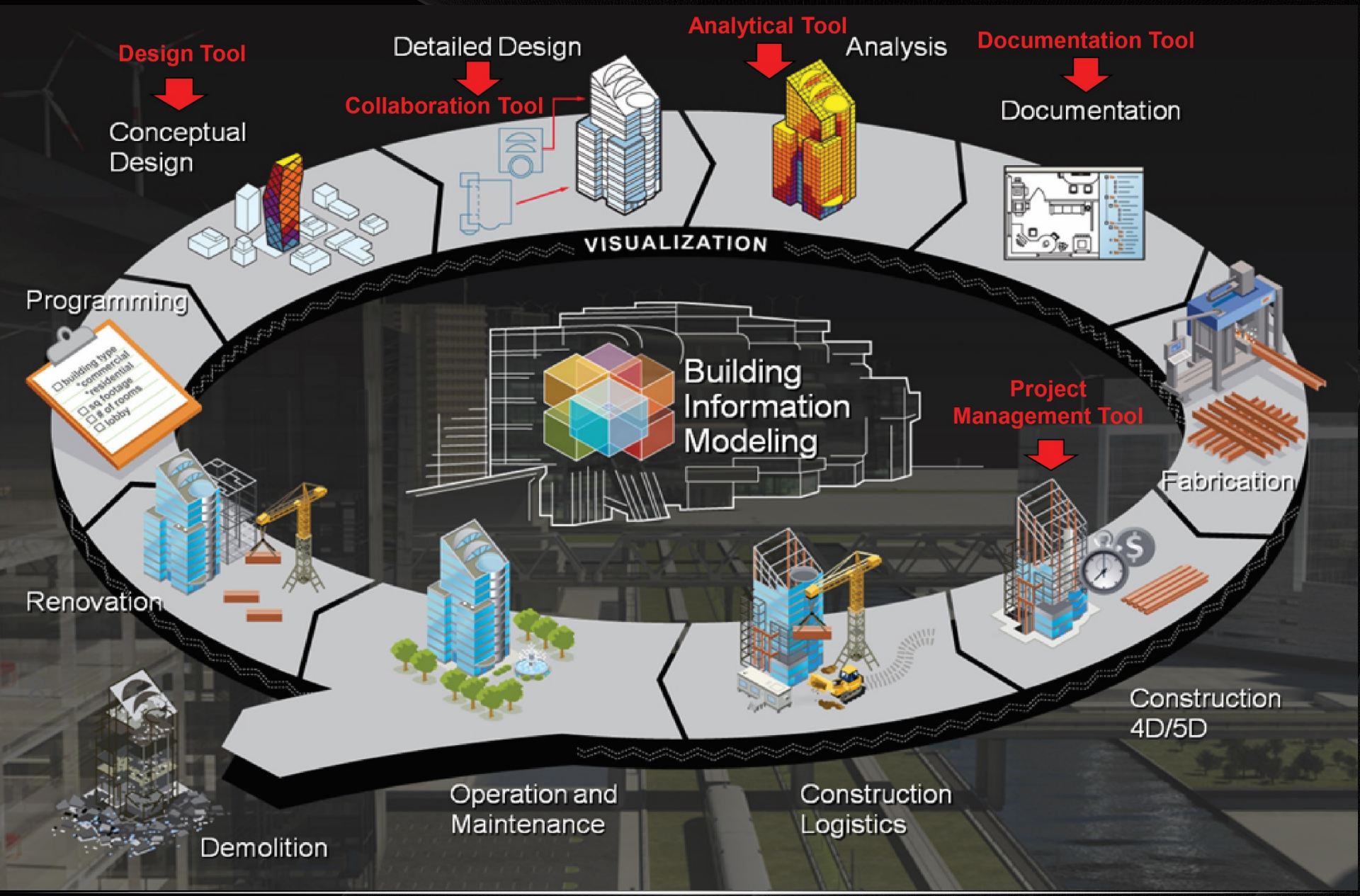
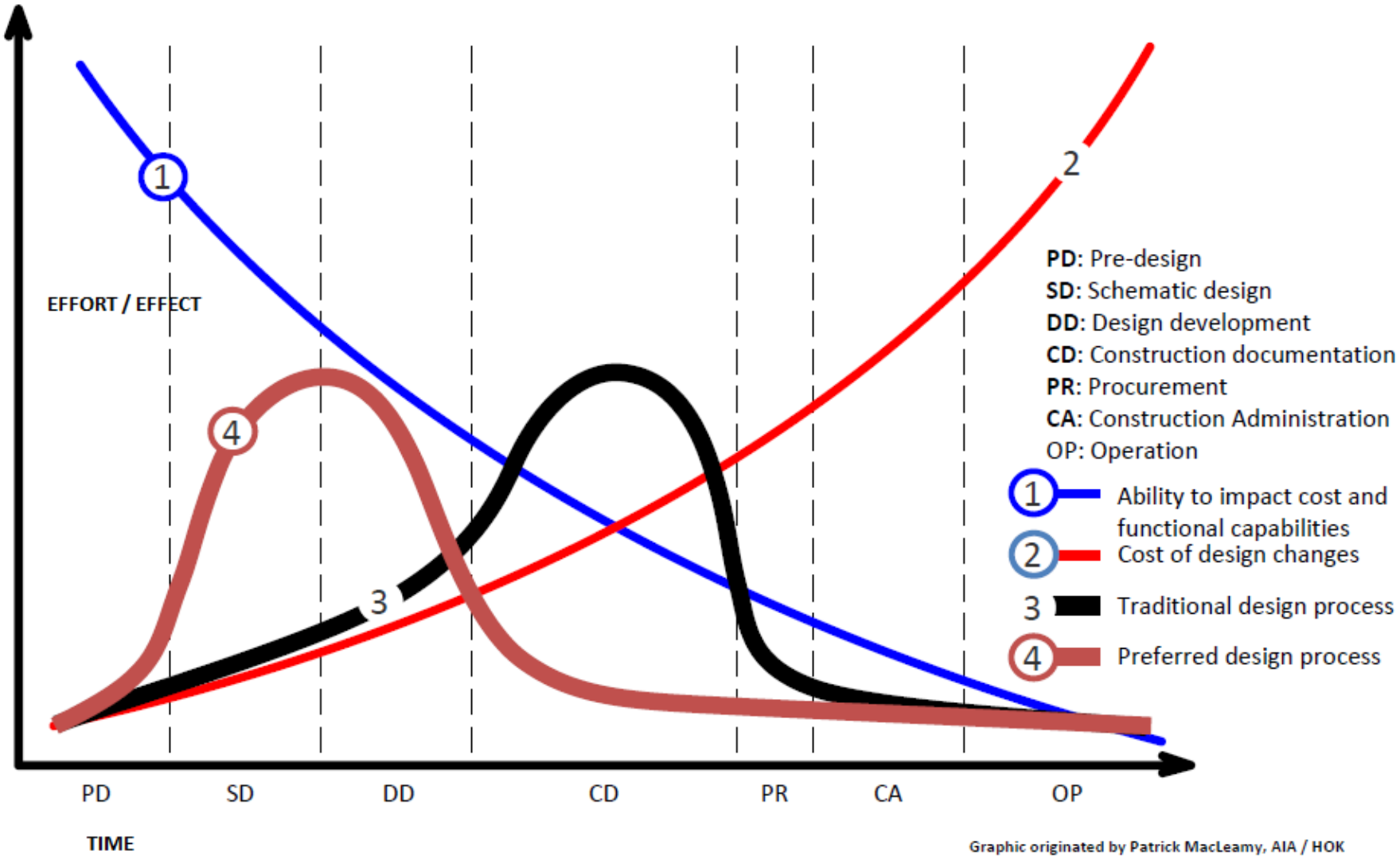
A DVANCED
C ONSTRUCTION
I NFORMATION
D EVELOPMENT

BIM



BIM - project life cycle


EFFORT / EFFECT
1
2
3
4
PD
SD
DD
CD
PR
CA
OP
TIME
PD: Pre-design
SD: Schematic design
DD: Design development
CD: Construction documentation
PR: Procurement
CA: Construction Administration
OP: Operation
1 Ability to impact cost and functional capabilities
2 Cost of design changes
3 Traditional design process
4 Preferred design process
Graphic originated by Patrick MacLeamy, AIA / HOK

BIM Courses

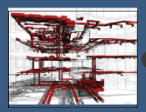
BIM Education Road Map

[CEIII-B]
CEIII BIM Management 30 hrs
BIM Management implementations with Project Execution Plan, requirements and standards.

[CEIII-A]
CEIII Architecture (Revit) 36 hrs
Architectural Concept Design, Detailed Design, Statutory Submission, Contract Documentations and Project Management level.

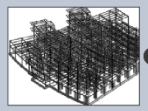
[CEIII-S]
CEIII Structure (Revit) 24 hrs
Structural Concept Design, Detailed Design, Statutory Submission, Contract Documentations and Project Management level.

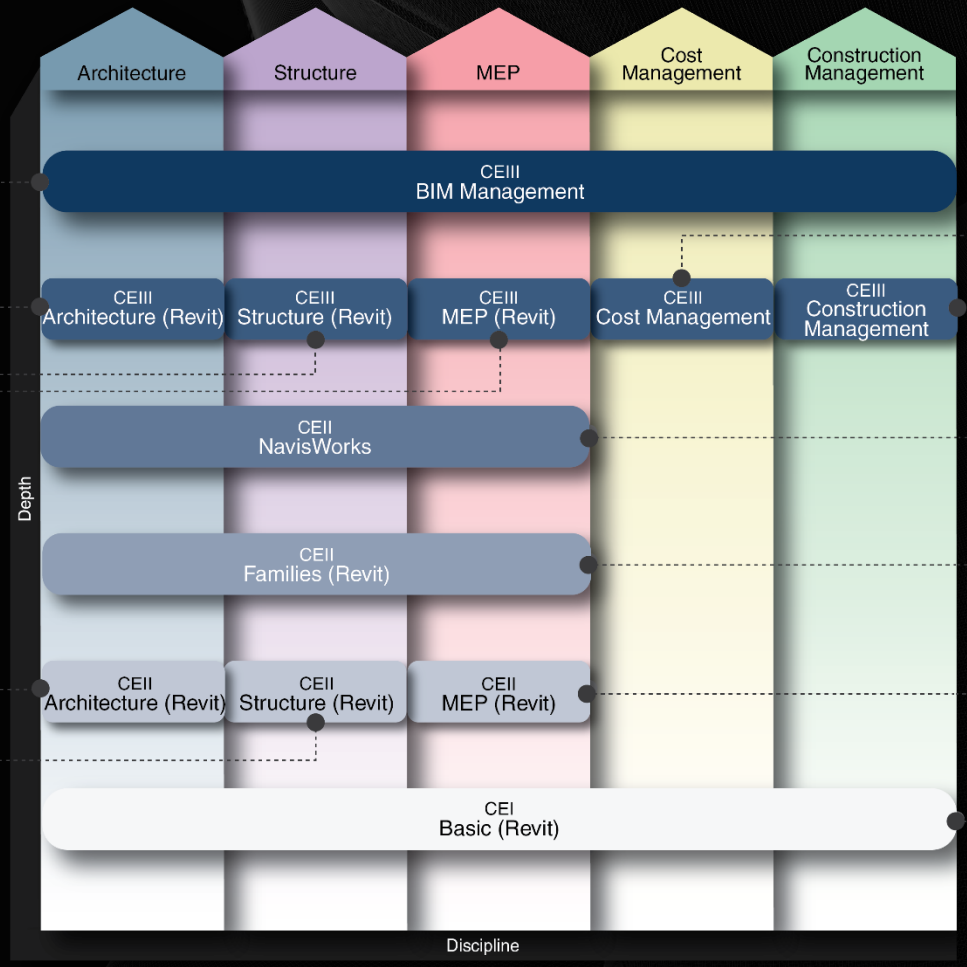
[CEIII-M]
CEIII MEP (Revit) 24 hrs
Building Services Concept Design, Detailed Design, Statutory Submission, Contract Documentations and Project Management level.



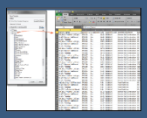
[CEII-A]
CEII Architecture (Revit) 32 hrs
Common operational commands in architectural BIM model for design visualization, co-ordination and production of professional drawings.

[CEII-S]
CEII Structure (Revit) 32 hrs
Collaboration of other project team disciplines producing collaborative design, and production of professional drawings. Integration of structural analysis.



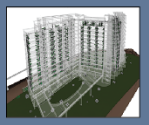


[CEIII-Q]
CEIII Cost Management 24 hrs
Information extraction to facilitate estimation, tendering process and cost control over BIM process.

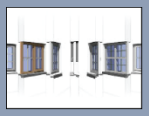


[CEIII-C]
CEIII Construction Management 32 hrs
BIM application during construction phase to improve constructability, efficiency, extensive project management and logistic tasks on site.

[CEII-N]
CEII Navisworks 24 hrs
Clash Analysis among different BIM Systems and Construction sequences.

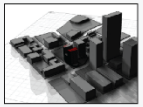


[CEII-F]
CEII Families (Revit) 21 hrs
Fundamental family building using Extrusion, Revolve, Blend, Sweep and Sweep Blend; to sophisticated parametric design principles.



[CEII-M]
CEII MEP (Revit) 32 hrs
Collaboration of other project team disciplines; producing collaborative design, and production of professional drawings.

[CEI]
CEI Basic (Revit) 8 hrs
System settings, parametric and compilation to building form; definition /editing properties, drawings sheets, B.Q. and overall BIM management.



http://hkacid.com/bim-courses/

Contact

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hkacid.com

A.C.I.D. – China

www.a-c-i-d.com

BIM Studio

香港荃灣海盛路3號 TML 廣場35樓A2

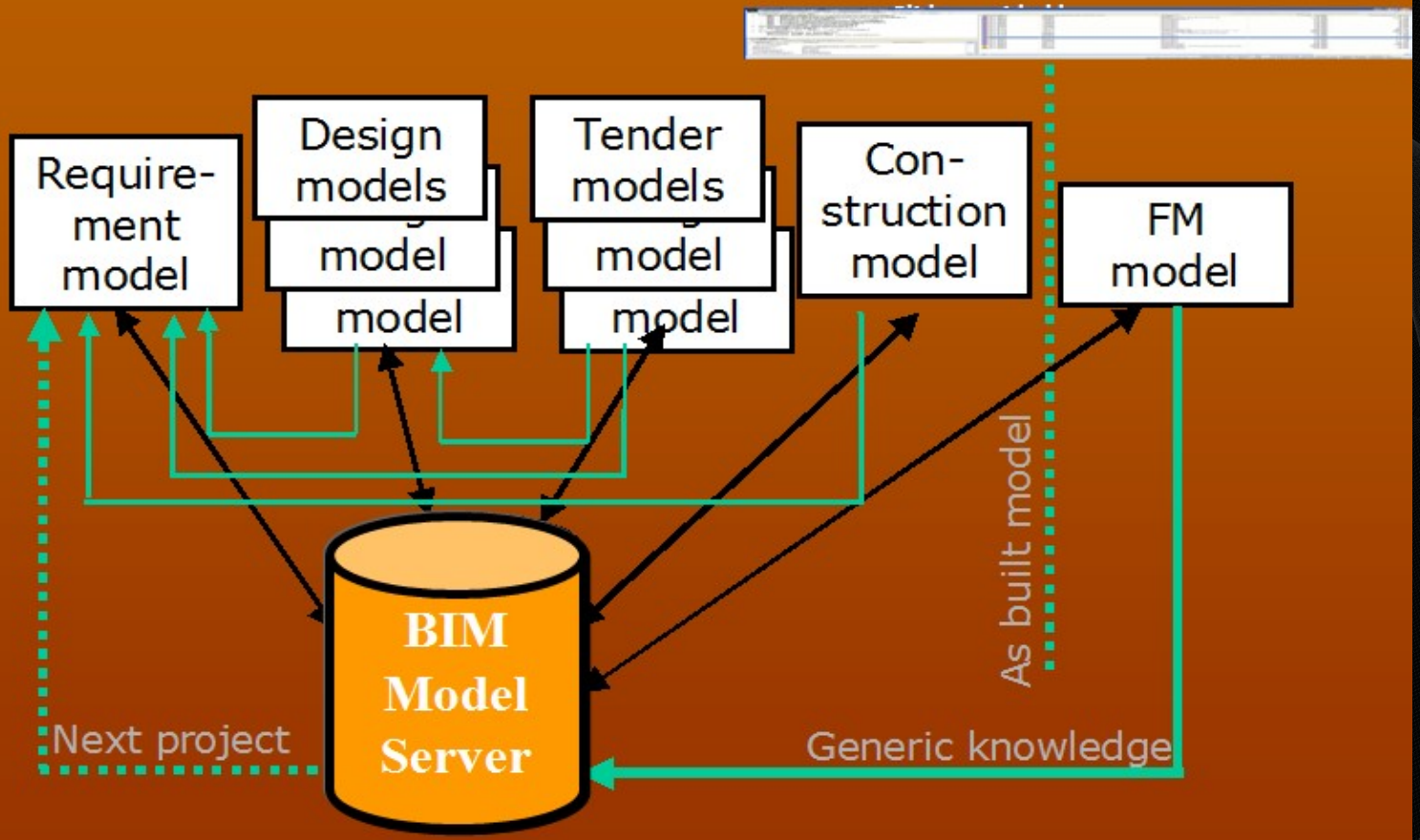
A2, 35/F, TML Tower,

3 Hoi Shing Road, Tsuen Wan, Hong Kong

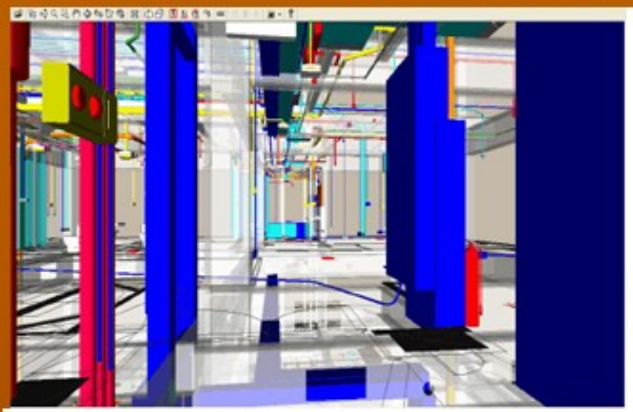
- Thank you!

