HDB PEAK Forum 2012

Road to Better Homes – Design & Productivity

Future Ready with building İnformation modelling

…. of dreams, İnnovations & expertise



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architect/story teller
HDBBRI
18 Oct 2012

"Design Excellence & Raising Productivity"

Future Ready with building İnformation modelling

..... of dreams, İnnovation & expertise

Scope:

1. **Where we stand** *(Design Excellence & Construction Productivity)*
2. **The Next Chapter** *("Better Living in HDB Towns")*
3. **Planning the Moves** *(Sustainable Strategies)*
4. **On the Road** *(BIM & Prof. Expertise)*
5. **Future Ready** *(Trends & Developments)*

1. Where We Stand *(Design Excellence / Construction Productivity)*

Lessons from 50 years of "Housing a Nation"
The Dreams of Singaporeans
The Visions: *Providing Homes*
Affordable Homes & Environ. of Quality



A roof



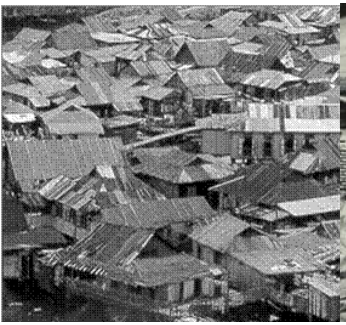
A Home



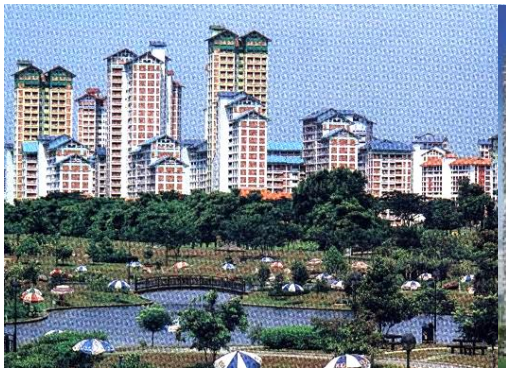
Quality Home



Quality living environment









...in a park ...in the city

1. Where We Stand *(Design Excellence / Construction Productivity)*

Outcomes: *Meet housing demand through*
higher productivity ***(Quantity)***
Attractive designs, good workmanship ***(Quality)***

Strategies: *i. adopted new construction methods*

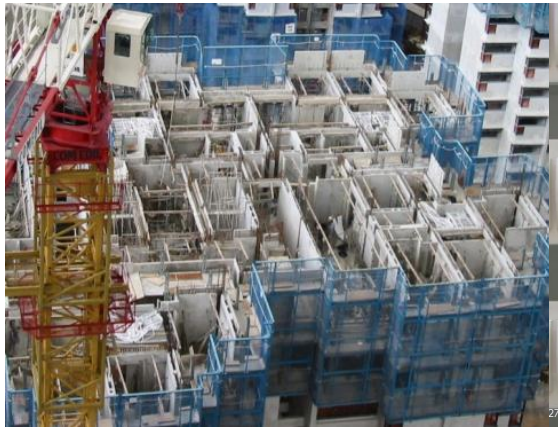




Construction – Metal formwork, Mechanisation, Prefabrication & PRECASTING





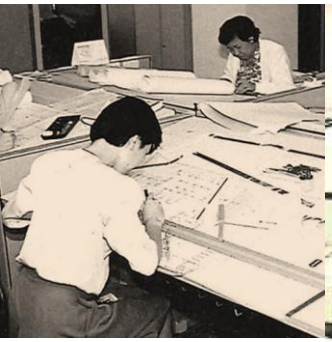




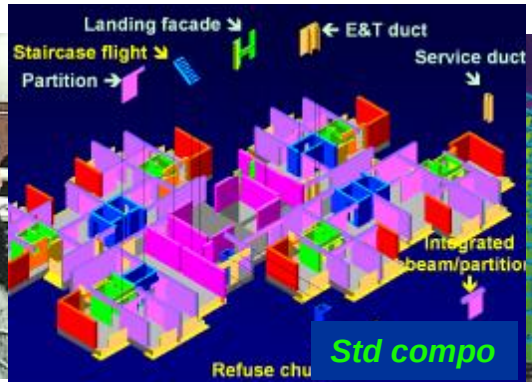
1. Where We Stand *(Design Excellence / Construction Productivity)*

Strategies: *ii. Adopted new technology (CADD)*

iii. Re-engineered work processes, Standardisation & Documentation



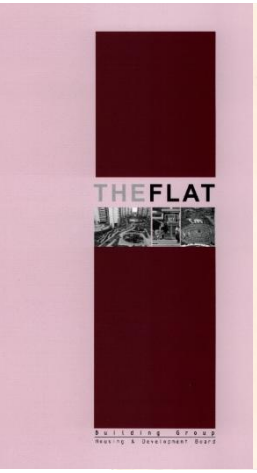


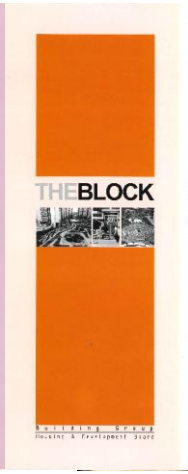


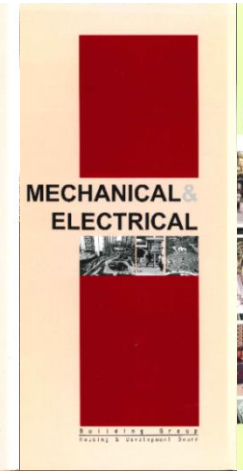


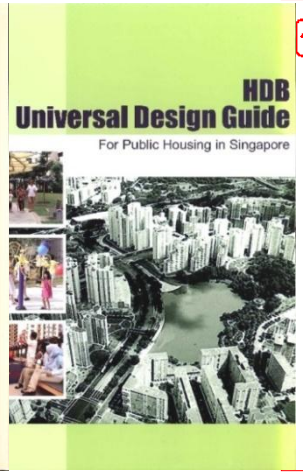


Upstream – Design, Institutional Knowledge, Innovation & Expertise















2. The Next Chapter

The Dream: *Cleaner, Greener & Healthier Quality of Life*

The Vision: **"***Better Living in HDB Towns"*
Well-designed, Sustainable &
Community-Centric Towns





Punggol Eco-Town 2012





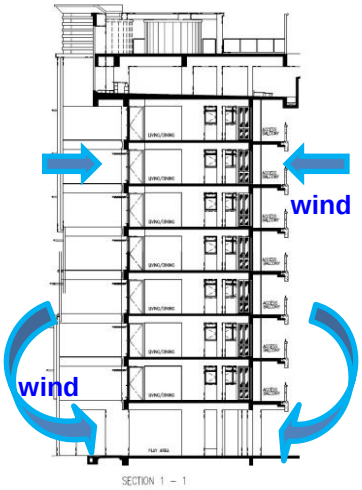
Sustainable Development Framework
Environment,
Social
Economics

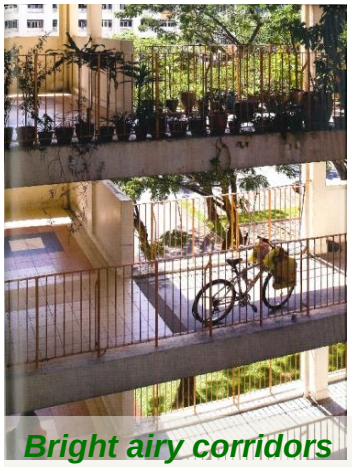
2. The Next Chapter

Outcomes: *Sustainability (construction)*

Strategies: *Promote Sustainable Designs / Details and Green Construction.*







Bright airy corridors



Sec. roof

BCA GREEN MARK

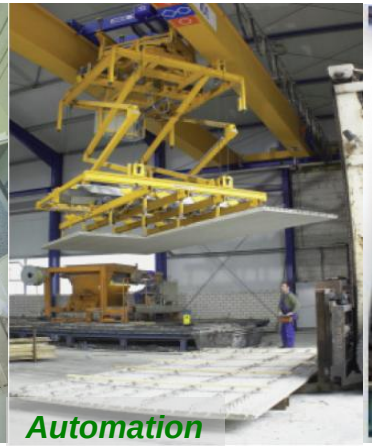
Passive tropical design & details, buildable design, Intelligent systems



Precast system



Prefab



Automation



Mast climbing platform / ABCS

2. The Next Chapter

Outcomes: *Sustainability (environment)*

Strategies: *Go **"GREEN"** (urban solutions / technology)*











Energy, Water, Greenery, Transportation, Waste







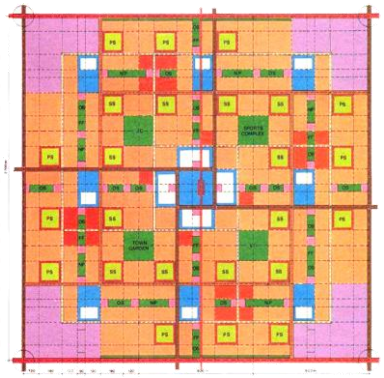


Urban Systems / Infrastructure for city living

3. Planning the Moves *(Sustainability)*

Well-designed Town, Sustainable Development
Planning for Better Quality of Life (city/urban living)

