PolyU Presentation

BIM in FM

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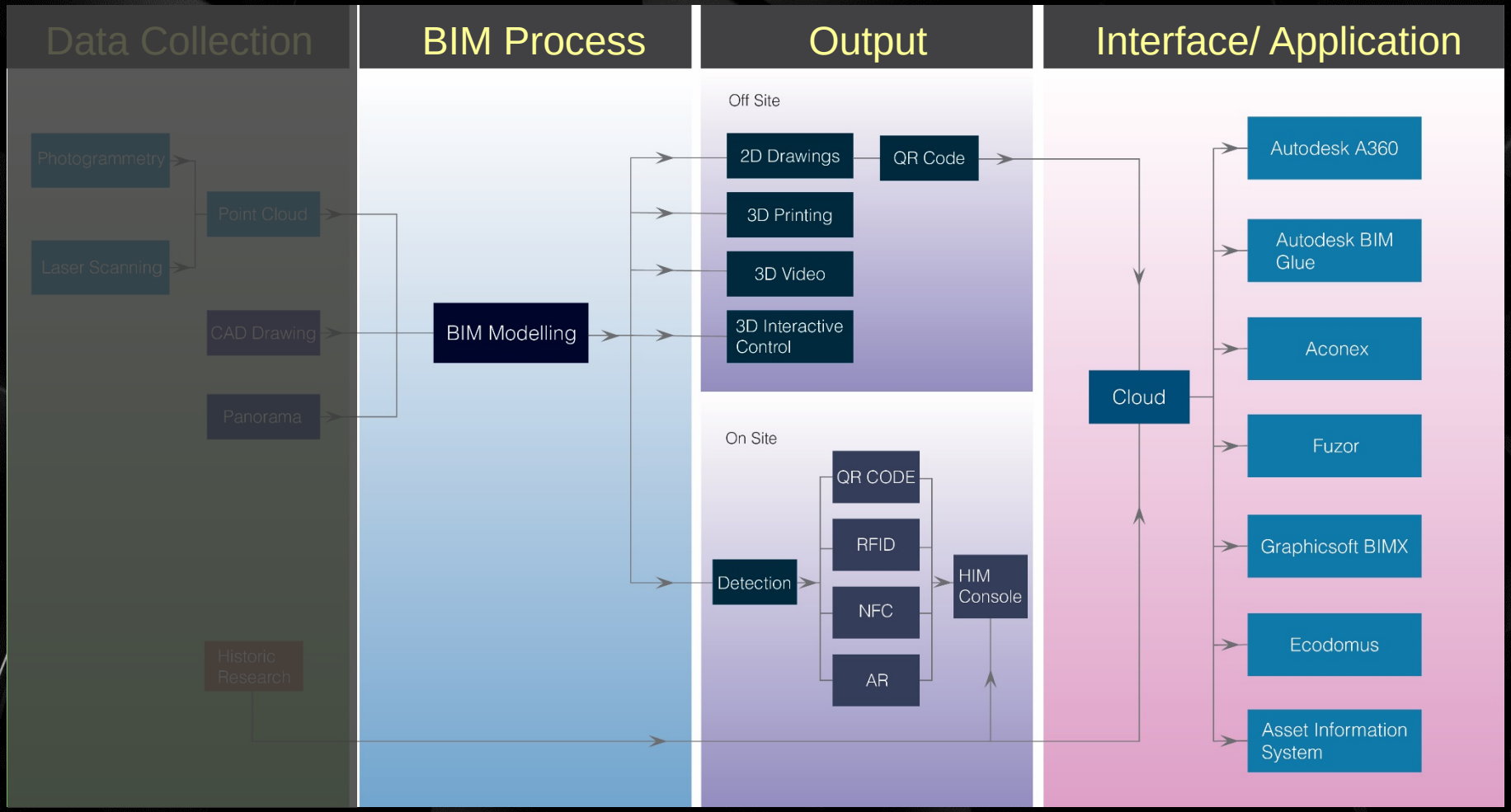
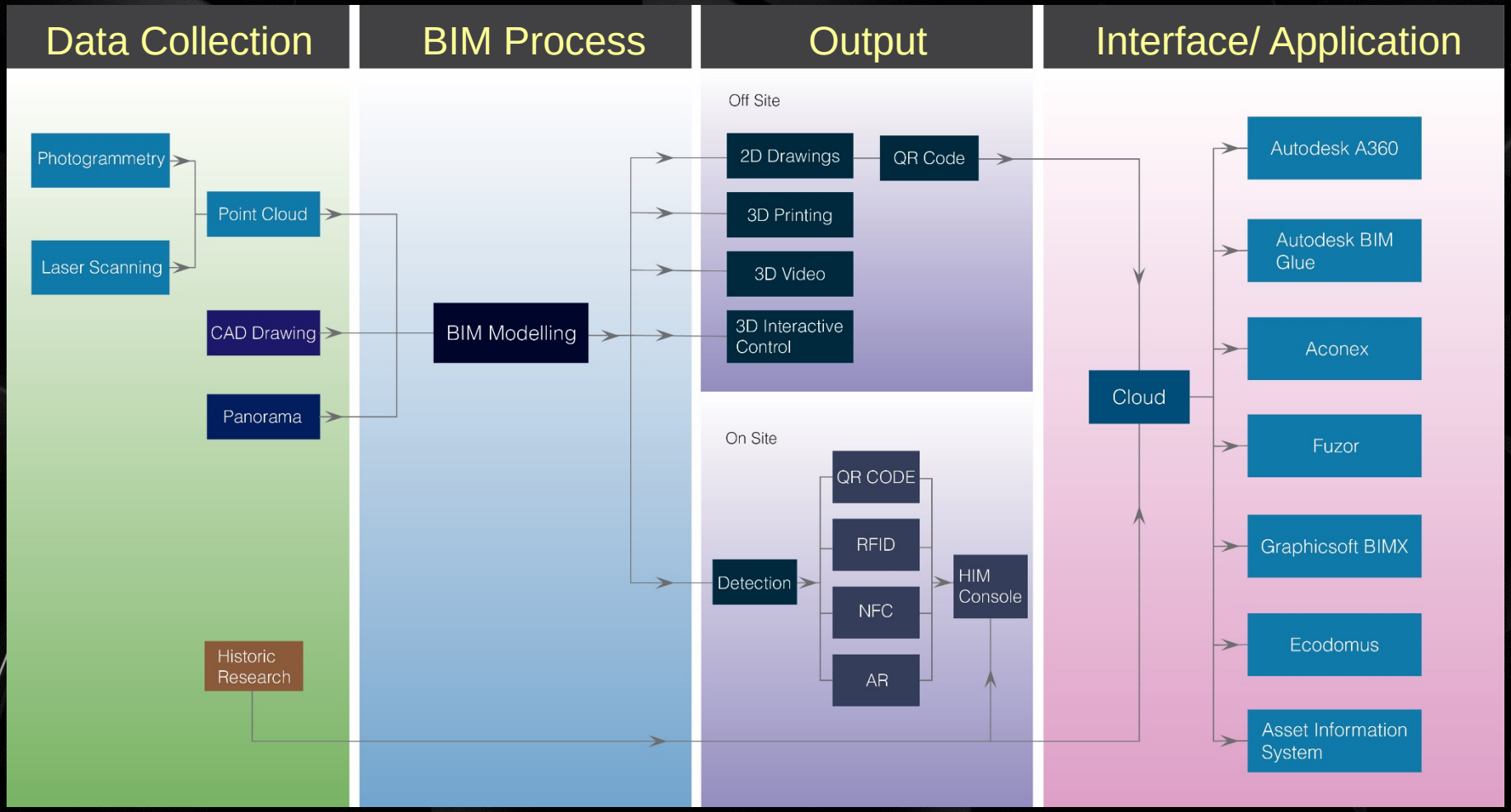
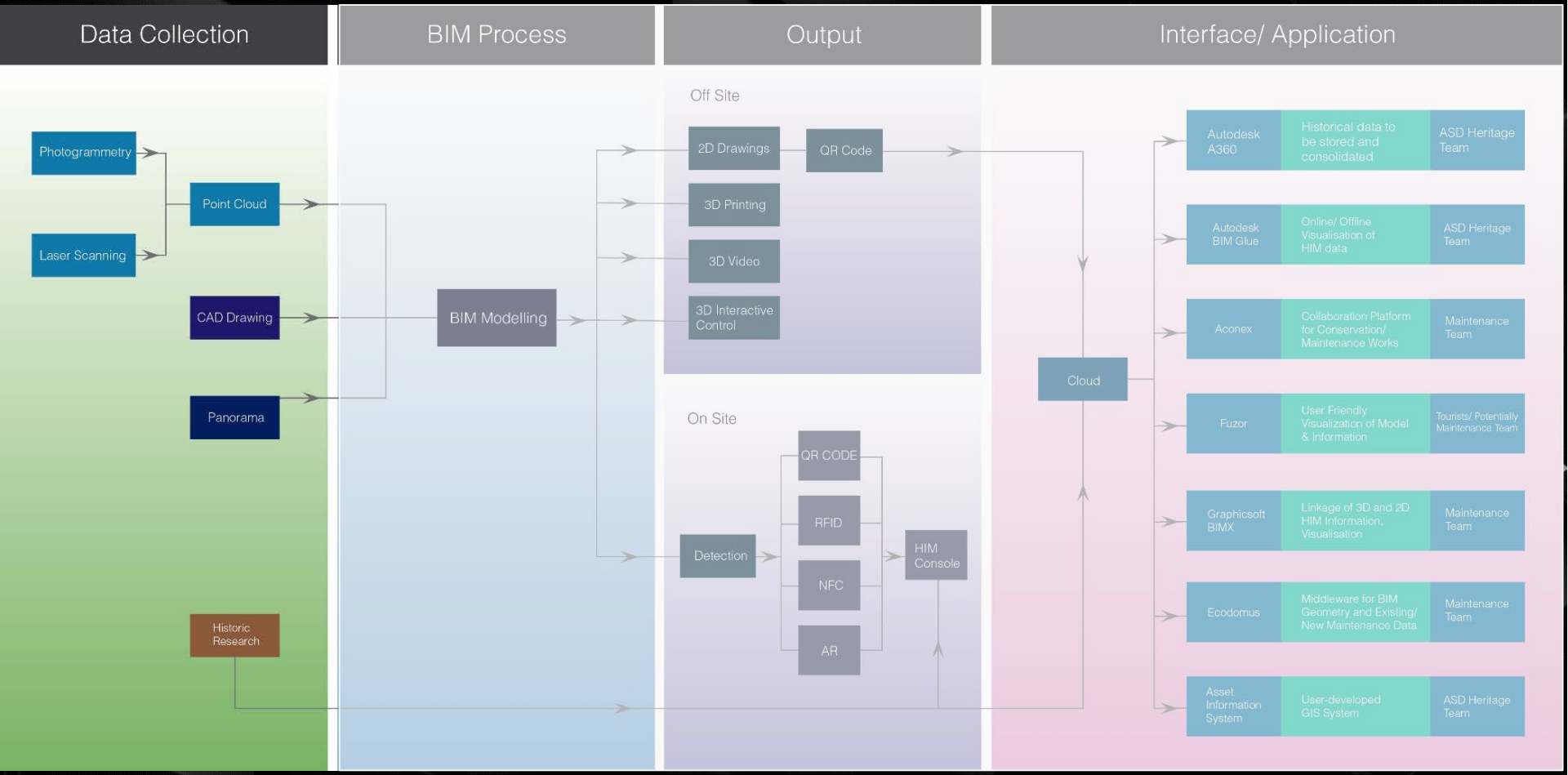
New Projects/ Assets



Existing Assets




Data Collection
BIM Process
Output
Interface/ Application
Photogrammetry
Laser Scanning
Point Cloud
CAD Drawing
Panorama
Historic Research
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Data Collection

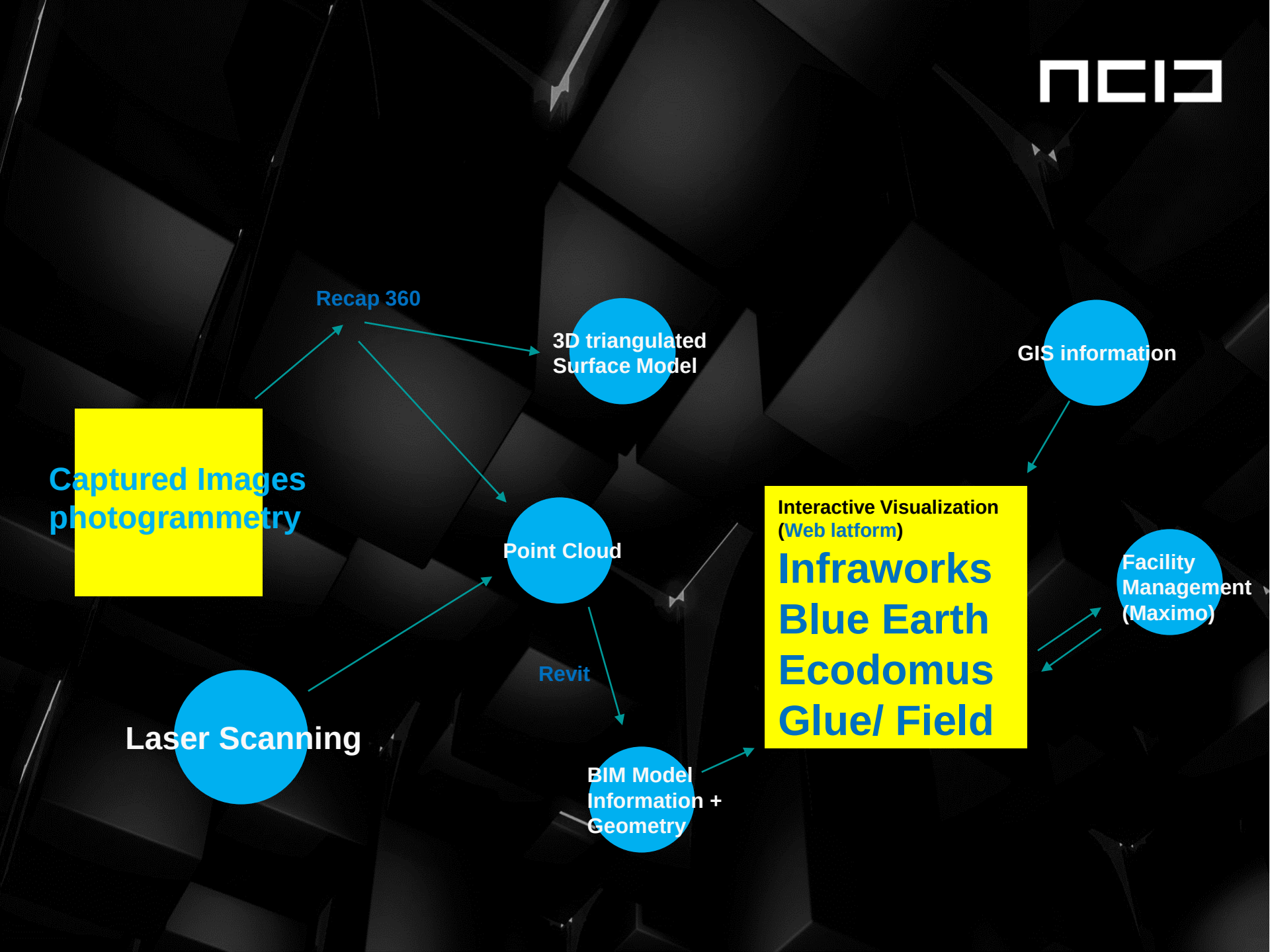
- Point Clouds (Photogrammetry and Laser Scanning)
- O&M Manual, Product Catalogue, Warranty, and etc.
- Other Existing Information

