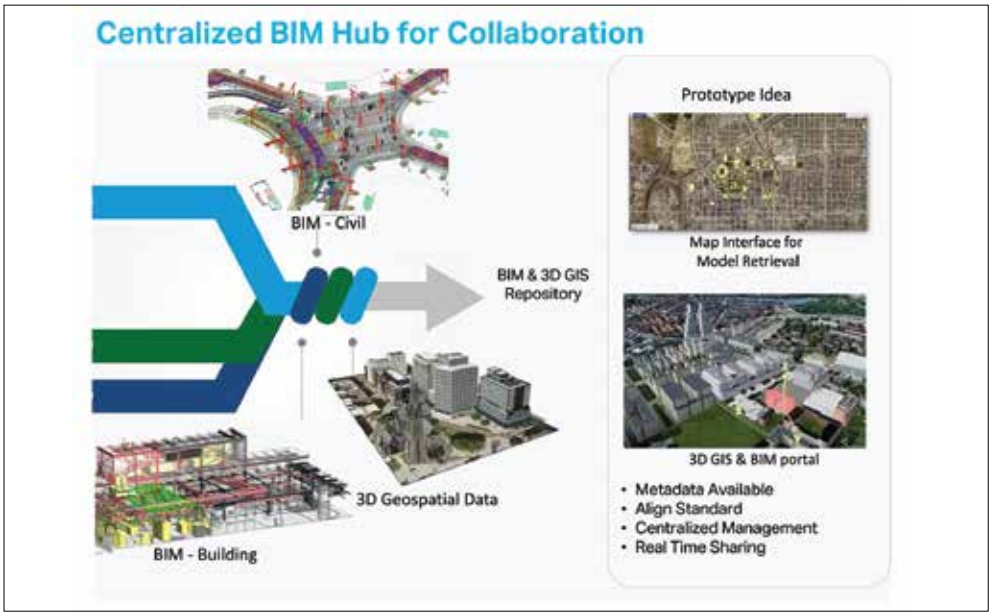
Integration Application of Geospatial Data with GIS, BIM and VR

Sr. Yvonne Cheu
Technical Director,
AECOM Asia Company Ltd

Ms. Yvonne Yuk-yi CHEU is an Authorized Land Surveyor with substantial experience in Project Management and a Professional member of Hong Kong Institute of Civil and Building Information Management. She has over 20 years' experience in implementing GIS, IT and BIM projects and quality assurance procedures.

Yvonne has led the successful implementation of a large number of GIS / IT systems for the government projects. She had been working in Government departments as well as private consultants and acquired diversified experiences such as communication with government departments and has track records on IT / GIS project government departments. In recent years, she has been actively participated in various BIM / GIS related projects, including those contracted by China Light & Power, Highways Department and Civil Engineering and Development Department.

As the Technical Director of AECOM, Yvonne is currently participating in various BIM/IT/ GIS/IoT integration projects.



With using the existing 3D geospatial data to evaluate the site conditions for a project related to at-grade and above ground development in the urban area is common in the AEC industry. However, it is not effective to collect all the latest 3D geospatial data with traditional approach.

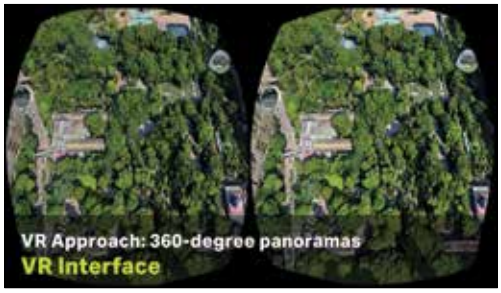
By integration of different state-of-art technologies, including GIS, BIM , Virtual Reality (VR) and Augmented Reality (AR), Autodesk Civil 3D, Revit, and Recap for 3D GIS aerial photos we greatly enhanced and supported the digital design study by creating a digital model which facilitates stakeholders to understand and visualise the proposed detail design work and associated facilities design in first-hand experience.

The preliminary conceptual design created in a BIM model could further be combined with the Site Reality Model to form a Visualization Model which can be hosted on a 3D model viewer for presenting the design to different users in an efficient manner. The model can be hosted on a web platform for viewing by the relevant stakeholders if necessary.