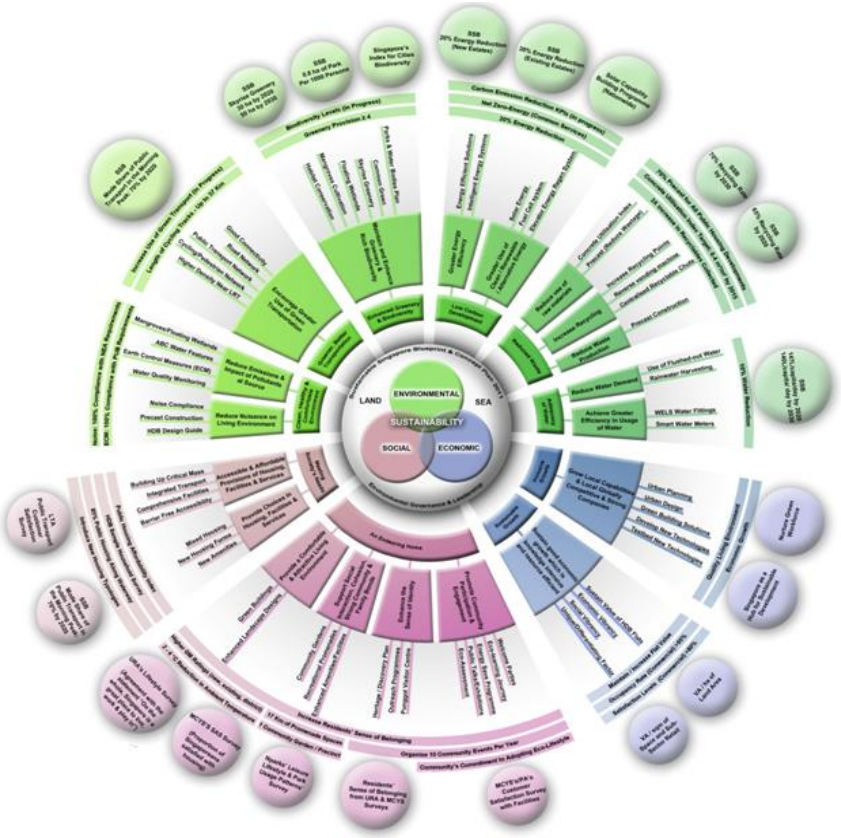
New Town Structure Model



Comp. Plan. for self-suff.
Live, Work, Play, Learn



Sustainable Development Framework



Environment
energy
transport
waste
Water
greenery
Environment

Social
Home
Society

Economics
Sus. Growth
Incl. growth

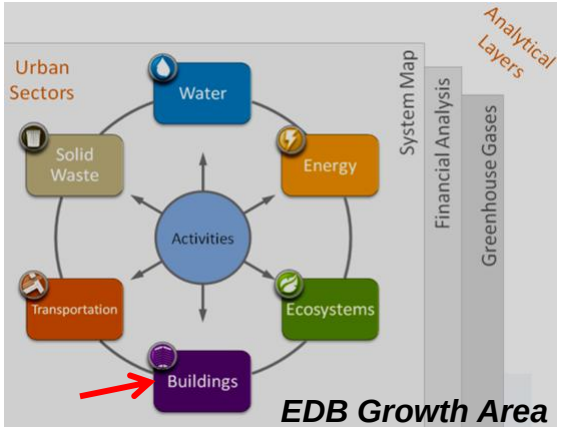
3. Planning the Moves *(Sustainability)*

Plugging in & broaden our knowledge

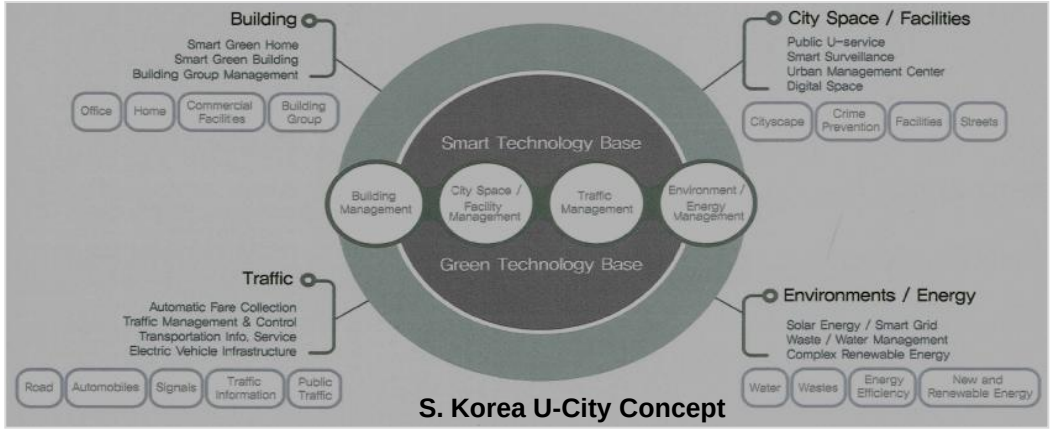
Strategies: *i. unlock value from data & information*

ii. More effective integration of work processes

iii. Greater use of innovative technology



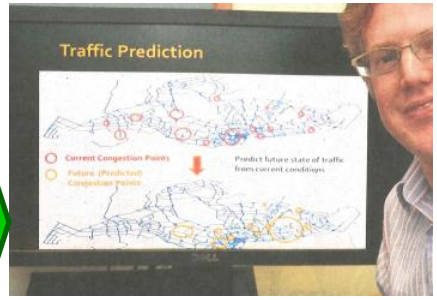
EDB Growth Area

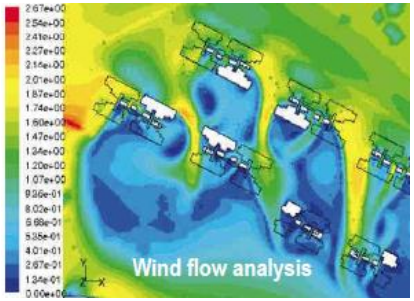


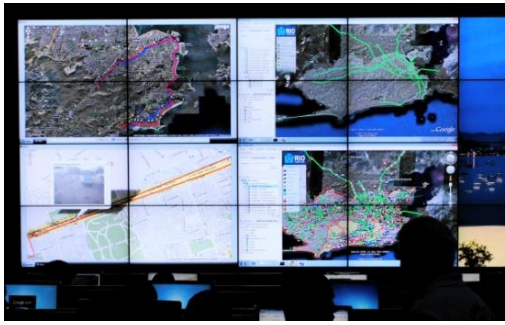
S. Korea U-City Concept

Intensive generation/use of information, wide adoption of info-comm (mobile) technology









Data collection / info sourcing

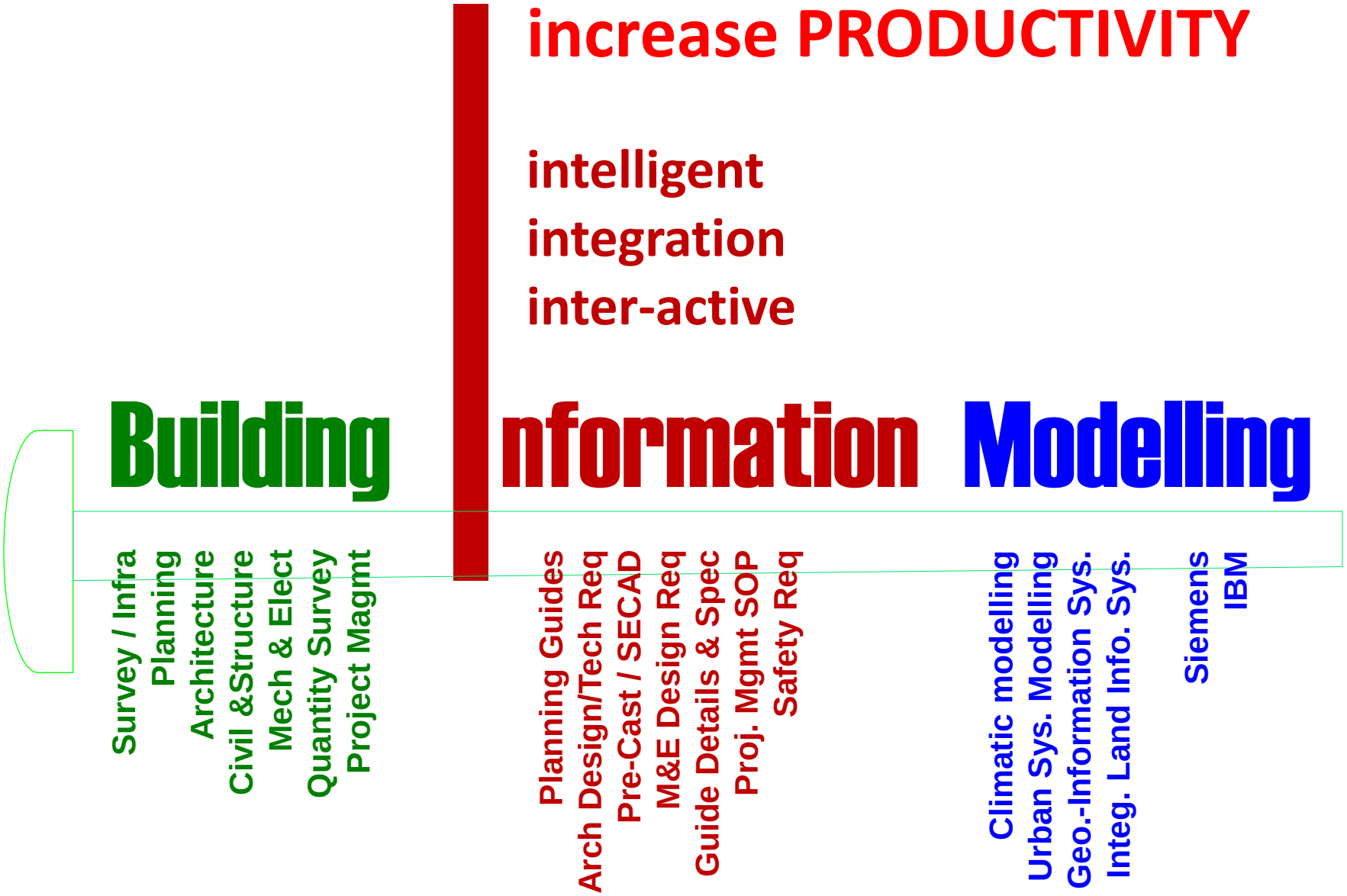
Analysis, modelling, prediction, scenario planning & Data Visualisation

... building up of information, modelling and communicating it

4. On the Road

increase PRODUCTIVITY

intelligent
integration
inter-active



4. On the Road...with BIM

Warning:
BIM is NOT just a drawing / visualisation tool !