- As-built CAD drawings
- Site Photos – Panorama
- Traditional Site Photos

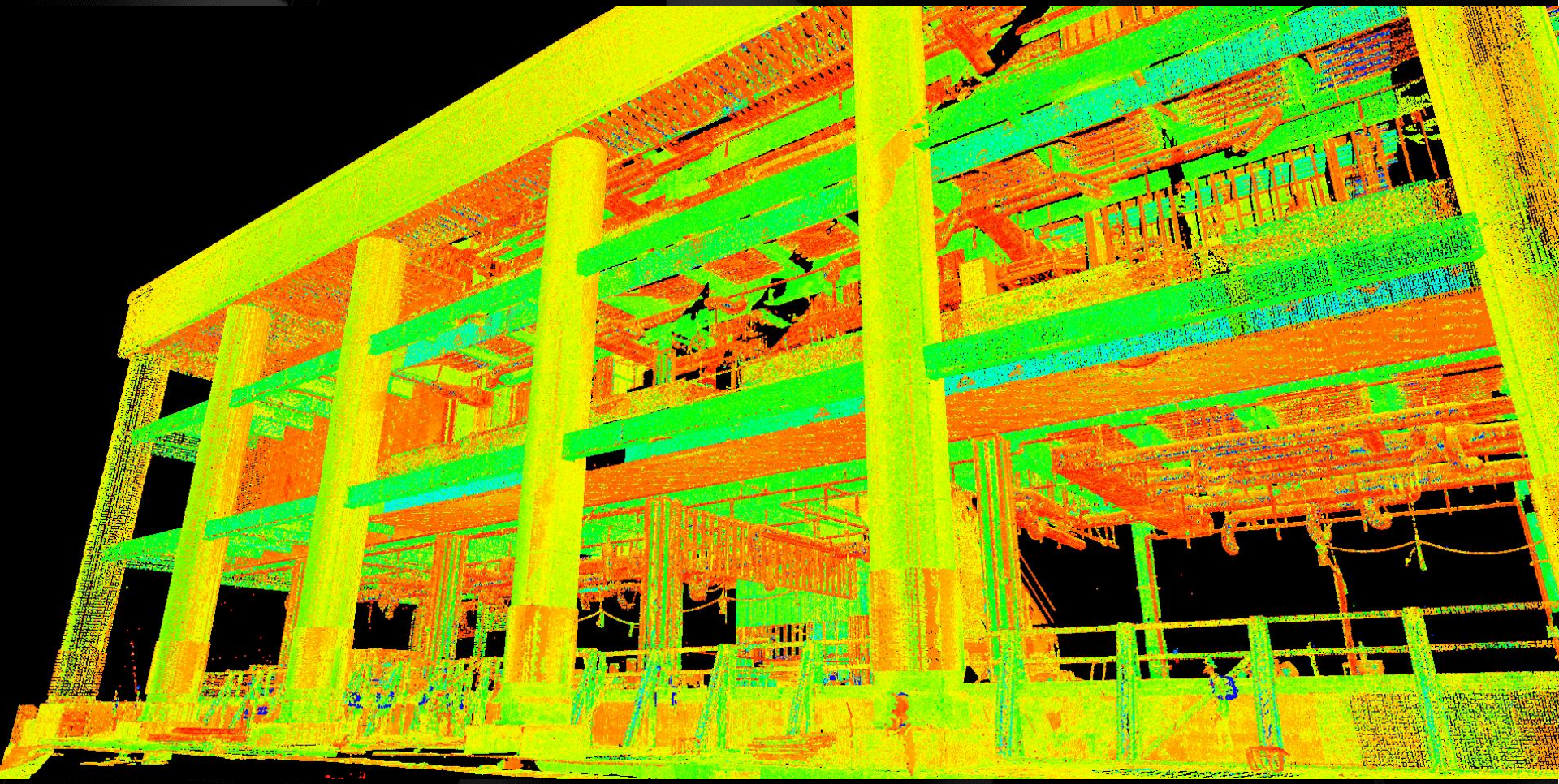
Photogrammetry

- Unmanned Aerial Vehicle (UAV)
- Take aerial photo of VPFS and its surrounding
- High resolution camera
- Autodesk Recap 360 - Point Cloud generation
- Calibration with geo-information and dimensions from Laser scanning

- By using the environment…


Recap 360
3D triangulated Surface Model
GIS information
Captured Images photogrammetry
Point Cloud
Interactive Visualization (Web latform)
Infraworks
Blue Earth
Ecodomus
Glue/ Field
Facility Management (Maximo)
Revit
Laser Scanning
BIM Model Information + Geometry

Laser Scanning

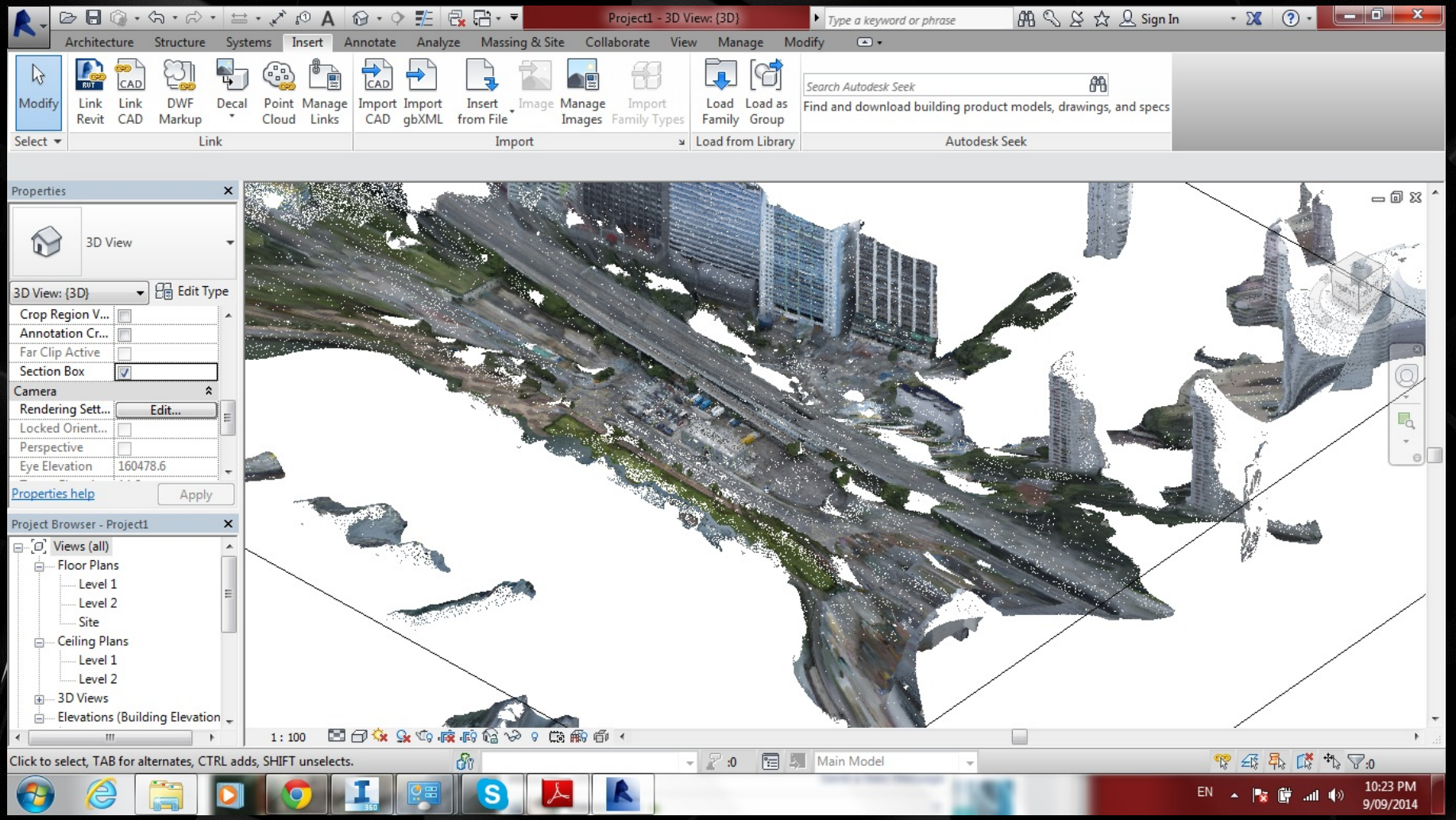


AND ERECTED IN

Captured Images
photogrammetry

Turn into Point Cloud

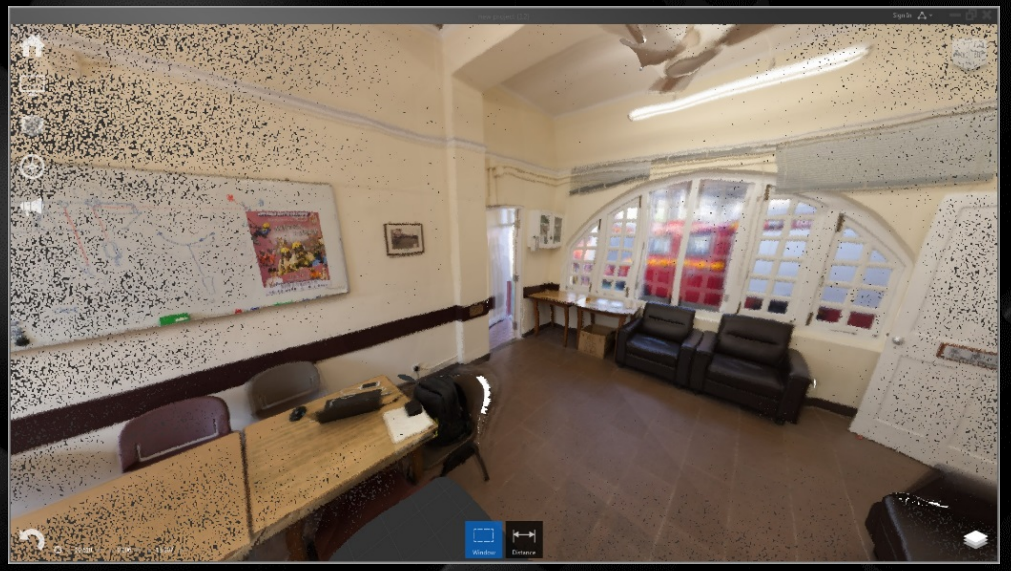
Point Cloud to BIM



- **Or give a bird’s eye view of the setting**

Turn into Point Cloud

Close Range Photogrammetry



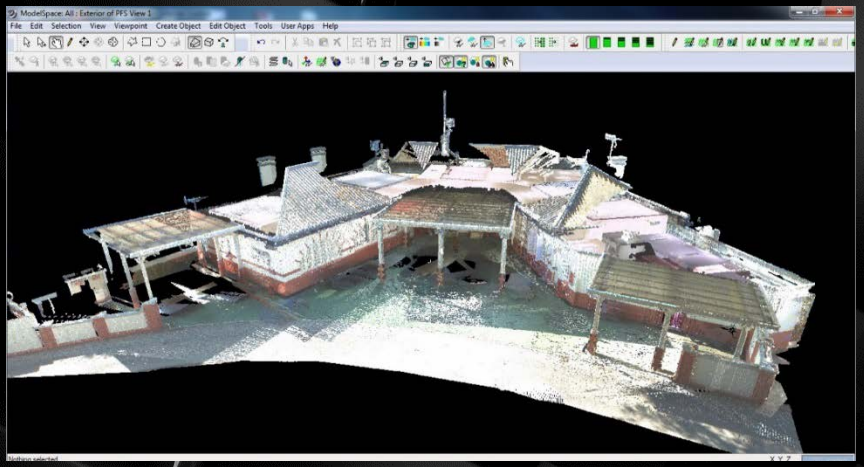
RENDERING | BIM MODEL | POINT CLOUD | REALITY

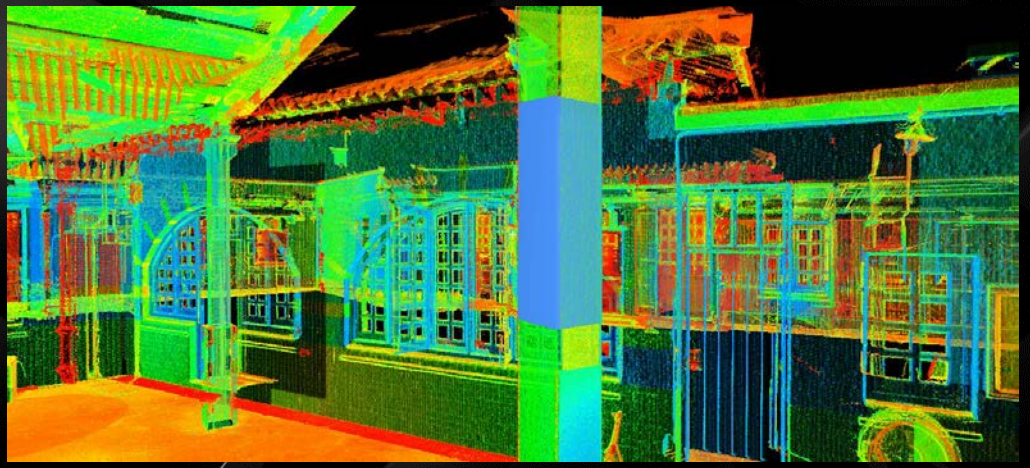
Laser Scanning

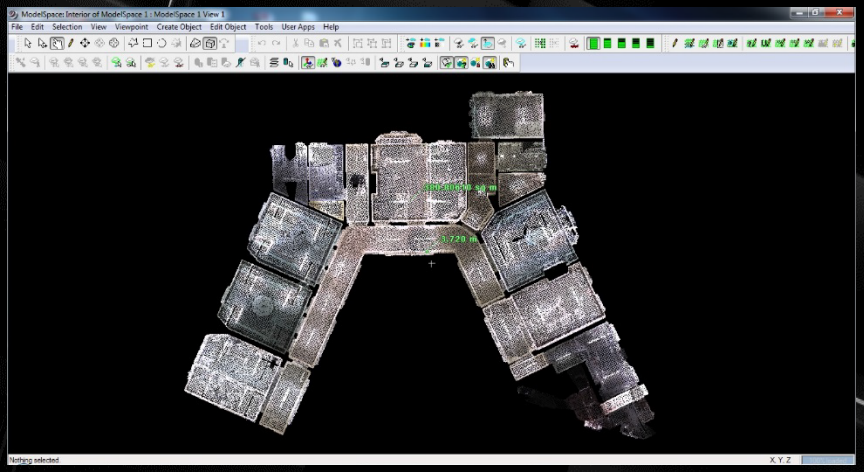
- Collecting accurate dimensions
- Widely used in Civil Engineering
- Quick, efficient, accurate and precise
- Resulting point cloud with true co-ordinates and above sea level
- Internal and External Scanning of VPFS

