COMPANY
Hong Kong Housing Authority, HKSAR Government

PROJECT
BIM SMAᶦRT - Revolutionising Public Housing Design with the power of Artificial Intelligence

LOCATION
Hong Kong

TYPE
Building Design and Master Planning

SCHEDULED TIME OF COMPLETION
Varies

About Hong Kong Housing Authority, HKSAR Government

The Hong Kong Housing Authority (HA) is a statutory body established in 1973 under the Housing Ordinance to provide subsidised public rental housing to low-income families, and to help low to middle-income families gain access to subsidised home ownership. The Housing Department is the executive arm of the HA to help the Government achieve its policy objective on public housing.

BIM PARTNER
isBIM Limited

AUTODESK PRODUCTS USED
**Autodesk® AutoCAD®
Autodesk® Dynamo
Autodesk® Navisworks®
Autodesk® Revit®
Generative Design in Autodesk® Revit®**

The Next Chapter of Public Housing Design with the Power of Artificial Intelligence

香港房屋委員會
Hong Kong Housing Authority

Project Description

The Hong Kong Housing Authority (HA) progressively takes steps to develop BIM SMAᶦRT, one of its signature design automation tools, for the architectural design process of public housing projects. With the advancement of artificial intelligence (AI) and generative design technology in recent years, HA encourages in-house professionals and collaborates with its consultants, contractors and to apply a wider use of generative design technology for design optimization, which intends to revolutionise the design options generation process thus saving cost and time for highly repetitive, yet explorative design solutions. BIM SMAᶦRT is a vivid example of how AI could venture into architectural regimes in the domain of public housing design.

Project Challenges

Every architectural design is a complex and sophisticated answer that transcends, inter alia, design parameters, statutory requirements and site-specific constraints into an appropriate design solution. Public housing design in Hong Kong is no exception. With a view to enhancing speed and efficiency, the team challenged the explorative use of generative design into the architectural regime, and meanwhile recipirically formulated appropriate design principles specific to public housing design. This aims to challenge the integration of advanced technology, applying generative design under the prevailing legislative and sustainable design framework that squarely suits the local public housing context.

Solutions for Challenges

Introspecting on the design thinking of our public housing design, which is standardised, modular and repetitive in nature, BIM SMAiRT promotes design optimisation across various areas with respect to the scale and spectrum of public housing design, resulting from integral considerations of building controls, customized Housing Authority's in-house design policy and project specific limitations. The algorithms of BIM SMAᶦRT are programmed to reference the traditional public housing design trajectory, from micro to macro, from modular flat to floor composition, and from block layout to master planning. Design solutions are formulated, filtered, ranked and recommended based on analytical results and the responsive intents of designers.

How does BIM benefit the project?

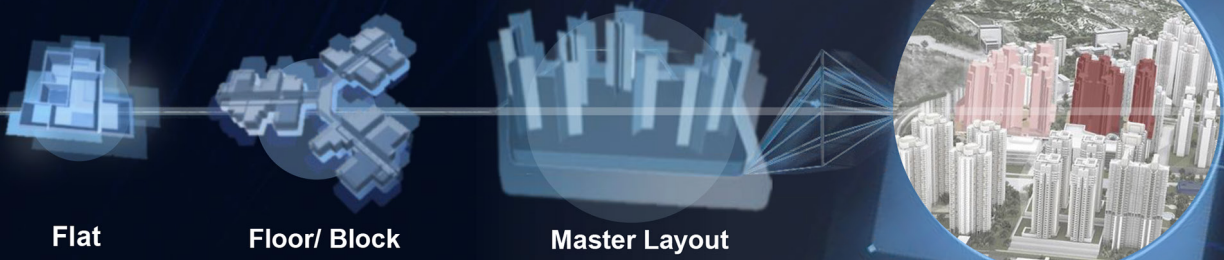Features of BIM SMAᶦRT bring the following key benefits to projects:

1. industrialise the design generation process from resources, time and cost-saving perspectives for highly analytical and fully explored design solutions. It's fast, precise and accurate!