The most powerful aspect of the Visualization Model is its capability to the application of VR technology. With this technology, the design model can be viewed in a 3D manner on real scale to facilitate designers to coordinate various design components during conceptual design. The VR simulation not only has similar functionalities, such as walk-throughs and fly-throughs, to that of a conventional and desktop-based 3D modelling technique but also allows users to view the model in a heightened sense of reality. The user-friendly visualization system can effectively enhance the coordination between different parties during the design process.

In consequence, the following results are achieved:

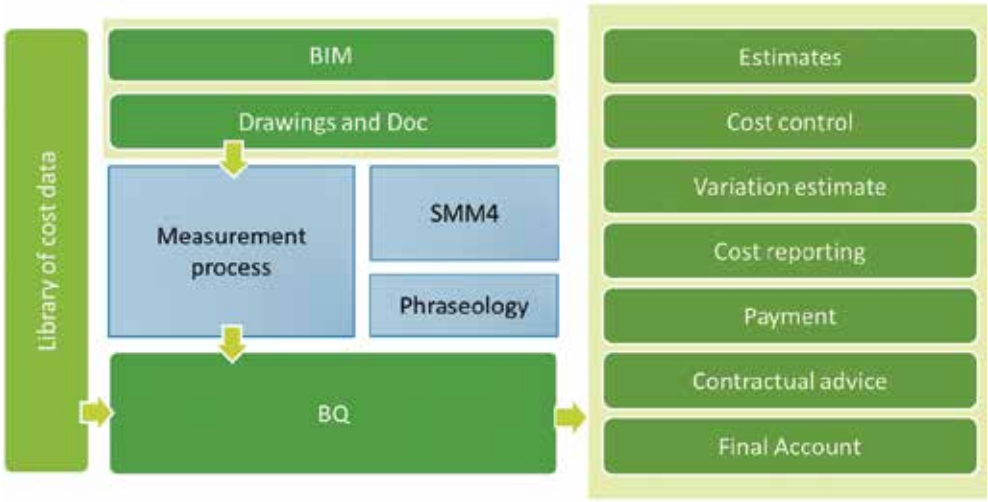
- Different professionals of design team can easily communicate their professional opinions during the design stage, leading to an optimised design incorporating various design options and principles comprised of over 100 persons.
- Streamlined both the internal and public consultation, as stakeholders can easily understand the proposal.
- We shared the design study views via dynamic interaction and had less iterations of design change and saving money.
- Saved paper costs by maintaining a digital workflow – creating an environmental friendly project and a digital design.

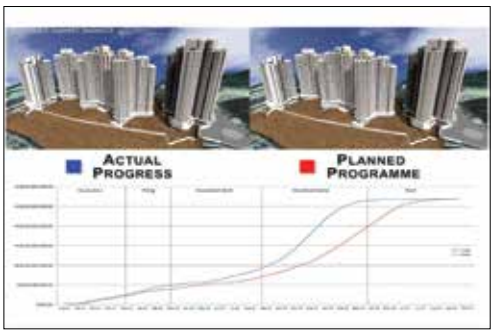


Mr. Kelvin Kuo
MRICS, MHKIBIM, FCInstCES, C. Build E., MCABE, MbSHK
Project Director of MES Services Ltd

Mr. Kelvin Kuo has 20 years of Quantity Surveying and Project Management experience in the construction industry among the discipline of Building, Civil and Interior Design and has over 8 years of BIM project management experience. With the professional knowledge and experiences in Quantity Surveying, Kelvin has involved in developing and promoting the integration of BIM services to current QS practices since 2011, he is handling QSBIM projects in public housings and private sectors of Hong Kong, China, Singapore, Malaysia and Japan. To contribute his professional knowledge to the industry, he has presented CPD/ training to RICS, HKIS, ICES, University of Macau and Hong Kong Institute of Vocational Education (IVE). He is the BIM Sub-Committee Vice-Chairman of ICES and member of HKIS QSD BIM Sub-Committee.

5D BIM practice on Cost Management





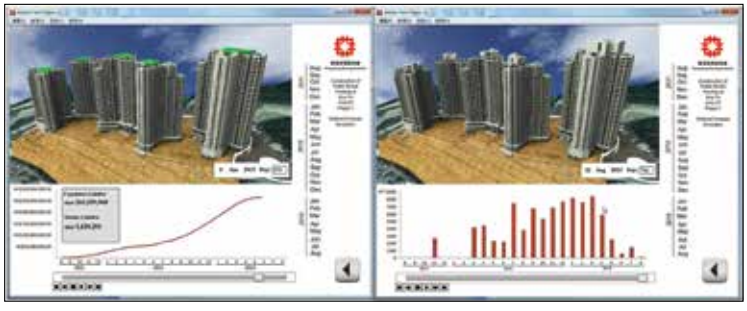
Development Bureau issued Technical Circular 18/2018 mandated to use BIM on Cost Estimation with effective on 1st January 2019. While the details of the BIM use expressed in TC required to use BIM on project cost budgeting, cost control and cost evaluation on design option at design stage; project cost control, cost evaluation on variation of works, cash flow/ spending analysis at construction stage. Government projects have stated 5D requirements in their project specification, some private project raise the same also. So people are looking for the best practice to dealing with the issue.