Laser Scanning

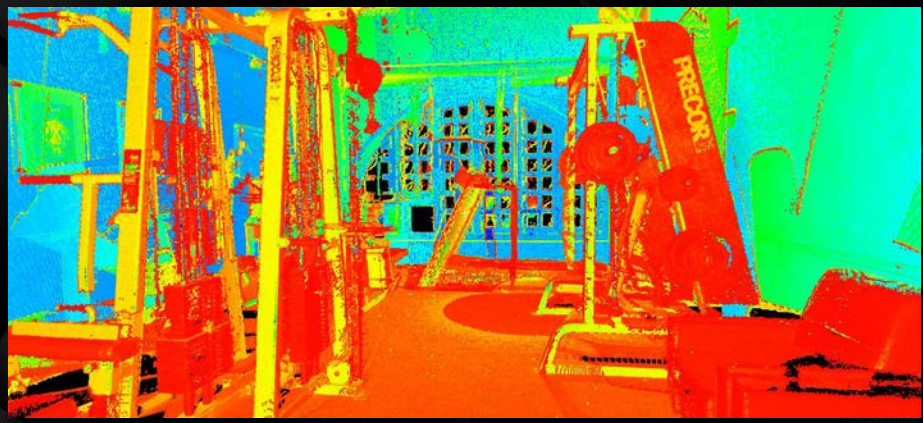
Laser Scanning

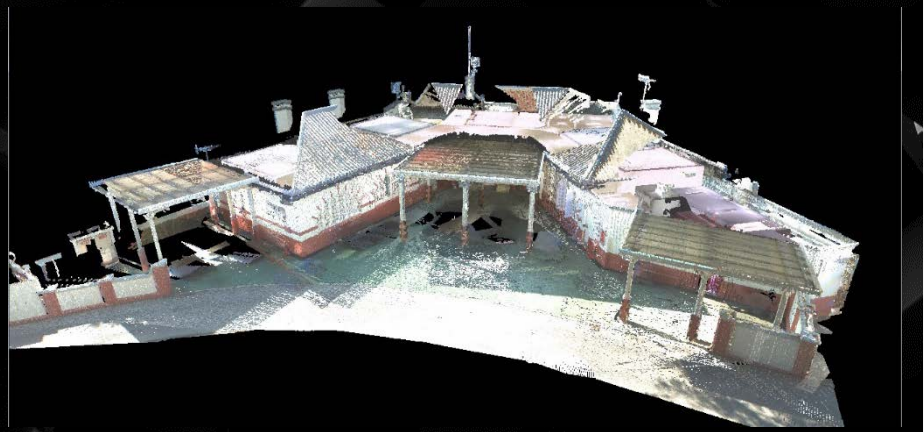




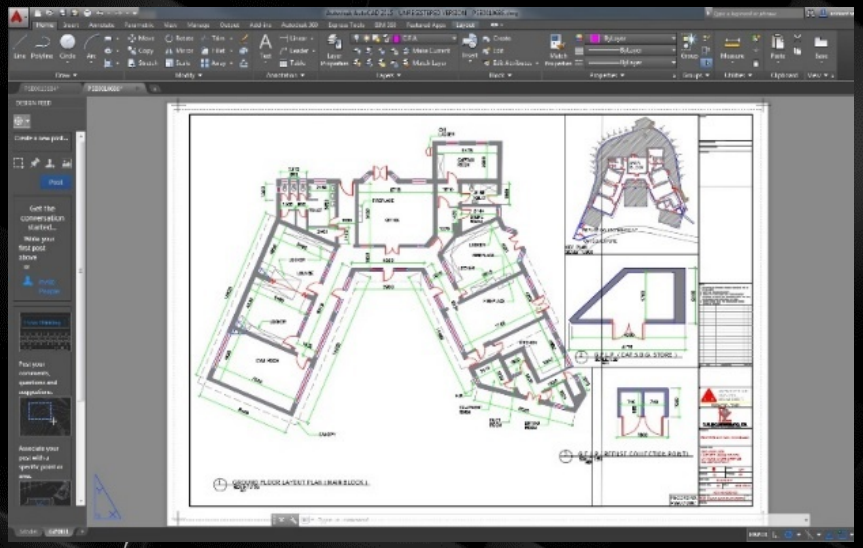


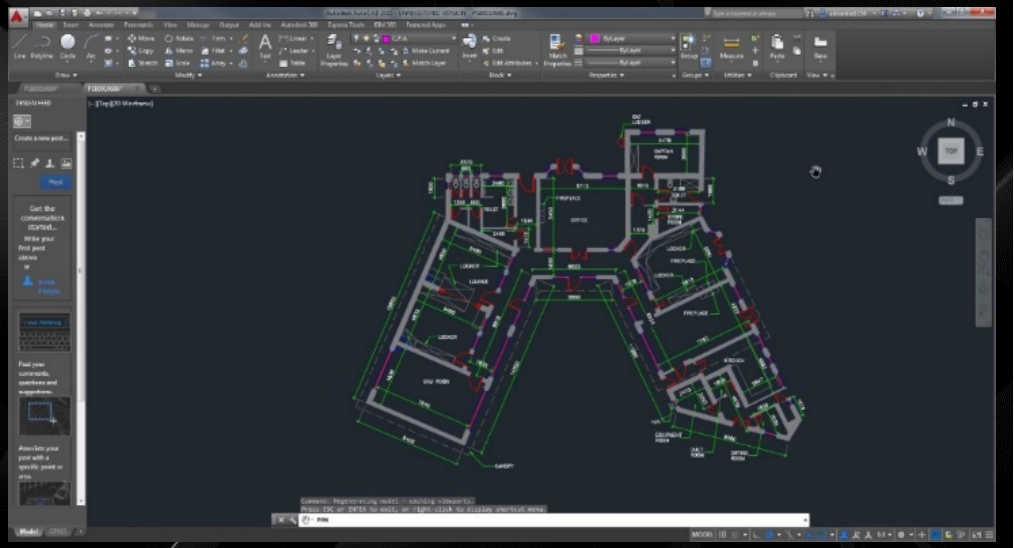
Laser Scanning

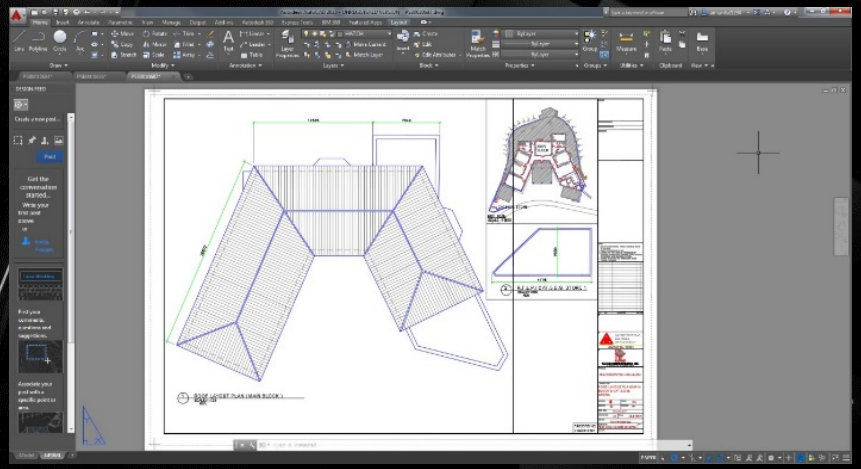


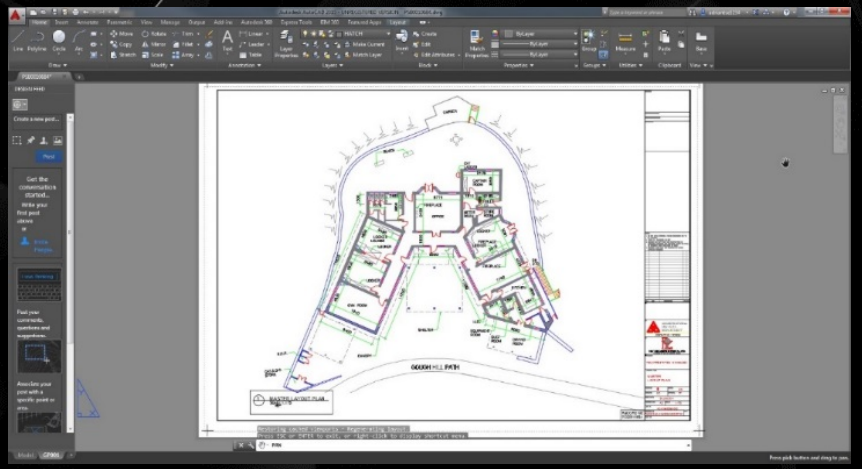


CAD Drawings



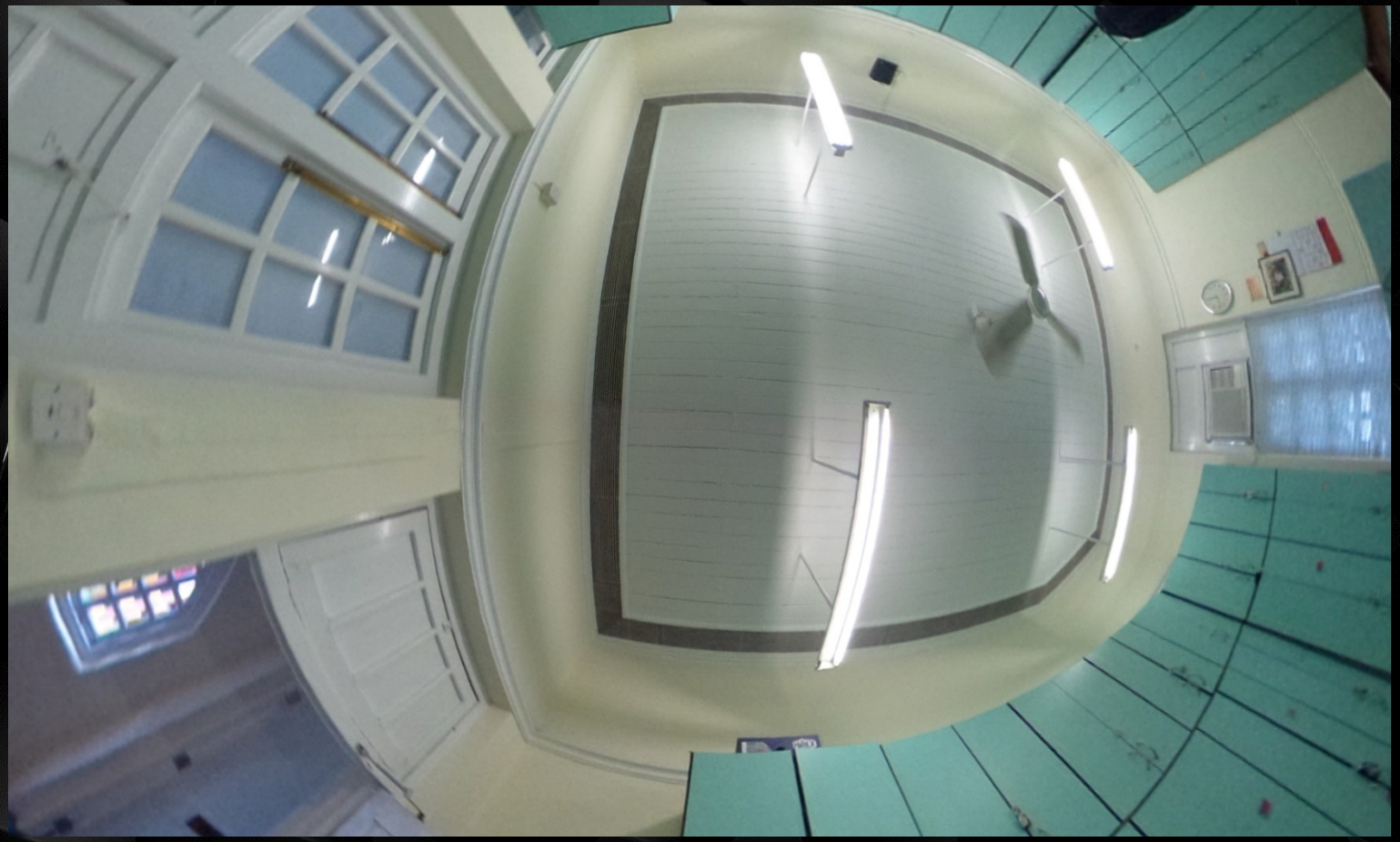






Panorama

Panorama



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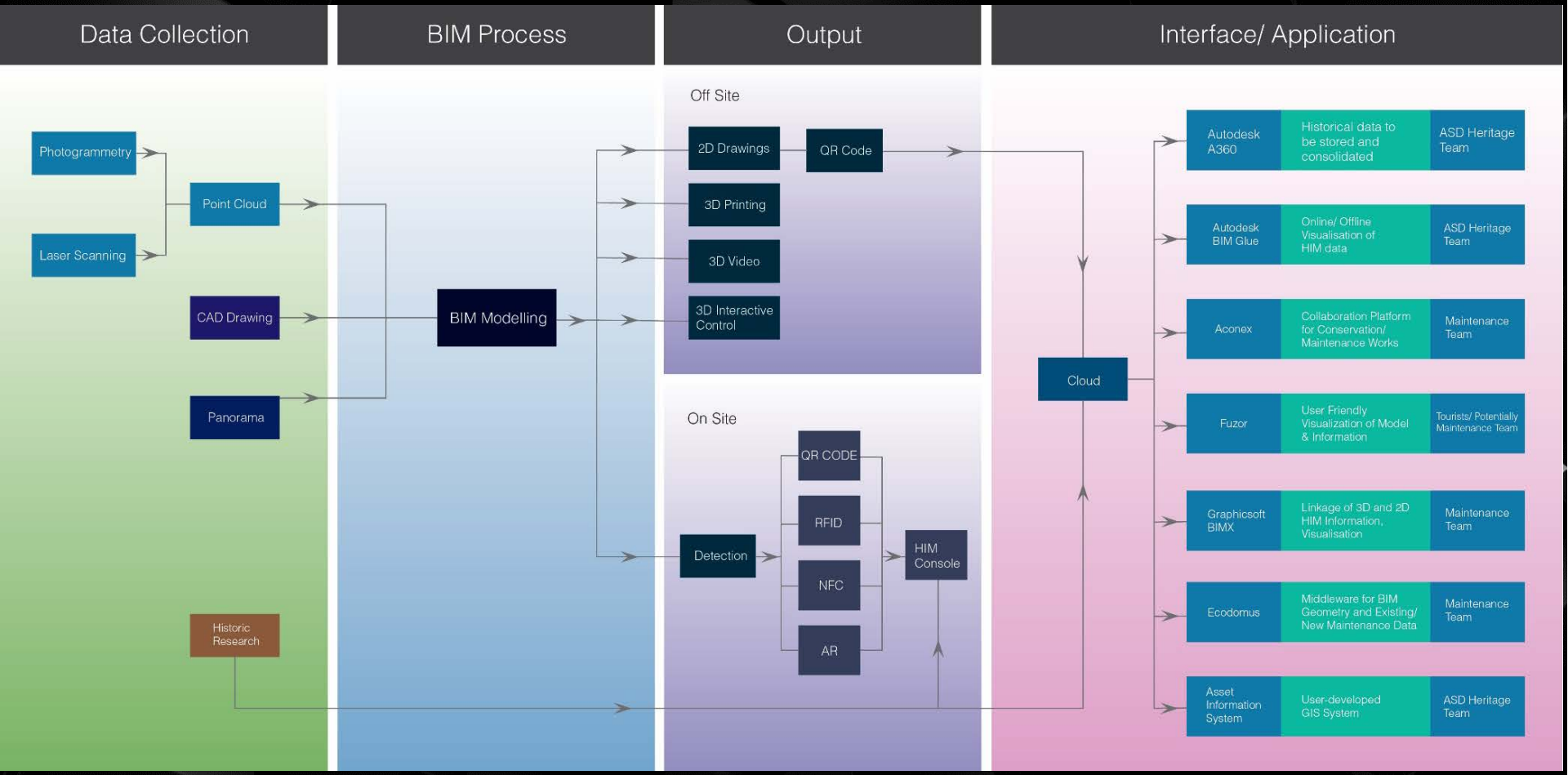
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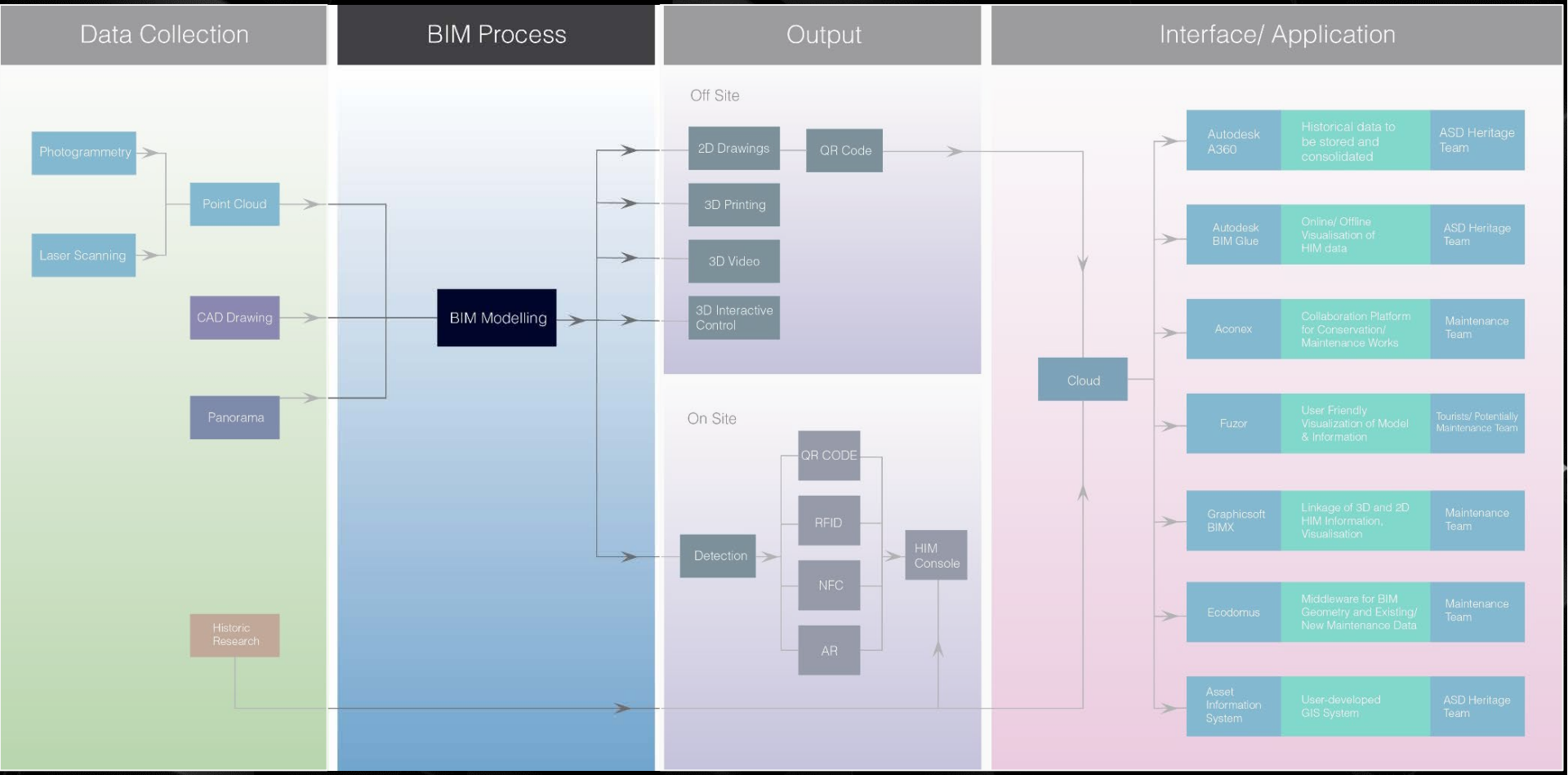
