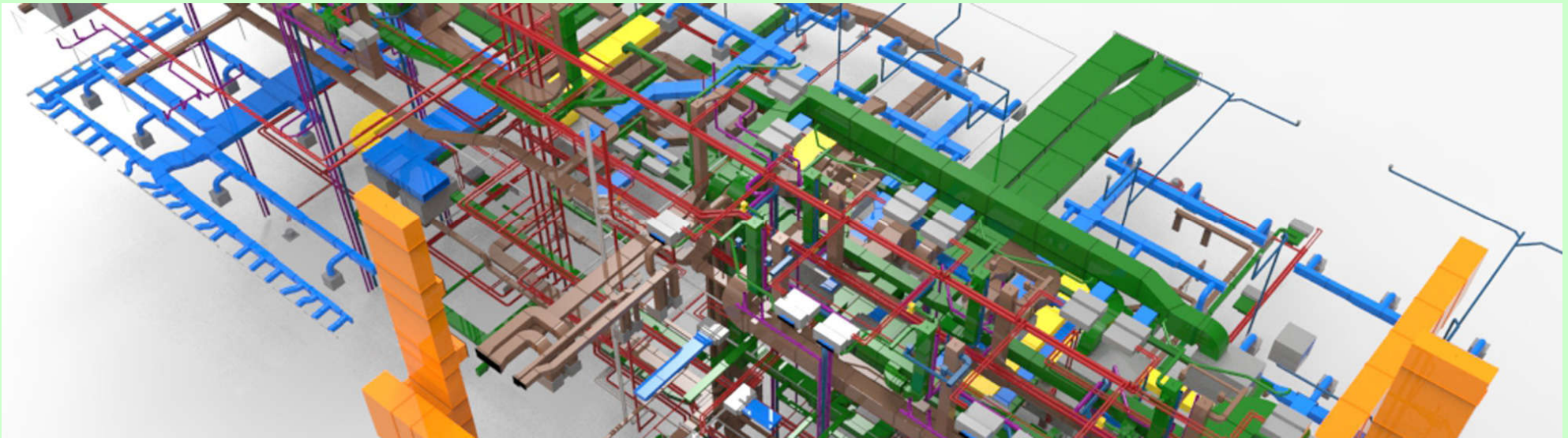


BEng-BSE Degree Programme

<http://ibse.hk/BEng-BSE.htm>

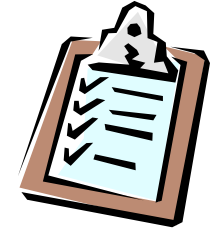


BSE FYP Design Projects

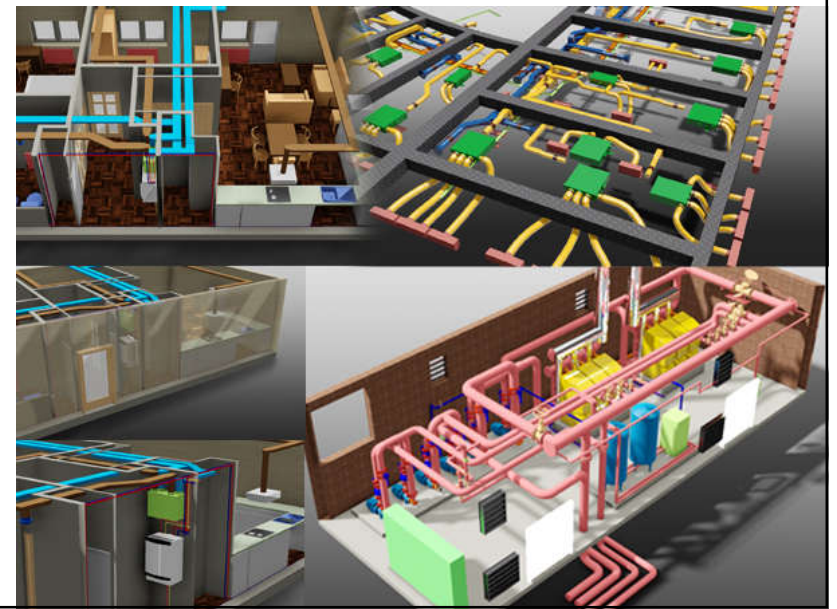
The*i*

Jan 2019

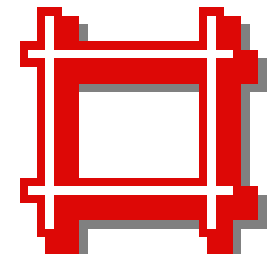
Contents



- FYP1 conceptual design
- FYP3 detailed design
- Follow-up from Semester 1



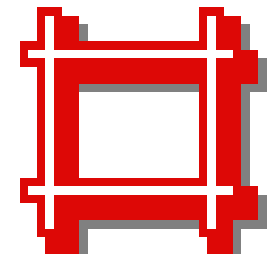
FYP1 conceptual design



- Assessment results for the whole class
 - Total number of students: 105
 - 22 student groups
 - Overall marks and grades:
 - Mean = 66.5 (B-)
 - Median = 66.2 (B-)
 - Standard deviation = 7.7
 - Range: D to B+
 - Assessed by 5 design tutors at different stages



FYP1 conceptual design



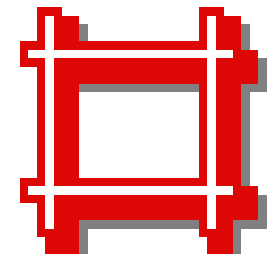
- Best five student groups:

- Group 19: B+
- Group 10: B+
- Group 06: B+/B
- Group 18: B
- Group 07: B



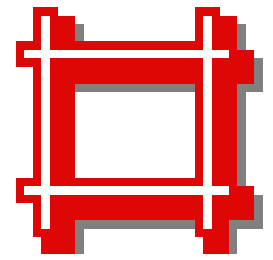
- Students may discuss with them to learn from each other

FYP1 conceptual design

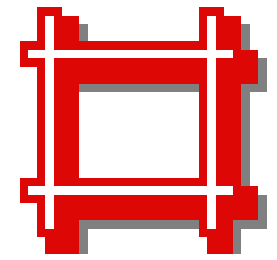


- Overview:
 - Average class performance is GOOD
 - Oral presentations are VERY GOOD
 - Site investigation & final report are GOOD
 - Business proposal & progress report can be improved
 - They require careful consideration of the client's needs and project management skills

FYP1 conceptual design

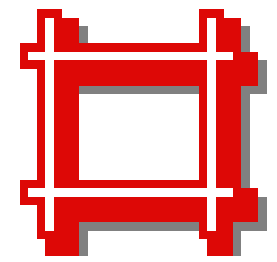


- Good points:
 - Schematic technical drawing skills of some groups are very good
 - Good use of figures, diagrams and photos to illustrate design concepts & information
 - Clear report organization & design information
 - Professional oral presentation for some groups
 - Such as dress code, PPT slides and voice



FYP1 conceptual design

- Things to improve:
 - No division of works in many groups (should indicate the role and contribution of each student)
 - Weak design information on some systems (such as FSS and P&D)
 - Cannot demonstrate efficient teamworking & good coordination
 - Misunderstanding about progress report
 - Should be concise and effective



FYP1 conceptual design

- Key issues (at the conceptual design stage)
 - System schematic diagrams (to show the design concept)
 - Report organization (enable people to follow and understand your design thinking)
 - Should avoid copying materials without good understanding
 - Should consider spatial and architectural requirements (to prepare for the next design stage)

FYPs

Design projects

Applied research project

Semester One

Semester Two

SBS5397 Final Year Project 1
(BSE Conceptual Design)

SBS5499 Final Year Project 3
(MEP Design)

(Identify project supervisor, select/propose/confirm study topic; attend research training seminars)

SBS5498 Final Year Project 2
(Applied Research Project)

