

COMPANY  
**Urban Renewal Authority**

PROJECT  
**Project TKW/1/002 Ma Tau Wai**

LOCATION  
**Kowloon City, Hong Kong**

TYPE  
**Urban Redevelopment**

SCHEDULED TIME OF COMPLETION  
**2019/2020**

# “One-click” Automation for Saleable Area

“The Ma Tau Wai project involves a cluster of tenement buildings, one of which collapsed in 2010, leading to the residents living in the deteriorated clusters. The urban recovery required the team to work efficiently together, accomplish tasks quickly, and address social concerns on an ongoing basis.

Being innovative and forward-looking, the URA is taking on the challenges of using BIM to fast track the redevelopment schedule. The project also serves as a pilot scheme for integrating BIM with other technologies in order to promote intelligent design of development projects.”

—Catherine Lau

Manager,  
 Urban Renewal Authority

#### BIM PARTNER

**BIT Building Information Technology Limited**

#### AUTODESK PRODUCTS USED

**Dynamo**  
**FormIt 360**  
**InfraWorks**  
**Navisworks**  
**Revit**



BIM for fast-track urban recovery  
 Image courtesy of Urban Renewal Authority

Since 2016, the Urban Renewal Authority (URA) adopts Building Information Modelling (BIM). It is well implemented to take out uncertainty in design stage and allow the project team to visualize a project, by identifying clashes, to share information and to enhance buildability. By helping to avoid abortive works, BIM can save considerable time in construction while minimize the cost associated with abortive works and delays.

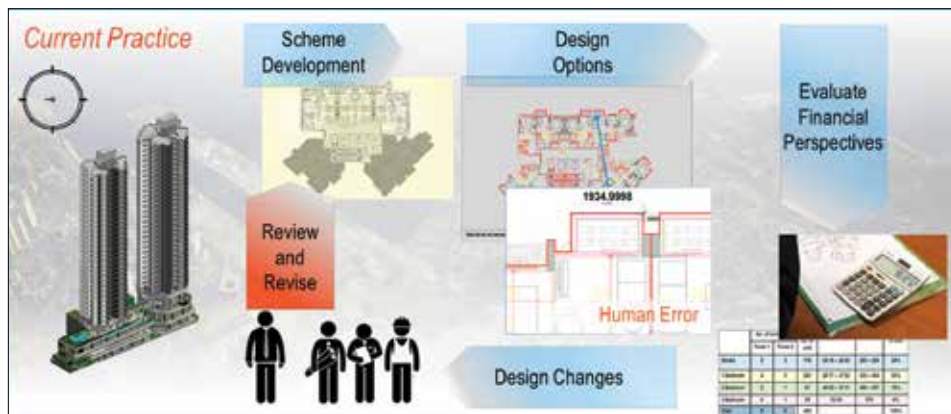
Despite that further BIM development,

such as automated calculation, data management, etc. for building information is not common in Hong Kong. In view of time and accuracy, the URA explores BIM application further in the field of automated calculation of saleable area.

Under the Residential Properties (First-hand Sales) Ordinance (Ordinance), saleable area means the floor area of the residential property, which includes the floor area of balcony, utility platform and verandah. It means the saleable area



FormIt and InfraWorks help appending the 3d city models from different sources and formats  
 Image courtesy of Urban Renewal Authority



Current practice of revising design, floor plans, calculation and area schedule  
Image courtesy of Urban Renewal Authority

to be measured from the exterior of the enclosing walls of the residential property. For the case of two adjoining residential properties, the measurement is to be taken from the middle line of the wall.

### Traditional Approach

Based on the First-hand Sales Ordinance, the Authorized Person (AP) is currently responsible for determining the area boundary, i.e. outer, middle or inner line of its enclosing walls based on the Ordinance. The AP provides the area boundary in 2D drawings, by calculating each area, copying and pasting the areas into separate spreadsheet to compose the required area schedules. As the whole processes are worked manually, arithmetic errors may be found. It may take days for the AP to calculate and re-calculate manually for each design option. Any changes of each design will involve repetition of the cycle. While maximization of total saleable areas is a priority concern of the clients for assessing the financial impact of different design options, time involvement in the calculations will then be a consequential consumable factor to consider.

### One Click Approach

With BIM, the design and construction drawings are digitized into a 3d platform which has the potential to allow automated calculation. Computer algorithms and modelling parameters are set to comply the Ordinance, while guiding the area boundary of each room elements to be measured from the outer/middle/ inner wall line. By implementing the validation algorithm as a plug-in function with a button triggered by a mouse click, the areas calculation can be started in such "one-click" action in

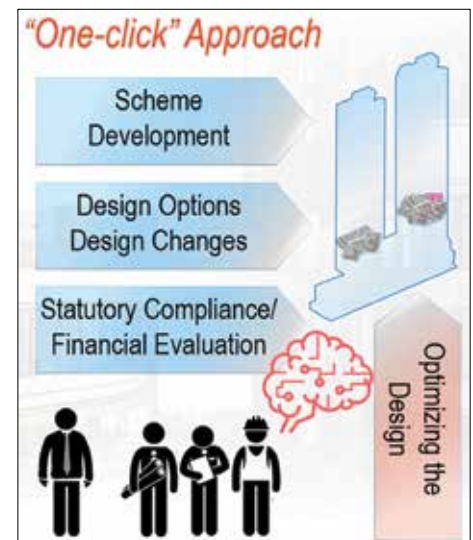
the BIM authoring software. No matter of any design stages, different schemes, any regulation changed, etc. updating the area calculation can be synchronized instantly.