Key Capabilities of BIM

The creation and use /**communication** of **computable information** of a building project in design & construction in **one accessible & intelligent model (single file)**



One accessible & intelligent model







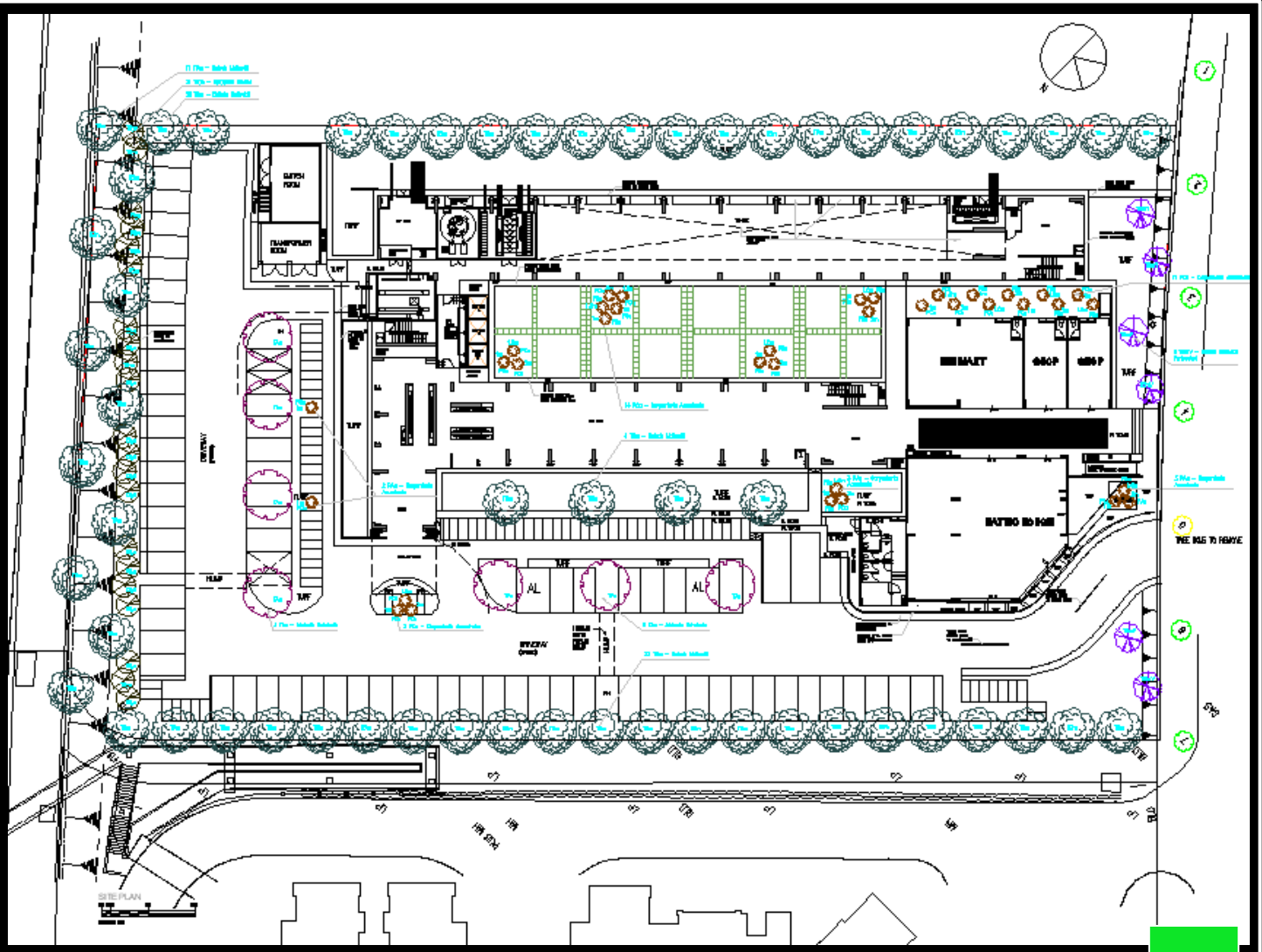
DESIGN – SENGKANG N1 C26

Conventional Approach

2D manual digital drawing

NEW INNOVATIVE APPROACH

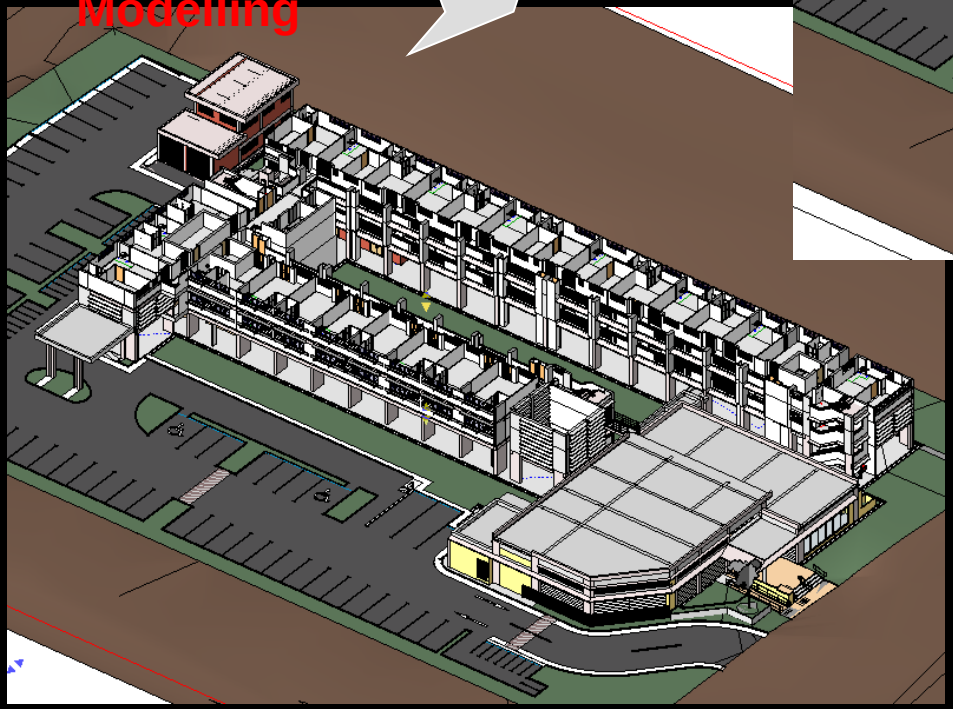
Building Information Modelling (BIM)

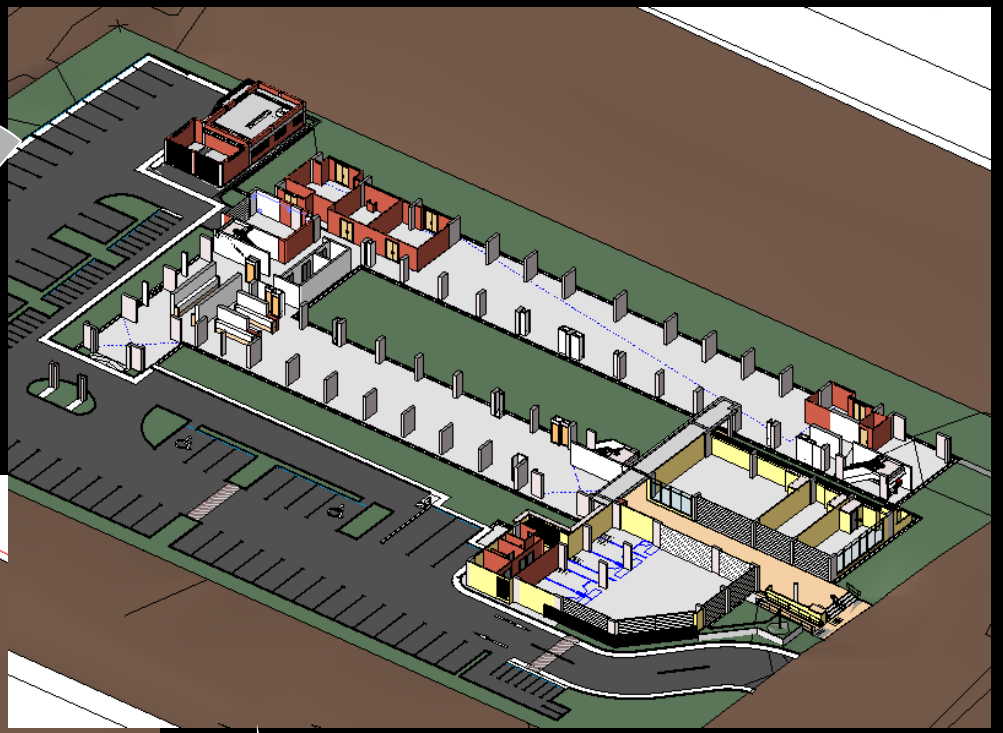


DESIGN – SENGKANG N1 C26

Building Information Modeling (BIM)