(Group & individual)

(Mainly individual)

FYP3 detailed design



- **Detailed Design Development**

- To perform a detailed and in-depth design as the role of Building Services Engineer in a design team
- Also provides students opportunity to cooperate and communicate with teammates
- Carry out development of the detailed design based on the formulation of the conceptual design in FYP1 (BSE Conceptual Design)

FYP3 detailed design



- Based on the RIBA Plan of Work, this design stage can be divided into two phases
 - **(a) Design Development**
 - Develop the concept design to include detailed information
 - Confirm and finalise all design requirements and solutions
 - Prepare and apply for detailed planning permission and statutory approval
 - **(b) Technical Design**
 - Prepare technical designs and specifications (for tendering and installation)
 - Complete design coordination and integration
 - Finalise details on calculations, drawings, zoning, interface and schedules

FYP3 detailed design



- Division of Works in the Team*
 - **HVAC**: Heating, ventilating and air conditioning systems
 - **ELEC**: Electrical power supply and distribution
 - **FSS**: Fire services systems
 - **P&D**: Plumbing & drainage systems
 - **LTG**: Lighting system design
 - **GBD**: Green building design and sustainability
- (* Do not have to cover all the areas)

FYP3 detailed design



- Design Requirements: typical design issues
 - BIM project execution and implementation
 - Design coordination (with other disciplines and among different building services systems)
 - Energy efficiency (building energy design and performance modelling)
 - Performance targets against design criteria
 - Installation, testing and commissioning
 - Measurement and verification
 - Operation and maintenance
 - Preliminary cost estimate and cost plan

FYP3 detailed design



- Examples of design tasks and deliverables:
 - Developed single line diagrams and schematics showing connections to all equipment (equipment, cables, pipes, ducts, circuit breakers all sized)
 - Developed drawings (sections as necessary) indicating finalised plant room locations, risers and service routes, initial reflected ceiling plans.
 - Utilities connections: Finalise utility connections/installations and liaise with local authorities
 - Equipment: Confirm sizing and generic selection, develop schedules

FYP3 detailed design



- Examples of design tasks and deliverables: (cont'd)
 - Materials and equipment: Prepare preliminary schedule(s) of major equipment and sub-systems
 - Distribution: Confirm sizes for services distribution and containment networks (ducts, cables, pipes, cable trays) including allowance for access and maintenance.
 - Interface requirements: With existing buildings and equipment, and with other disciplines.
 - Zones: Finalise zoning plans for all services

FYP3 detailed design



- Assessment Methods
 - Progress (10%)
 - Design Report (40%)
 - Exhibition (10%)
 - Oral Presentation (10%)
 - Final Design Report (30%)
- Please refer to the Schedule of Activities for deadlines and dates



Description of the assessment components

Assessment component	Description
Progress (10%)	<ul style="list-style-type: none">• A short report (not more than five A4 pages)• Outline of the important design requirements and considerations• List of design tasks and deliverables planned• Division of works and the role of each member
Design Report (40%)	<ul style="list-style-type: none">• A technical report to present the design development• Supported with detailed technical drawings and diagrams• Should show clearly the design responsibility of each student
Exhibition (10%) and Oral Presentation (10%)	<ul style="list-style-type: none">• Present your project in a professional manner• Prepare presentation materials and poster exhibition• Should cooperate and communicate with teammates
Final Design Report (30%)	<ul style="list-style-type: none">• A technical report to present the technical design• Full details of design solutions with accurate sizing, distribution, layouts and coordination• Should show clearly the design responsibility of each student

FYP3 detailed design



- Key dates and milestones:
 - 01 Mar 2019 (Fri) Submit progress report
 - 22 Mar 2019 (Fri) Submit design report
 - 26 Apr 2019 (Fri) Oral Presentation & Exhibition
 - 03 May 2019 (Fri) Submit final design report
- Seminars and design tutorials will be arranged for students to discuss the design issues
- Coordination of the dates with FYP2 Applied Research Project