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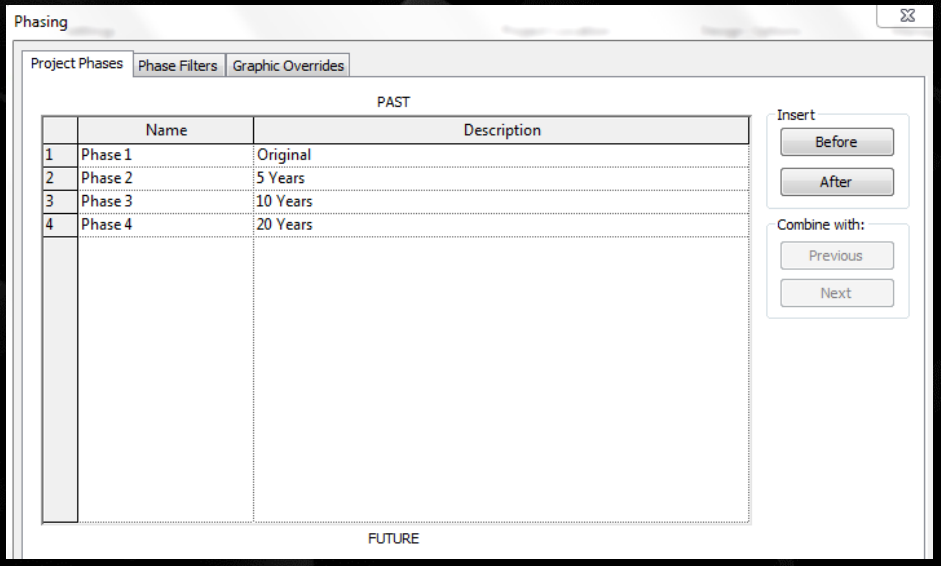
BIM Process

- Phasing
- Significant application of BIM in HIM
- Any building component with two phase parameters
- Phase created
- Phase demolished
- Subdivided into certain Phases
- Illustrate the important historical changes



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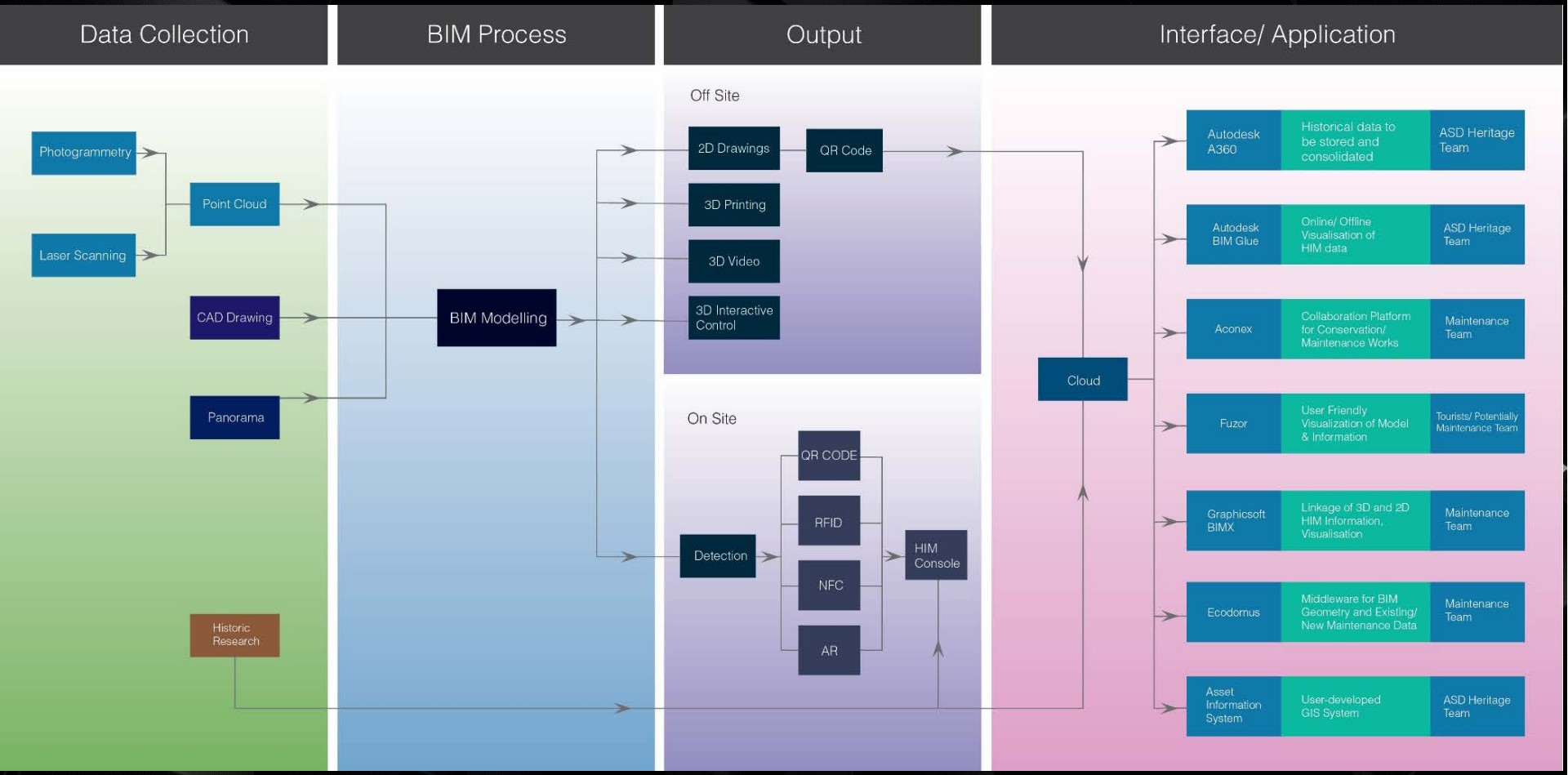
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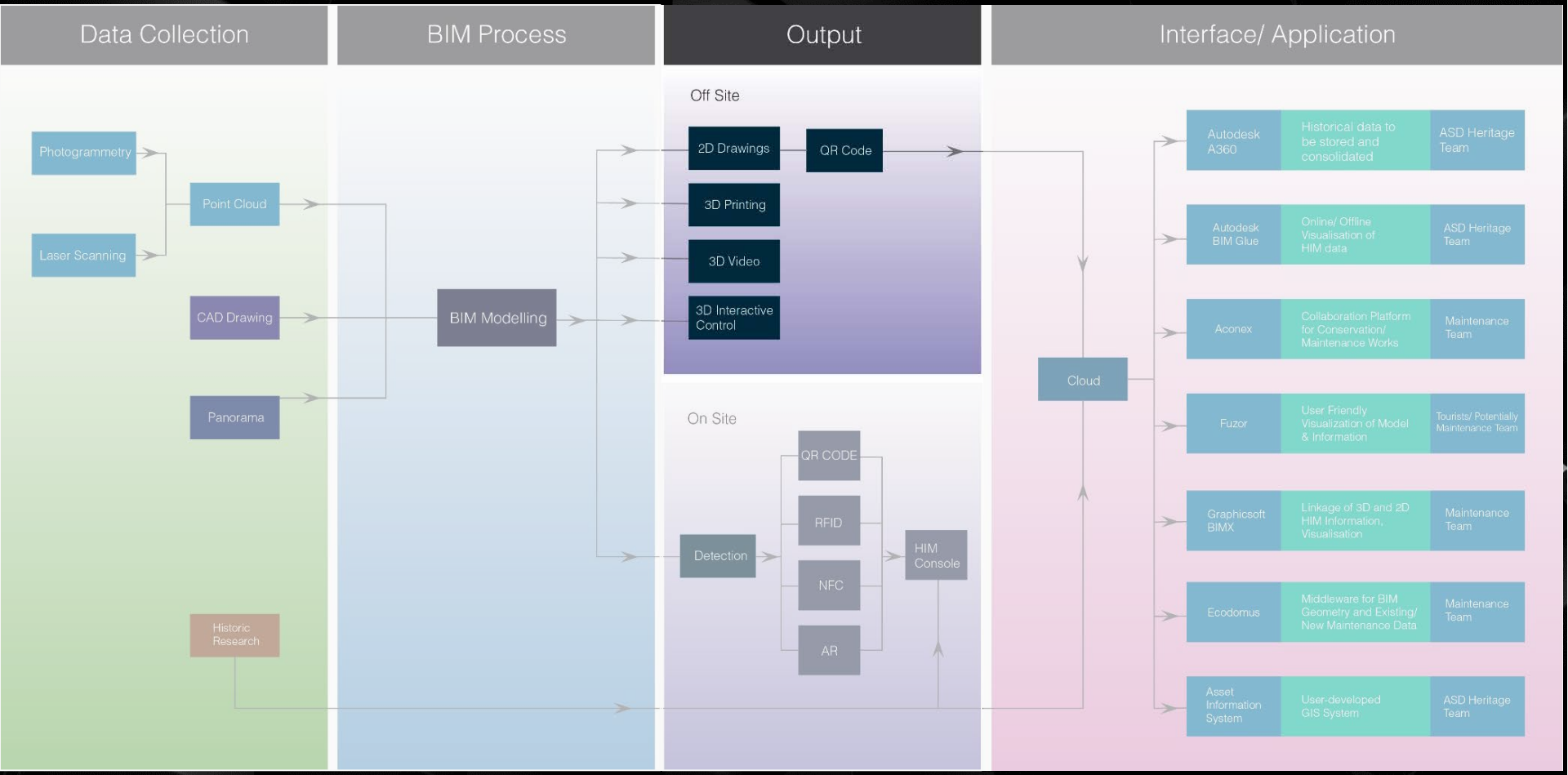
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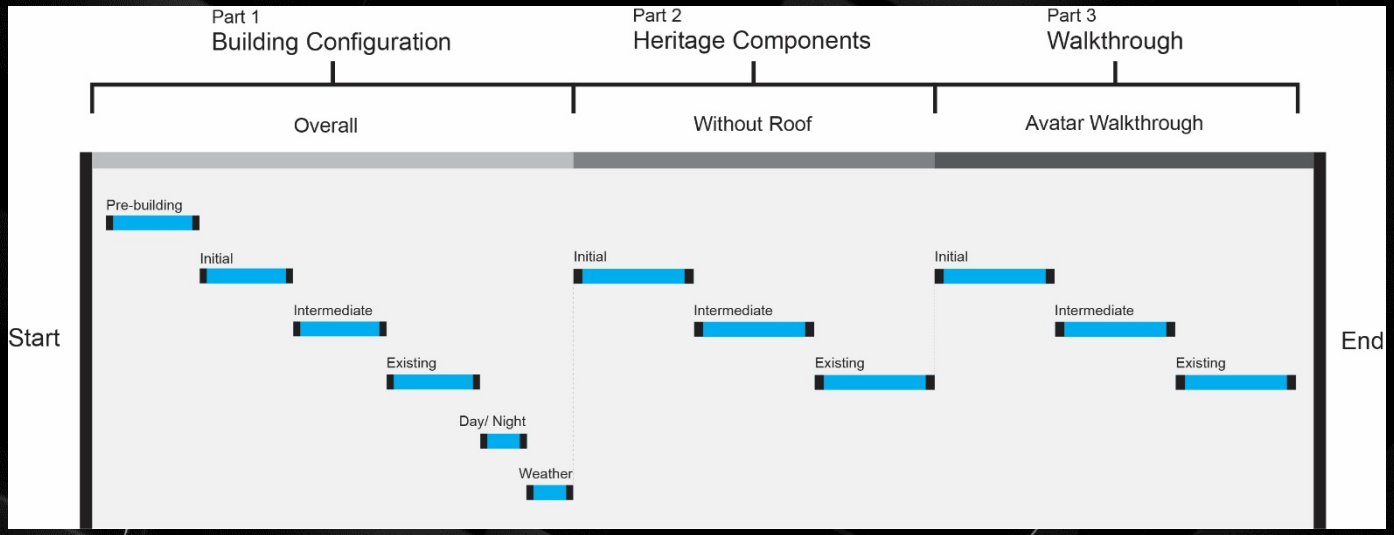
Output