As per "True BIM", "SSOT" approach, we expected all information are come from the single model, information included: Time, Cost, Measurement method, Quantities, and Elemental location are integrated, we named this ***Quantitative Information Modelling*** (QIM), those quantitative and costing information are contained in the model for the quantifying and costing purposes.

There are stages upon the common QS practice. *QIM1.0 - BIM QTO*, quantities extracted from BIM models according to the HKSMM rules that generate the Bills of Quantities (BQ) and then produce the cost/budget estimation accordingly.

QIM2.0 – Model revision, as model changes, we can compare two models and extracted the quantities difference to generate the changes summary for the design options evaluation in design stage or VO evaluation in construction stage.

QIM3.0 – Cost Management Application, based on the cost information, by adding the Time schedule, we can have S-curve – cash flow forecast for the project. Moreover, according to update schedule, we can produce cash flow comparison between planned and actual. Focus on quantities and time, we can have the forecast of materials requisition diagram to control the project procurement for on time ordering and delivery. Based on the location and the demarcation of objects, we can have the cost of relevant objects in particular location for payment claims or certified the work done accordingly. As we can proceed the payment and VO assessment, the Final Account will then be easily concluded.



The QIM or 5D BIM cost management approach are ready to apply on all BIM projects, pilot projects among public and private are carried out, the new era for QS professional has arrived.

Nurturing Talents for BIM in VTC

Ir Dr Eric Liu
EdD MSc BSc(Eng) FHKIE FIEAust
CPEng CEng MIET MACM

Ir Dr Eric Liu is Deputy Executive Director of Vocational Training Council (VTC). He is primarily responsible for overall strategic development of Engineering and Design programmes offered by different member institutions of VTC. He is also steering development of dual-track training including apprenticeship and strategic collaboration with local industry partners on vocational and professional education and training (VPET).

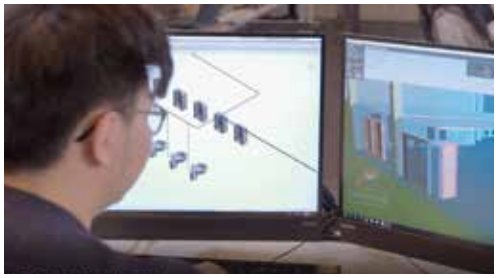
Ir Dr Liu joined the VTC in 1994 and has since held positions as Vice Principal of Hong Kong Design Institute, Principal of Hong Kong Institute of Vocational Education (Tuen Mun) and Principal of Hong Kong Institute of Vocational Education (Tsing Yi). He is currently leading the VTC's strategic initiatives of promoting STEM Education, nurturing talents for smart city development and applying Virtual and Augmented Reality technology for learning and teaching.

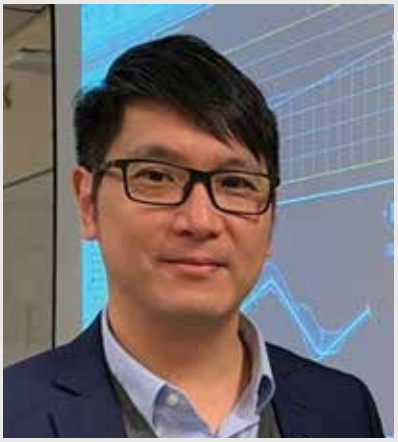
Vocational Training Council (VTC) has been offering vocational and professional education and training for the AEC industry in the last five decades; and incessantly evolves in tandem with the economic and technological transformations in the local AEC industry, providing a competent and innovative workforce needed in a knowledge economy.