Starts with 3D Modelling

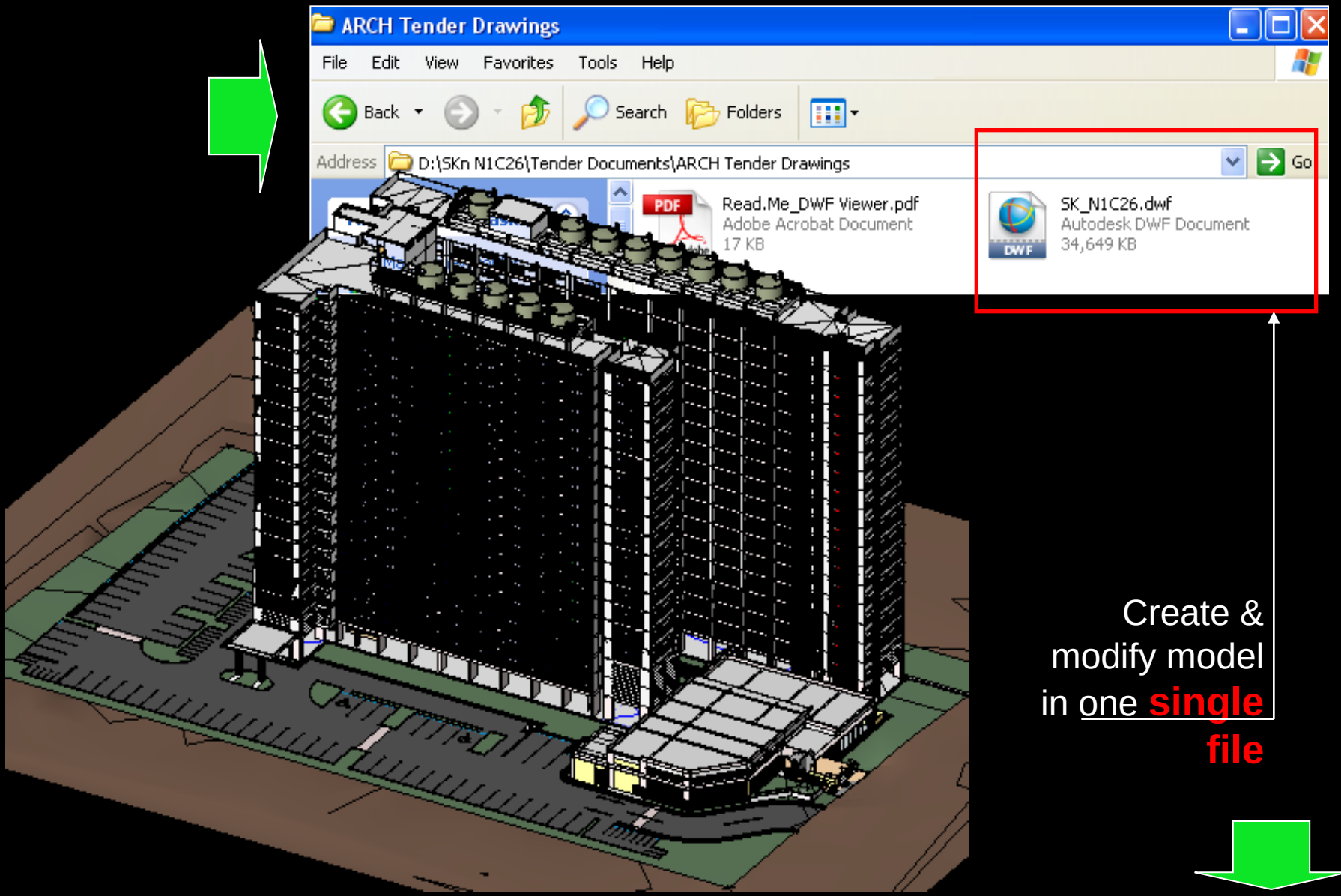




Innovative approach

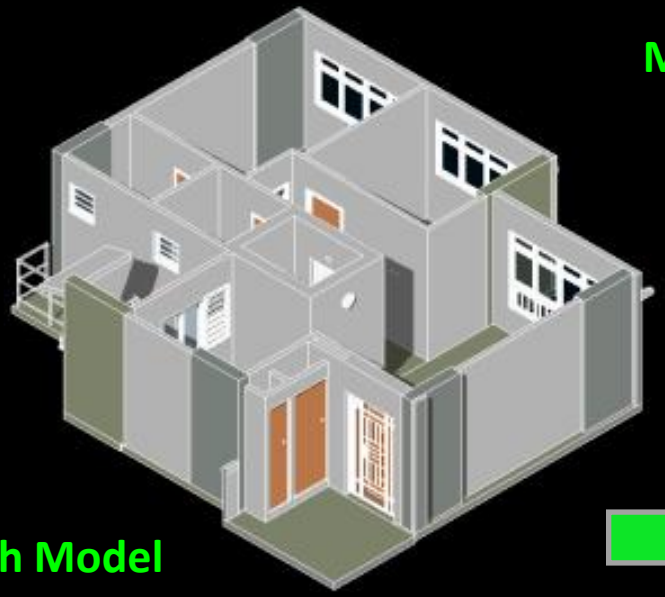
Create & modify **3D digital MODEL** in one **single file**

DESIGN – SENGKANG N1 C26



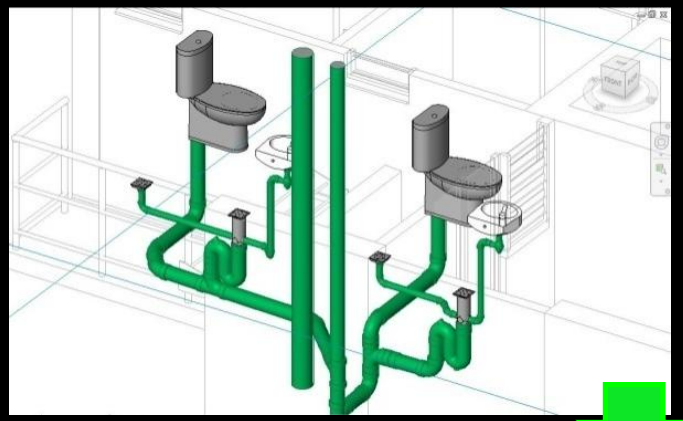
Key Capabilities

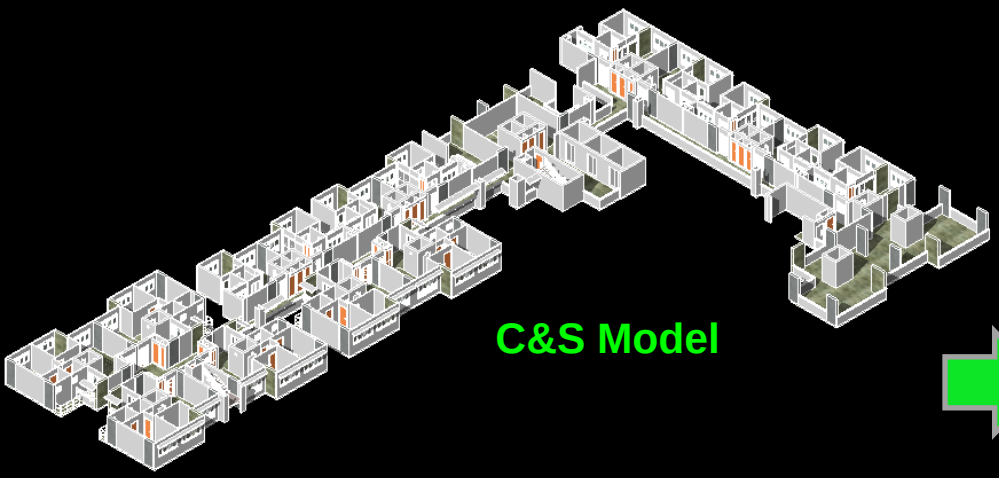
2. Integrated work process – better co-ordination