2. enhance buildability not merely by detecting conflicts, but proactively avoiding and resolving them in the evaluation process. This shifting approach helps to ensure that design solutions are generally and duly considered, facilitating efficient and effective construction.

3. facilitate new construction methods such as modular integration construction (MiC). Any method of construction, no matter adopting a common traditional approach with prefabricated elements or the MiC approach, could be facilitated.
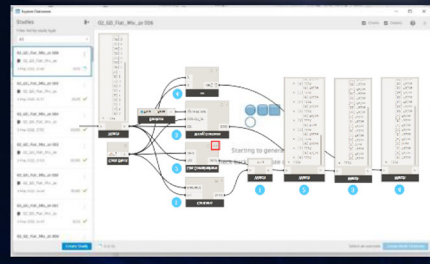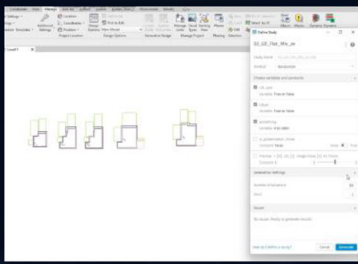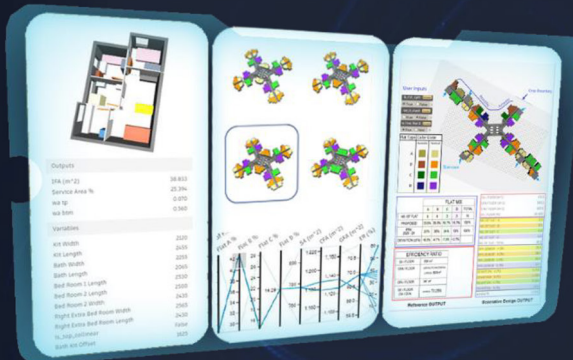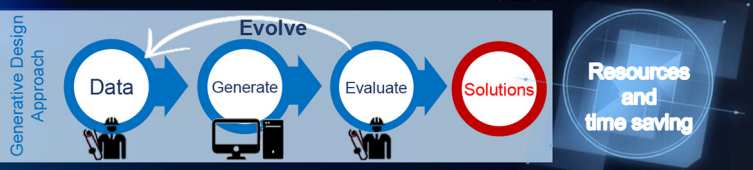
Better with BIM

The beginning of BIM SMAᶦRT was initiated by our aspiration on striving ahead with the challenging housing production targets in the near future under the social situation that we lack construction labour-power compounded with a limited number of professionals shared by the entire industry. This mission inspires us with a strong determination in development and adoption of innovative technologies architecturally, as we believe, being the smartest and most sustainable way not only for the advancement and growth of our public housing development, but more significantly, impactful to the construction industry.

BIM SMAⁱRT

Revolutionising Public Housing Design with the power of Artificial Intelligence

Flat

Floor/ Block

Master Layout

Smart & sustainable future for public housing design

Traditional Approach

Read + Recognize → Design → Trial & Error → Solutions

Generative Design Approach

Evolve

Data → Generate → Evaluate → Solutions

Resources and time saving

Input interface ➡ **Script in plug-in (Dynamo)** ➡ **Output interface**

Application in MiC

Design thinking – from micro to macro

Create options for master planning at feasibility study — **SITE**

Automated floor generation with varied flat mix composition — **FLOOR**

BLOCK — Automated block layout options for prototype block study

FLAT — Automated module generation for design review

Hong Kong Housing Authority
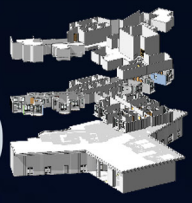
BIM SMAⁱRT – The signature design automation tool for the next chapter of public housing developments with the Power of AI
Image Courtesy of Hong Kong Housing Authority, HKSAR Government

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