VTC has recognized the forthcoming paradigm shifts and the importance of nurturing *BIM literate* graduates at all levels since the late 2000s. We started to offer BIM training to higher diploma students of IVE Engineering in 2012, and undergraduate students of THEi in 2016. The BIM education spans across different job aspects for BIM Managers, Coordinators and Modellers, ranging from BIM concepts and software, computer visualization techniques, BIM-supported collaboration and teamworking, BIM coordination and documentation, scheduling and cost management to BIM for sustainable design and energy analysis, and MEP design management. To date a significant number of VTC graduates out there in construction industry are BIM capable to different levels and specialisms and ready for the growing maturity of BIM applications in practice.

The need of lifelong learning to enhance BIM knowledge and techniques of our graduates and other practitioners is never undermined. VTC has developed a range of BIM in-service training programmes for BIM Coordinators and Modellers in recent years such as Professional Certificate in BIM (Building Works) and a number of HKIBIM recognized "Certified Expert" training courses. The new QF Level 5 Professional Diploma in Building Information Modelling will also provide training for potential BIM Managers.

BIM education at VTC is supported by a network of VTC BIMiHub and BIM Laboratories across campuses. Latest BIM applications and tools including 3D laser scanners, UAS and structural analysis/design suite are available for teaching and applied research projects. Cloud-based BIM collaboration platforms, video wall, wireless presentation system, and interactive smartboards are installed to allow BIM-supported collaboration process. Apart from specialized training, the BIMiHub also offers the opportunities in unleashing the full potential of BIM through promotion of co-creation management strategy for the AEC industry. Through various initiatives and institute-industry partnerships, VTC is ready and committed to nurture BIM talents for the AEC industry.



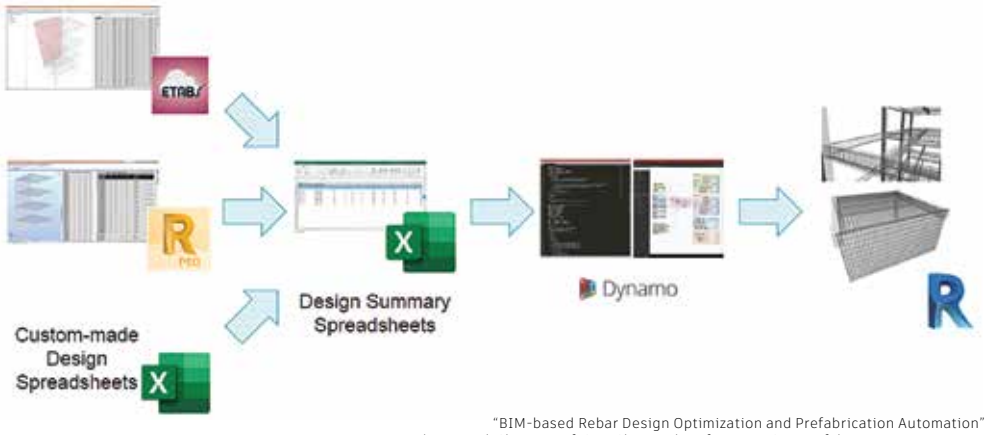


Ir Dr George C.K. Wong
PhD MPhil BEng MIStructE MHKIE
RPE CCBM

Ir Dr George WONG is a chartered Structural Engineer with over 25 years of experience in construction industry. He had involved in projects of various scales and in many places such as the CASL Hangar project in Hong Kong International Airport, Parcel 7&8 of the Cotai Hotel Development in Macao and a 6-Storey operation centre in Myanmar. Ir Dr Wong also had years of teaching experience at the University of Hong Kong for undergraduate courses in the Civil Engineering department. He received the Faculty Outstanding Teaching Award (Team Award) in 2013.

Since 2016, Ir Dr Wong has been focused in BIM promotion, standardisation and training missions for Hong Kong construction industry. His BIM experience is from modelling, teaching BIM courses for structural engineers as well as technical implementation of BIM for 3D modelling with structural design and analysis data to generate drawings for statutory submissions. He is now working for the Construction Industry Council in building capability and capacity in BIM of the construction industry in Hong Kong.

The time is always right to do what is right - *Martin Luther King, Jr.*



"BIM-based Rebar Design Optimization and Prefabrication Automation"
by Dr Jack Cheng, Prof. C.M. Chan and Prof Vincent Gan Prefabrication Automation

In recent years, we experienced the bloomsome of digital technologies like 5G, Internet of Things and Blockchain empowering us to transform our traditional construction practices into digital processes that allow efficient and secured sharing and analysing information across all stages of a built asset. While it is easy to get carried away by all these fascinating technological advancement, I believe BIM champions, talented and passionate practitioners like you in the industry or academia could focus on the following areas to bring Hong Kong into a brighter and smarter digitalised city.