### Time and Accuracy

The AP can generate the plans and areas from the BIM model and generate huge amount of drawing sheets automatically with initial setting of views. The drawing production is streamlined substantially and the accuracy of the deliverables is assured.

Using BIM, any design changes and even in design options will result in an instant change in the model, worksheets for different options can be generated by "one-click". Saleable areas, efficiency, financial implication, any preset calculations can be viewed instantly as soon as the BIM model is updated. Thus,

BIM greatly improves the workflow of the whole process, enabling substantial time and manpower savings. The clients can select the optimal designs that are legitimately and economically sound. BIM can become a fast-track for client's decision making process on design options.



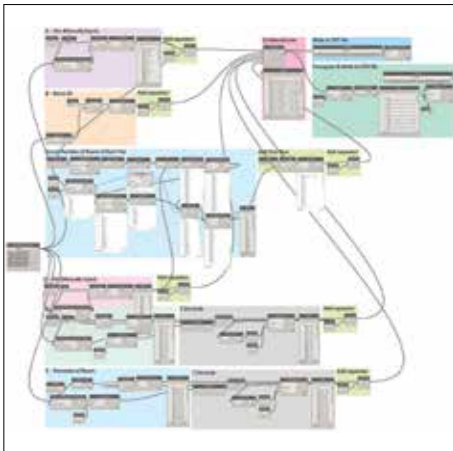
BIM automation can become a fast-track for client's decision making  
Image courtesy of Urban Renewal Authority



BIM allows early visualization of a project and identifying potential clashes  
Image courtesy of Urban Renewal Authority



Elements involved in saleable area  
Image courtesy of Urban Renewal Authority



Dynamo plays important role for data  
Image courtesy of Urban Renewal Authority



Interplay of Dynamo and python scripting can streamline the drawing production substantially  
Image courtesy of Urban Renewal Authority

BIM is the information hub to store building information, including design and construction drawings, materials, equipment, etc. The team are studying and resolving the problems of the unstructured and scattered data across various systems.

### Data Mangement - Rooms and Areas

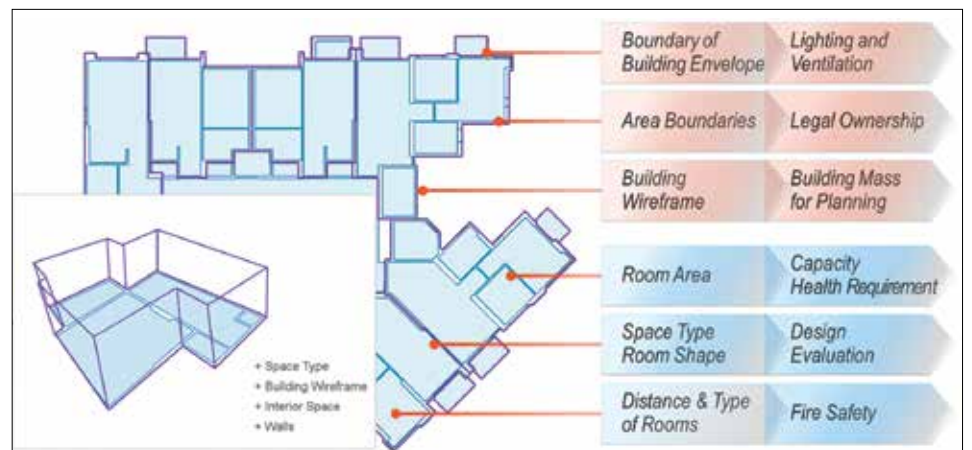
Rooms and areas are the key spatial data and basis of the data structure across various systems. They are also crucial in the building plans submission as they tie with different constraints of greenery area, usable floor areas, fire separation, etc. "Rooms and areas are simple but intelligent. For example, the outer line of the areas, i.e. the building envelope, is restricted by the lighting and ventilation regulation against the surrounding environment. Each area boundary represents the properties ownership. Building area boundaries represent the massing for urban planning and city management. Each room area is restricted by the regulations including the capacity under the health requirement. Room type and geometry are useful for design evaluation. Distance between each room and its door elements are restricted by the fire safety regulations." says Catherine. "With the development of plug-in function, the automated calculation can improve the accuracy of the BIM deliverables. The accuracy is very important for data management and realize further data validation."



BIM takes out uncertainty and allow us to visualiz a project and enhance buildability  
Image courtesy of Urban Renewal Authority

### Data Validation of BIM

Nowadays, building regulatory controls in Hong Kong are increasingly stringent. The stakeholders cannot timely identify regulatory issues as they are not apparent in 2D drawings. With BIM and software development for compliance checking, they help alerting non-compliance issues and the stakeholders to visualize the building elements in 3D. It can shorten the approval time of building plans and as a whole shorten the whole development process. BIM is not only for the construction but relates to the full spectrum of the building process.



Room and Area are the basis of the data structure across various systems  
Image courtesy of Urban Renewal Authority



Looking at the buildings as one in an urban district through BIM-computerized lens  
Image courtesy of Urban Renewal Authority

## About Urban Renewal Authority

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.

The Urban Renewal Authority (URA), being a public body, moves forward to integrate BIM with other technologies.