Follow-up from Semester 1

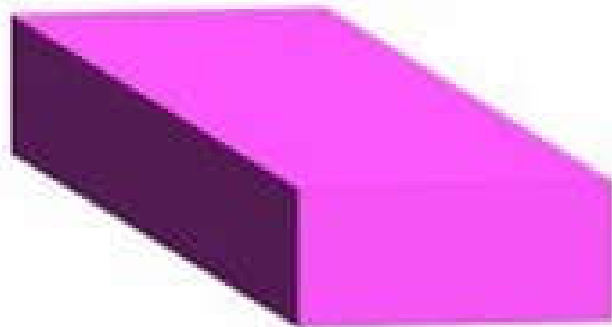


- Confirm the role of each student in the team
- Architectural floor plans & drawings
 - Should review & update if necessary
- Further development on schematic diagrams
 - Provide details & accurate sizing
- Design calculations & information
 - Develop accurate data & information
- BIM execution & implementation

Examples of detailed design development

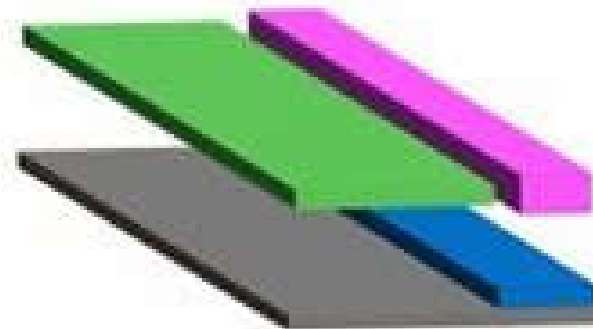
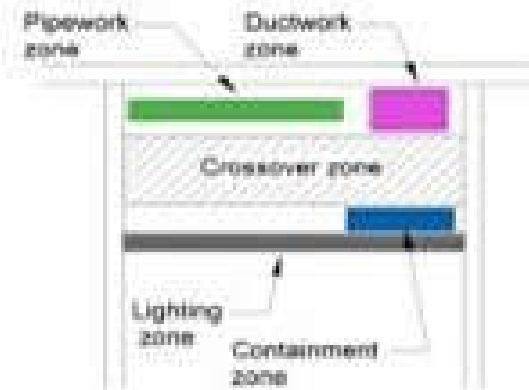
LEVEL OF MODEL DEVELOPMENT STAGES 2-3

M&E zone sufficiently sized via simple cross section sketches to accommodate main ducts, pipes, containment, etc



Stage 2; Initial Concept Model

- Where building design is still subject to significant change and development.
- Show large service blocks/zones in main distribution routes, i.e. ceilings and risers
- Requires appropriate development of the model provided by the structural engineer and architect