- **Automating your Workflows:**

  Study and review your daily workflows and use appropriate scripting tool such as Dynamo to help you complete the task(s) automatically. You can start small by automating the generation of drawings in Revit by linking to your drawing register. For more advanced players, like Dr Jack Cheng of the HKUST whom in a research project funded by the Construction Industry Council automated the generation of 3D rebar from structural analysis/design, then to Bar Bending Schedule and all the way to BVBS format for off-site rebar fabrication using machine. Human intelligence is excelled in knowing what information is important and how it should be processed. We let the computer do the nitty-gritty of repetitive calculations and data transmissions.

- **Capturing your Knowledge:**

  Construction has been an aspect of life since the beginning of human existence. There is huge amount of knowledge acquired throughout its history yet most of the knowledge is being capture manually which at time could be difficult to share not to mention analyse it. Nowadays, with (ideally) everything starts in BIM then you should derive tools to capture the knowledge for future use. Together with the application of AI, after you digitse all your past projects, you could complete your framing plans of a new project perhaps with only a few clicks after importing the architectural layout.

- **Building your Capability:**

  There are a lot to learn and to experience in order to be capable of leveraging digital technologies. After learning the knowledge, it is important to practice as our great philosopher Aristotle brilliantly advised "For the things we have to learn before we can do them, we learn by doing them".

  Our government has set up the Construction Innovation and Technology Fund (CITF) to subsidise you to learn, experience and adopt innovation technologies for construction. Apply for a course to learn Dynamo, Revit or Infraworks and start applying them. Slowly but surely, your capability will rampant.

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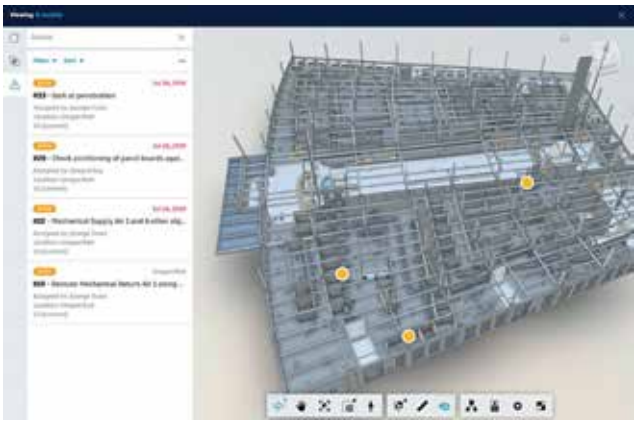
Mr. Kevin S.C. Wong
MSc. (IPD) (Distinction), B.ASc (Civil), CCBM, MHKIBIM, Vice-chairman of HKIBIM (2019-2021), Autodesk Certified Professional, AIAB Committee Member, buildingSMART International Hong Kong Chapter Founding Member (2019)

Mr. Kevin S.C. Wong had over 20 years' engineering design and BIM management experience in large scaled projects in Hong Kong and UK. Being a Civil and Structural BIM enthusiast, Kevin possessed both engineering design background and the application of BIM Software using integrated design approach. He was responsible for various large scaled construction projects while working as a Structural Engineer in Atkins China Ltd since year 1998. During his work as BIM consultant, he had delivered many effective Revit Structure and Design Software training courses for the Design Consultants, Contractors, Institutions, and Government bodies including Hong Kong Housing Authority (HKHA), Architecture Services Department of HKSAR (ArchSD), and Construction Industry Council (CIC). As an Autodesk Certified Professional, Certified Expert, and Vice-chairman of HKIBIM, he continues to apply his professional knowledge on BIM for practitioners in construction field. He is currently the part-time lecturer in HKU SPACE, VTC, and CUSCS and is the founding member of Hong Kong Alliance of Built Asset & Environment Information Management Associations (HKABAEIMA) of buildingSMART Hong Kong Chapter in 2019.

Our Ambition on Digital Transformation for Hong Kong's Construction Market: openBIM® Approach with IFC File Exchange Format in CDE



With the continuous policy push, awareness education, and fund investment on BIM by the Hong Kong Government in recent years, the adoption of BIM on construction industry is getting more popular in most of construction projects compared to previous years. Looking into some of the public works contracts and agreements where significant sections have specified the use of BIM technology as mandatory requirements, the BIM process is now becoming the "DNA" in all stakeholders such as Architects, engineers, contractors, suppliers, clients and operators in our construction industry. As we are entering new pages of BIM implementation and collaboration in coming year 2020, more practitioners shall join together and share the building information amongst each other. The use of openBIM® approach on construction project is now getting more mature in adoption around the world. openBIM® improves building design project collaboration using openBIM® data exchange standards.