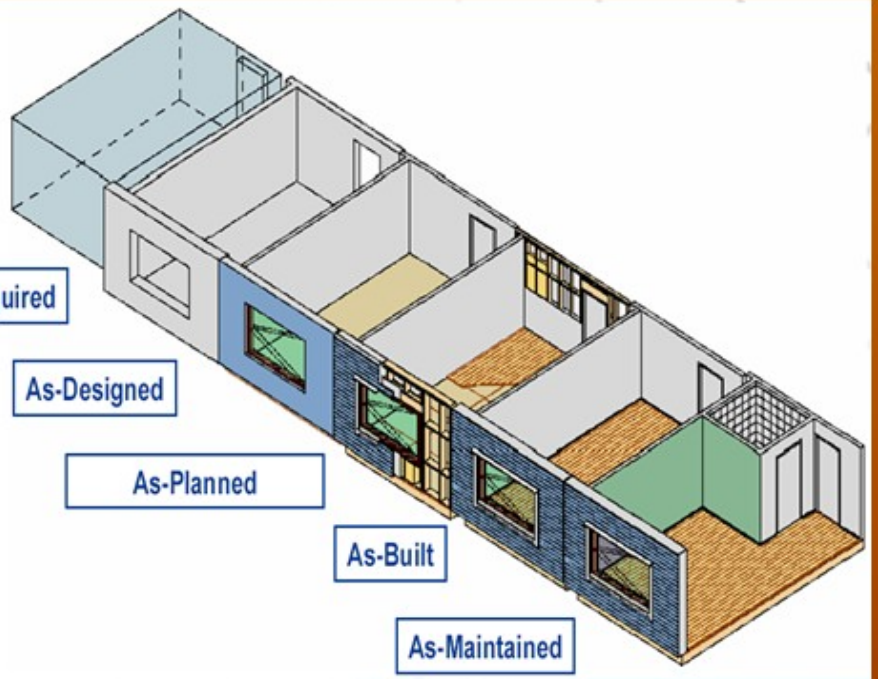
BIM Evolution -Information Flow

Different Models at different stages



Model evolution





Bring BIM To Site For Asset Construction and Operation

Building Component Management S.S

Barcode & RFID

Delivery Instruction Sheet

Factory

Inventory

QA/QC

Shop Drawing CAD

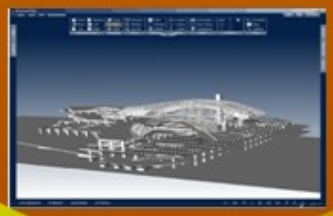
3 D Building Model Data

Material Plan S.S

Material Management Database

Erection Site Management S.S

Actual Management S.S



Operation-BIM Demand Cross-Platform Approach

On Site

Remote (Mobile)

Enterprise

Energy Management

Climate Control

Energy+Comfort

Inventory

Space Planning

Assets

Access Control

People

Work Orders

Network Management

Security

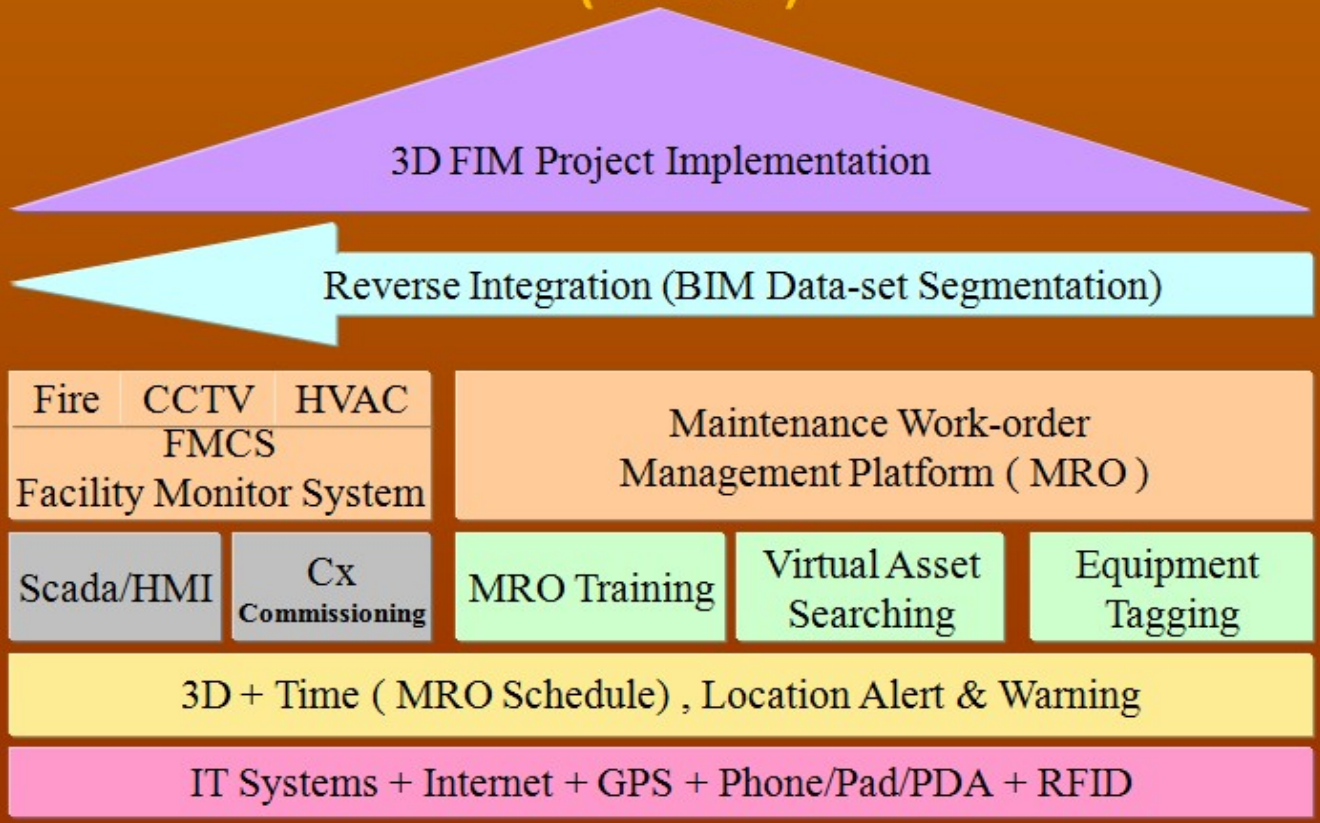
Servers

IT

We Need To Bring Operation-BIM To Site

3D FIM Framework

Maintenance , Repair & Operation (MRO)



VDC Team Management Model Layer-1

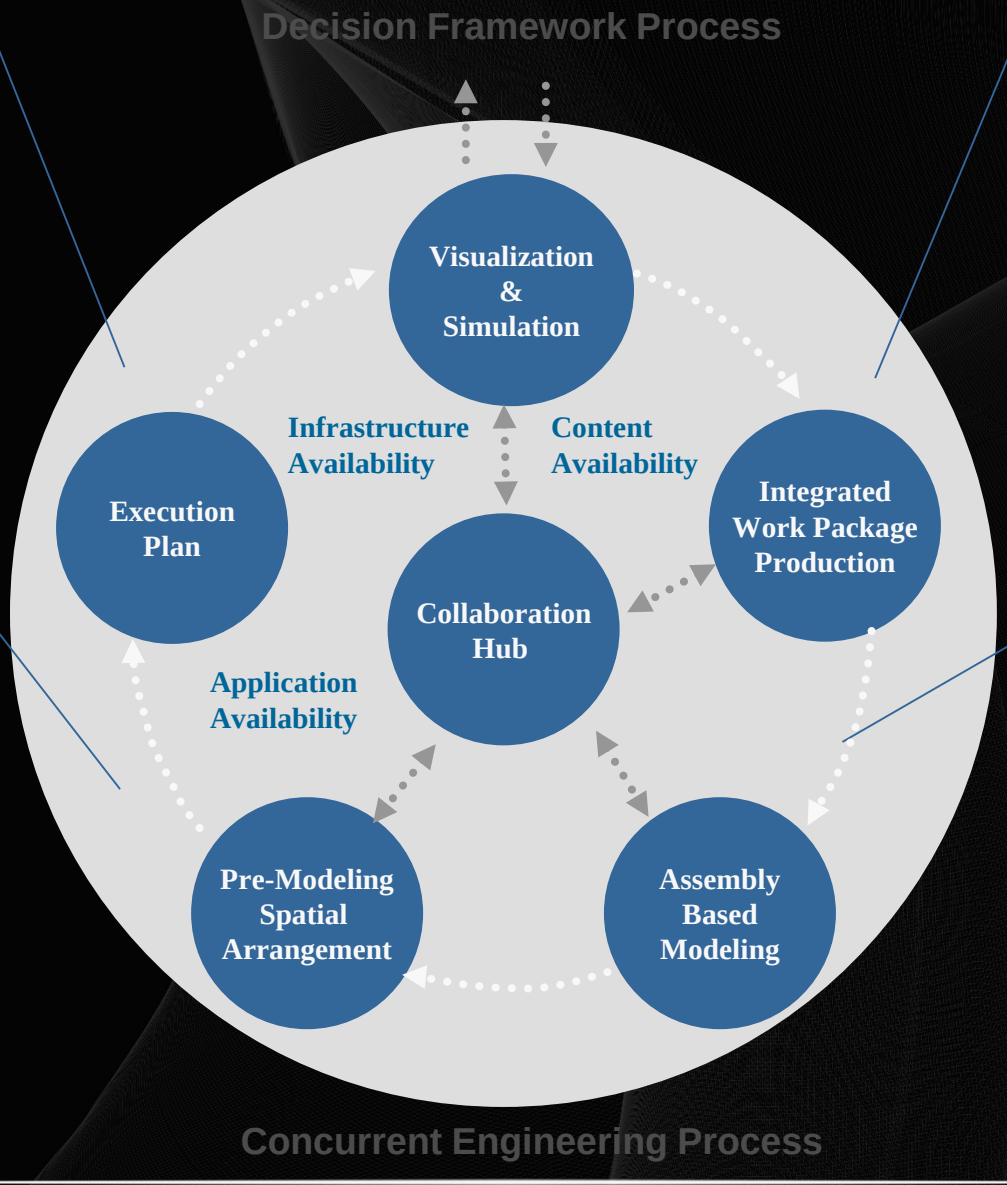
Design and Build

VDC BIM Manager

P 1	**Value Planning**
P2	**Deliverable Planning**
P3	**Resource Planning**
P4	**Execution Planning**
P5	**Modeling Planning**
P6	**Innovation Planning**

VDC CSD Engineer (Pre-Construction)

E 1	Technical Solution Planning.
E 2	**MEP** Trade Routing Planning.
E 3	Define Resolution Direction.
E 4	Ensure continuous design process integration.
E 5	Define Work Breakdown strategy .
E 6	Identify and allocate costs.



VDC Site Manager

S 1	Define Site VDC Process.
S 2	Define the deliverable issuance procedure.
S 3	Determine updating and change management.
S 4	Define the Trade Collaboration procedure,
S 5	Manage the IT investment.

VDC CSD Engineer (Construction)

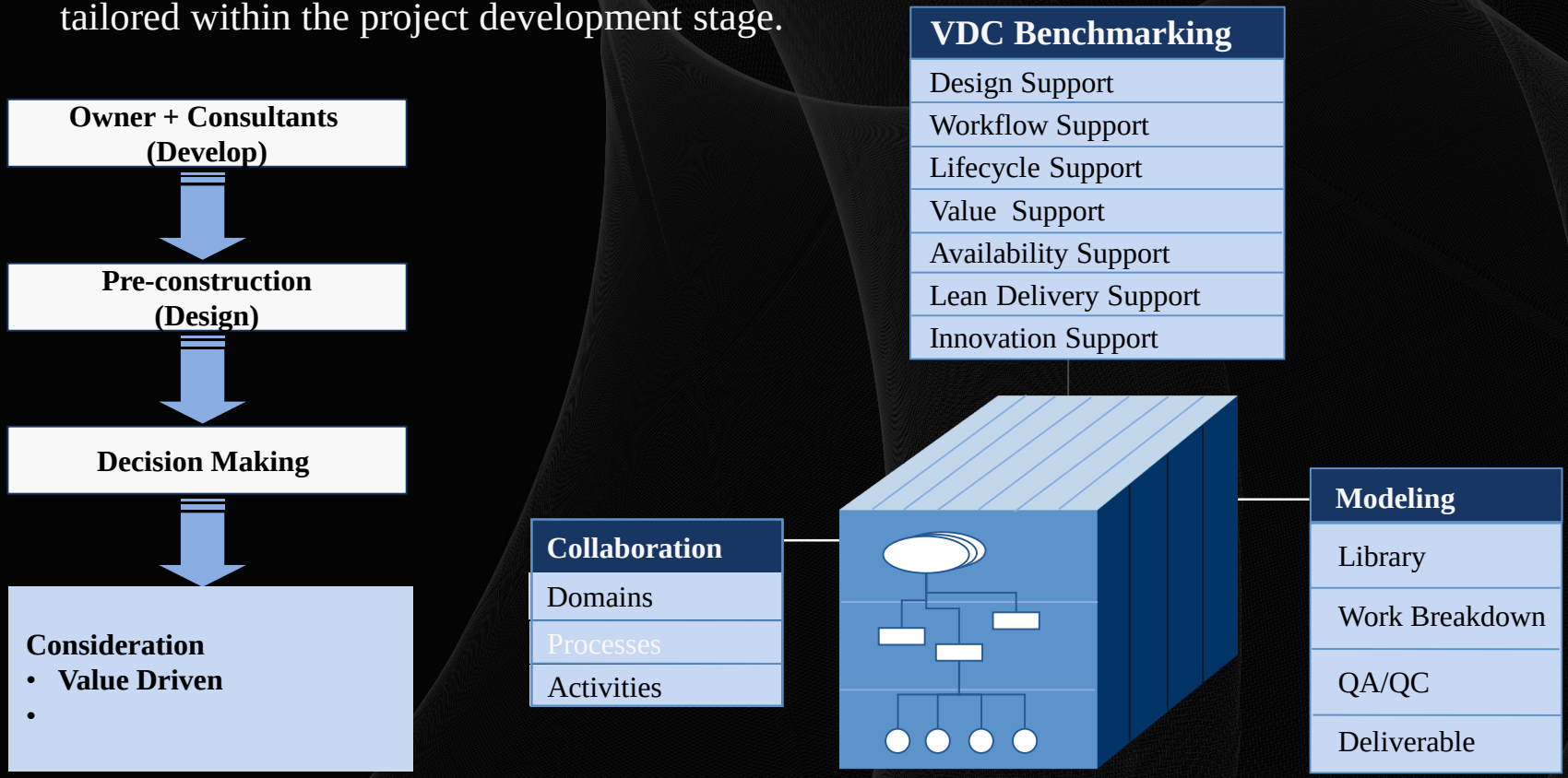
C 1	Identify automated solutions.
C 2	Detail Trade Modeling Requirement.
C 3	Arrange Continuous Sub-contractor validation.
C 4	Enable Assembly Modeling.
C 5	**Deliverable** QA / QC .
C 6	Manage changes.

VDC Management Focus

Design and Build

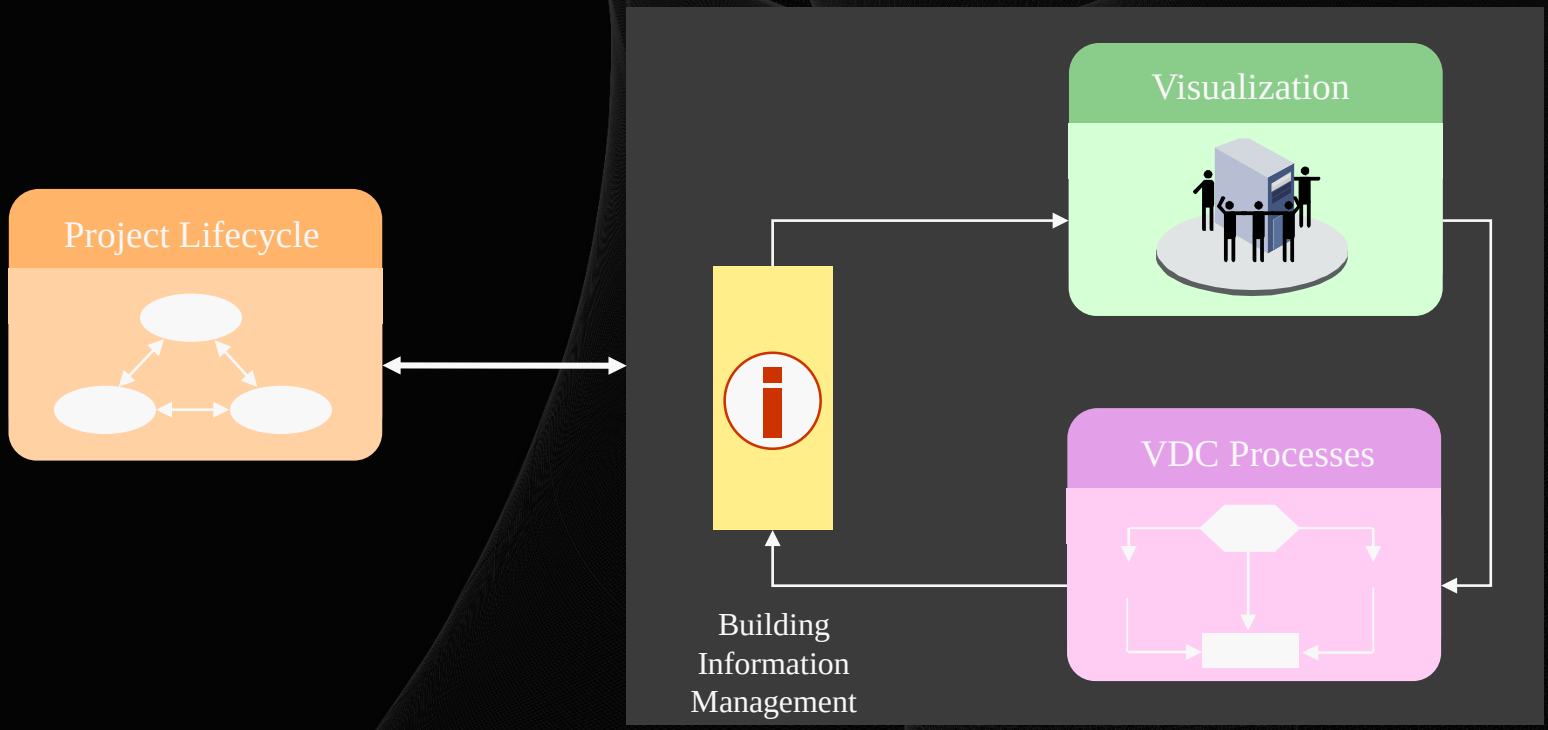
As Lean Delivery Approach framework for VDC collaboration process focuses on two key areas:

- Providing the model based information content required to support Base-Of-Design (BOD) verification and layout planning.
- Managing team activities as the result of the VDC Process-related best practice that need to be tailored within the project development stage.

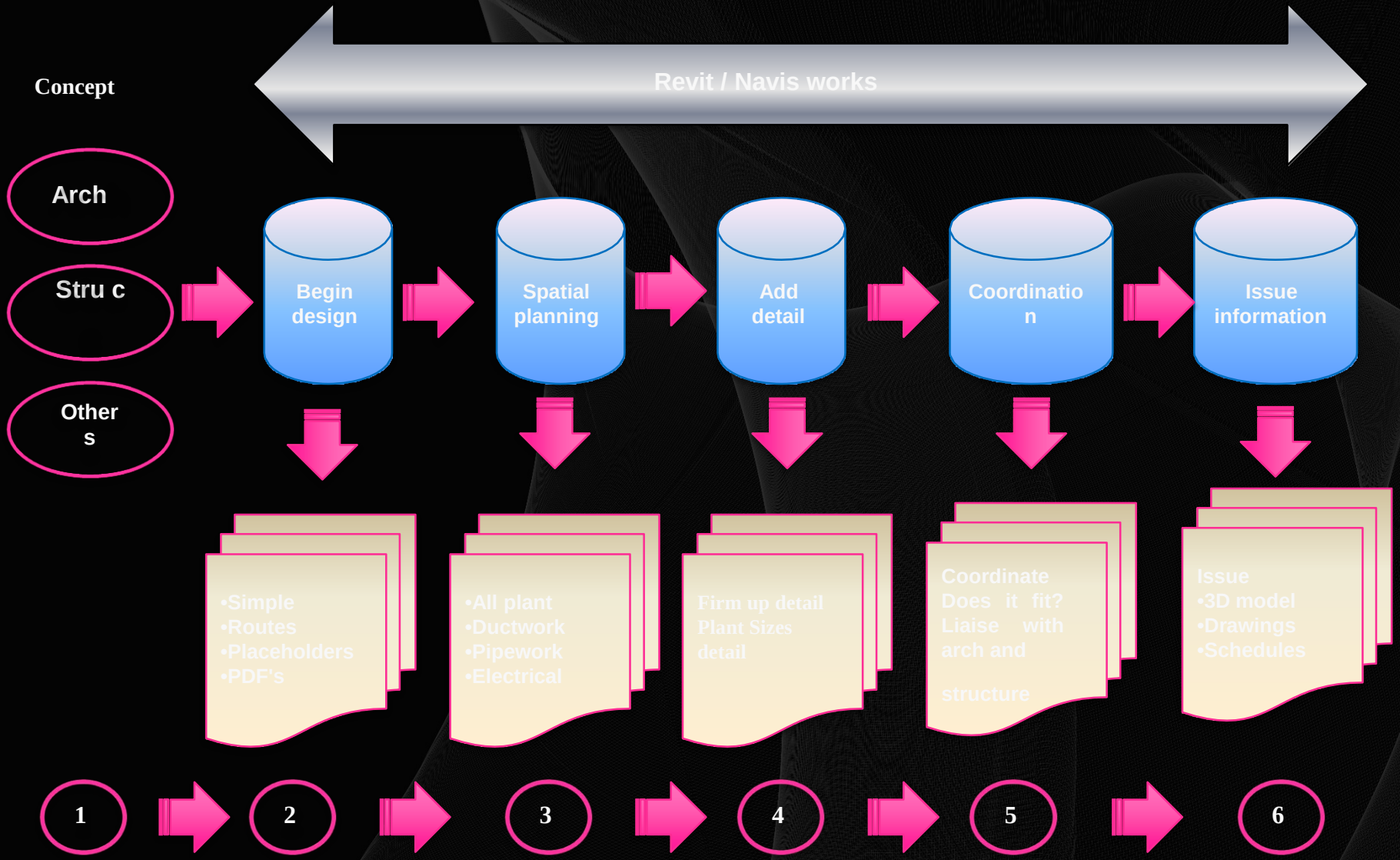


VDC Management Focus

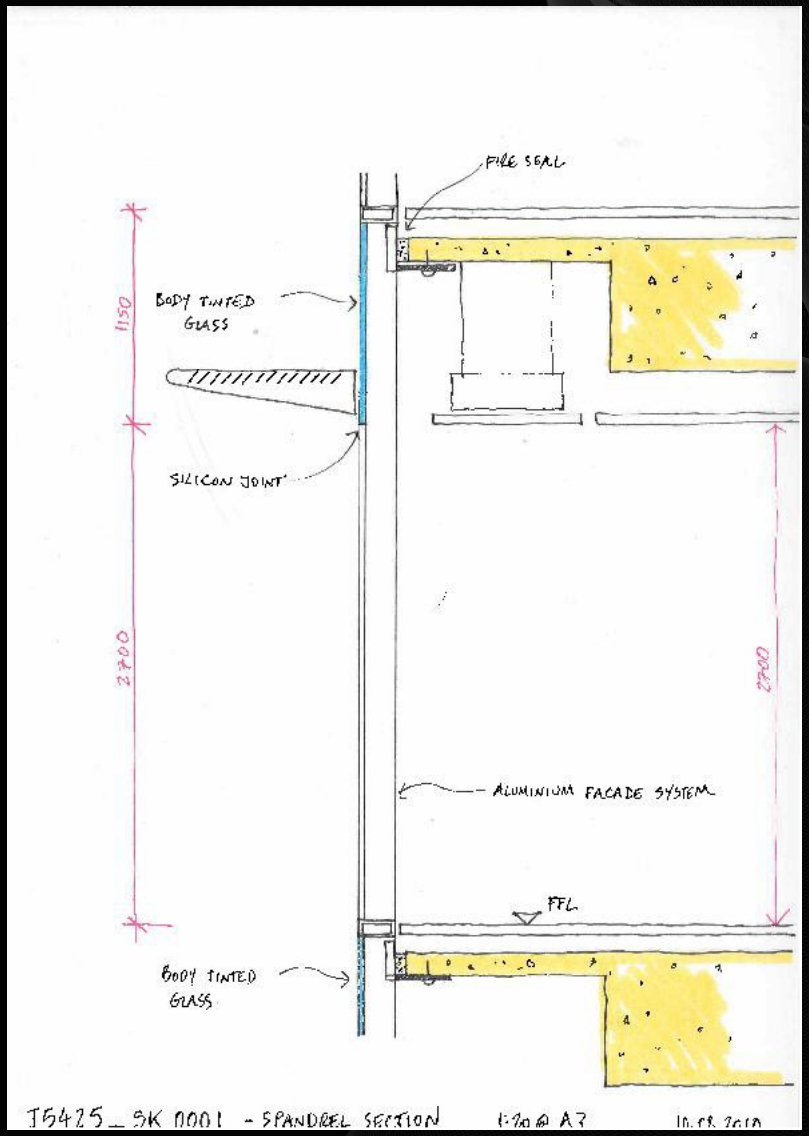
The objective is to facilitate on-time Integrated Work Package deliverables to site team whilst managing the Model Based Project Life Cycle Workflow.