Arch Model

M&E Model

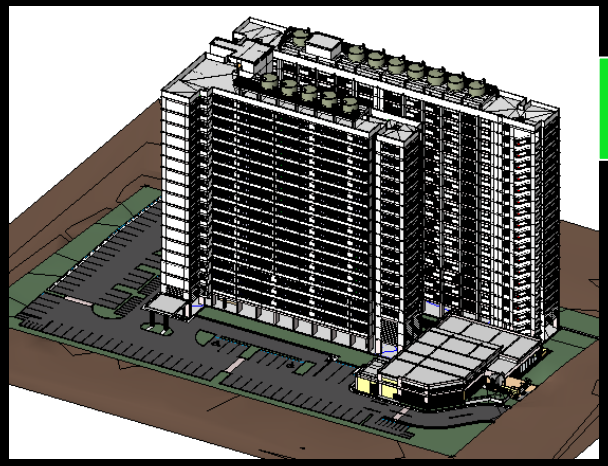




C&S Model



Key Capabilities

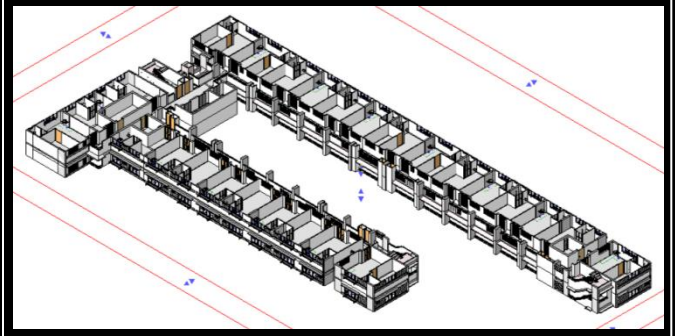


3. Interactive Drawings

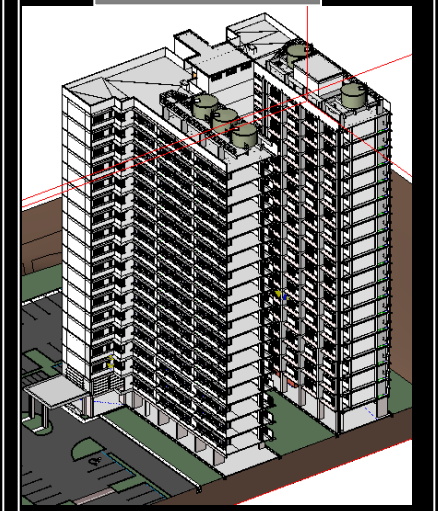
mean… When there is any changes to the model, the system will **automatically update** plans, elevations & sections

Full model

Plans



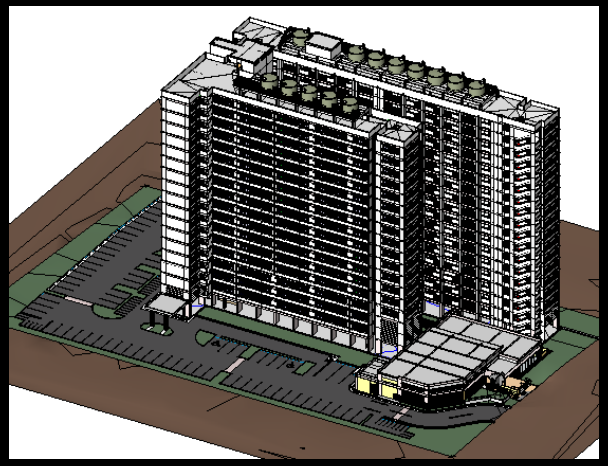
Sections



Elevations



INCREASED PRODUCTIVITY



Completed model will

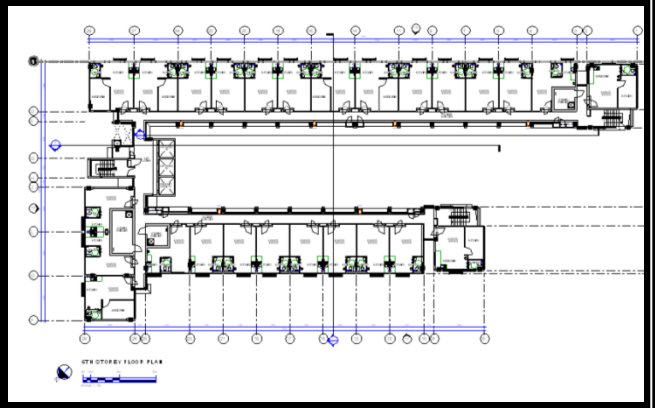
Auto Self-generate

INTERACTIVE plans, elevations & sections

Note: **NO MANUAL EFFORT REQUIRED TO DRAW 2D DRAWINGS !!!**

Full model

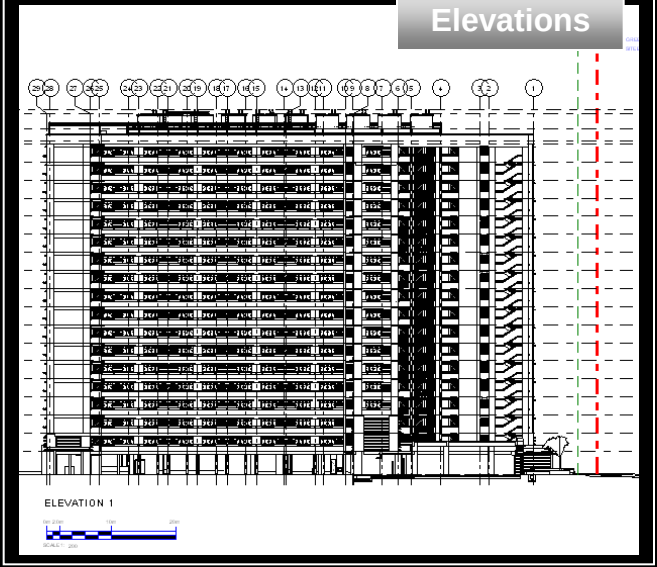
Plans



Sections



Elevations

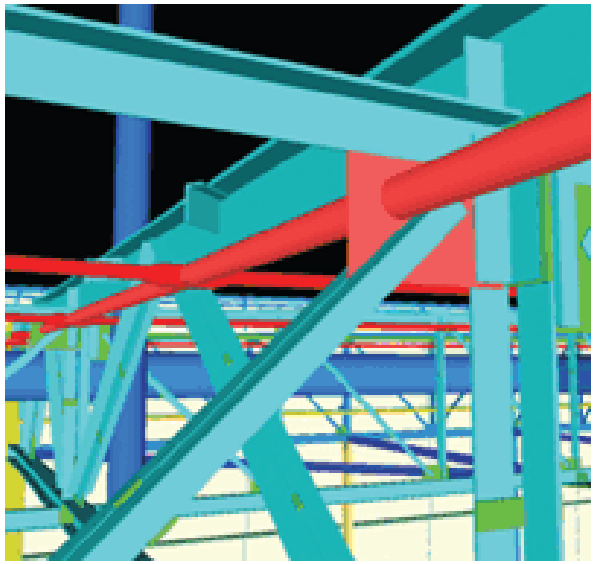


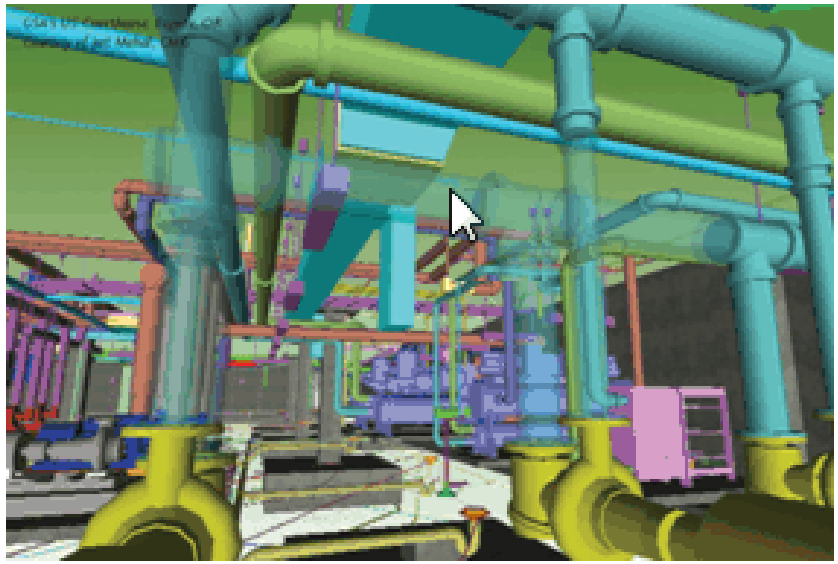
Key Capabilities

4. 3D Coordination/Clash Detection

Constructability of the BIM

- 3D - Coordination/Clash Detection
  - "The ambiguity between the architect's design intent and the 'fit' of a consultant's building system is practically eliminated." - Matthew Jogan - H3 Hardy Collaboration Architecture





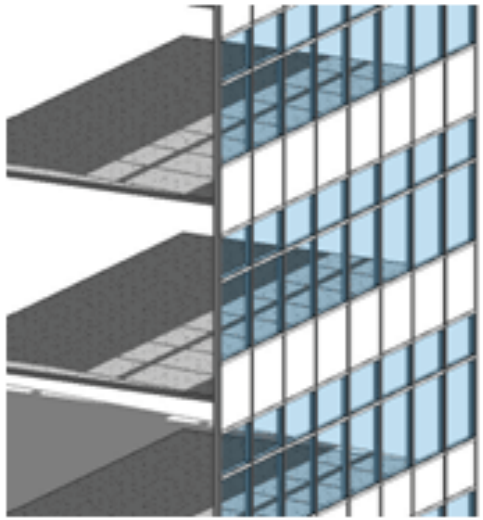
Key Capabilities

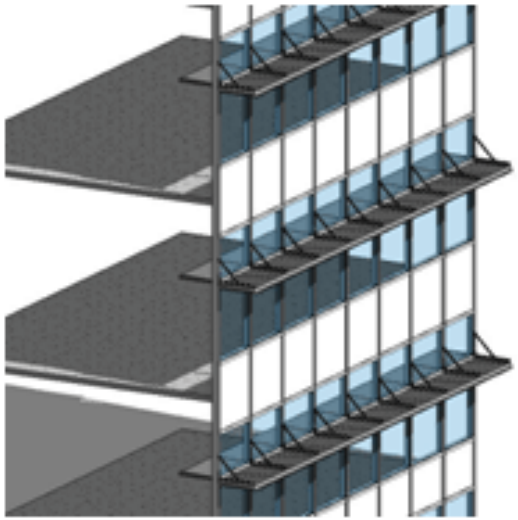
4. Analysis of building performances

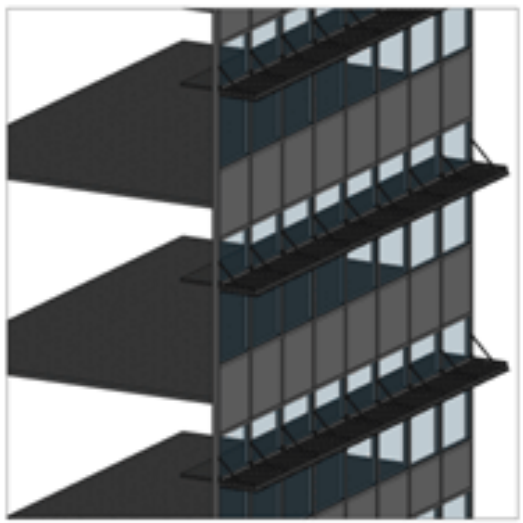
Sustainable Design

- Sun studies
- Design options

Buildability Score
Constructionability Score
Green Mark







The Potential

1. 4D, 5D 6D, 7D

- 4D - Sequencing and schedule **(Project Management)**
- 5D - Quantities and cost estimating **(Quantity Surveying)**
- 6D, 7D and beyond...