- Off Site
- 2D & 3D Drawings with Time factors + QR Code
- Fuzor: Interactive Control and 3D Video
- On Site - Detection
- Near Field Communication (NFC)
- Radio-Frequency Identification (RFID)
- Augmented Reality (AR) with different tracking methods

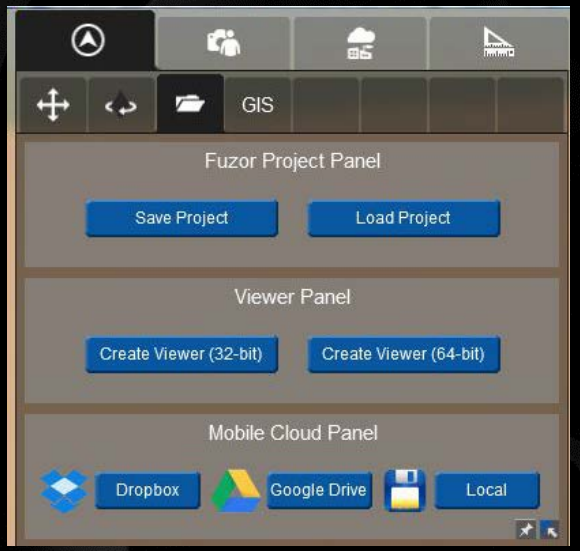
Output (Off-site) - 2D Drawings

Output (Off-site) - 3D Printing

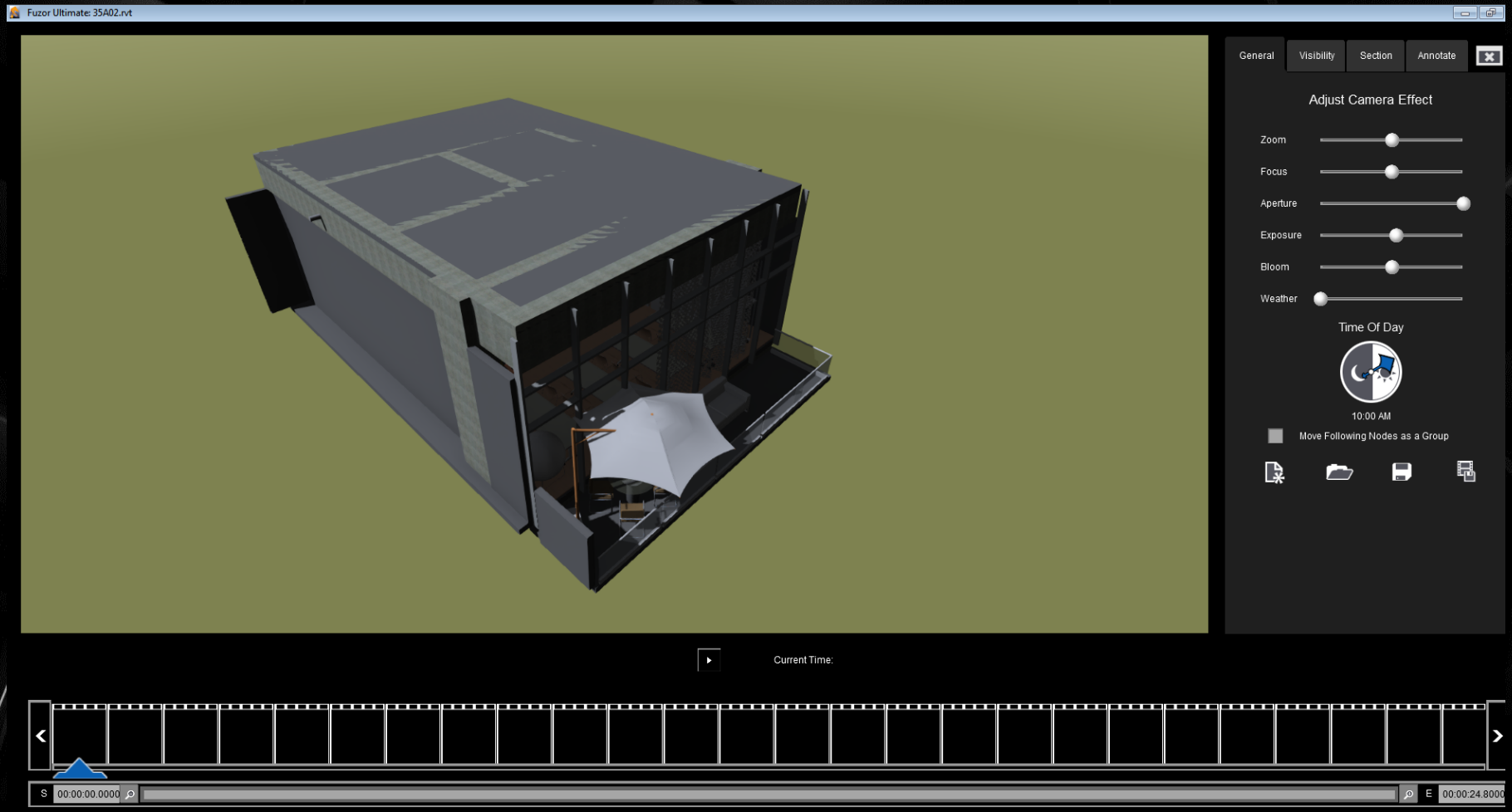
Output (Off-site) - 3D Video



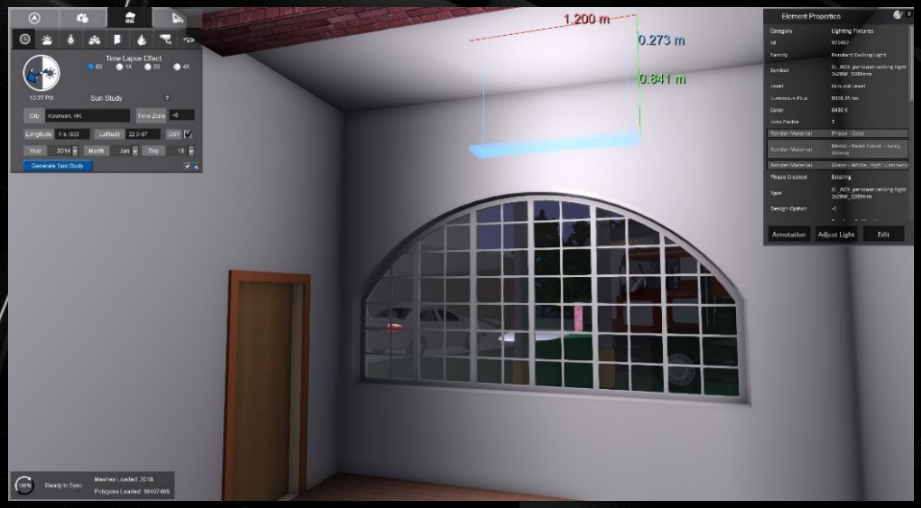
Output (Off-site) - 3D Video

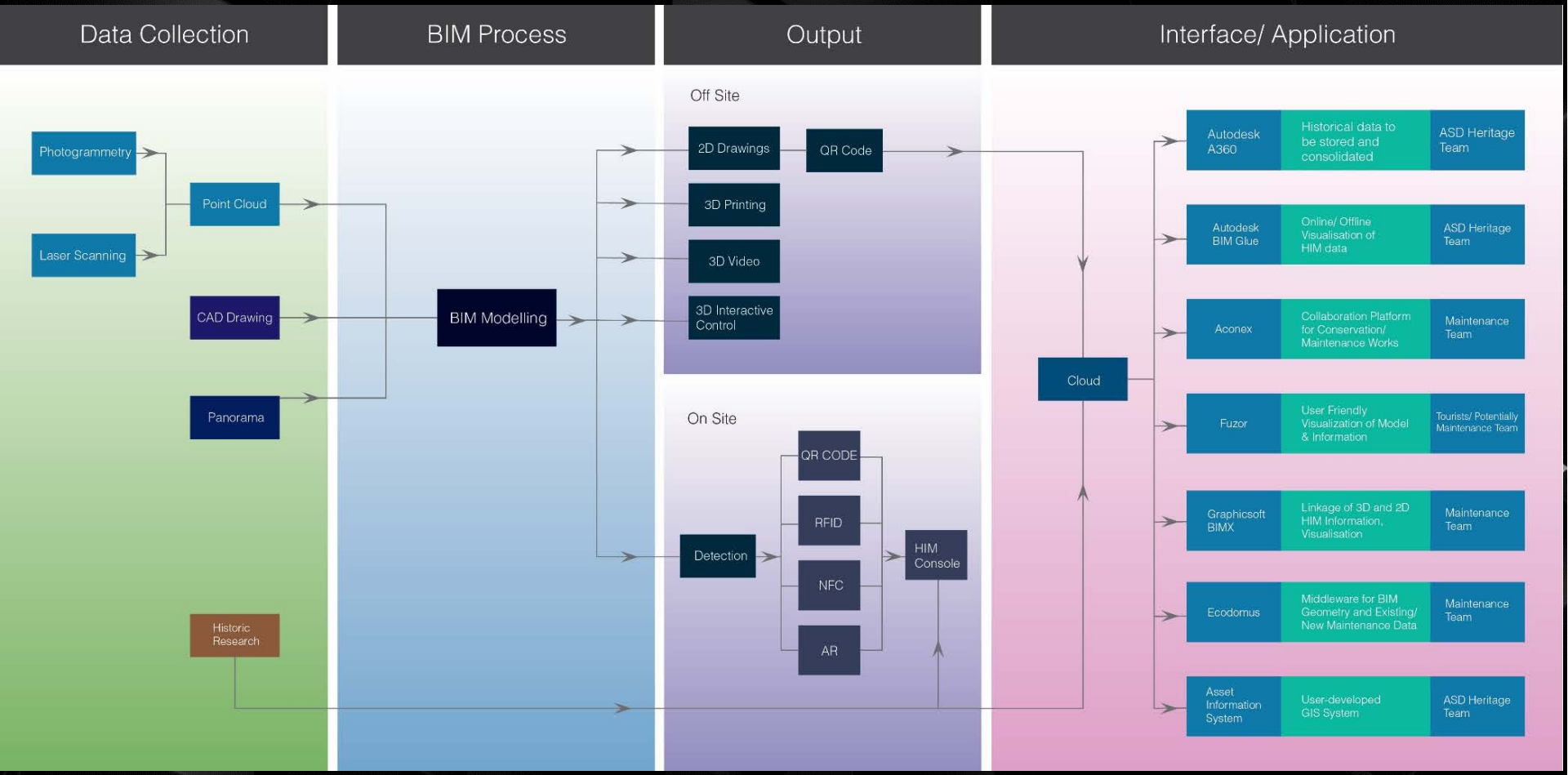


Output (Off-site) - 3D Video



Output (Off-site) - 3D Interactive Control

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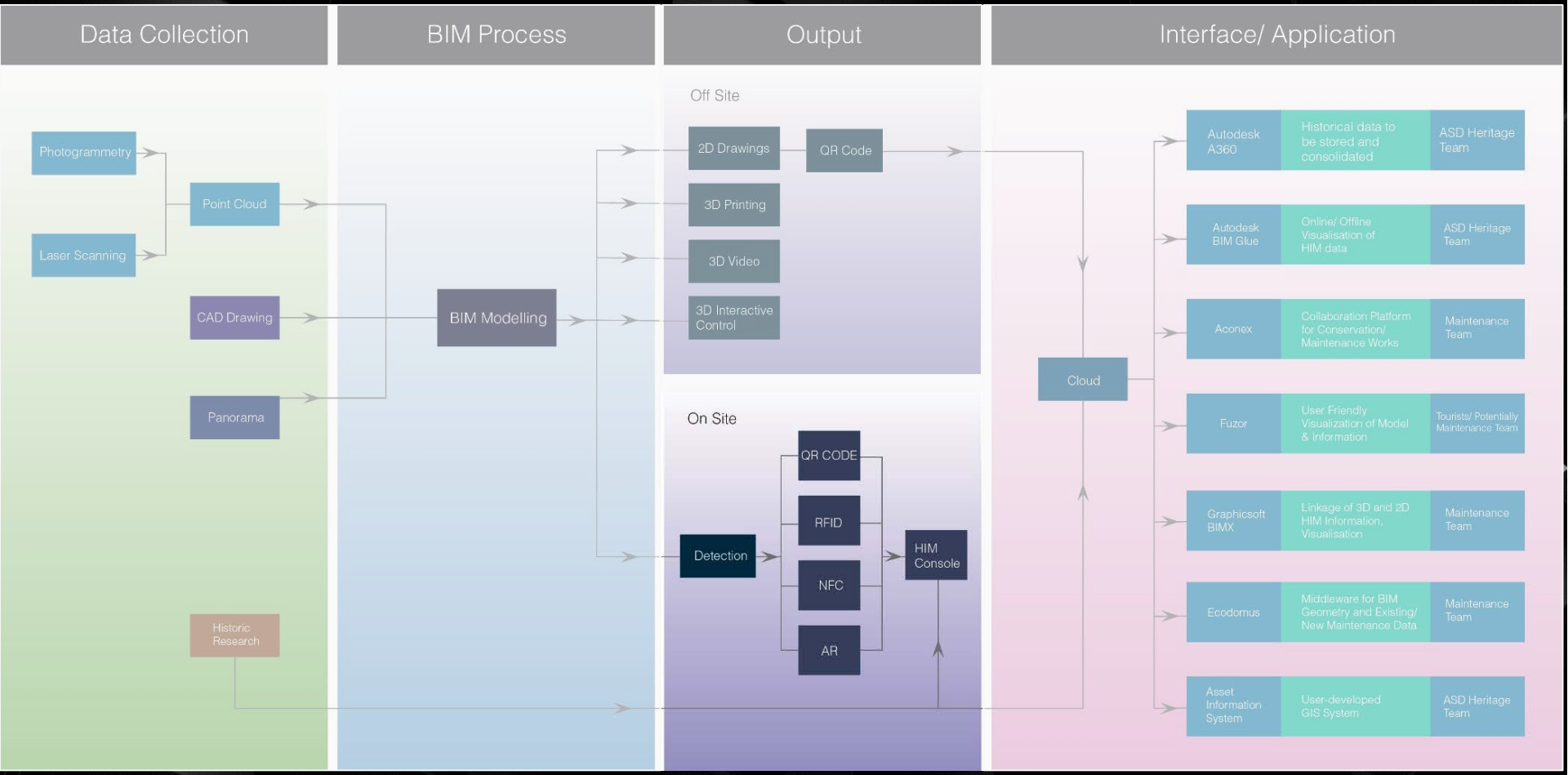
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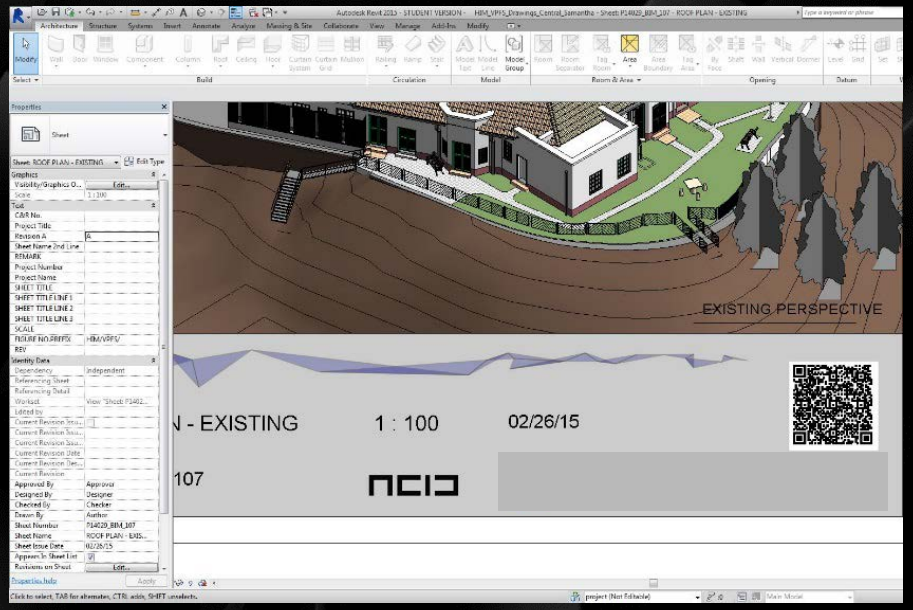
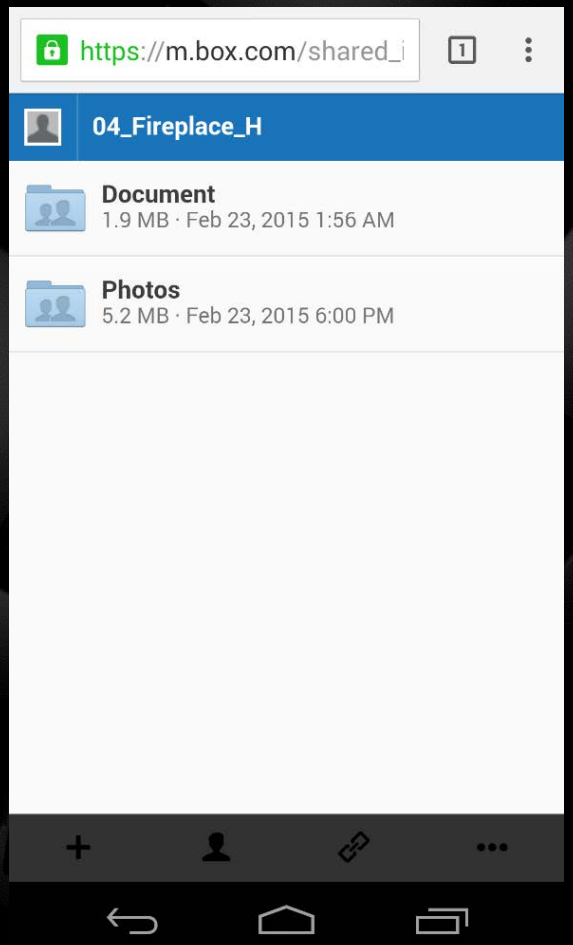
2D & 3D Drawings with Time factors + QR Code