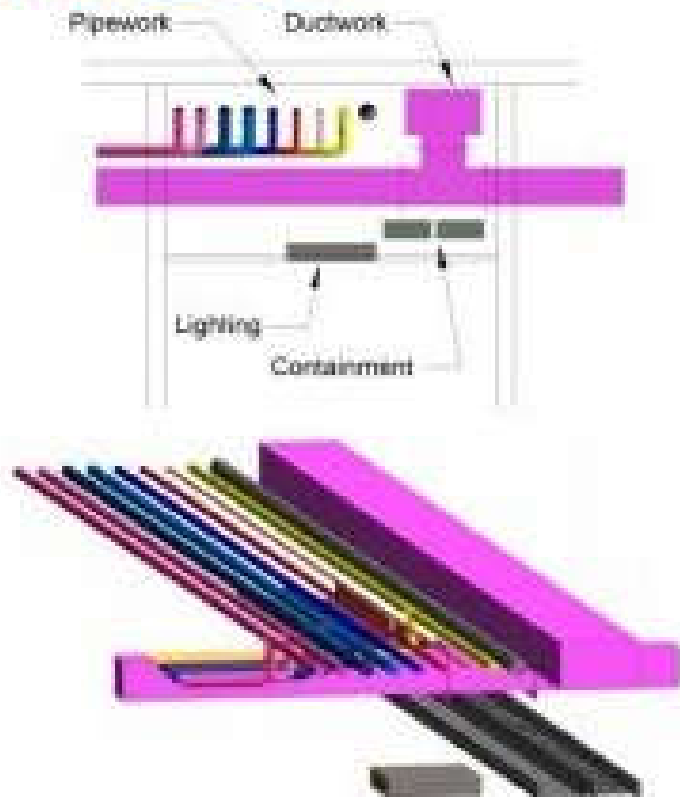


Stage 3; Design Development Model

- Where changes to building design are still occurring, but magnitude of change is relatively small.
- Show individual services type zones in main distribution routes, i.e. ceilings and risers

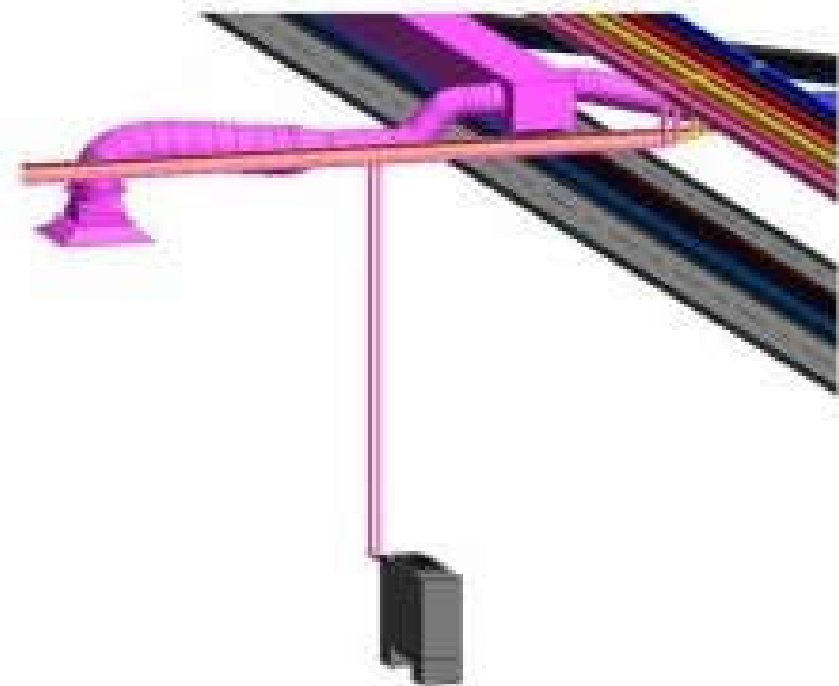
Examples of detailed design development

LEVEL OF MODEL DEVELOPMENT STAGES 4



Stage 4; Technical Design Model

- Where building layout is frozen and development for tender is required.
- Max level of development for Performance duties or D&B Contracts.
- Show individual elements on main distribution routes and branches into rooms. Sizes of mains calculated, sizes of branches approximate as applicable.