  (Fac. Mgmt)

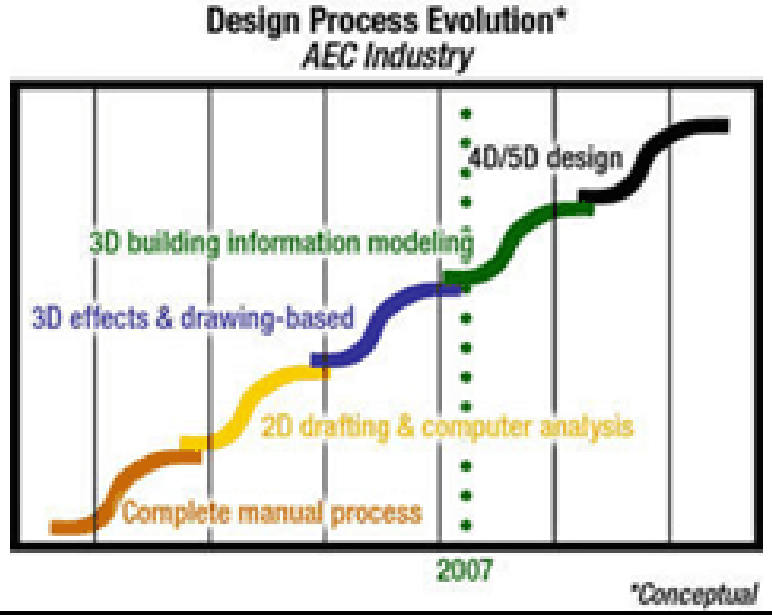
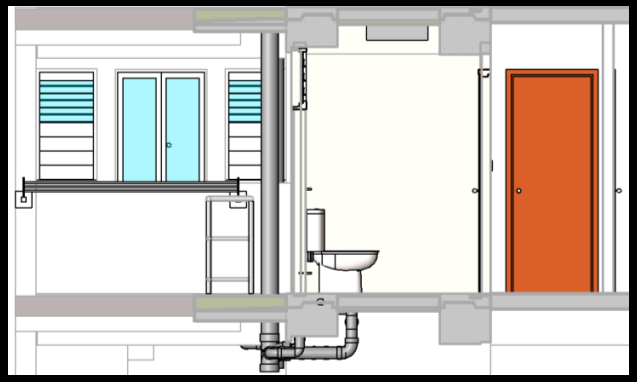
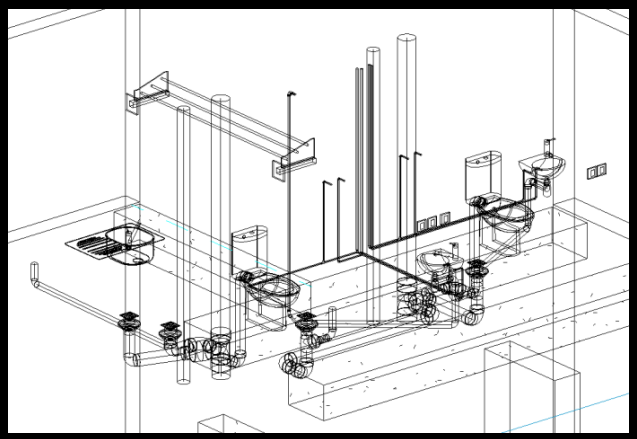


Image courtesy:
Walter P. Moore

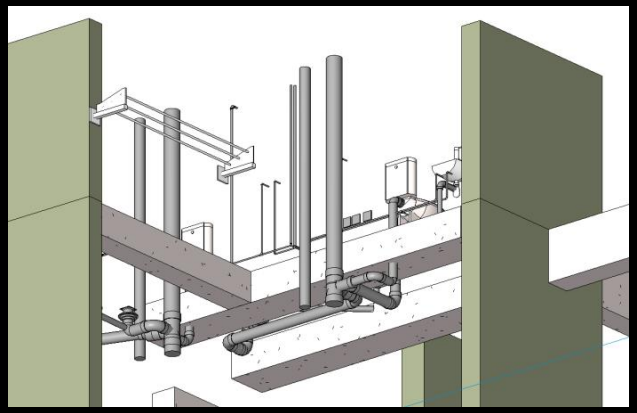
2. Supply Chain Integration (Pre-fab Toilet / Shelters)



ARCHITECTURE

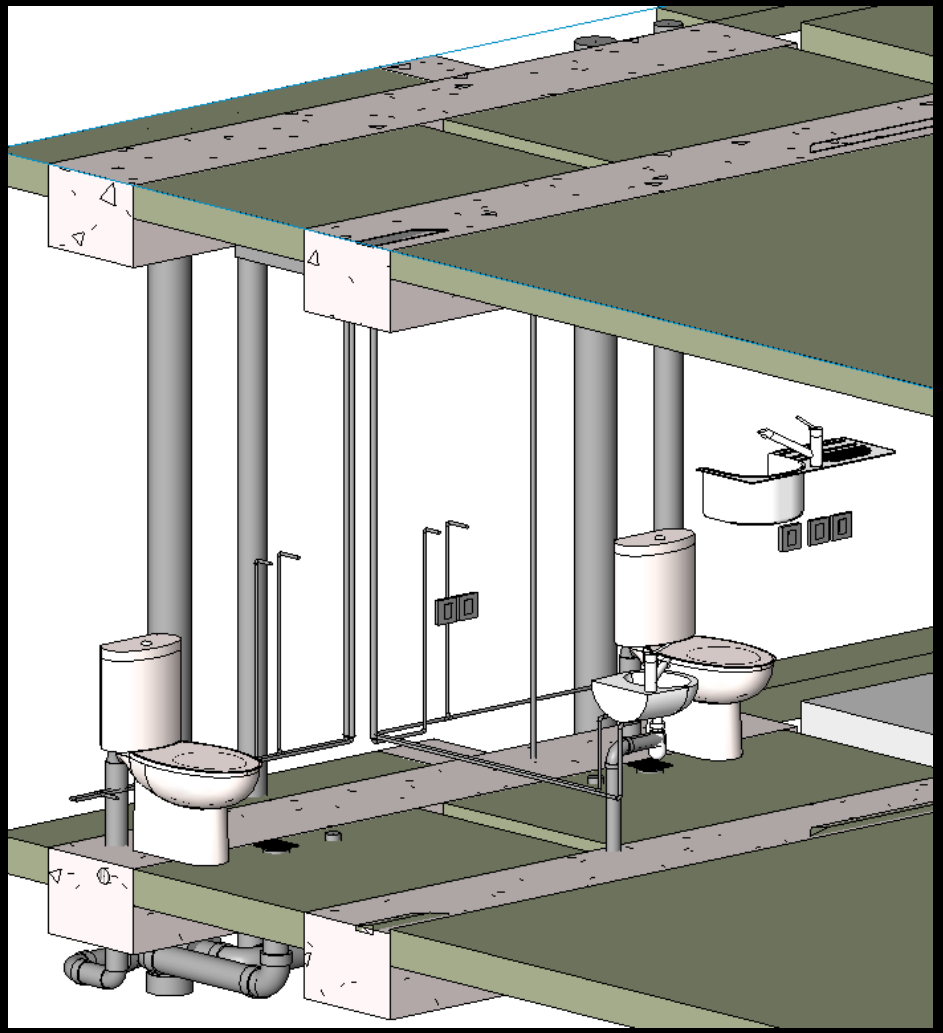


MECHANICAL & ELECTRICAL



STRUCTURE

PREFAB TOILET STUDY

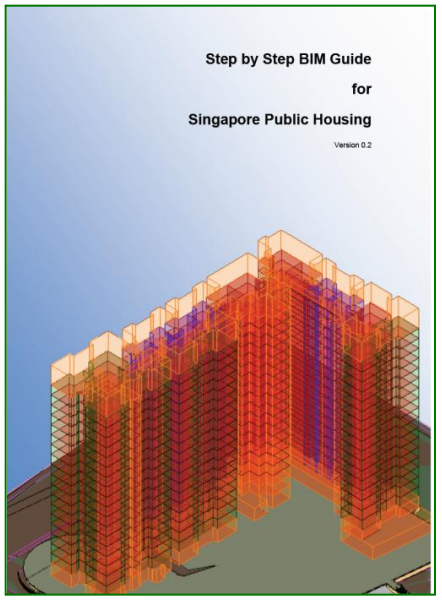


APPLYING BIM MULTI-DISCIPLINARY COORDINATION
CRASH DETECTION

Addressing Challenges & Concerns

"Step by Step BIM Guide for HDB Housing projects"