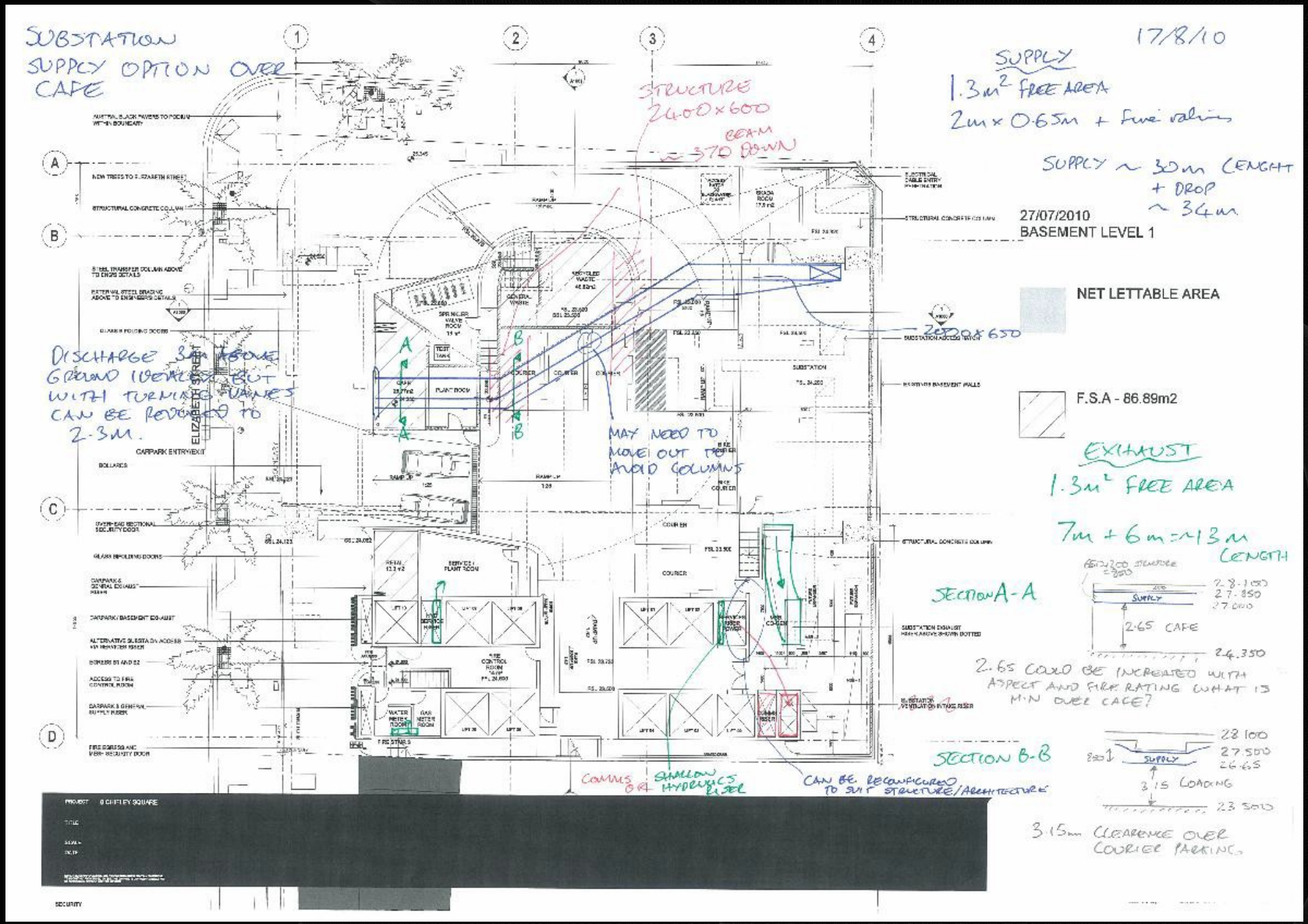


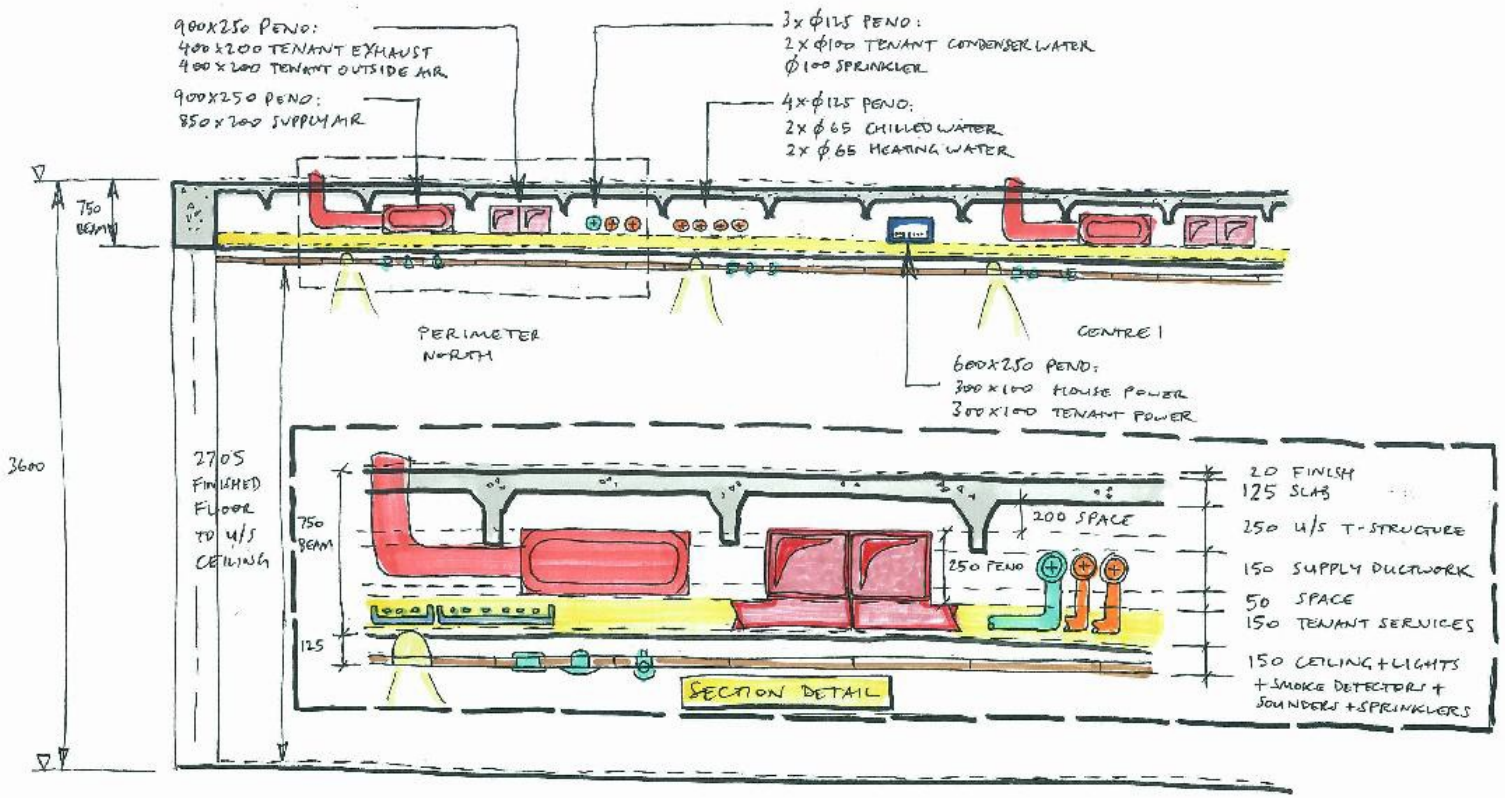
- Client - concept
- Architect provides visual images etc.
- Structural involvement (can we build it?)
- PDF„s, hand sketches / Google sketch up etc..
- No 2D or 3D cad
- Oh...and lots of “MEETINGS”


Concept
Revit / Navis works
Arch
Stru c
Other s
Begin design
Spatial planning
Add detail
Coordinatio n
Issue information
•Simple
•Routes
•Placeholders
•PDF's
•All plant
•Ductwork
•Pipework
•Electrical
Firm up detail
Plant Sizes
detail
Coordinate
Does it fit?
Liaise with arch and
structure
Issue
•3D model
•Drawings
•Schedules
1
2
3
4
5
6

- Concept
- Client and design team discuss concept.
- Produce hand sketches, PDF's
- Cad not engaged.
- Agree services zoning strategy?


FIRE SEAL
BODY TINTED GLASS
1150
SILICON JOINT
2700
2700
ALUMINIUM FACADE SYSTEM
FFL
BODY TINTED GLASS
J5425_SK 0001 - SPANDREL SECTION


SUBSTATION
SUPPLY OPTION OVER CAFE
17/8/10
SUPPLY
1.3m² FREE AREA
2m x 0.65m + five louvres
STRUCTURE 2400x600 BEAM ~370 DOWN
SUPPLY ~ 30m LENGHT + DROP ~ 34m
27/07/2010
BASEMENT LEVEL 1
NET LETTABLE AREA
F.S.A - 86.89m2
DISCHARGE 3m ABOVE GROUND (VERTICAL) BUT WITH TURNING VANES CAN BE REDUCED TO 2-3m.
MAY NEED TO MOVE OUT TO AVOID COLUMNS
EXHAUST
1.3m² FREE AREA
7m + 6m = 13m LENGTH
SECTION A-A
SUPPLY
2.65 CAFE
24.350
2.65 COULD BE INCREASED WITH ASPECT AND FIRE RATING (WHAT IS MIN OVER CAFE?
SECTION B-B
28.100
27.500
26.65
3.15 LOADING
23.500
3.15m CLEARENCE OVER COURIER PARKING
COMMS OR SMALLOW HYDRAULICS RISER
CAN BE RECONFIGURED TO SUIT STRUCTURE/ARCHITECTURE
PROJECT 8 CHIFLEY SQUARE
SECURITY



NOTES:

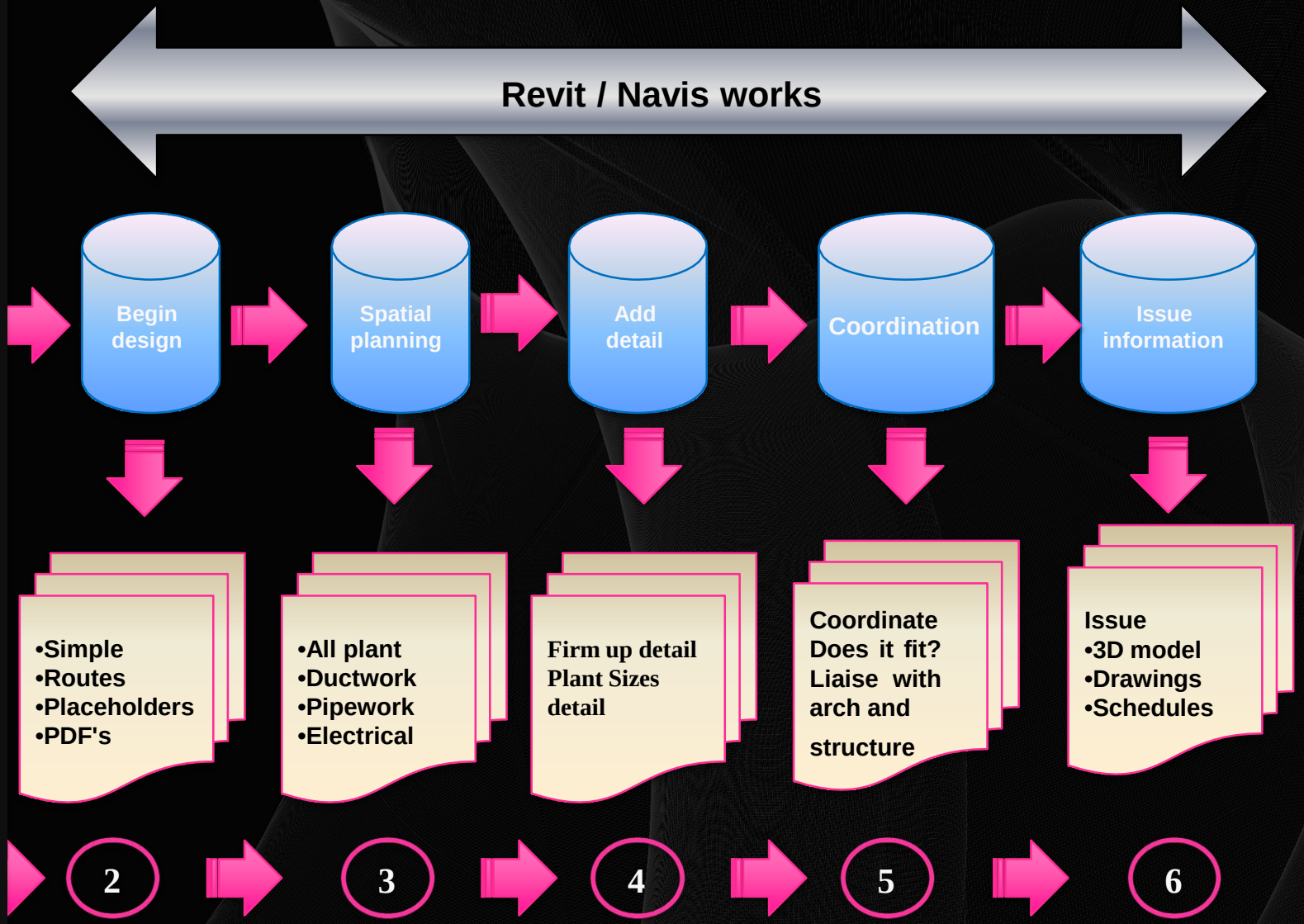
1.) PRELIMINARY SERVICES & SIZES NOMINATED, REVIEW OF FIT OUT & FLEXIBILITY REQUIRED

2) PENETRATIONS NOMINATED AT CENTRE OF BEAM. POTENTIAL TO RAISE PENETRATIONS UP TO SOFFIT TBC BY STRUCTURAL ENGINEER. MAY BE ABLE TO RAISE CEILING 100-200mm?

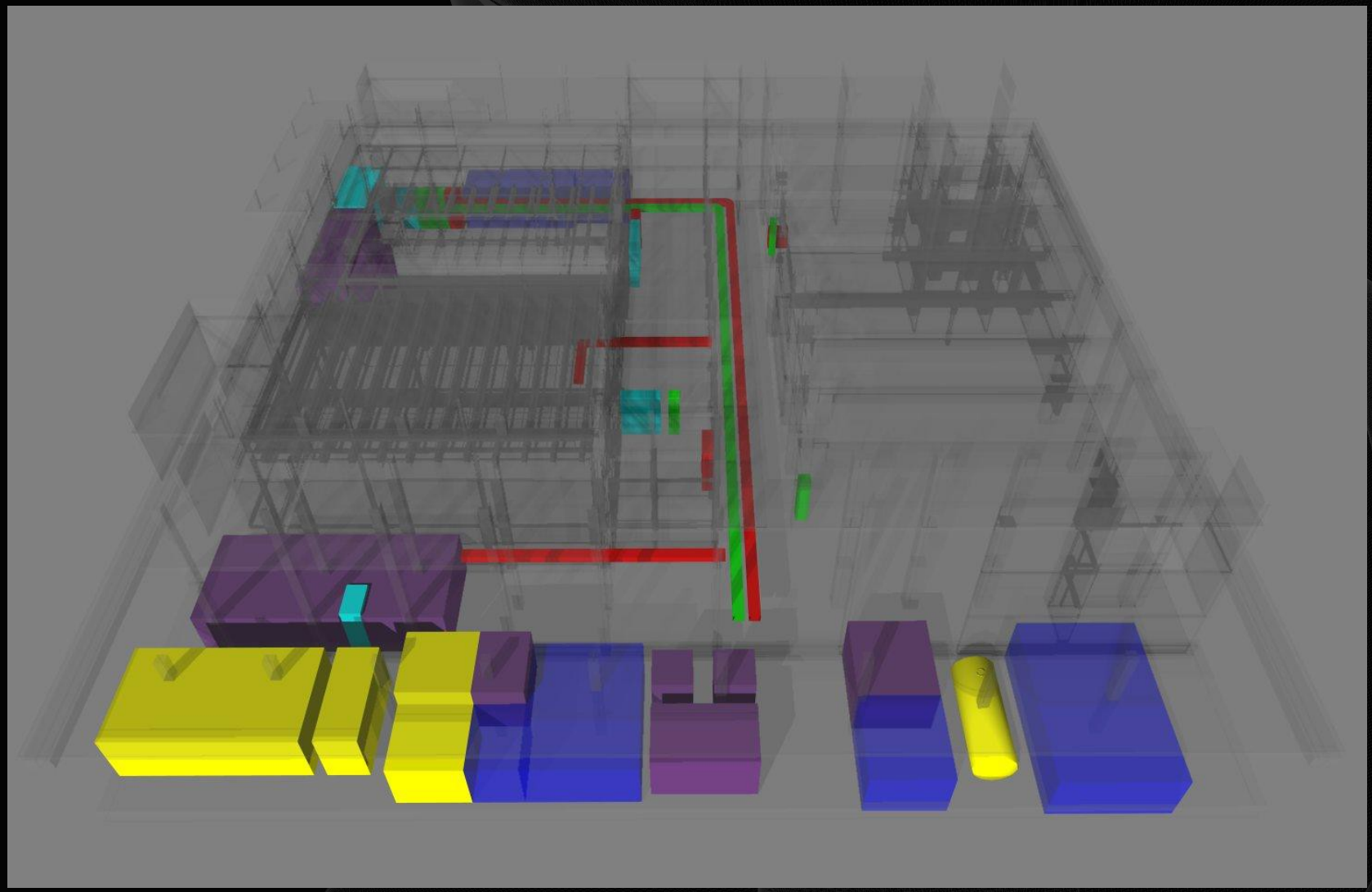
3.) SERVICES NOMINATED MAY BE MIRRORED FOR OTHER AREAS OF FLOOR PLATE.