The idea is to focus on the process and how well the various BIM tools operate together. Now more than 35 software vendors with total more than 50 applications has adopted openBIM® through IFC (Industry Foundation Classes). To facilitate this approach, the buildingSMART International is leading the digital transformation by enabling better collaboration and digital workflows through the solutions and standards it delivers. Digital workflows help project stakeholders collaborate and communicate efficiency throughout all phases of the project and asset lifecycle. The process involves many disciplines, software applications, and organizations who must collaborate and exchange information to achieve success. The development, creation and adoption of open digital standards for productive workflows is therefore achieved. Amongst software solution that help facilitating openBIM®, Autodesk® is an active member of buildingSMART International, and has been from the beginning of the formation of buildingSMART. In technical aspects, IFC format, like other industry standards, enables data exchange between different BIM software applications. In Hong Kong, construction projects are now required more BIM software working together to deliver better results. The Common Data Environment (CDE) platforms such as BIM 360 allows users to import IFC models for better collaborations and to share information across disciplines. By exporting BIM models to IFC, users using various software such as ArchiCAD, Bentley and Tekla, can now work in a single connected BIM environment to perform design collaboration and coordination via BIM 360. All stakeholders are enabled with common open standards during the 3D coordination plus clash detectives where the ownership of models still being kept for each party. The changes on models could be easily updated by model's owners and then export into IFC and authorized by the CDEs for further collaboration. In conclusion, openBIM® approach enable open and transparent data exchanges amongst different stakeholders and encourage better BIM adoption for the Hong Kong construction market in the long term.

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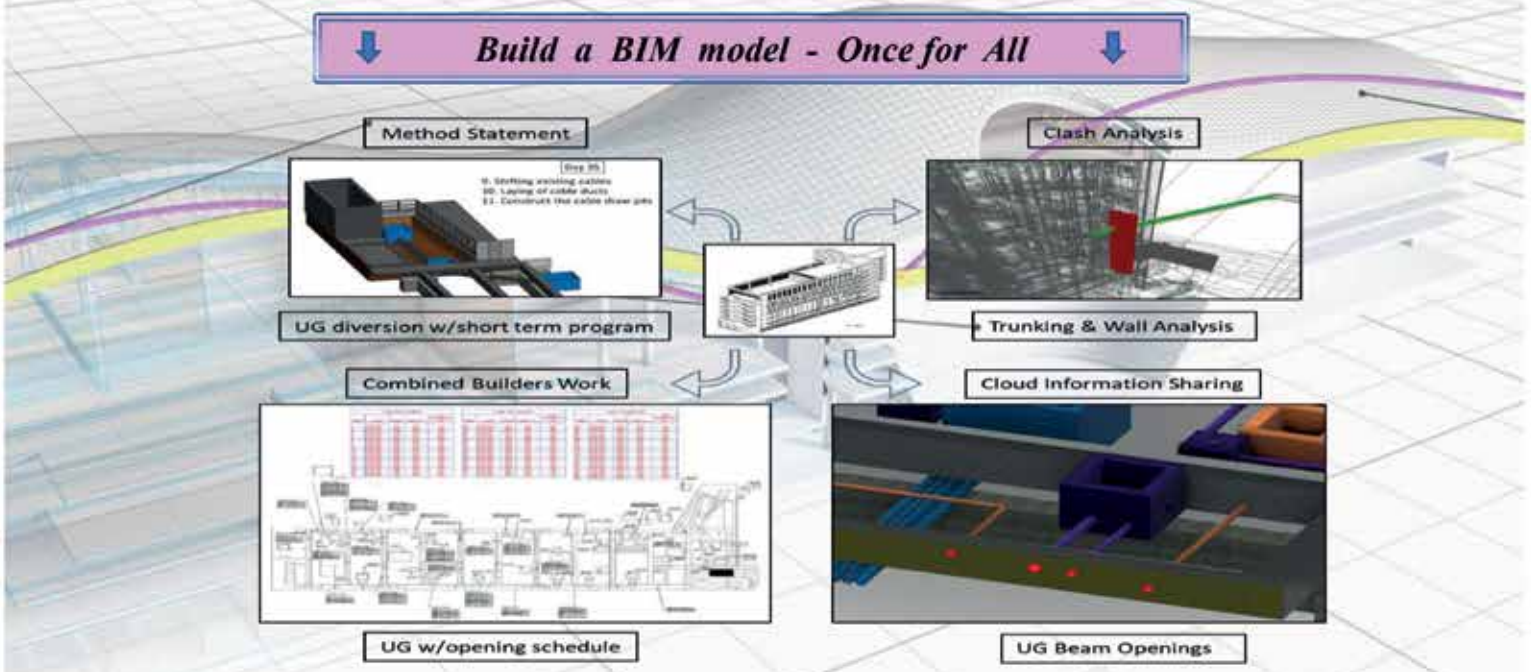

