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

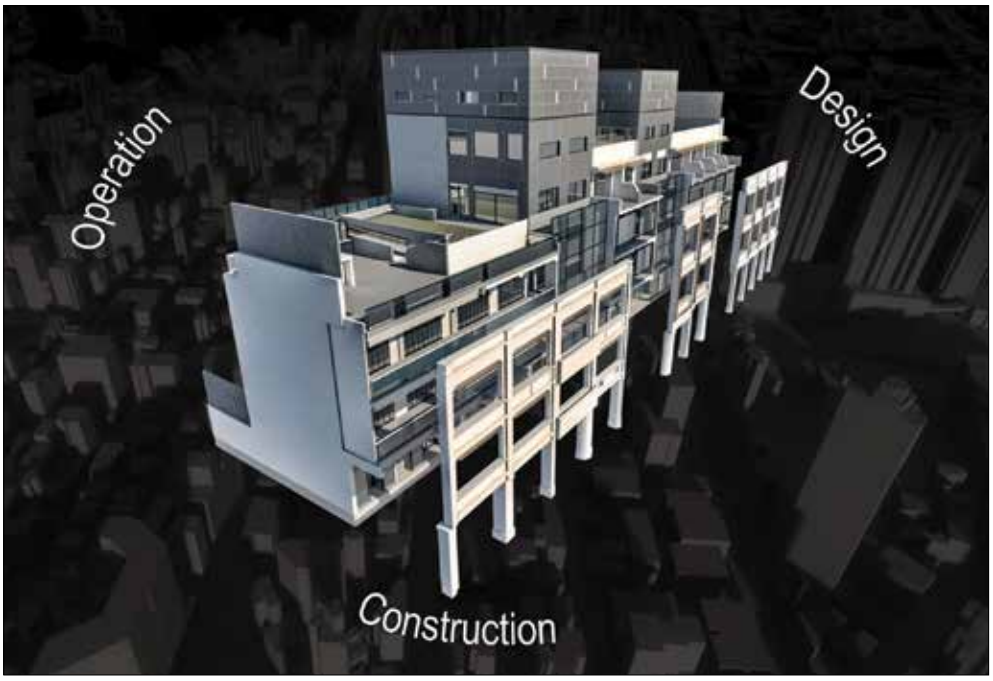
Sustainable BIM FM Platform for URA (Project MK01)

"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.

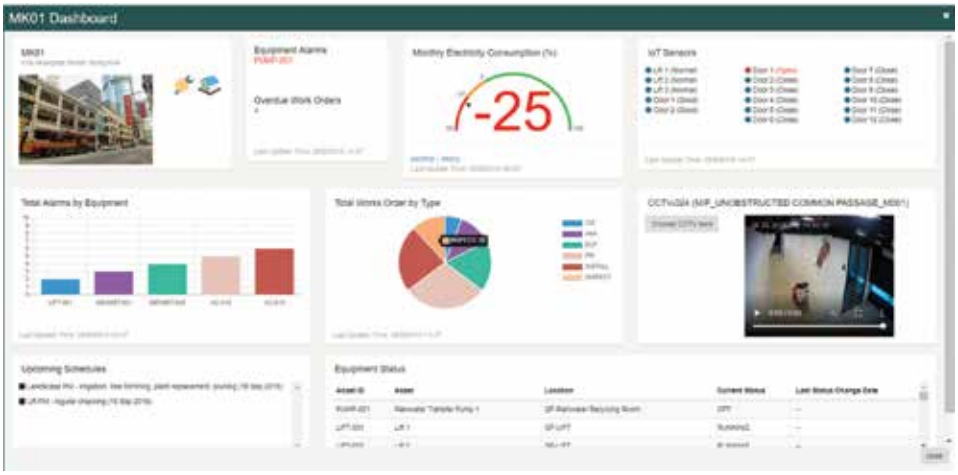
During the O&M Stages, with the centralized BIM-FM platform, site officers can retrieve maintenance and equipment information effectively within the system, often without being on-site, assess what the problem is and how it can be solved. This usage is extended to field inspection with mobile device 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.

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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.