SEVICES SECTION

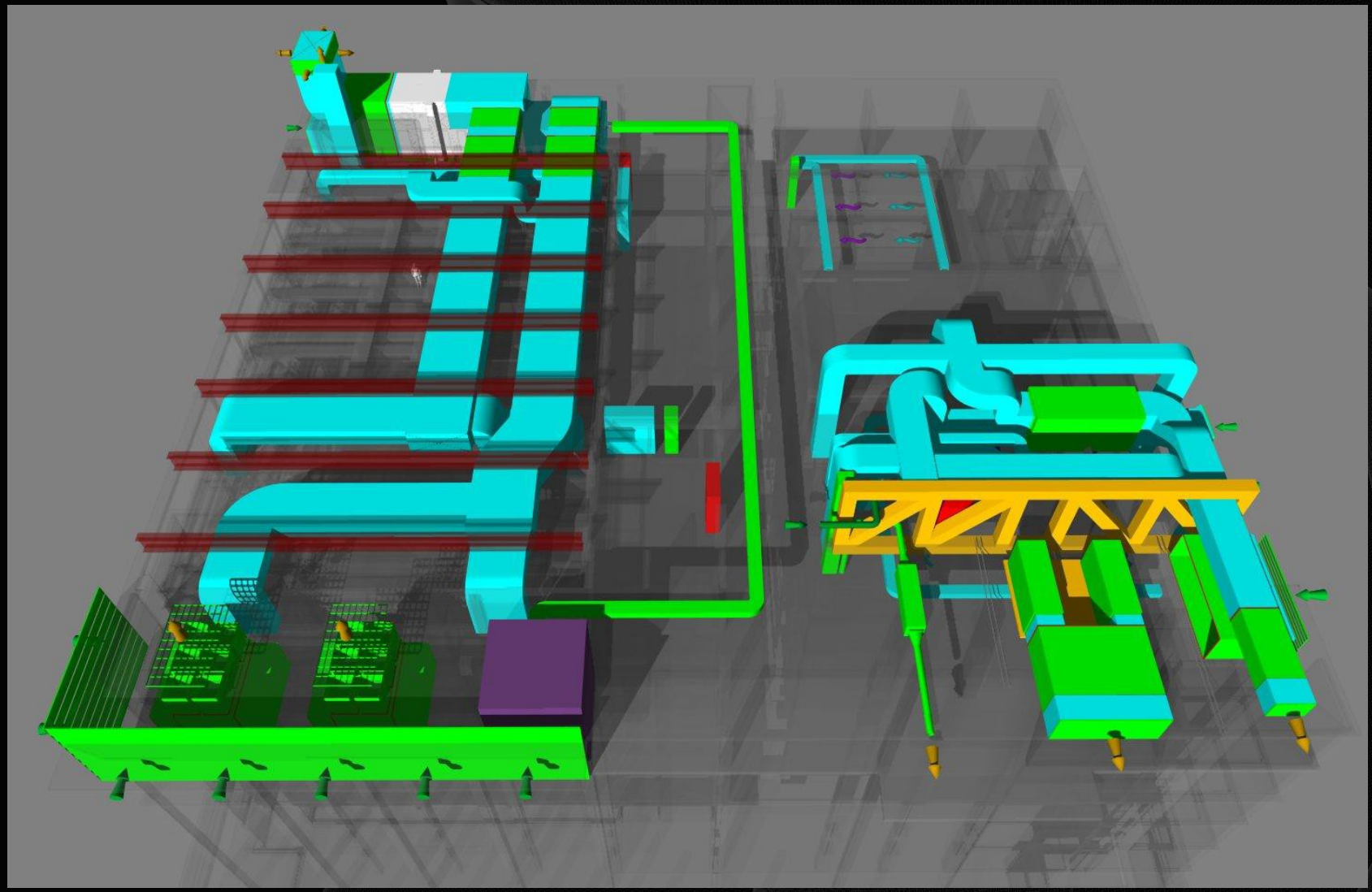
205953/00 ARUP SERVICES SECTION 1 of 2 20/4/10 AB


Revit / Navis works
Begin design
Spatial planning
Add detail
Coordination
Issue information
•Simple
•Routes
•Placeholders
•PDF's
•All plant
•Ductwork
•Pipework
•Electrical
Firm up detail
Plant Sizes
detail
Coordinate
Does it fit?
Liaise with
arch and
structure
Issue
•3D model
•Drawings
•Schedules
2
3
4
5
6

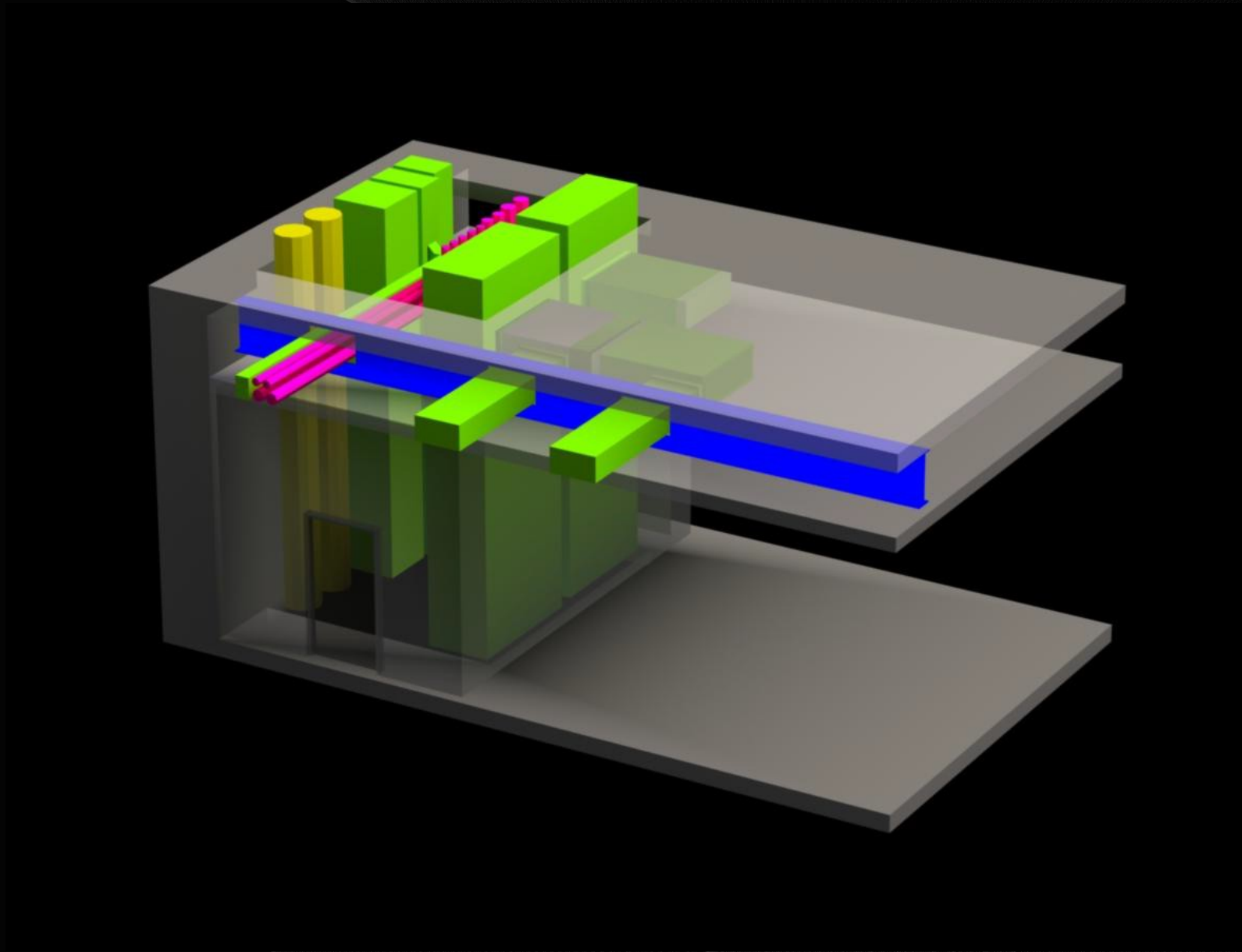
- Begin design.
- Design begins to evolve from step 1 meetings.
- Simple shapes to represent plant items.
- Cad may be engaged?
- Lots of options.