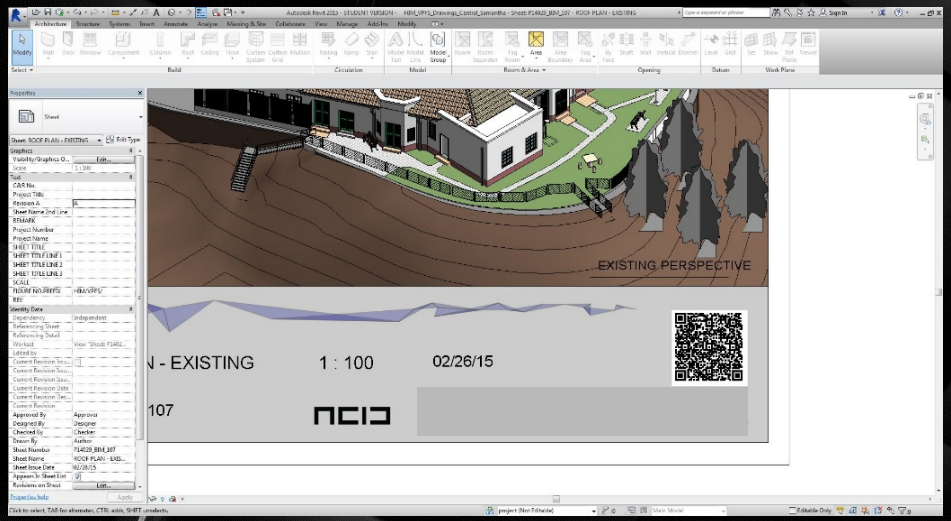
- Traditional Plans, elevations and Sections can be generated with ease
- 3D presentation such as hiding elements, making elements transparent or temporary exploding different components
- Incorporating a unique QR Code at each individual drawings brings the 2D and 3D representations together

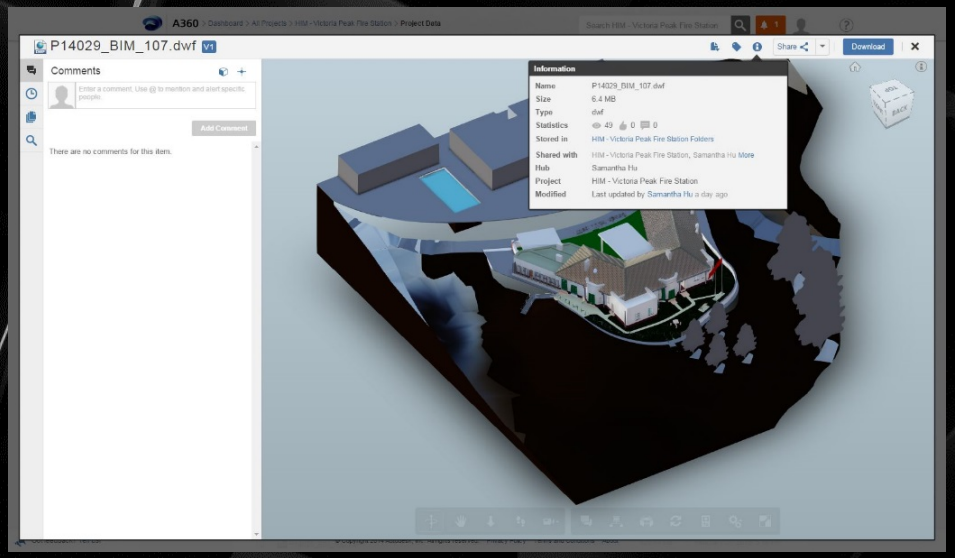


Output (On-site) – Detection - QR Code



QR Code on Drawings





Output (On-site) – Detection - RFID

Output (On-site) – Detection - NFC

NFC & RFID

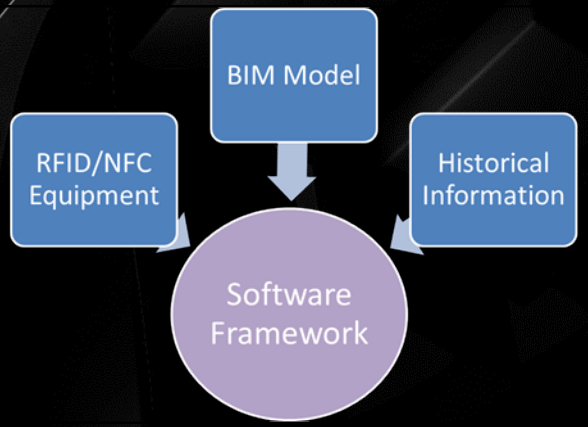
- NFC
- Near Range Detection (5cm)
- is capable of two way communication
- be used for more complex interactions such as card emulation like Octopus Payment
- RFID
- Wide Range Detection (2-10m)
- One way wireless communication, typically between an unpowered RFID tag and a powered RFID reader
- Asset tracking in warehousing, Airport baggage handling, Livestock identification, etc.

NFC & RFID (Cont'd)

RFID & NFC technologies comparison table		
	UHF RFID	NFC
Frequency	800/960Mhz	13.56Mhz
Standards	EPC Gen2	ISO14443A
Communication	1 way	2 way
Reading Rang	2m ~ 10m	5cm
Scan Tags Simultaneously	Yes	No

NFC & RFID (Cont'd)

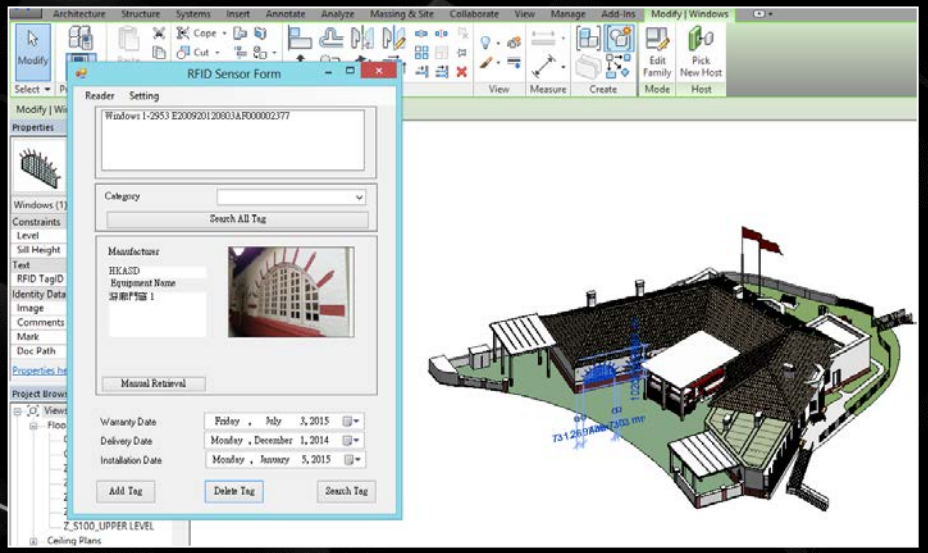
- Software Framework
- Integrate NFC/RFID and BIM by means of the application programming interface (API)
- Revit plug-in software module connect with the RFID/NFC Reader API with a data file



NFC & RFID (Cont'd)

- Provisioning

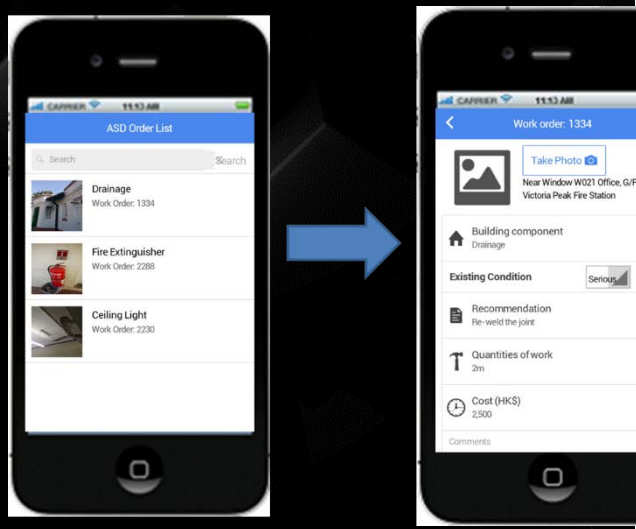
- Create an Element Id directly in Revit API
- Associate a unique integer value to the new Element Id
- Associate the ID with the RFID/NFC tag Id directly



NFC & RFID (Cont'd)

- NFC for Facility Management Mobile Application

- Android mobile application
- Information is retrieved from and input to the system in the back office manually
- NFC tag
- Staff can submit the inspection report and photo on site



Output (On-site) – Detection - AR

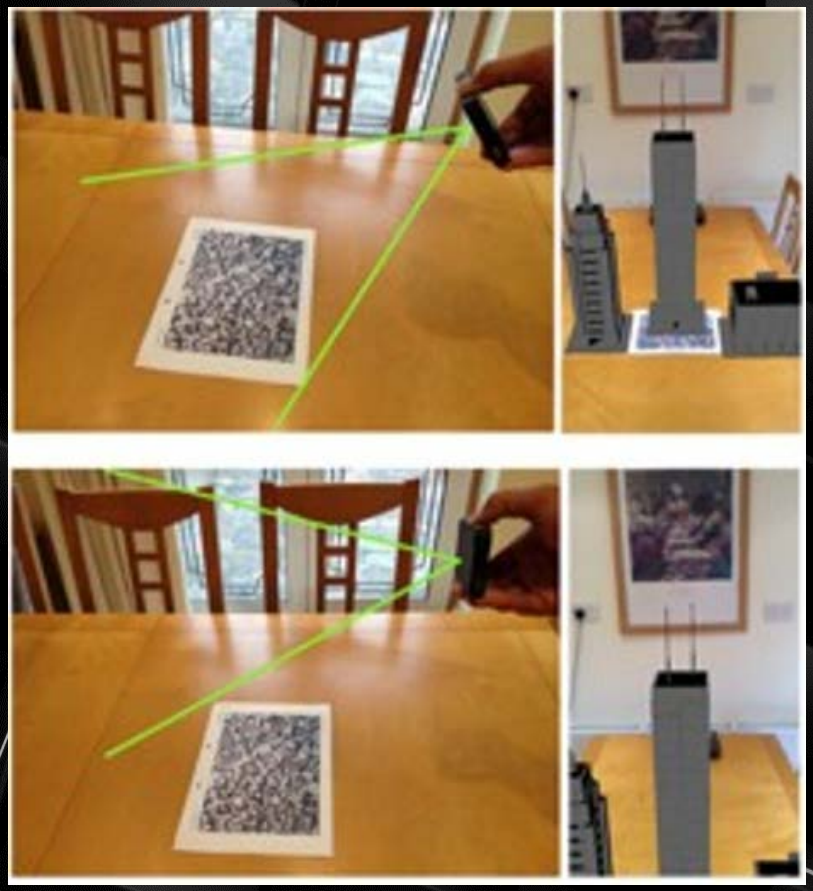
Augmented Reality

- Augmented Reality is a live direct or indirect view of a physical, real-world environment whose elements are augmented by computer-generated sensory input such as sound, video, graphics or GPS data.

- Mobile augmented reality systems use tracking technologies, such as:
- Digital cameras and other optical sensors,
- Accelerometers,
- GPS,
- Gyroscopes,
- Solid state compasses,
- RFID and wireless sensors

- These technologies offer varying levels of accuracy and precision.