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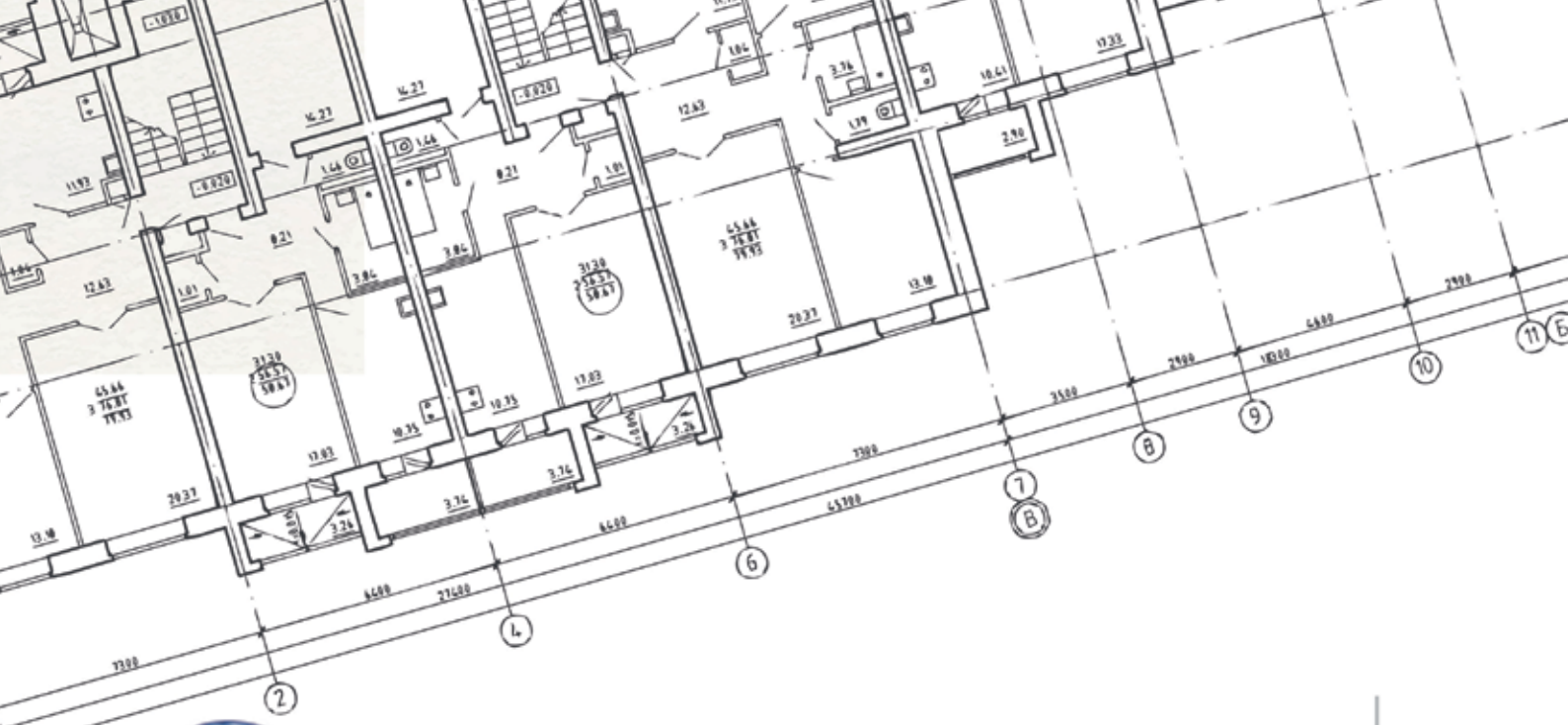