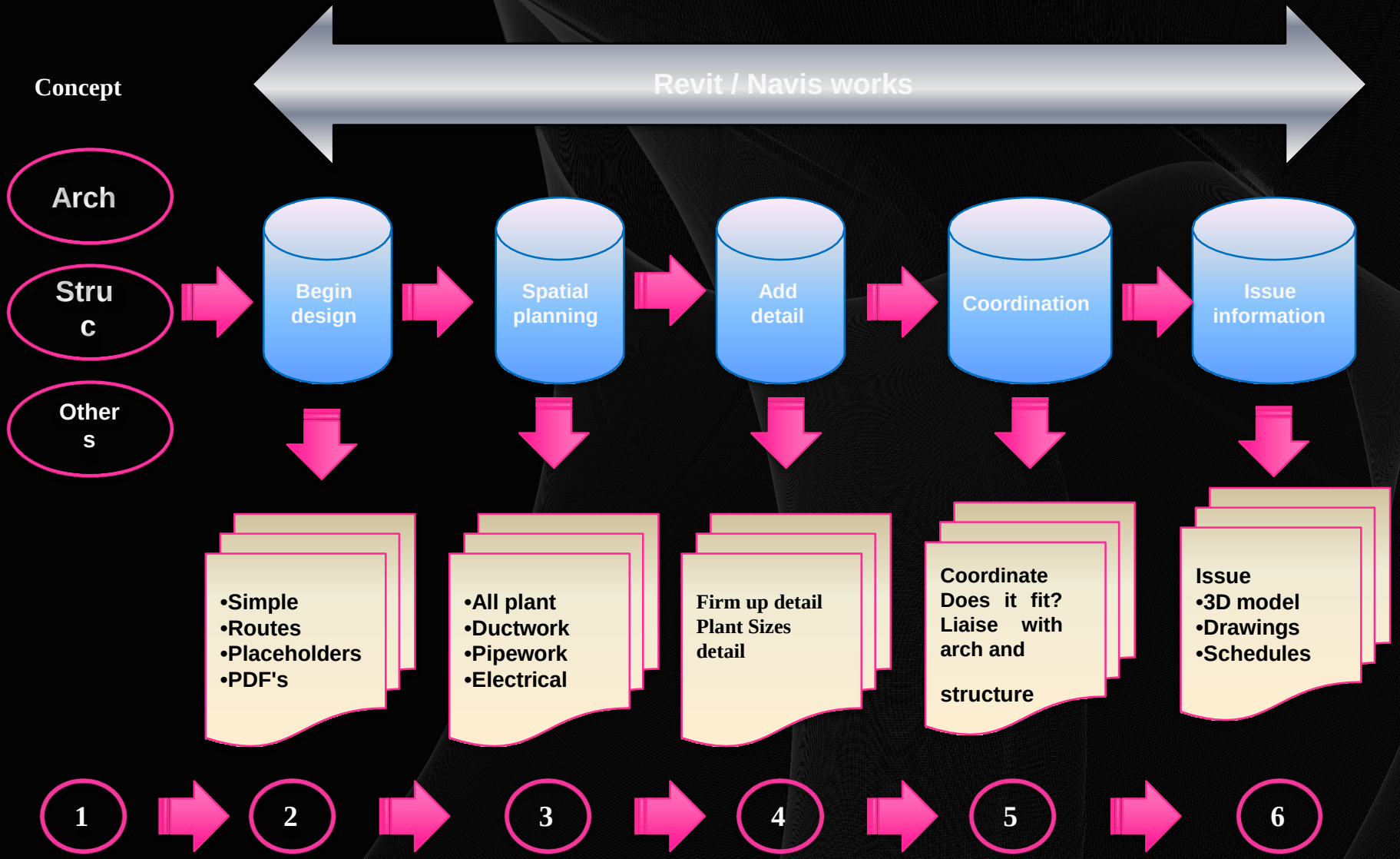


Sample step 2

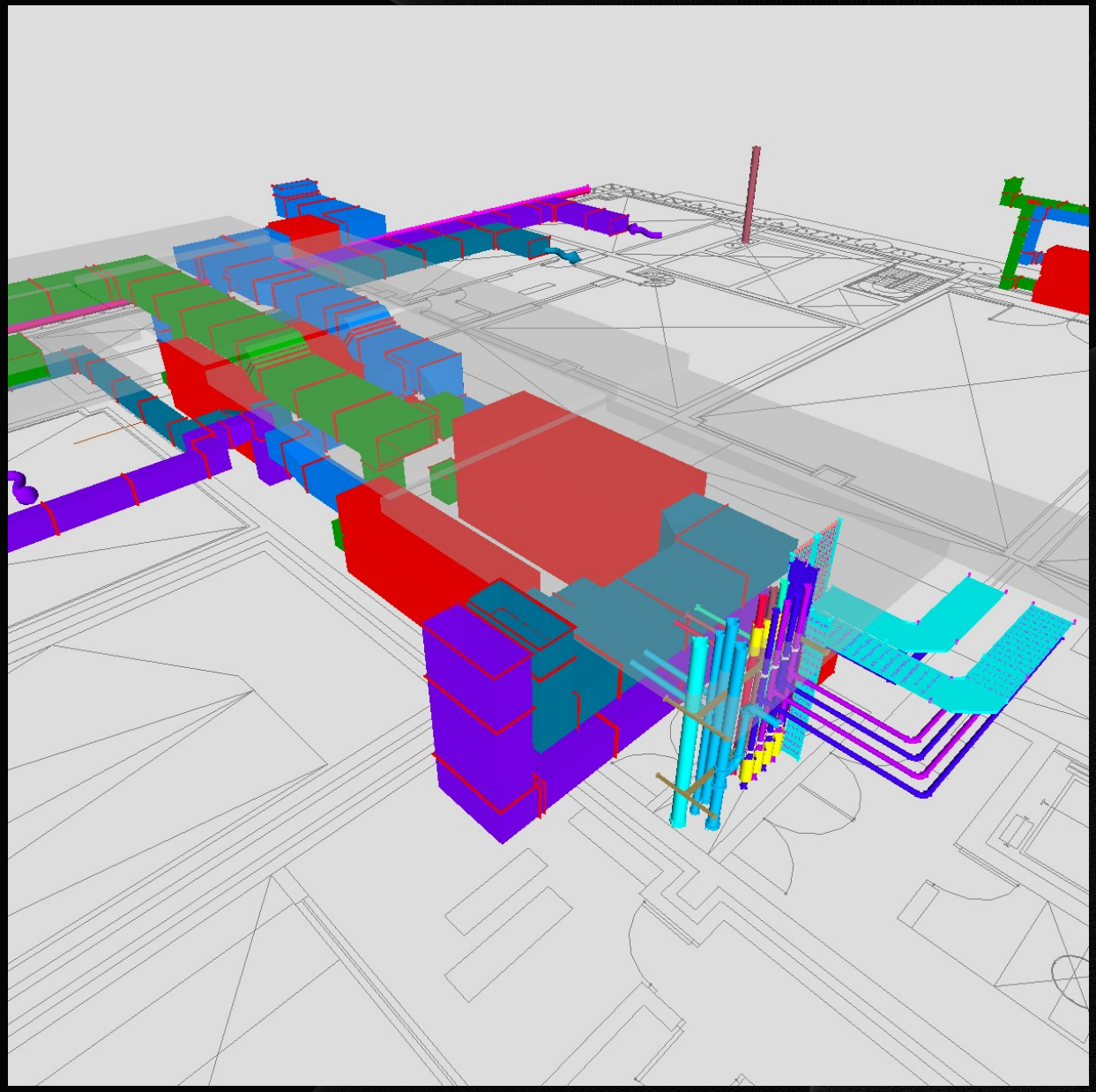


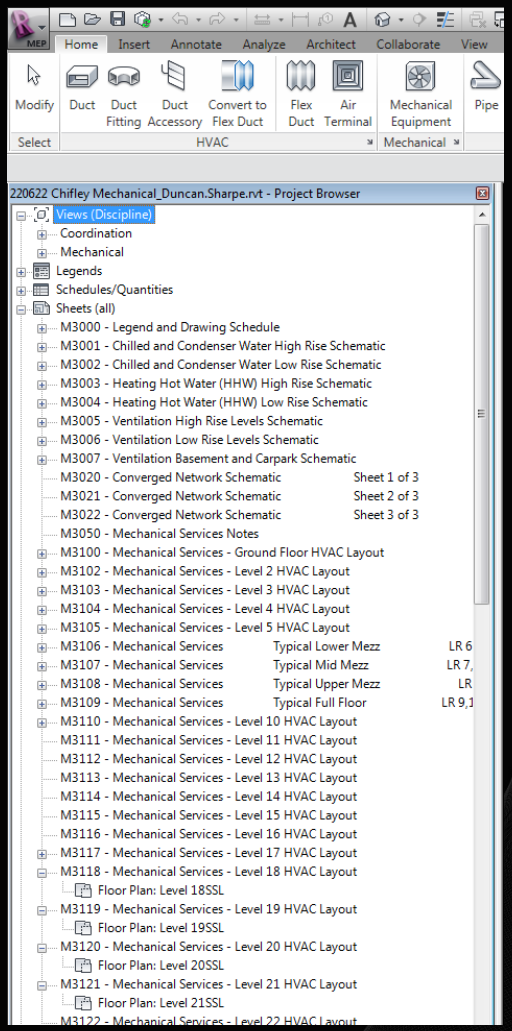
Sample step 2

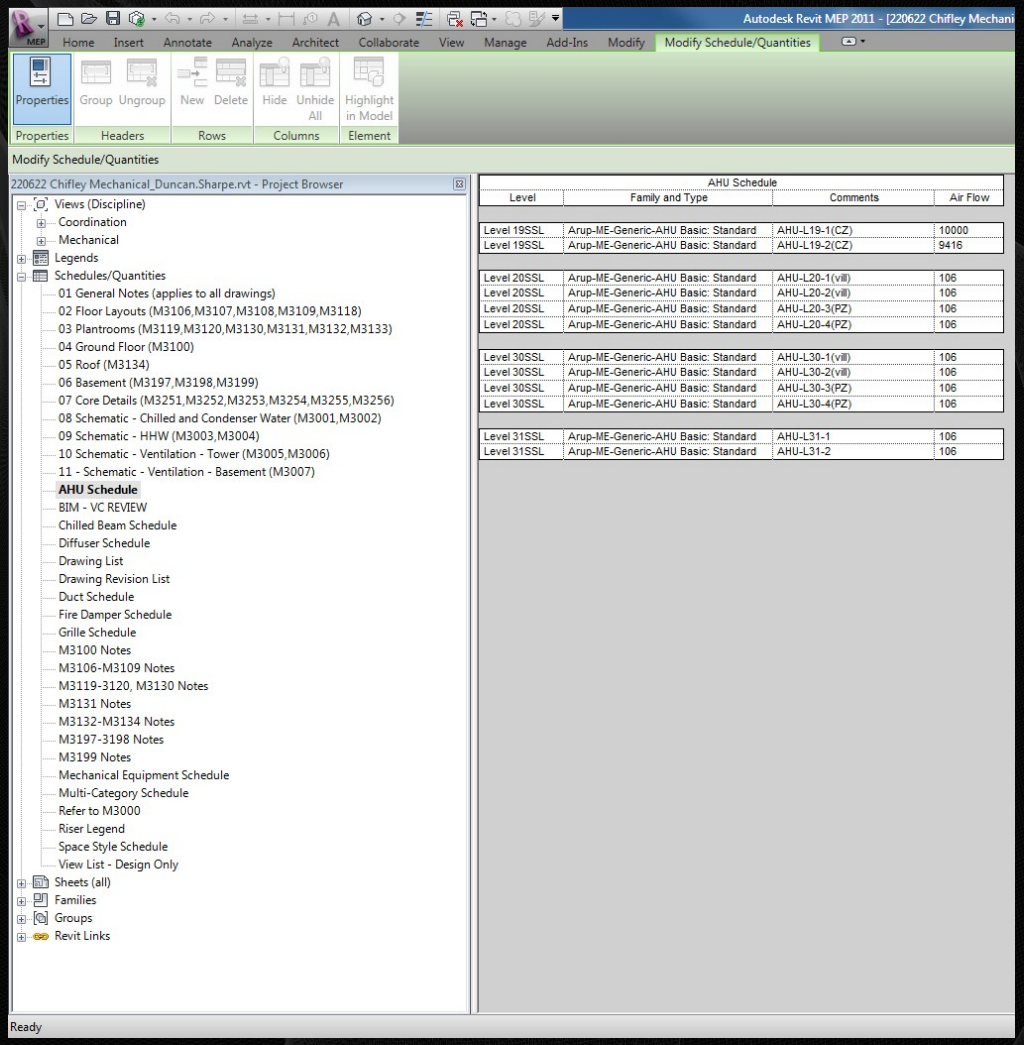


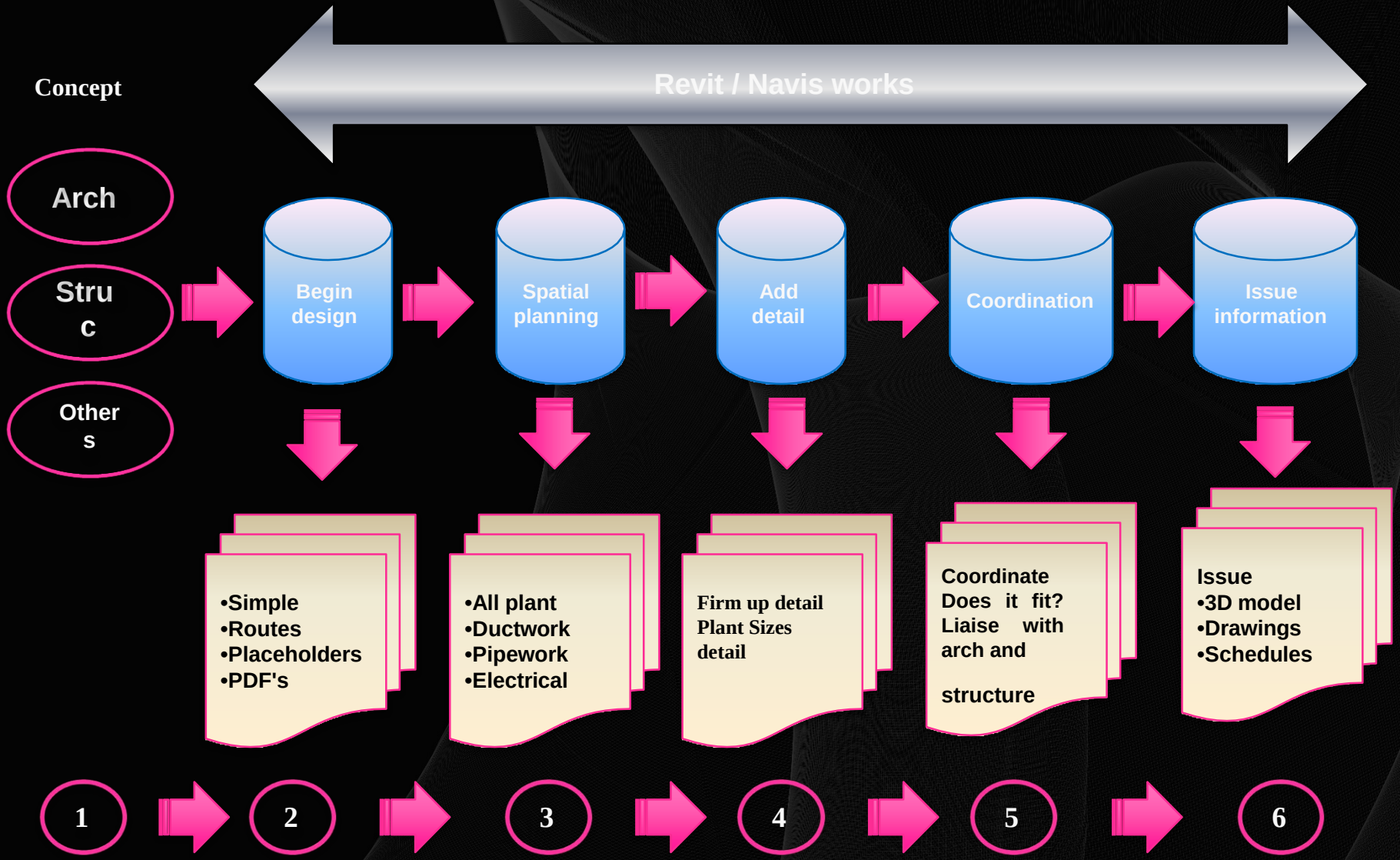

Concept
Revit / Navis works
Arch
Struc
Others
Begin design
Spatial planning
Add detail
Coordination
Issue information
•Simple
•Routes
•Placeholders
•PDF's
•All plant
•Ductwork
•Pipework
•Electrical
Firm up detail
Plant Sizes
detail
Coordinate
Does it fit?
Liaise with
arch and
structure
Issue
•3D model
•Drawings
•Schedules
1
2
3
4
5
6

- Spatial planning.
- Design evolves from step 2 meetings.
- Service routes / strategy are agreed.
- Cad and engineers collaborate.

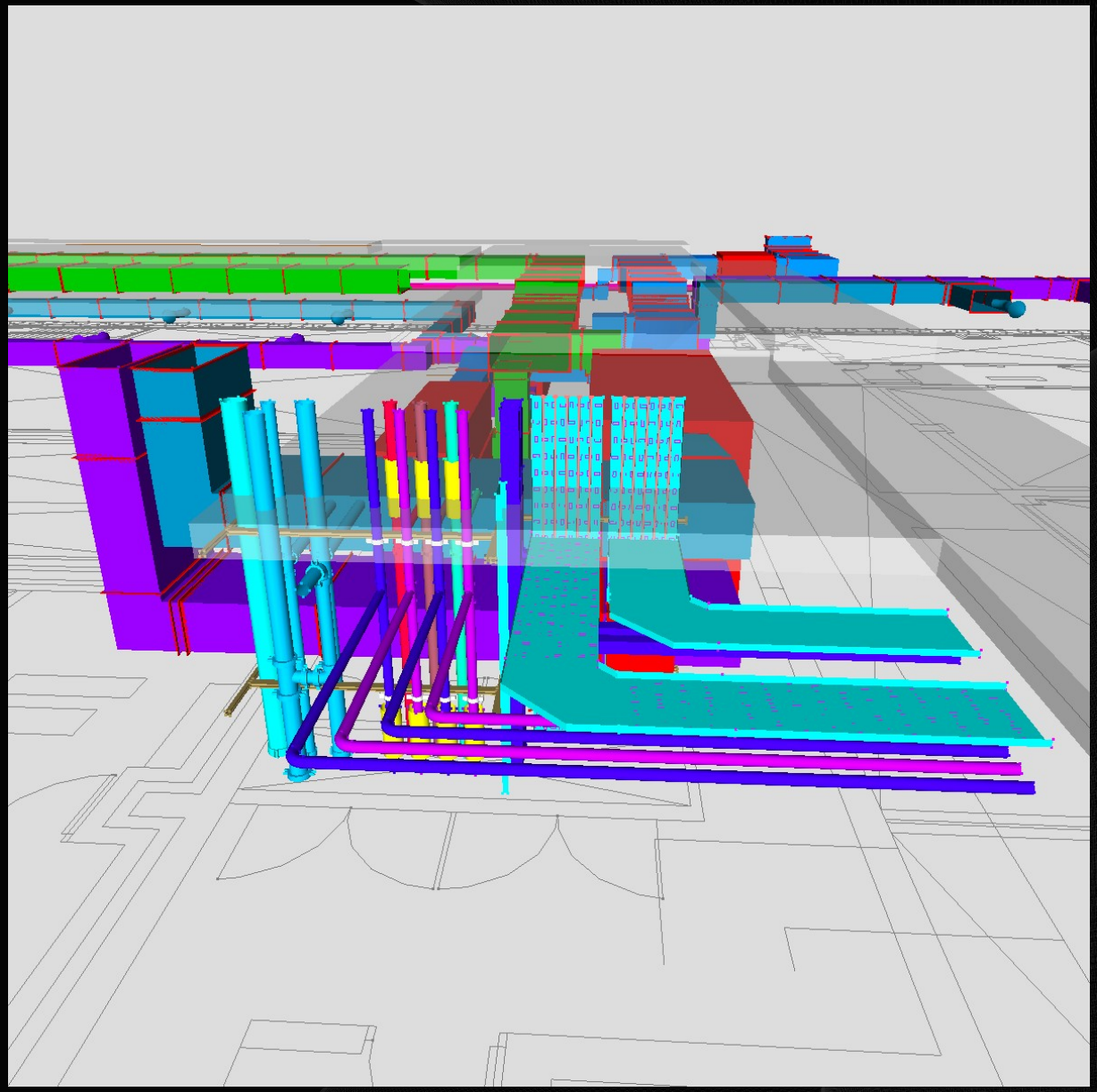



Home Insert Annotate Analyze Architect Collaborate View
Modify Duct Duct Fitting Duct Accessory Convert to Flex Duct Flex Duct Air Terminal Mechanical Equipment Pipe
Select HVAC Mechanical
220622 Chifley Mechanical_Duncan.Sharpe.rvt - Project Browser
Views (Discipline)
Coordination
Mechanical
Legends
Schedules/Quantities
Sheets (all)
M3000 - Legend and Drawing Schedule
M3001 - Chilled and Condenser Water High Rise Schematic
M3002 - Chilled and Condenser Water Low Rise Schematic
M3003 - Heating Hot Water (HHW) High Rise Schematic
M3004 - Heating Hot Water (HHW) Low Rise Schematic
M3005 - Ventilation High Rise Levels Schematic
M3006 - Ventilation Low Rise Levels Schematic
M3007 - Ventilation Basement and Carpark Schematic
M3020 - Converged Network Schematic Sheet 1 of 3
M3021 - Converged Network Schematic Sheet 2 of 3
M3022 - Converged Network Schematic Sheet 3 of 3
M3050 - Mechanical Services Notes
M3100 - Mechanical Services - Ground Floor HVAC Layout
M3102 - Mechanical Services - Level 2 HVAC Layout
M3103 - Mechanical Services - Level 3 HVAC Layout
M3104 - Mechanical Services - Level 4 HVAC Layout
M3105 - Mechanical Services - Level 5 HVAC Layout
M3106 - Mechanical Services Typical Lower Mezz LR 6
M3107 - Mechanical Services Typical Mid Mezz LR 7,
M3108 - Mechanical Services Typical Upper Mezz LR
M3109 - Mechanical Services Typical Full Floor LR 9,1
M3110 - Mechanical Services - Level 10 HVAC Layout
M3111 - Mechanical Services - Level 11 HVAC Layout
M3112 - Mechanical Services - Level 12 HVAC Layout
M3113 - Mechanical Services - Level 13 HVAC Layout
M3114 - Mechanical Services - Level 14 HVAC Layout
M3115 - Mechanical Services - Level 15 HVAC Layout
M3116 - Mechanical Services - Level 16 HVAC Layout
M3117 - Mechanical Services - Level 17 HVAC Layout
M3118 - Mechanical Services - Level 18 HVAC Layout
Floor Plan: Level 18SSL
M3119 - Mechanical Services - Level 19 HVAC Layout
Floor Plan: Level 19SSL
M3120 - Mechanical Services - Level 20 HVAC Layout
Floor Plan: Level 20SSL
M3121 - Mechanical Services - Level 21 HVAC Layout
Floor Plan: Level 21SSL
M3122 - Mechanical Services - Level 22 HVAC Layout

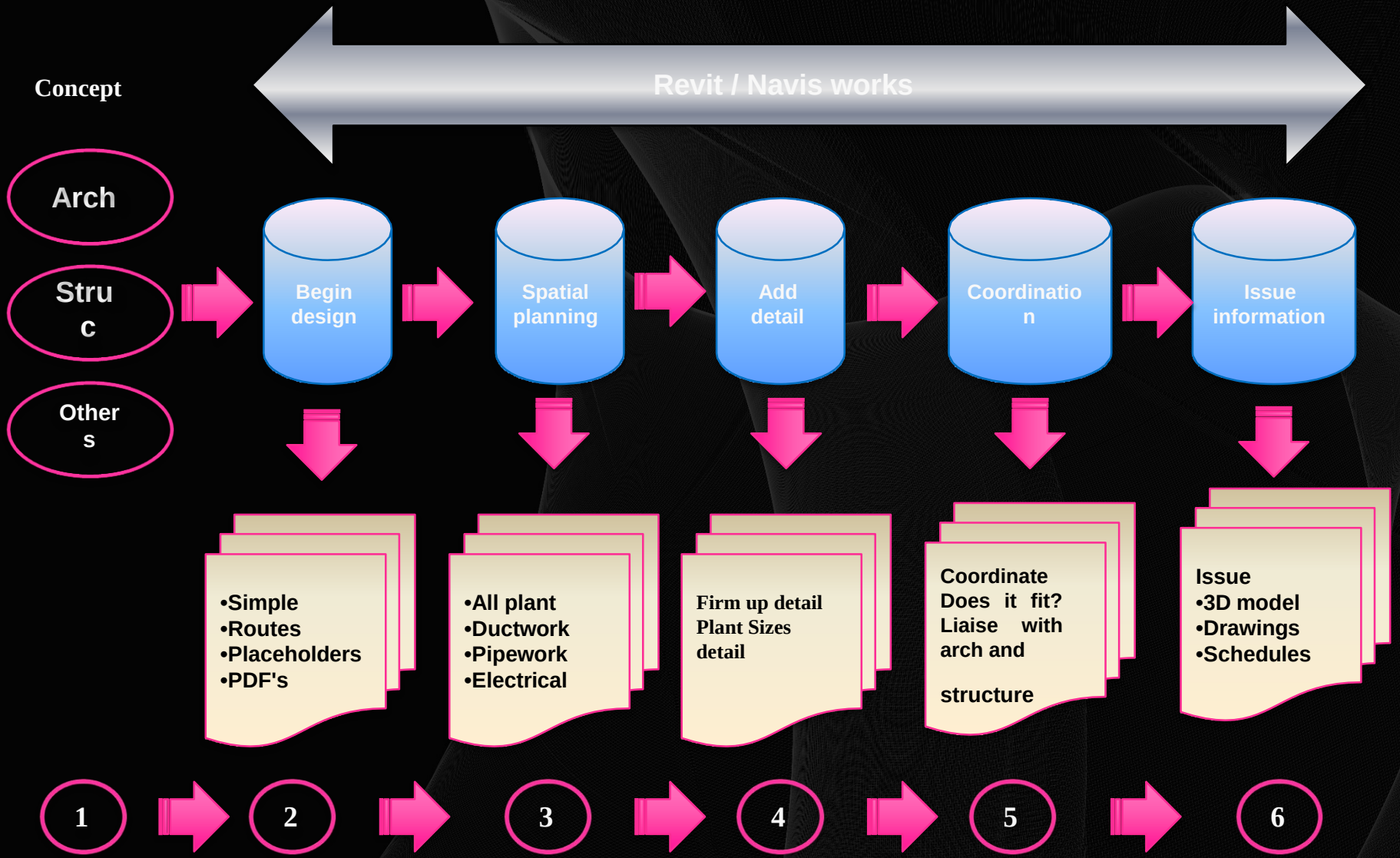

Autodesk Revit MEP 2011 - [220622 Chifley Mechani
Home Insert Annotate Analyze Architect Collaborate View Manage Add-Ins Modify Modify Schedule/Quantities
Properties Group Ungroup New Delete Hide Unhide All Highlight in Model
Properties Headers Rows Columns Element
Modify Schedule/Quantities
220622 Chifley Mechanical_Duncan.Sharpe.rvt - Project Browser
Views (Discipline)
Coordination
Mechanical
Legends
Schedules/Quantities
01 General Notes (applies to all drawings)
02 Floor Layouts (M3106,M3107,M3108,M3109,M3118)
03 Plantrooms (M3119,M3120,M3130,M3131,M3132,M3133)
04 Ground Floor (M3100)
05 Roof (M3134)
06 Basement (M3197,M3198,M3199)
07 Core Details (M3251,M3252,M3253,M3254,M3255,M3256)
08 Schematic - Chilled and Condenser Water (M3001,M3002)
09 Schematic - HHW (M3003,M3004)
10 Schematic - Ventilation - Tower (M3005,M3006)
11 - Schematic - Ventilation - Basement (M3007)
AHU Schedule
BIM - VC REVIEW
Chilled Beam Schedule
Diffuser Schedule
Drawing List
Drawing Revision List
Duct Schedule
Fire Damper Schedule
Grille Schedule
M3100 Notes
M3106-M3109 Notes
M3119-3120, M3130 Notes
M3131 Notes
M3132-M3134 Notes
M3197-3198 Notes
M3199 Notes
Mechanical Equipment Schedule
Multi-Category Schedule
Refer to M3000
Riser Legend
Space Style Schedule
View List - Design Only
Sheets (all)
Families
Groups
Revit Links
AHU Schedule
Level Family and Type Comments Air Flow
Level 19SSL Arup-ME-Generic-AHU Basic: Standard AHU-L19-1(CZ) 10000
Level 19SSL Arup-ME-Generic-AHU Basic: Standard AHU-L19-2(CZ) 9416
Level 20SSL Arup-ME-Generic-AHU Basic: Standard AHU-L20-1(vill) 106
Level 20SSL Arup-ME-Generic-AHU Basic: Standard AHU-L20-2(vill) 106
Level 20SSL Arup-ME-Generic-AHU Basic: Standard AHU-L20-3(PZ) 106
Level 20SSL Arup-ME-Generic-AHU Basic: Standard AHU-L20-4(PZ) 106
Level 30SSL Arup-ME-Generic-AHU Basic: Standard AHU-L30-1(vill) 106
Level 30SSL Arup-ME-Generic-AHU Basic: Standard AHU-L30-2(vill) 106
Level 30SSL Arup-ME-Generic-AHU Basic: Standard AHU-L30-3(PZ) 106
Level 30SSL Arup-ME-Generic-AHU Basic: Standard AHU-L30-4(PZ) 106
Level 31SSL Arup-ME-Generic-AHU Basic: Standard AHU-L31-1 106
Level 31SSL Arup-ME-Generic-AHU Basic: Standard AHU-L31-2 106
Ready


Concept
Revit / Navis works
Arch
Struc
Others
Begin design
Spatial planning
Add detail
Coordination
Issue information
•Simple
•Routes
•Placeholders
•PDF's
•All plant
•Ductwork
•Pipework
•Electrical
Firm up detail
Plant Sizes
detail
Coordinate
Does it fit?
Liaise with
arch and
structure
Issue
•3D model
•Drawings
•Schedules
1
2
3
4
5
6

- Add detail.
- Model all services – duct/pipe/Elec systems.
- Plant items are now more accurately sized.
- Use approved content / families.
- Generic content.