Augmented Reality



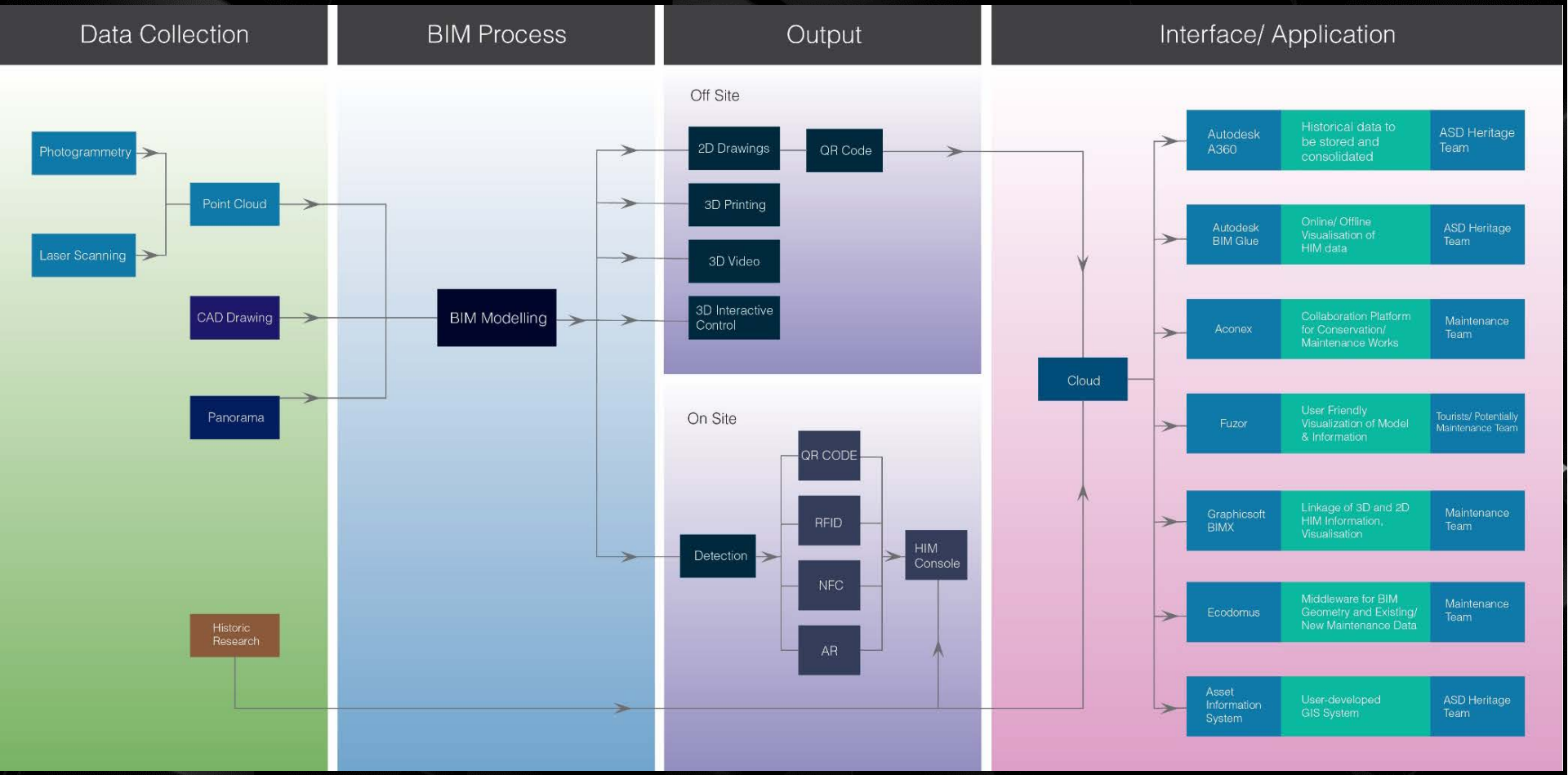
AR (Cont’d)

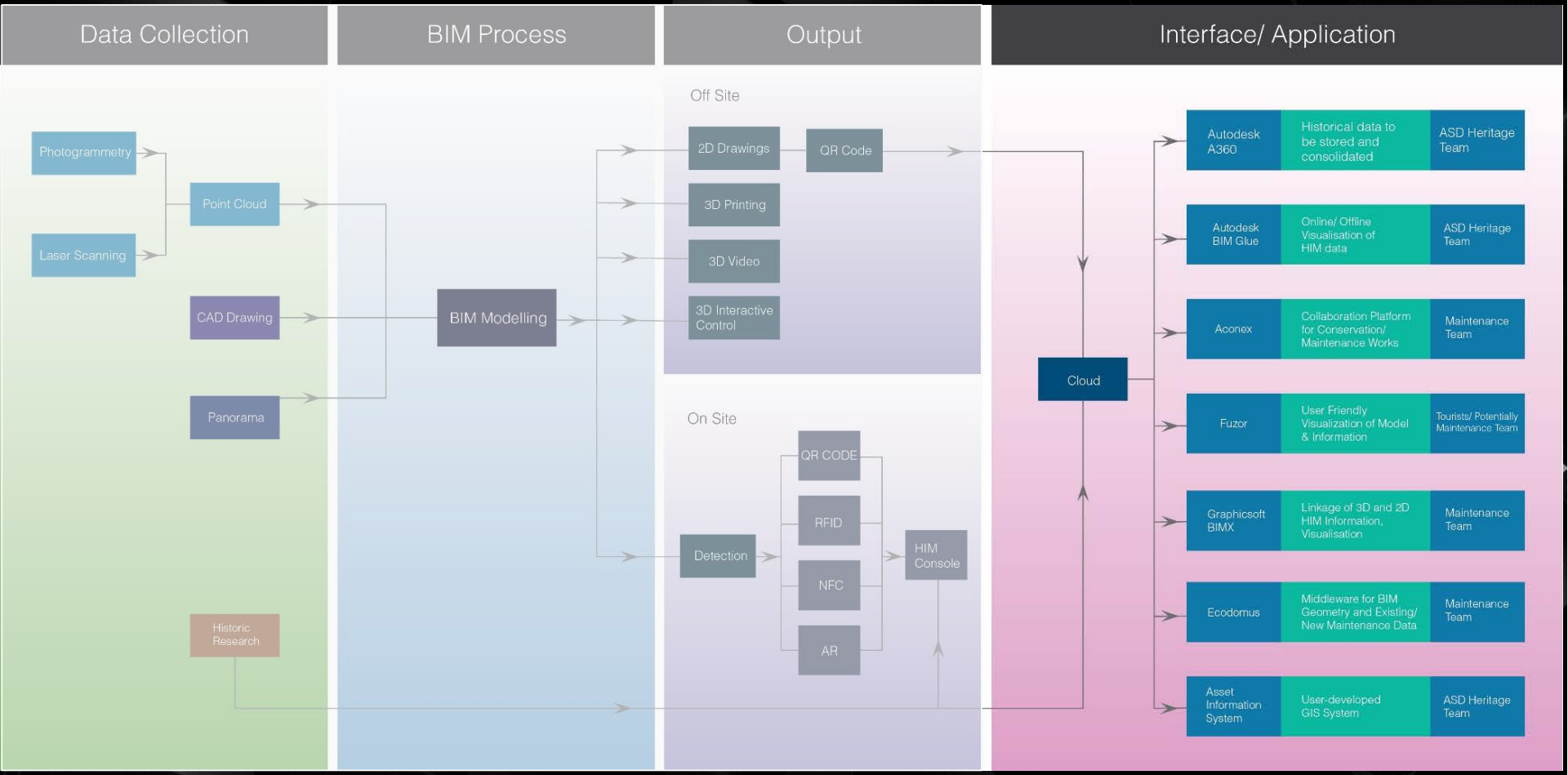
- Various technologies are used in Augmented Reality rendering including:

- Optical projection systems
- Monitors
- Held devices
- Display systems worn on one person

AR (Cont'd)

- Tracking Methods:
  - ❖ Display the building changes
    - ➢ Outdoor positioning using Geographic information system(GIS)
  - ❖ Display the unseen partition (Roof truss)
    - ➢ Indoor positioning using Bluetooth Low Energy triangulation
      - ✓ iBeacon/Beacon
  - ❖ Extended image-based tracking
  - ❖ Object recognition and mapping


Data Collection
BIM Process
Output
Interface/ Application
Photogrammetry
Laser Scanning
Point Cloud
CAD Drawing
Panorama
Historic Research
BIM Modelling
Off Site
2D Drawings
QR Code
3D Printing
3D Video
3D Interactive Control
On Site
QR CODE
RFID
NFC
AR
Detection
HIM Console
Cloud
Autodesk A360
Historical data to be stored and consolidated
ASD Heritage Team
Autodesk BIM Glue
Online/ Offline Visualisation of HIM data
ASD Heritage Team
Aconex
Collaboration Platform for Conservation/ Maintenance Works
Maintenance Team
Fuzor
User Friendly Visualization of Model & Information
Tourists/ Potentially Maintenance Team
Graphicsoft BIMX
Linkage of 3D and 2D HIM Information, Visualisation
Maintenance Team
Ecodomus
Middleware for BIM Geometry and Existing/ New Maintenance Data
Maintenance Team
Asset Information System
User-developed GIS System
ASD Heritage Team


Data Collection
BIM Process
Output
Interface/ Application
Photogrammetry
Laser Scanning
Point Cloud
CAD Drawing
Panorama
Historic Research
BIM Modelling
Off Site
2D Drawings
QR Code
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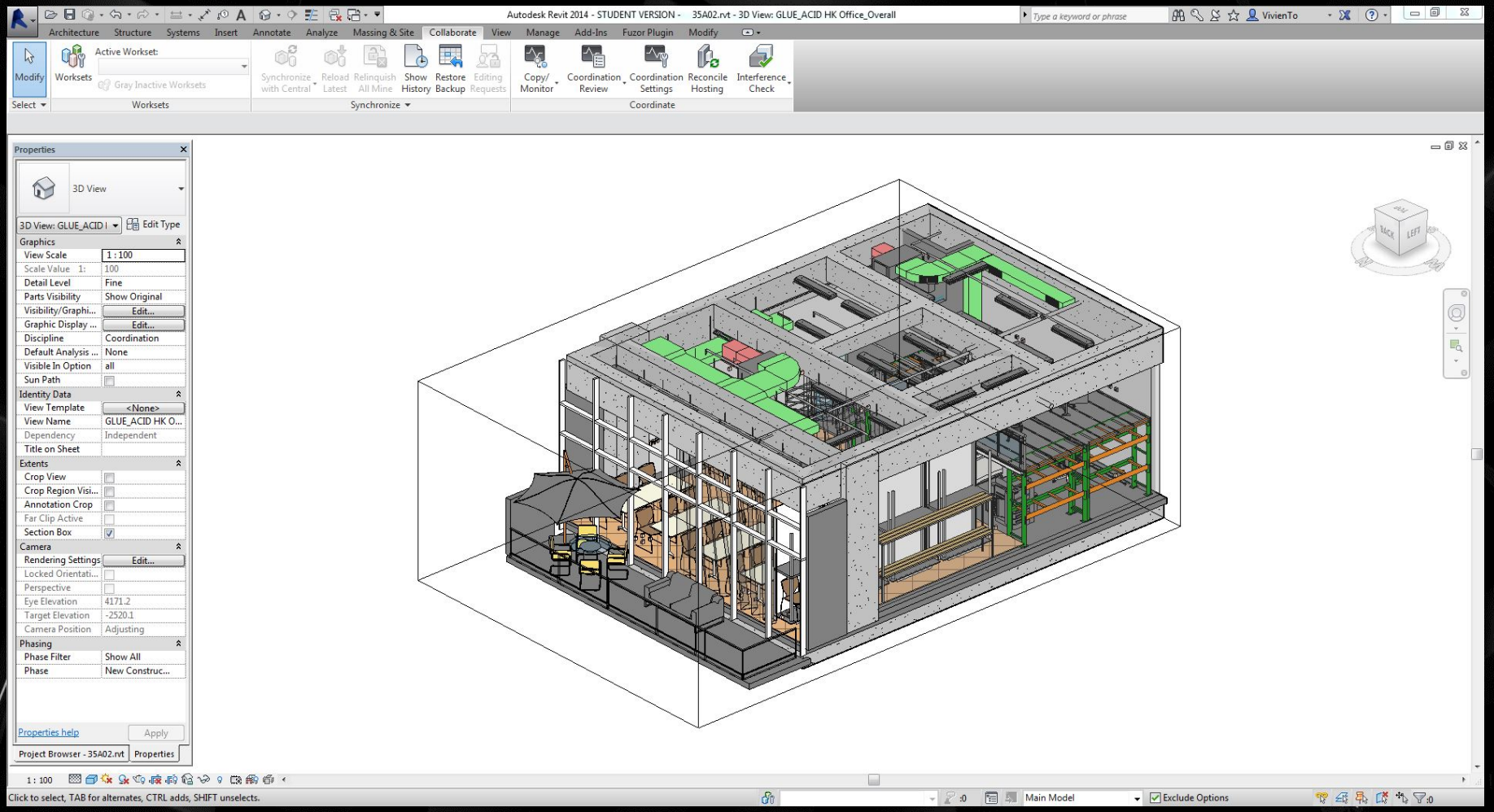
ASD Heritage Team