1. **Build BIM Skills / Expertise**
   Hybrid BIM + HDB standard details
2. **Integrated work processes**
   Arch, C&S & M&E
3. **Meet URA & BCA BIM e-submission req. & Struct. Design submissions.**



BIM Ready – Apr 2013

Adoption & Implementation - NOT "one-size fit all", build skills
Software - Unlike autoCAD / "data entry"
Inter-operability - BIM & Struct.design analysis software

Regulators, **Users,** Developers

BCA - mandatory BIM e-sub (Arch) April 2013, C&S / M&E Apr 2014

Building and Construction Authority

HOUSING & DEVELOPMENT BOARD

Step by Step BIM Guide for HDB Housing Projects

18 October 2012
V.1

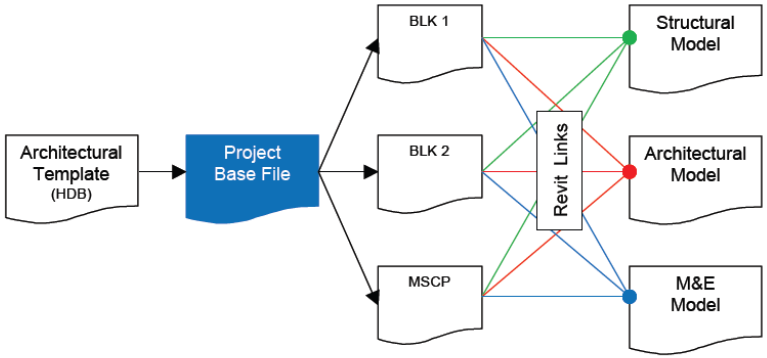


Project Base File
Project base file should be created with the HDB Architectural template discussed in the previous step. This need to be done before starting the project.

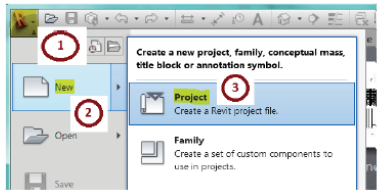
Project base file consists of location and orientation. The location and orientation were set as per Surveyor's drawing. If there is a need a common reference point can be marked using the **Reference Plains**. Grids and Levels are optional as they can be drawn in the individual files.

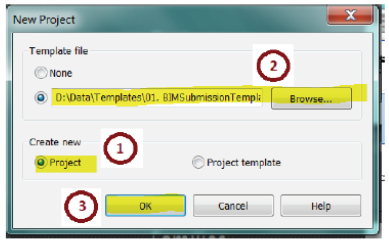
Project base file should be used by all the team members to model their assigned portion of the model. This allows to link the individual portions of the model smoothly to the master file that shows the complete assembly of the project.

Structural and M&E team should use the Architectural model(s) as a base. This will allow them to inherit the settings in the Project Base file.



Steps: Creating Project Base File
1. Create a new project based on (HDB's) Architectural Template.
   a. From the **Application Menu** choose **New → Project**.
   b. In the **New Project** dialog box choose **Project** in the **Create new** section.
   c. Click the **Browse...** button and locate the template file using the file dialog box.
   d. Click **OK** to create the new project.





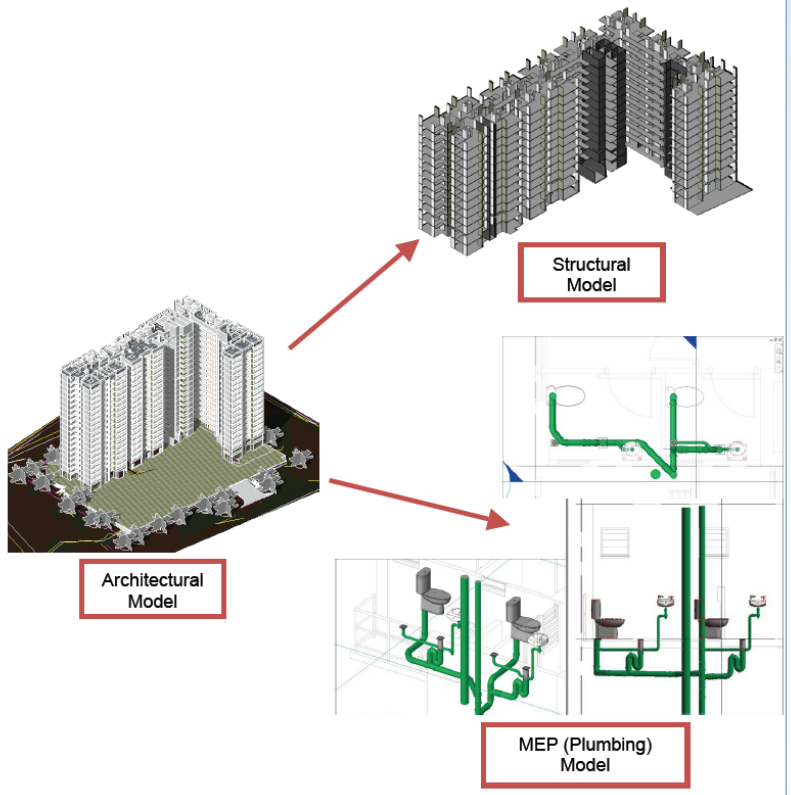
a. **Revit Groups** are mainly used for repeating portions of the model. Groups helps to propagate changes quickly. It is recommended to use groups minimally. Groups can be used for typical units and vertical shafts that might have one or more instance(s) in the model.

b. **Revit Links** will improve the model performance. Especially good for propagating change when the project has typical floors. Links allows the team members to share their work.

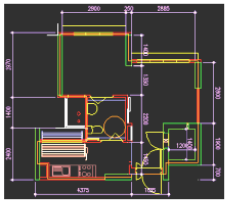
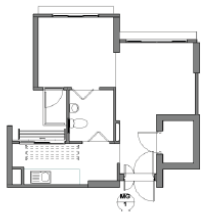
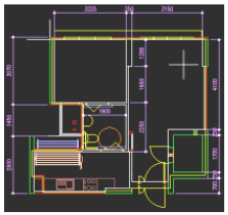
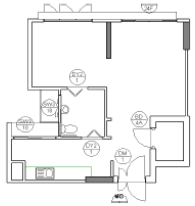
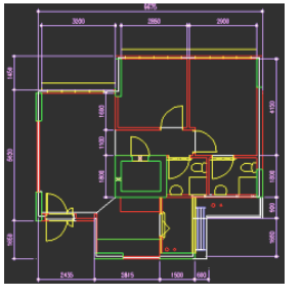
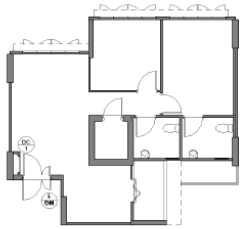
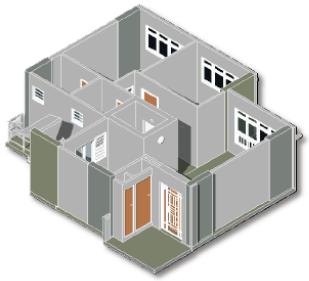
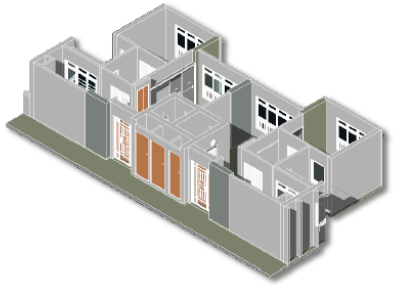
c. **Worksharing** allows multiple modellers to work on a single model. It allows modellers to share the updates quickly. Worksharing can be used during the preparation of the documentation by all the team members in a single model.

2. Architectural link files and master file should be shared to the Structural and MEP Engineers. They can use either the links or the master file, clean-up the content (show only the necessary items for them), link to their model, copy monitor the necessary elements and prepare their part of the model/documentation.

   Note: These steps will be explained in the later part of the document.



i. Trace the DWG file and model the typical units. Skip the Columns and Walls that is common with the adjacent units. Select the unit and make it as a group.

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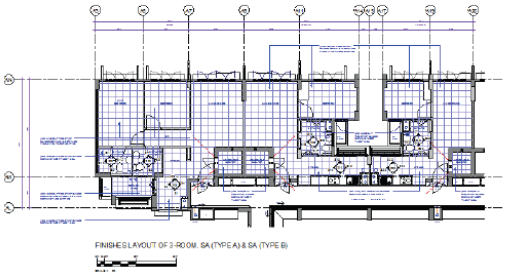
BIM Guide for Singapore Public Housing

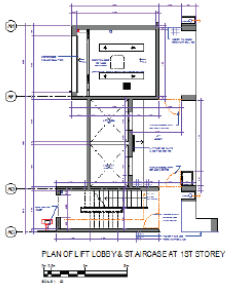
Indication of Furniture/Fittings

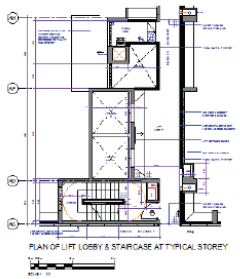
9. Sample of 1:50 Typical Unit Finishes Layout shown below



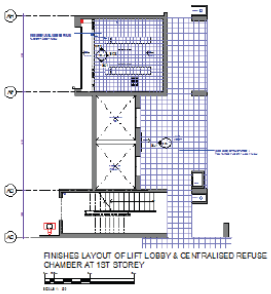
Add the following annotations:
Indication of the tiles using Fill pattern. Room(s) 300X 300 and Bath/WC 200 X 200.
Annotate the finish.