Sample step 4


Concept
Revit / Navis works
Arch
Struc
Others
Begin design
Spatial planning
Add detail
Coordination
Issue information
•Simple
•Routes
•Placeholders
•PDF's
•All plant
•Ductwork
•Pipework
•Electrical
Firm up detail
Plant Sizes
detail
Coordinate
Does it fit?
Liaise with arch and
structure
Issue
•3D model
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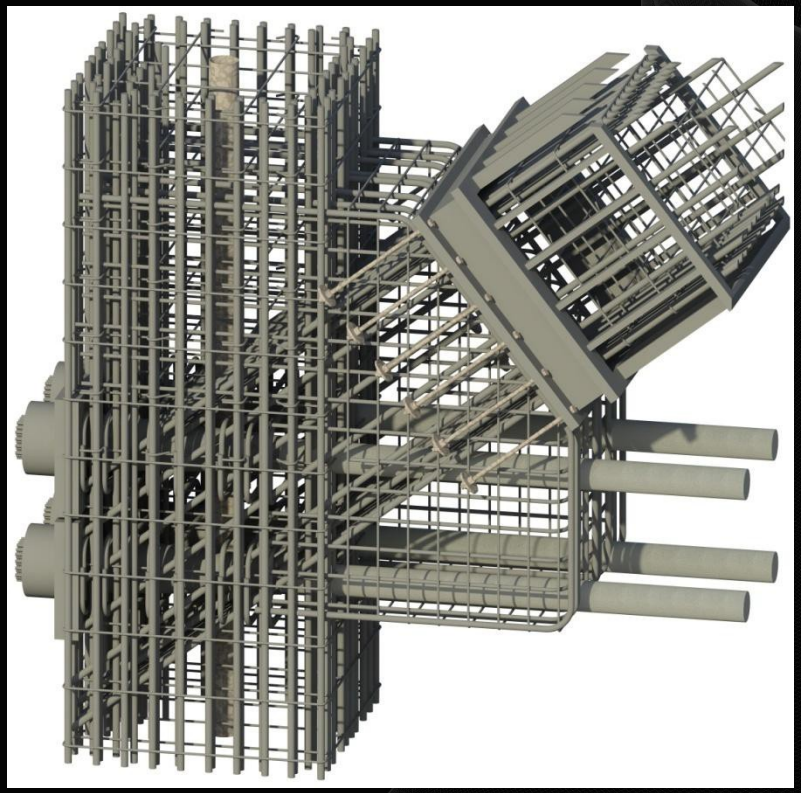
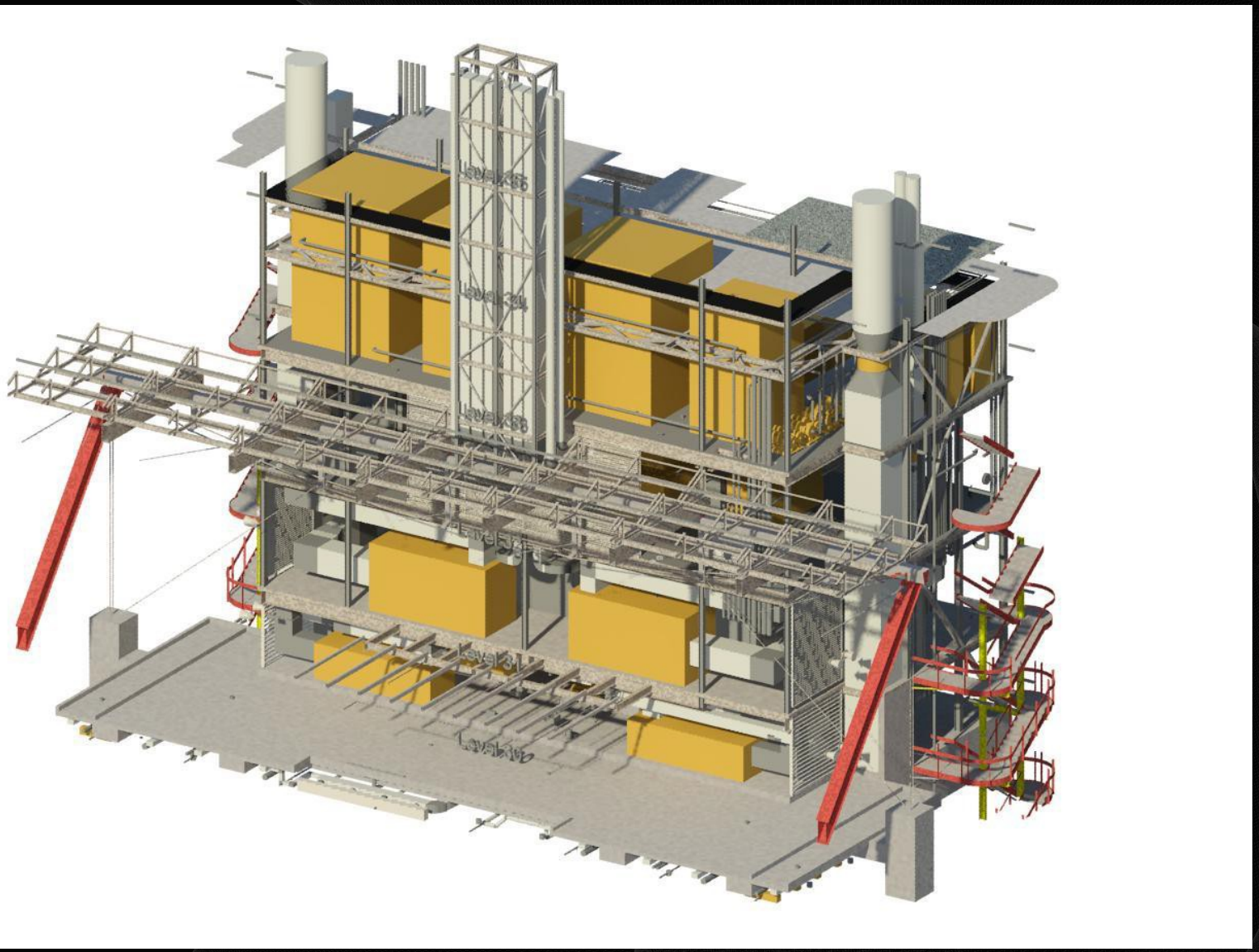
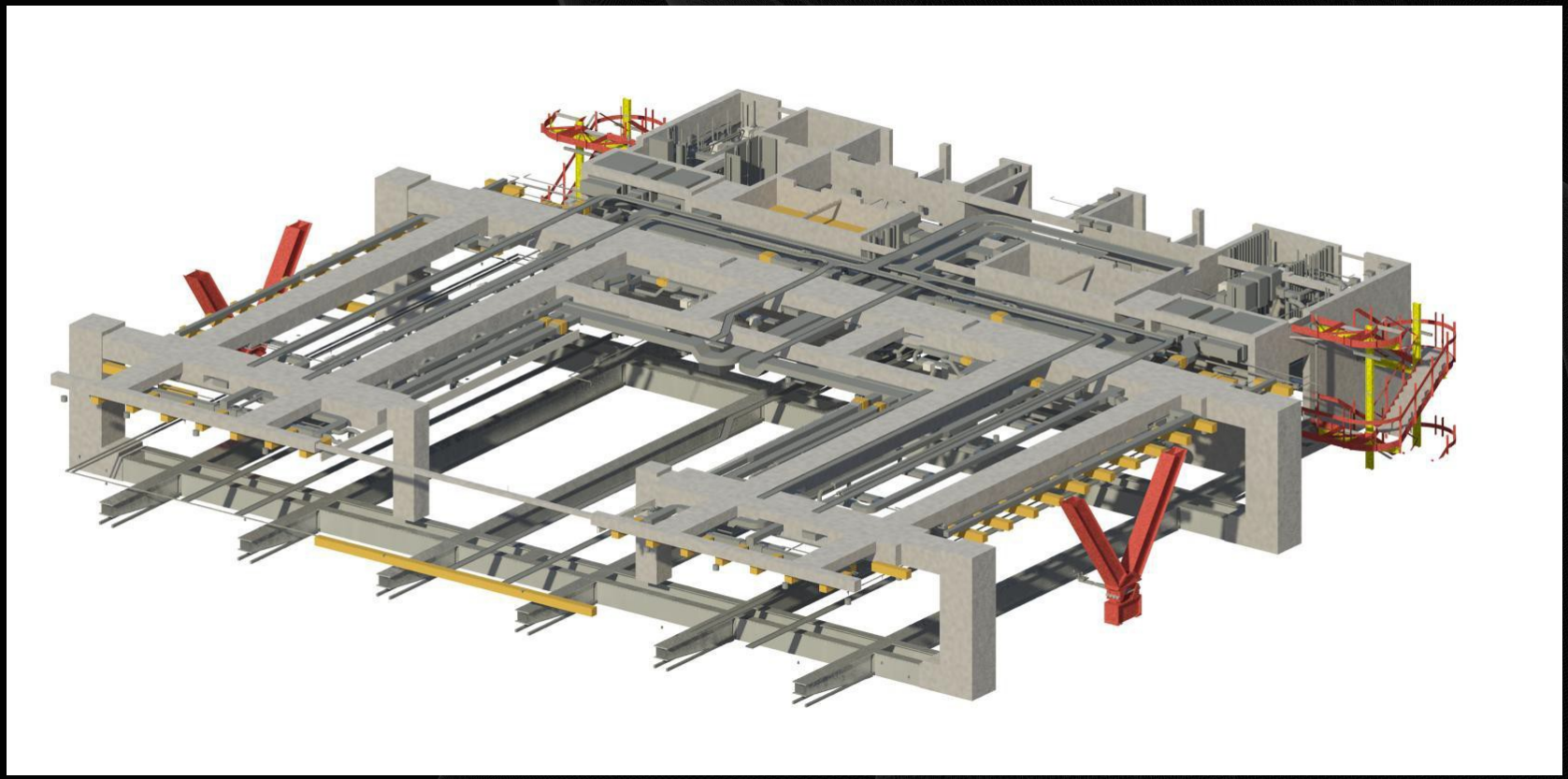
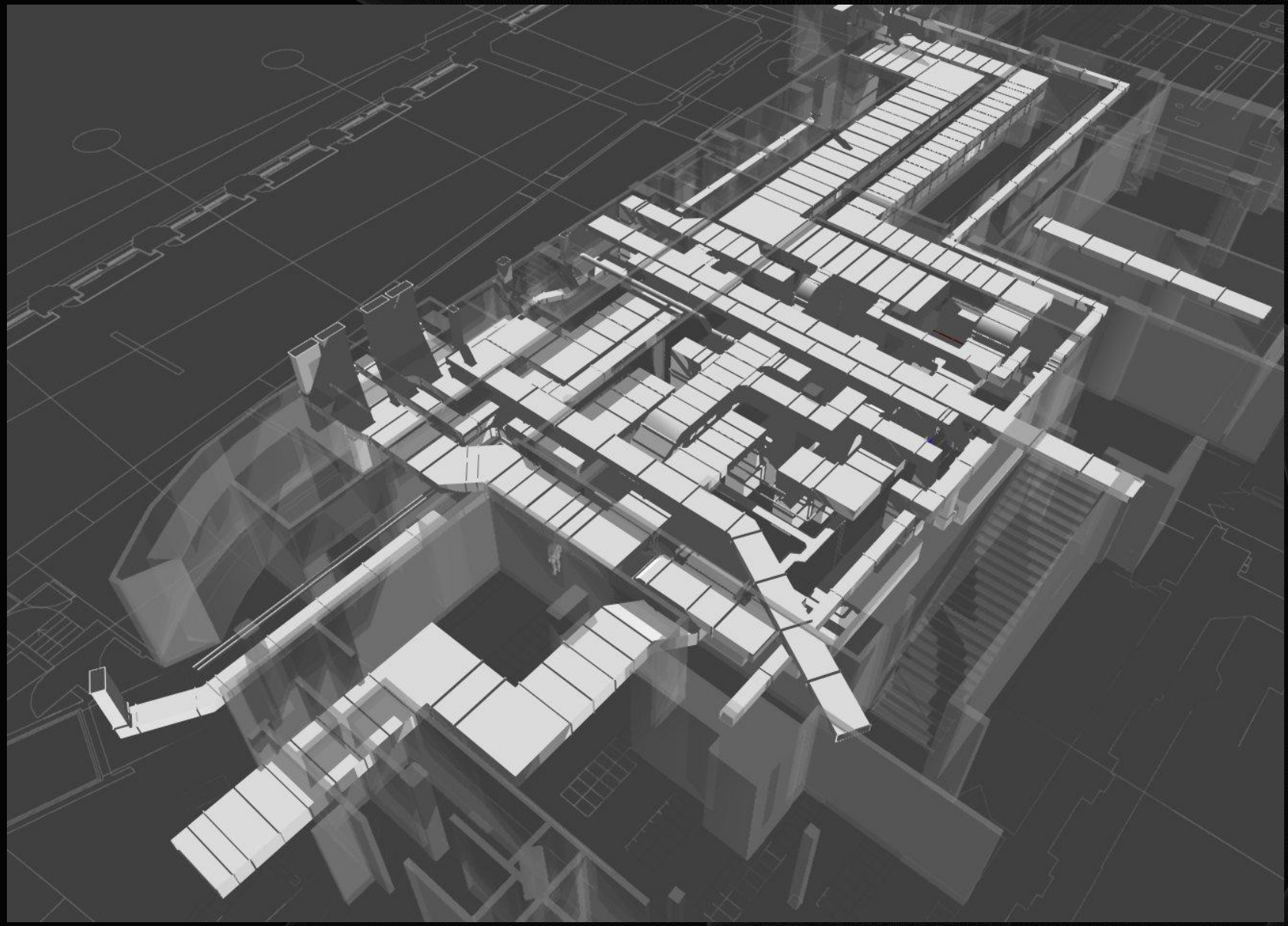
- **Coordination.**
- **Accurate coordination between services / structure and architecture.**
- **Information is passed between all members of the design team in 3D format.**
- **Plant items have property fields which may be empty and ready for population by contractors.**



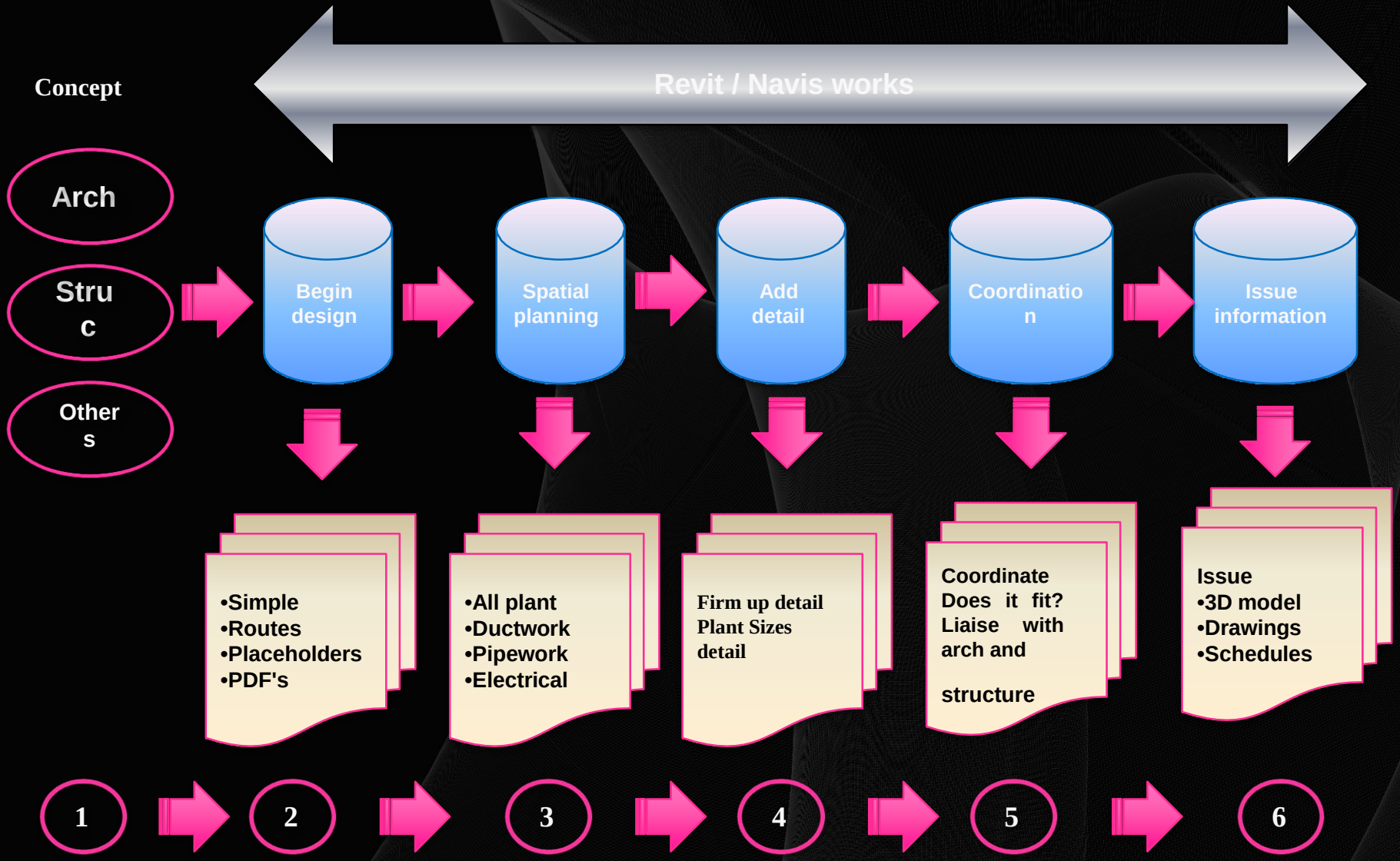




Typical Revit MEP model



Typical CadDuct model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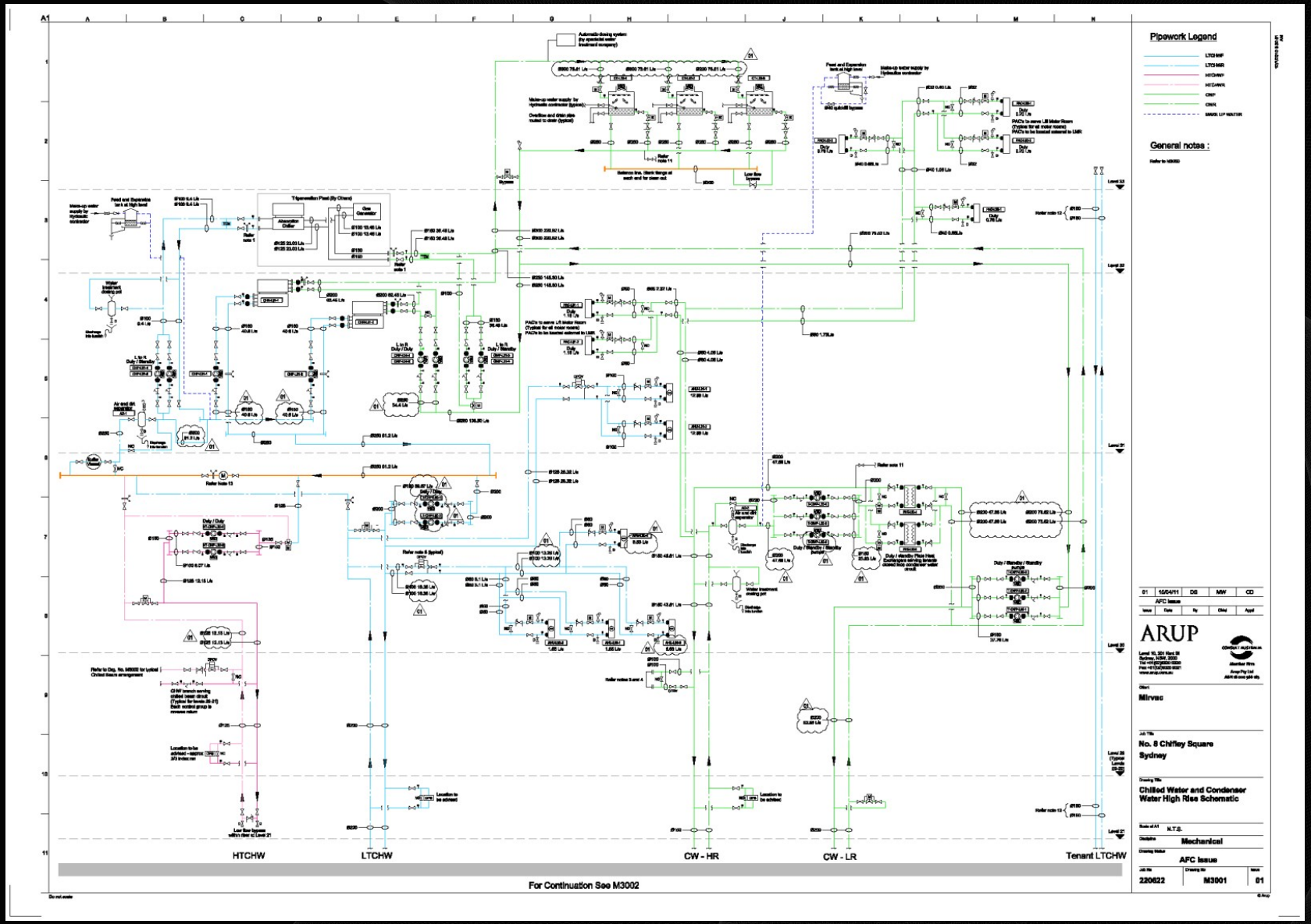
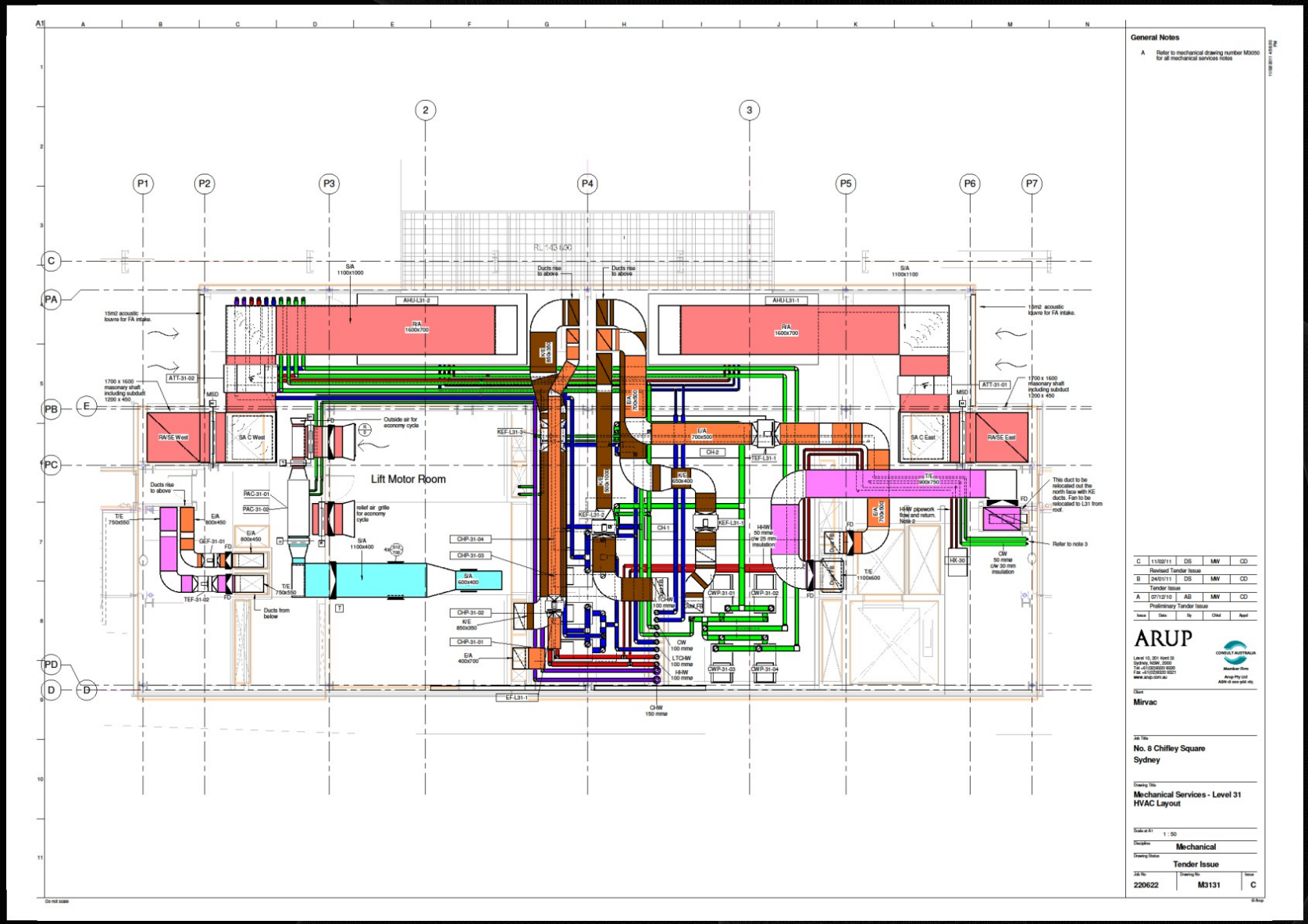
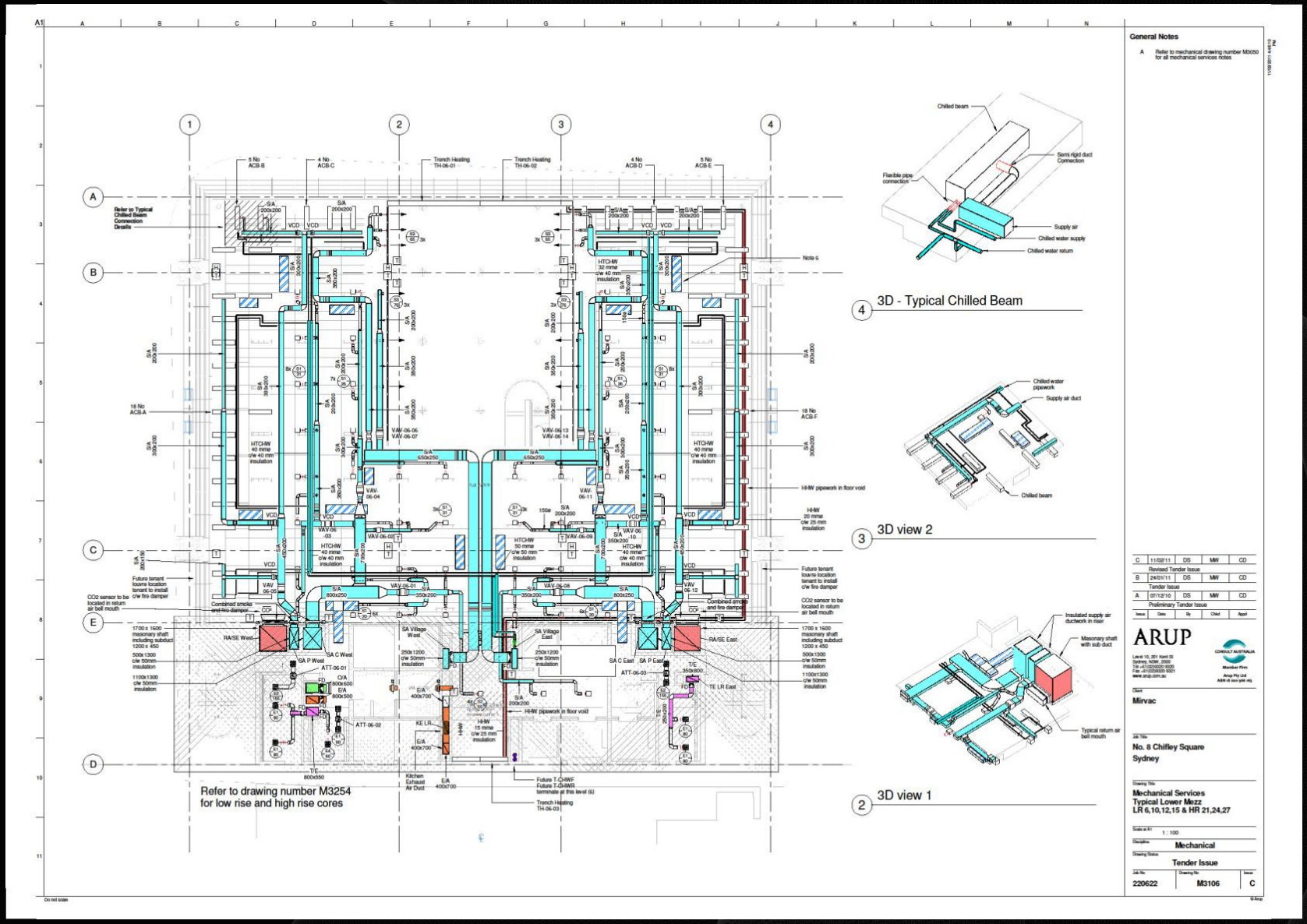
- **Issue Information.**
- **Hand over to contractor – DWG – RVT – PDF – Schedules etc (everything contained within Revit).**
- **Contractor coordinate in Revit**
- **Fabrication.**
- **Installation.**