Stage 4; Technical Design Model

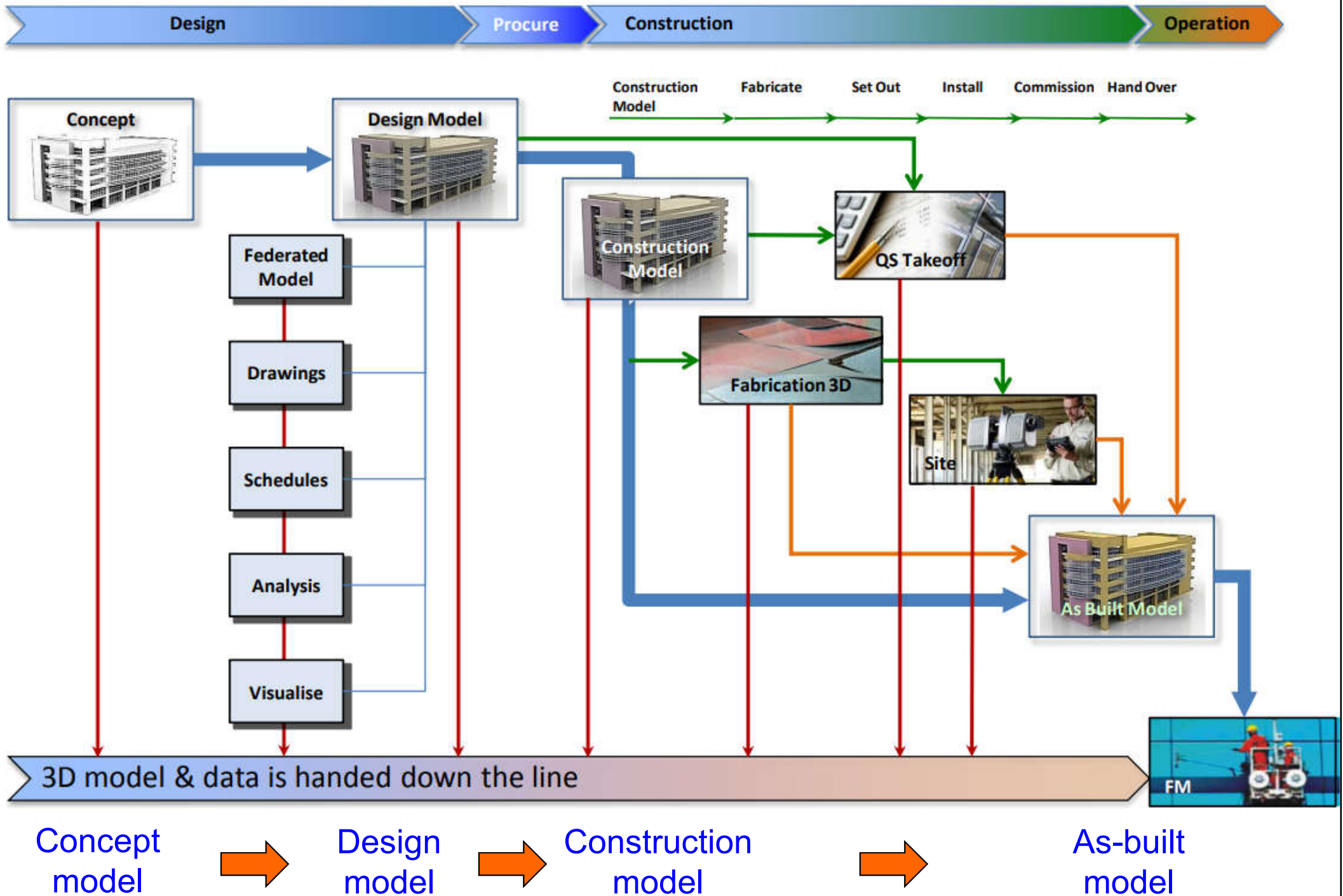
- Where building detail is final and coordination of all elements is required.
- Detail Design duties.
- All services sized correctly and final connections to all outlets/appliances/equipment shown.
- Contractor still responsible for installation drawings (2D or 3D).

Follow-up from Semester 1



- MEP design management and MEP coordination
 - You learnt from the module SBS5411 Building Information Modelling for BSE
 - Should demonstrate how you implement BIM in the project for detailed design and MEP coordination
 - Give some examples of coordinated models and clash analysis

BIM process overview



Follow-up from Semester 1



- BIM collaboration and project management --- suggested tools
 - **Revizto** <https://revizto.com/>
 - A visual collaboration software for the AEC industry
 - Connects BIM and VDC specialists with stakeholders and streamlines BIM coordination workflow
 - Revizto tutorials <https://revizto.com/en/support/tutorials>
 - **BIM Track** <https://bimtrack.co/>
 - Simplifies BIM coordination communications on building and infrastructure projects by centralizing project communications