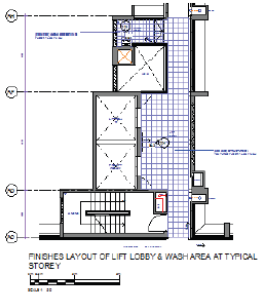
10. Sample 1:50 drawings of other common areas shown below





11. Sample 1:50 Finishes drawings of other common areas shown below





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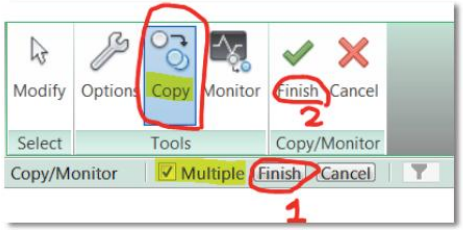
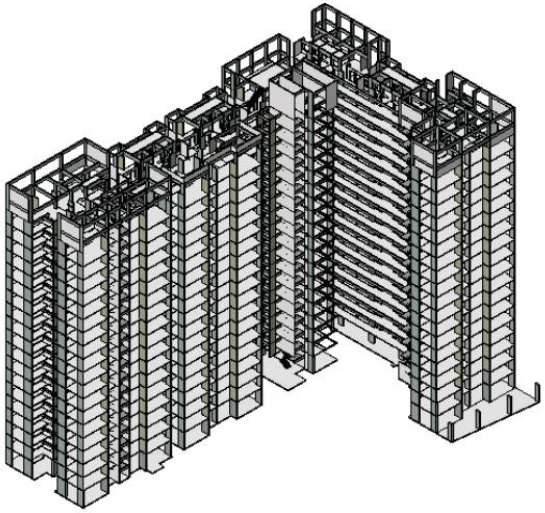
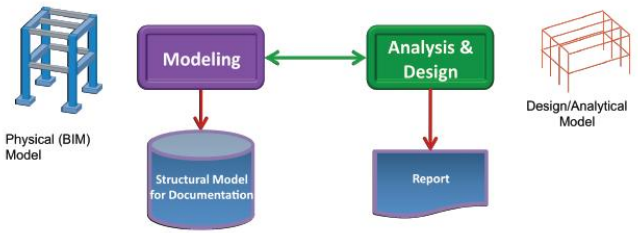
c. Once the options were set correctly, Choose **Copy** tool.



d. Choose **Multiple** in the **options bar**, select all the columns, structural walls and slabs in the link. click **Finish (1)** in the options bar and then **Finish** in the **Copy/Monitor** tab. This will create the equivalent elements and associate them to the Architectural model.
e. Repeat **Step 5b** onwards for the rest of the floors.
f. Add the Beams for each floor with approximate size. Once the model is completed it is ready to export for Design/Analysis tools.





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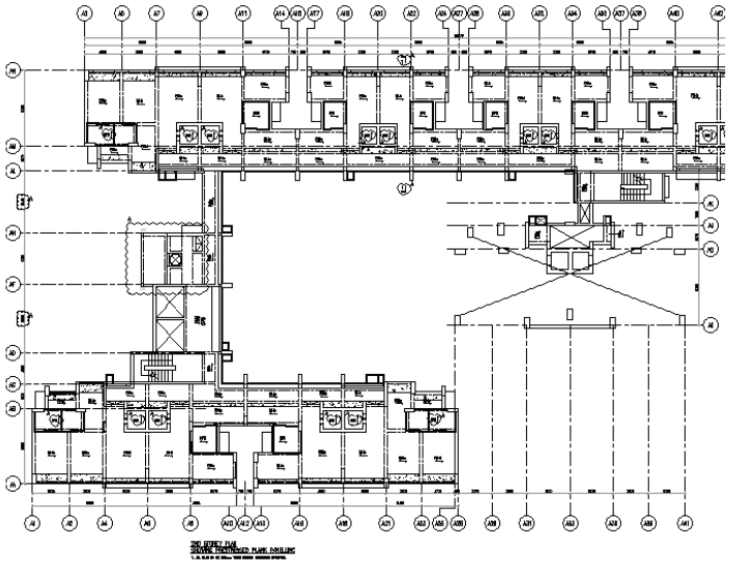
4. Sample of 2nd Storey General Arrangement Plan is shown below. It will be similar for Typical Floor(s)



Add the following annotations to the plan view:
Grid dimensions,
Markings and
Size

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5. Future Ready

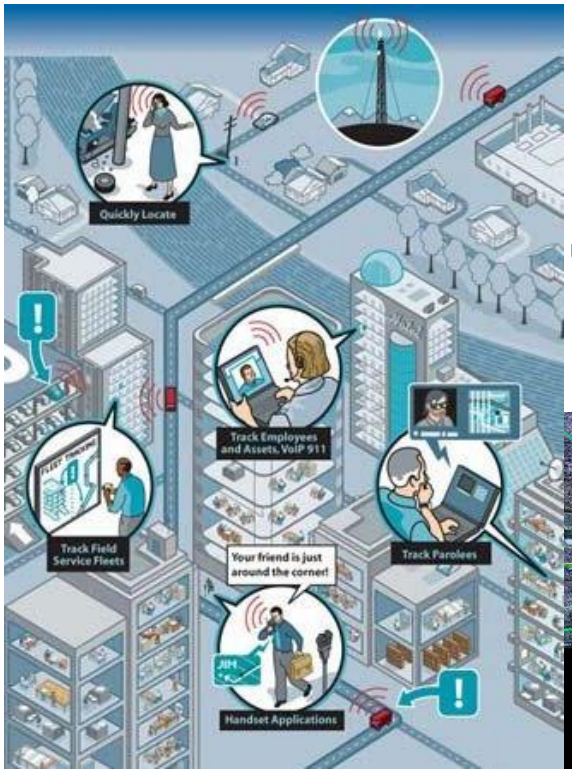
Trends & Developments

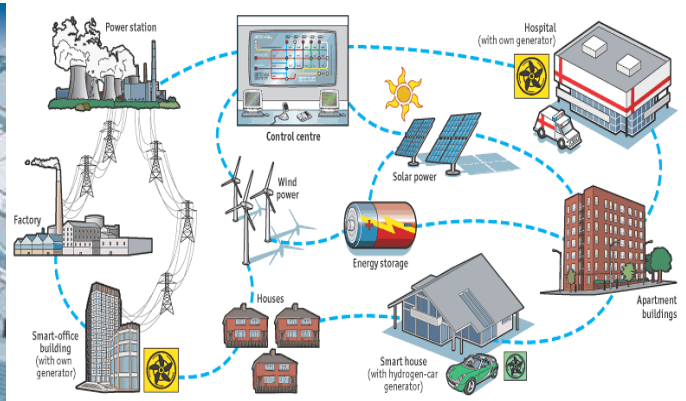
1. *High density living & Climate change*
2. *Innovative urban solutions / green technology*
3. *Use of "Big Data" & Need to be Connected*

Towards "Intelligent Urban Living"



High density / city living







Intelligent City – Rio de Janerio

5. Future Ready

intelligent urban Living
information / “big data”
info-comm technology

increase PRODUCTIVITY

intelligent
integration
inter-active

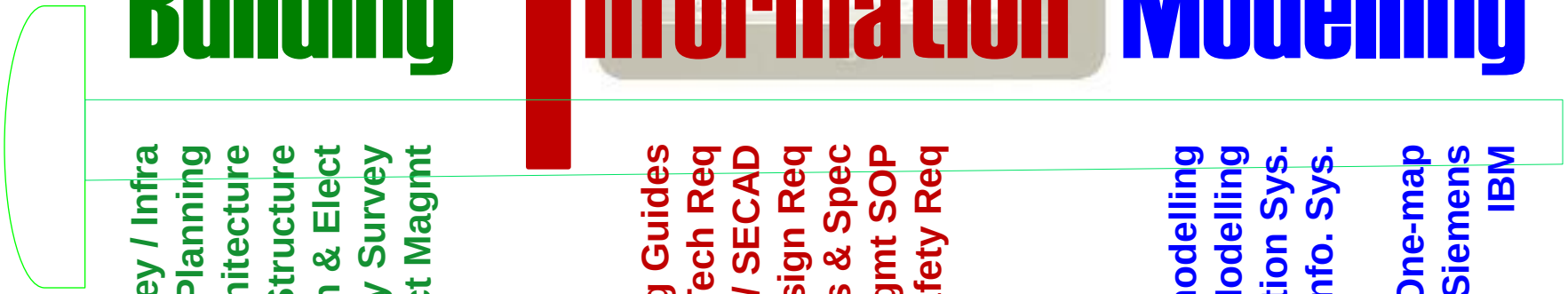
Energy
Greenery
Water
Waste
Transport

Building

nformation

Info-sourcing
Analytics
Scenario. Plan.
Prediction
Communication

Modelling



Survey / Infra
Planning
Architecture
Civil &Structure
Mech & Elect
Quantity Survey
Project Magmt

Planning Guides
Arch Design/Tech Req
Pre-Cast / SECAD
M&E Design Req
Guide Details & Spec
Proj. Mgmt SOP
Safety Req

Climatic modelling
Urban Sys. Modelling
Geo.-Information Sys.
Integ. Land Info. Sys.

One-map
Siemens
IBM

...of dreams, innovation & expertise

Year 2020
Intelligent Urban Living
i-tools
'Green' Professionals





Thank You