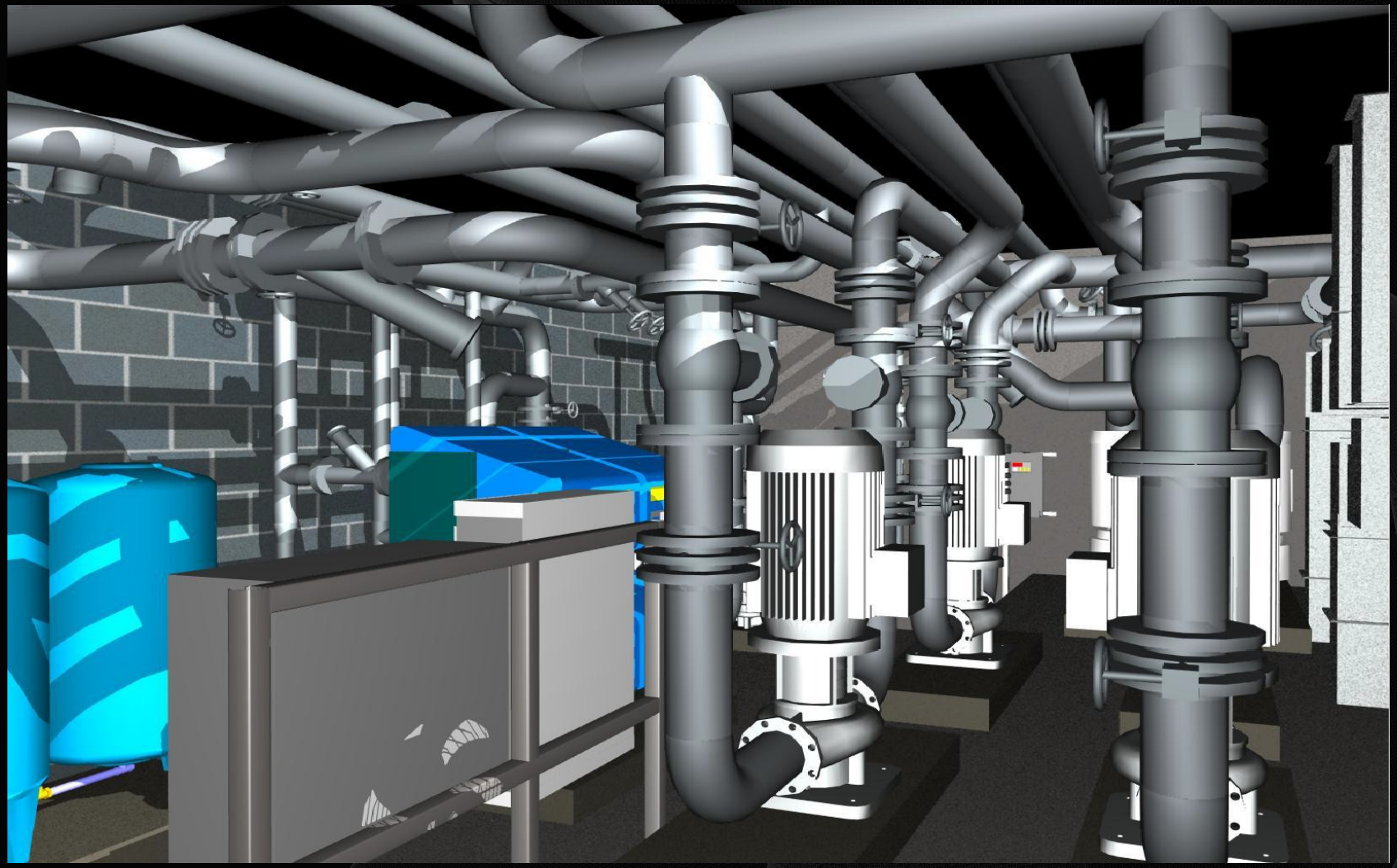
Typical mechanical schematic



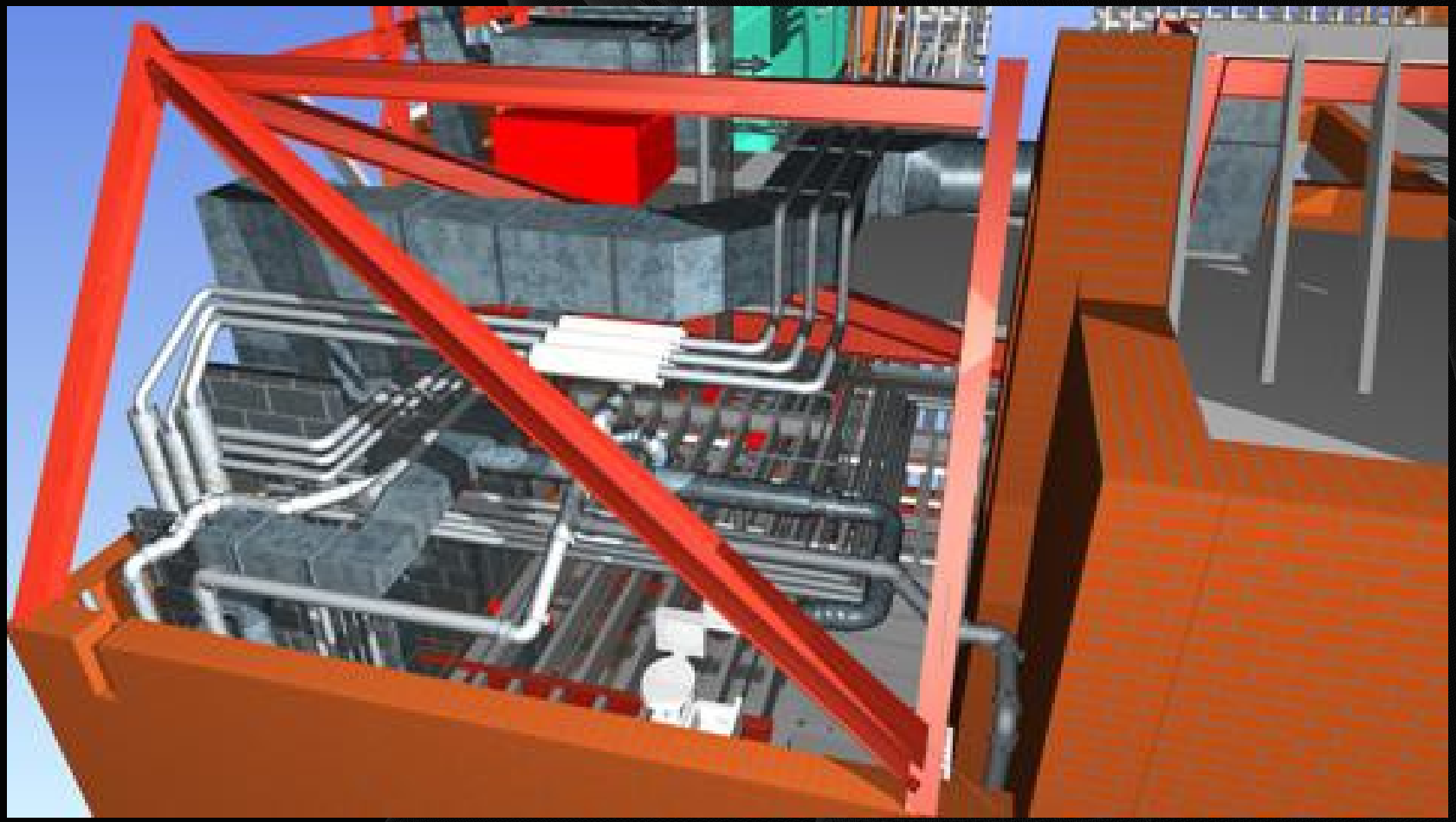
Typical mechanical layout



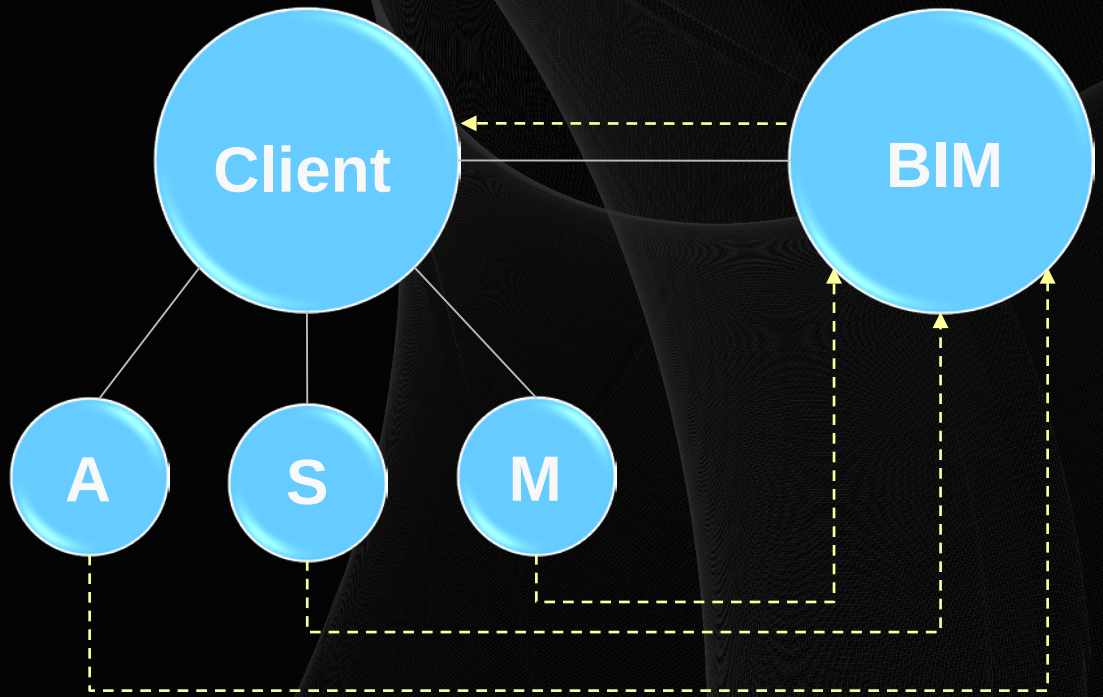
Typical mechanical floor layout



Typical Plant Room model

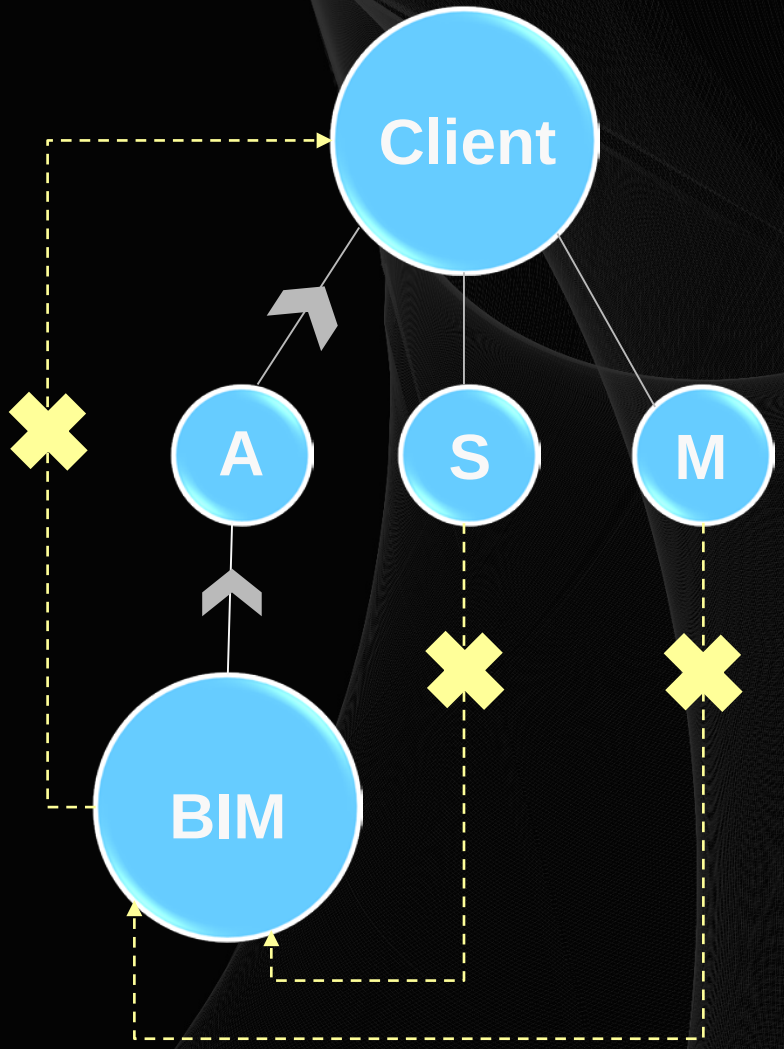


Typical Duct model



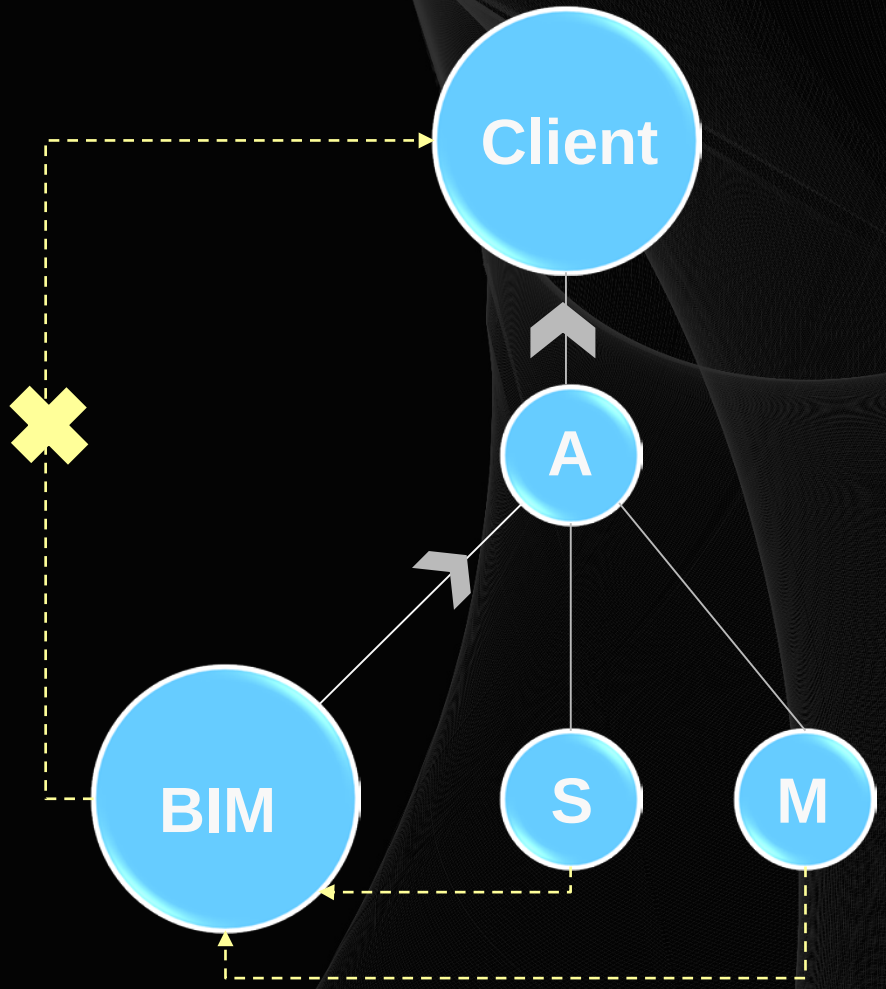
Low Level BIM

Super BIM !