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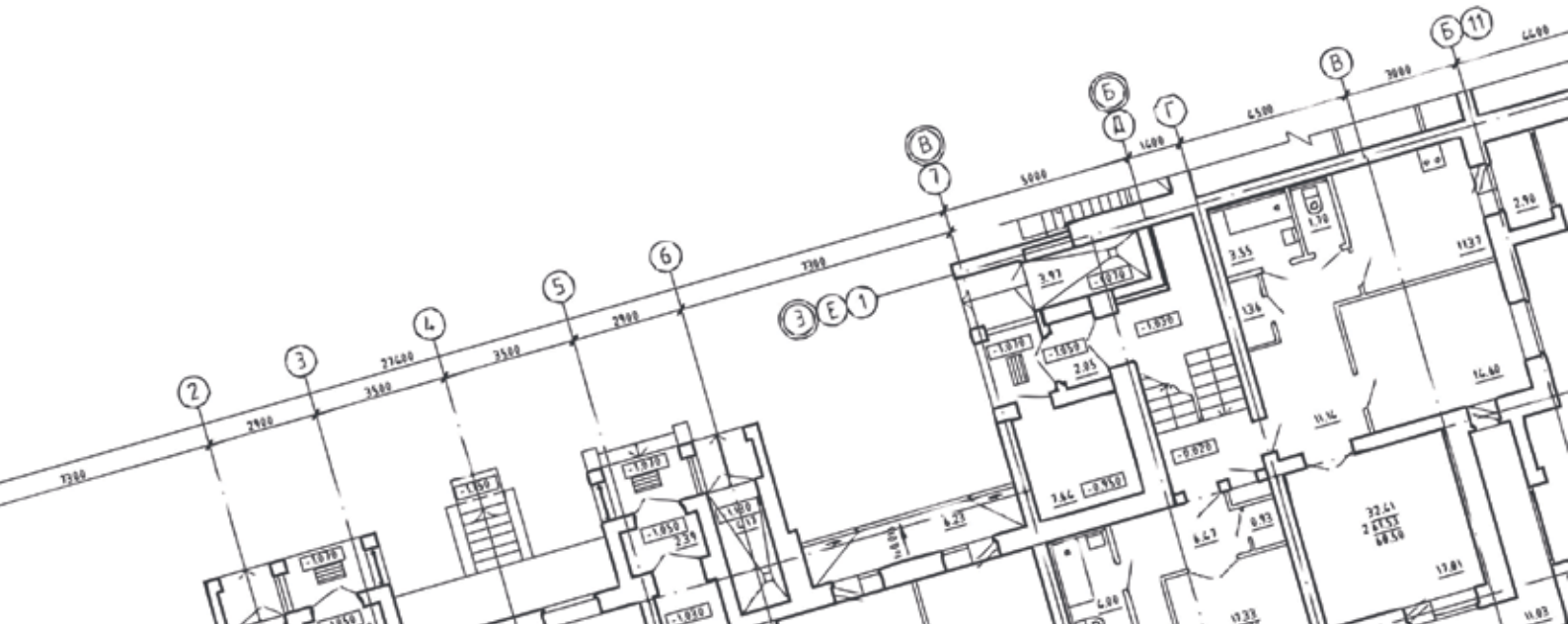

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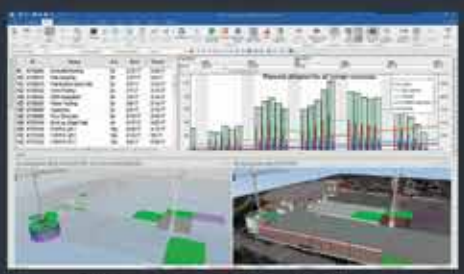

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榮獲HKIBIM Merit Award in Training Institution, 增設BIM交付管理課程系列, 強化業界實踐BIM標準

2017
增設課程 "BIM for Constrcution Managers", 讓工程管理者更有效融入BIM流程

2013
擴充BIM培訓系統, 常設MEP, Strcuture及Navisworks等課程, 讓學員更全面學習BIM應用

2012
成為Autodesk Ahthorised Academic Partner, 推動學界應用Autodesk軟件於專上教育。

2008
提供教授Revit的持續進修基金認可課程。同期亦引入Autodesk專家認證服務。

2007
榮獲Autodesk頒予香港區最佳認可培訓中心名銜。

2006
開設 Civil 3D 課程, 並獲持續進修基金認可, 是[illegible]早期的[illegible]課程

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