Dishonest reporting

Hard to chase information



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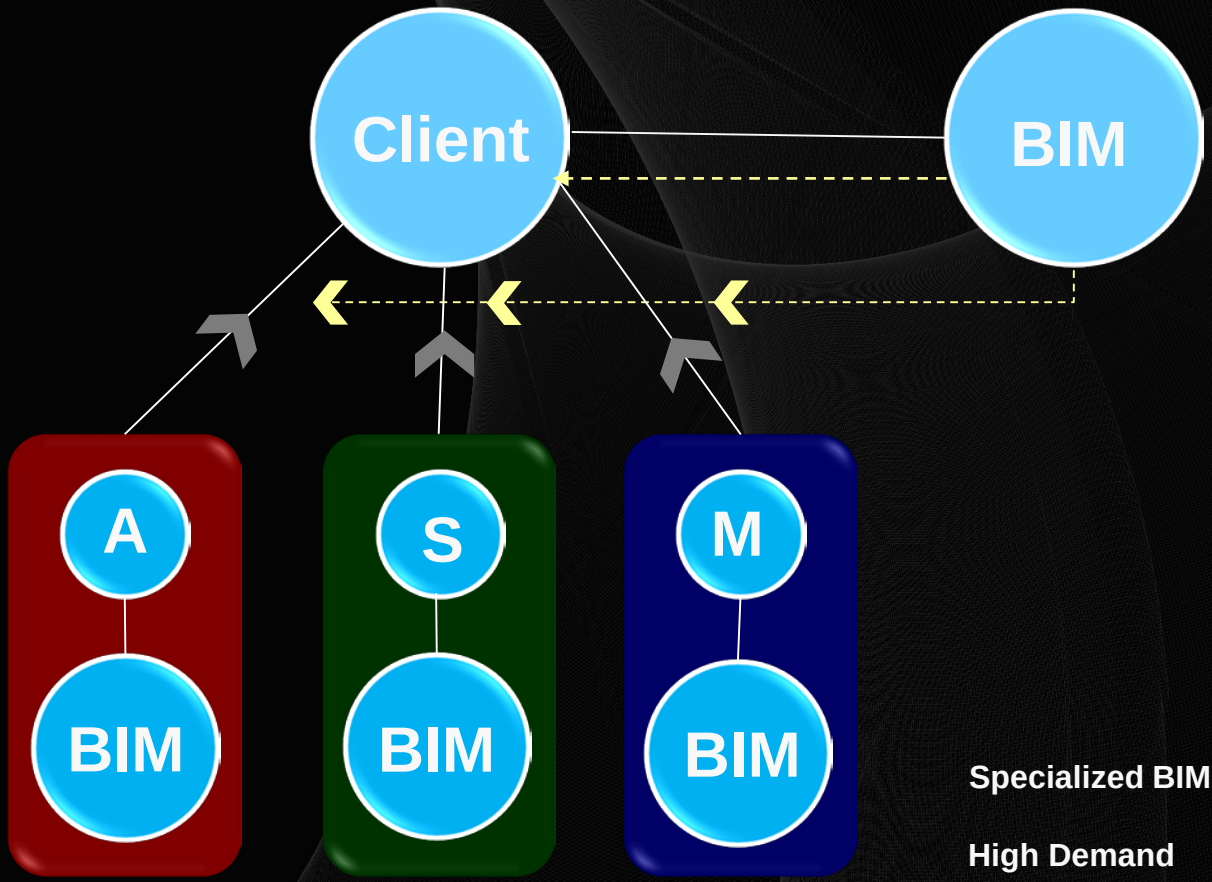
Dishonest reporting

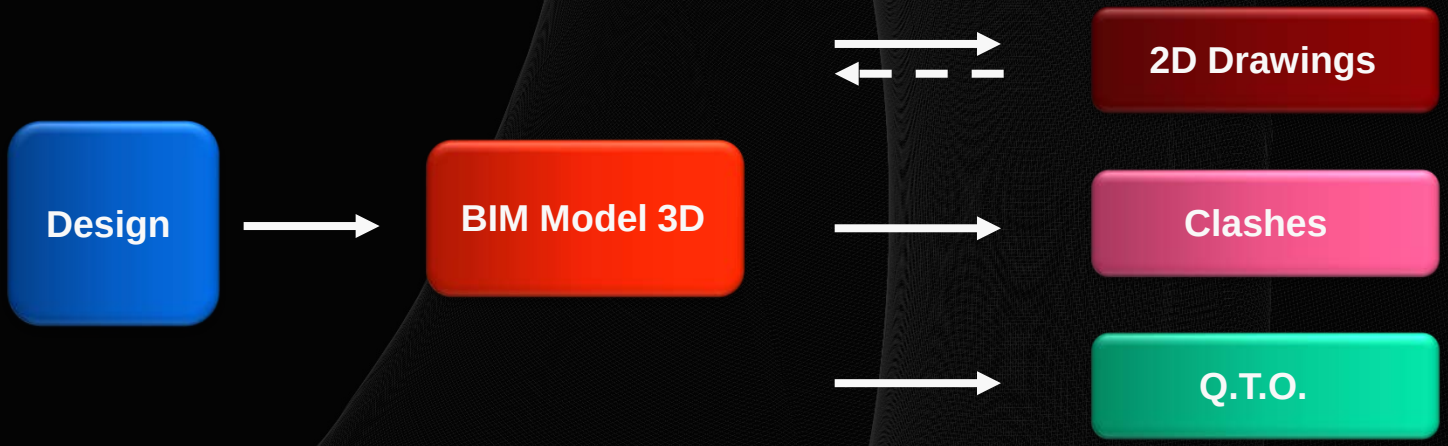


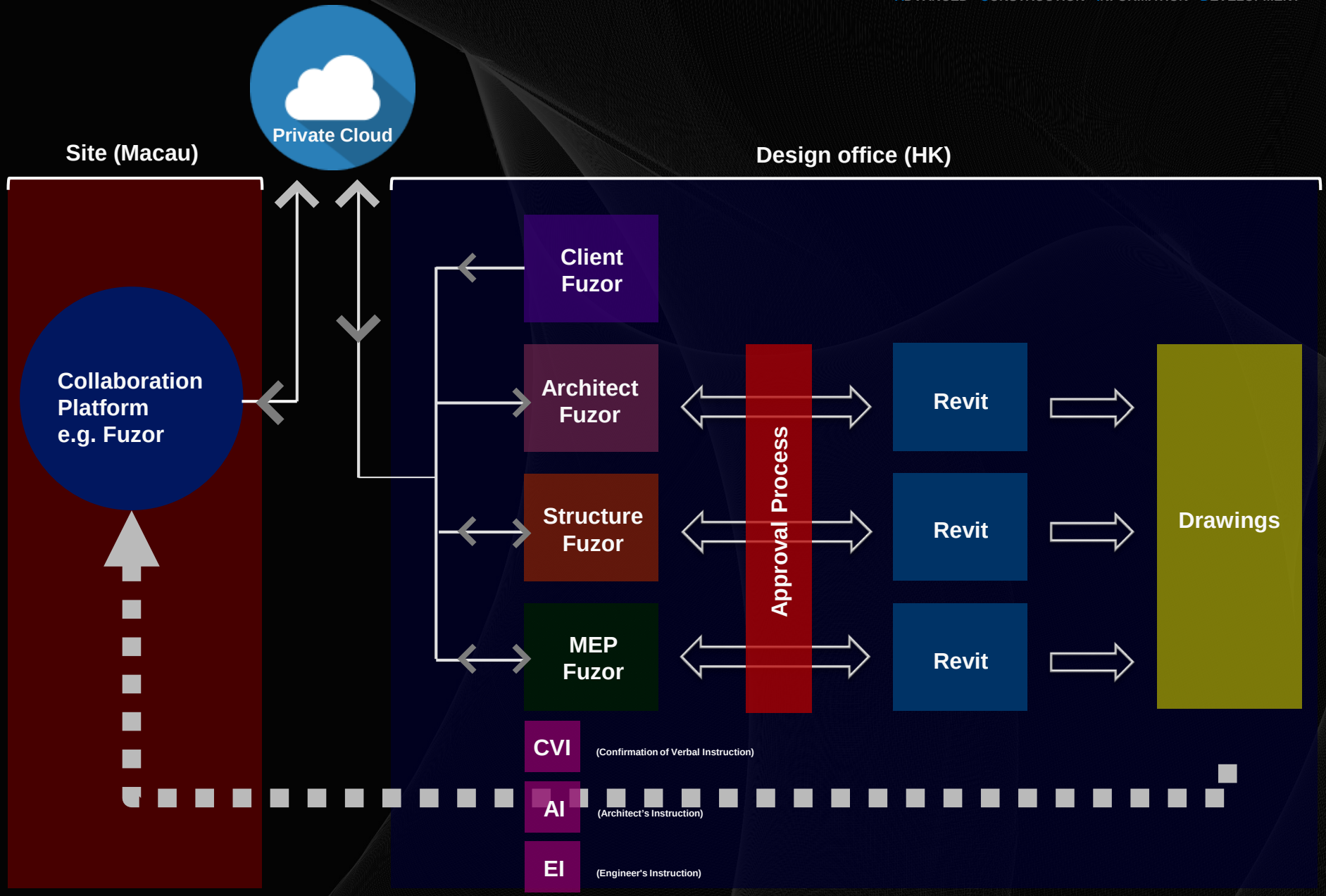
Specialized BIM

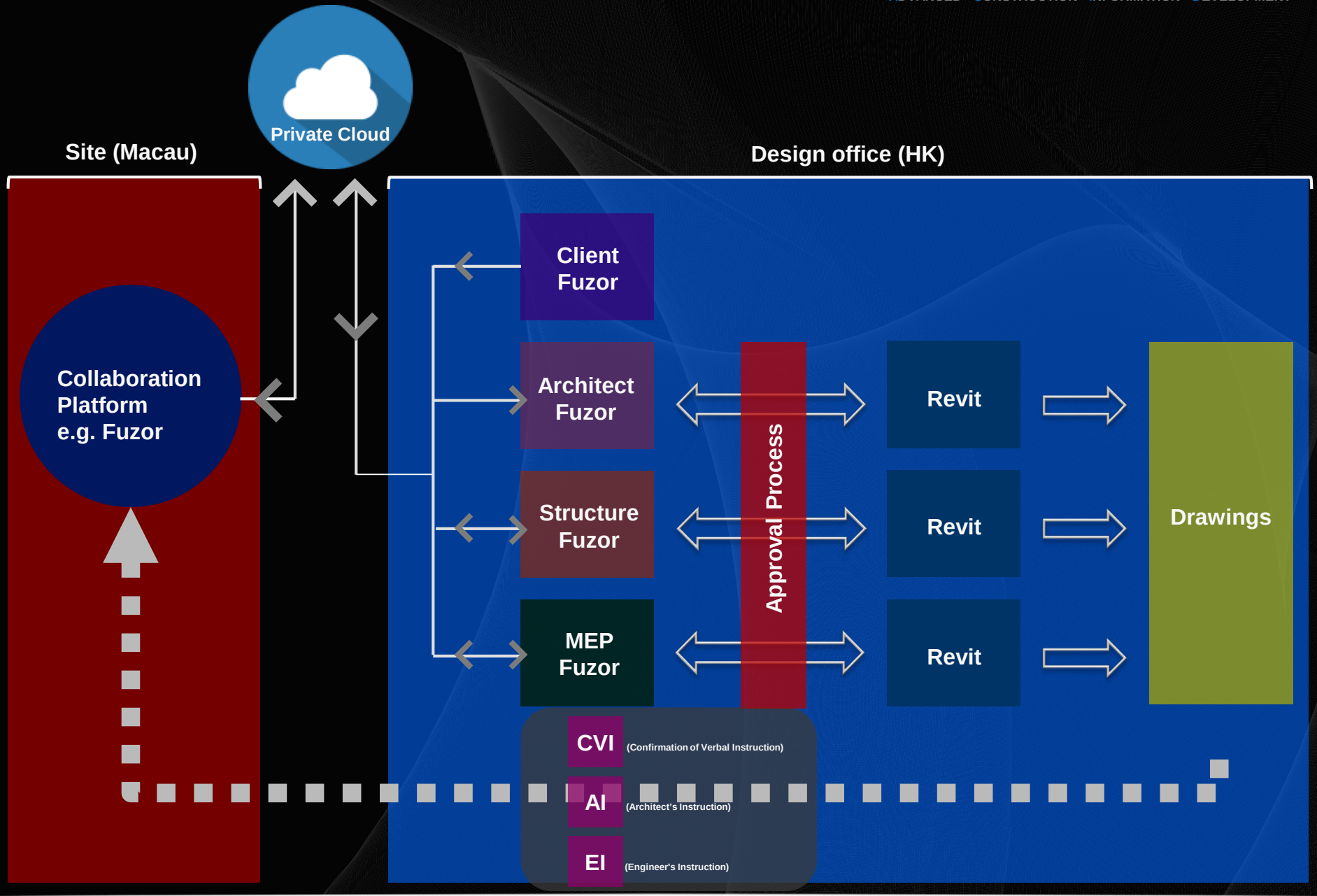
High Demand

Perceived BIM Workflow

True BIM Workflow :




Private Cloud
Site (Macau)
Design office (HK)
Collaboration Platform e.g. Fuzor
Client Fuzor
Architect Fuzor
Structure Fuzor
MEP Fuzor
Approval Process
Revit
Revit
Revit
Drawings
CVI
(Confirmation of Verbal Instruction)
AI
(Architect's Instruction)
EI
(Engineer's Instruction)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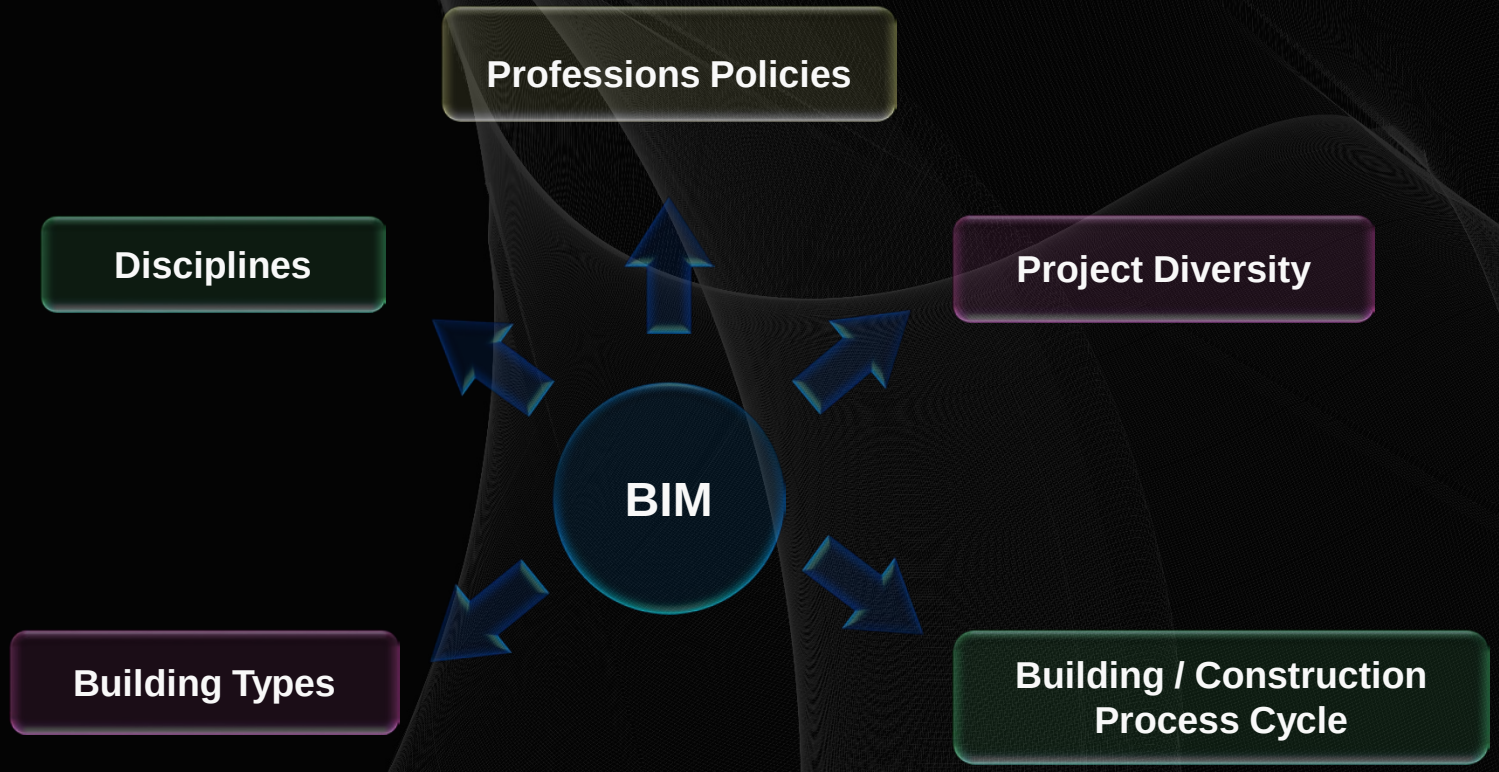
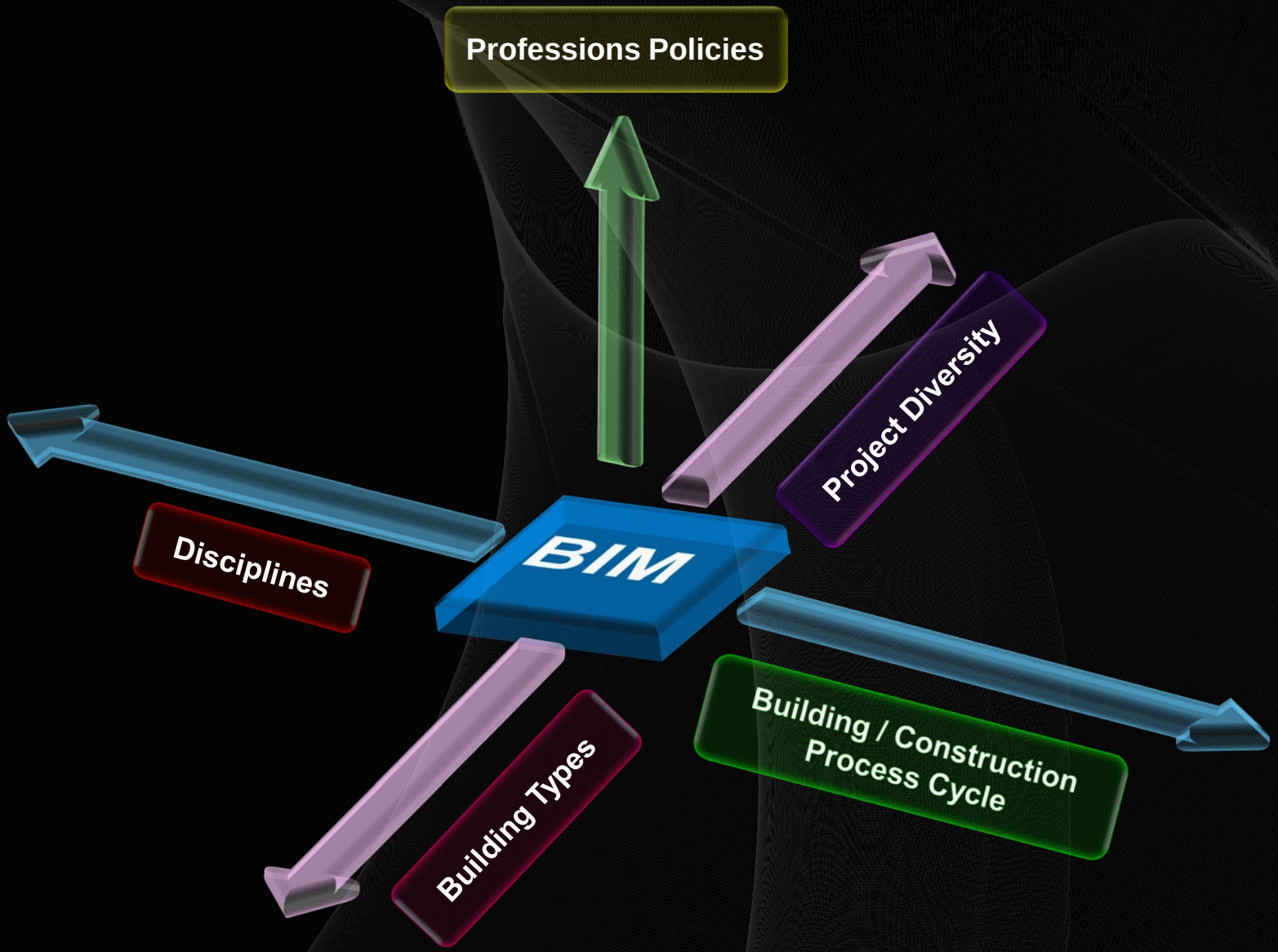

Professions Policies
Disciplines
Project Diversity
BIM
Building Types
Building / Construction Process Cycle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