Interface / Application

- Autodesk A360
- Autodesk BIM Glue
- Aconex
- Fuzor
- Ecodomus

Autodesk A360

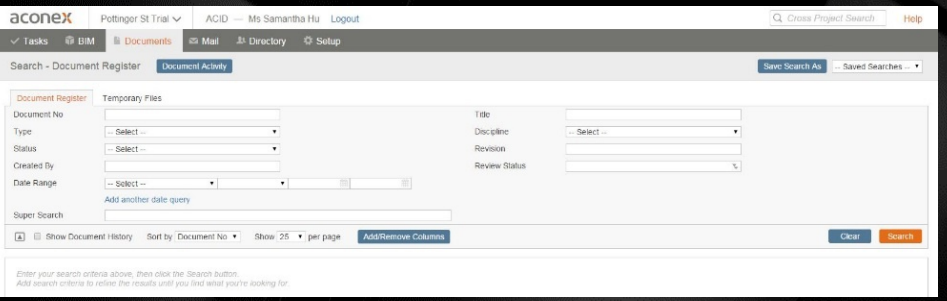


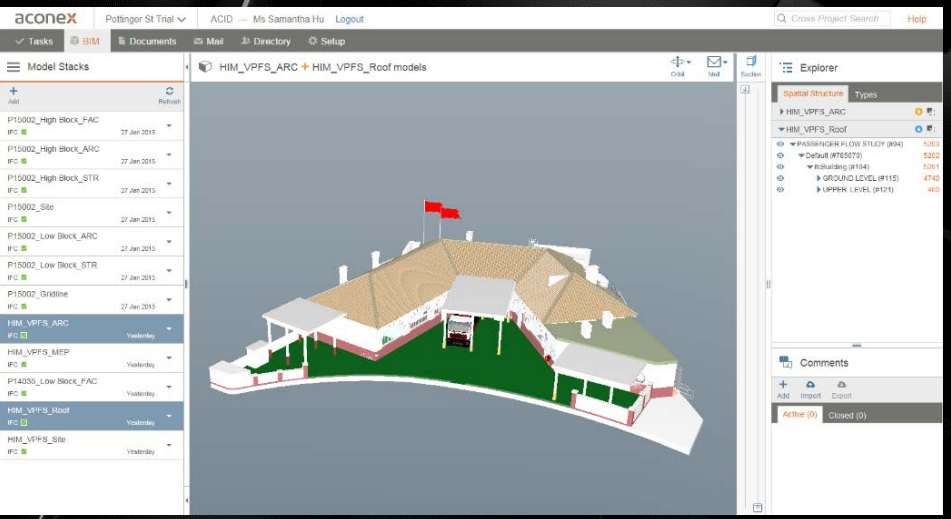
Autodesk BIM Glue

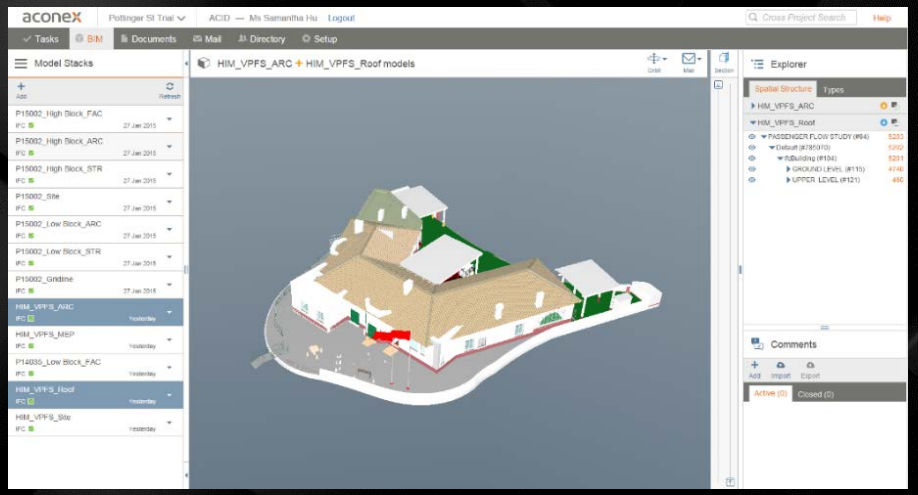
Autodesk BIM Glue

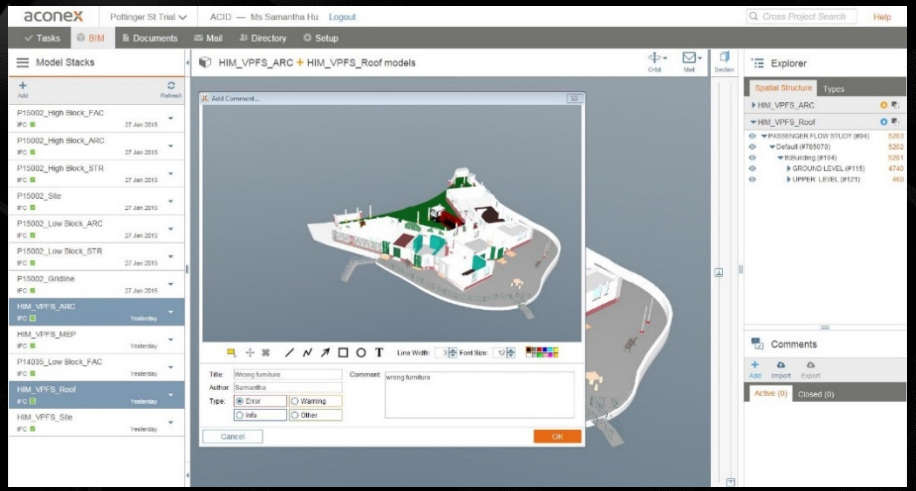
Autodesk BIM Glue

Aconex

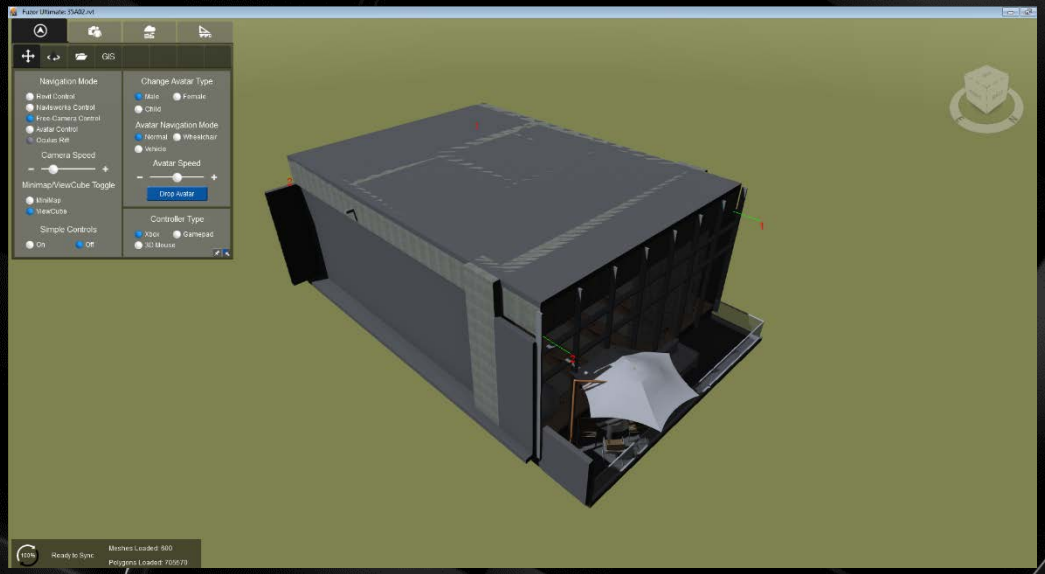

aconex
Pottinger St Trial
ACID — Ms Samantha Hu
Logout
Tasks
BIM
Documents
Mail
Directory
Setup
Search - Document Register
Document Activity
Save Search As
Saved Searches
Document Register
Temporary Files
Document No
Title
Type
Discipline
Status
Revision
Created By
Review Status
Date Range
Add another date query
Super Search
Show Document History
Sort by: Document No
Show: 25 per page
Add/Remove Columns
Clear
Search
Enter your search criteria above, then click the Search button.
Add search criteria to refine the results until you find what you're looking for.

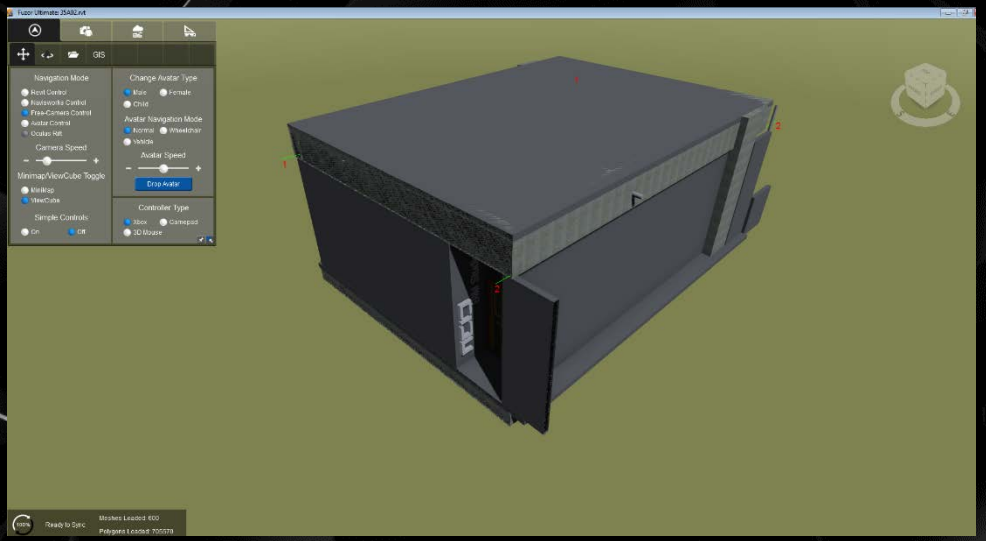

aconex
Pottinger St Trial
ACID — Ms Samantha Hu
Logout
Tasks
BIM
Documents
Mail
Directory
Setup
Model Stacks
HIM_VPFS_ARC + HIM_VPFS_Roof models
Explorer
Spatial Structure
Types
HIM_VPFS_ARC
HIM_VPFS_Roof
Comments
Active (0)
Closed (0)


aconex
Pottinger St Trial
ACID — Ms Samantha Hu
Logout
Tasks
BIM
Documents
Mail
Directory
Setup
Model Stacks
HIM_VPFS_ARC + HIM_VPFS_Roof models
Explorer
Spatial Structure
Types
HIM_VPFS_ARC
HIM_VPFS_Roof
Comments
Active (0)
Closed (0)


aconex
Pottinger St Trial
ACID — Ms Samantha Hu
Logout
Tasks
BIM
Documents
Mail
Directory
Setup
Model Stacks
HIM_VPFS_ARC + HIM_VPFS_Roof models
Explorer
Spatial Structure
Types
HIM_VPFS_ARC
HIM_VPFS_Roof
Comments
Active (0)
Closed (0)
Cancel
OK

Fuzor


GIS
Navigation Mode
Revit Control
Navisworks Control
Free-Camera Control
Avatar Control
Oculus Rift
Camera Speed
Minimap/ViewCube Toggle
Minimap
ViewCube
Simple Controls
On
Off
Change Avatar Type
Male
Female
Child
Avatar Navigation Mode
Normal
Wheelchair
Vehicle
Avatar Speed
Drop Avatar
Controller Type
Xbox
Gamepad
3D Mouse
Ready to Sync


GIS
Navigation Mode
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Navisworks Control
Free-Camera Control
Avatar Control
Oculus Rift
Camera Speed
Minimap/ViewCube Toggle
Minimap
ViewCube
Simple Controls
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Off
Change Avatar Type
Male
Female
Child
Avatar Navigation Mode
Normal
Wheelchair
Vehicle
Avatar Speed
Drop Avatar
Controller Type
Xbox
Gamepad
3D Mouse
Ready to Sync

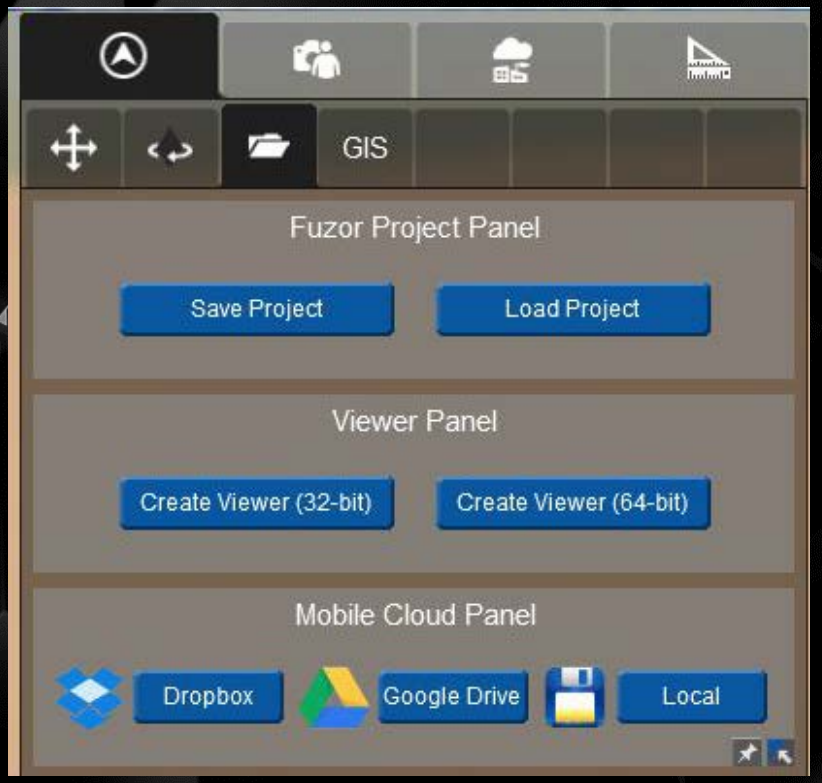
Fuzor

Fuzor Ultimate: 35A02.rvt
HD Screenshot Settings
3840 x 2160
5760 x 3240
7680 x 4320
11520 x 6480
15360 x 8640
Take Screenshot
Cinematic Option
Take Cinematic
Walkthrough Video
Ready to Sync
Meshes Loaded: 600
Polygons Loaded: 705570

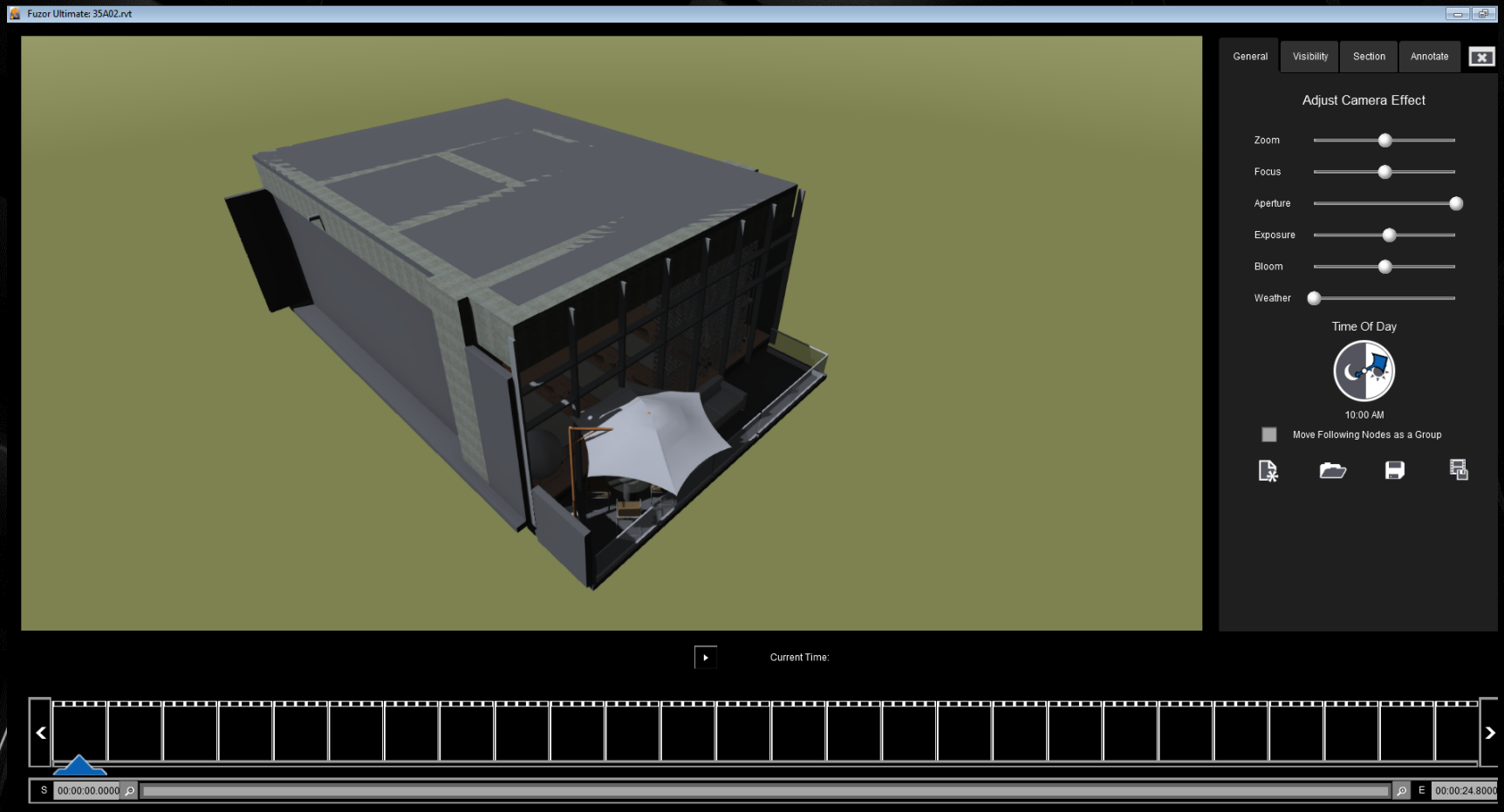
Fuzor

Adjust Camera Effect
Time Of Day

1.300 m
2.240 m


GIS
Fuzor Project Panel
Save Project
Load Project
Viewer Panel
Create Viewer (32-bit)
Create Viewer (64-bit)
Mobile Cloud Panel
Dropbox
Google Drive
Local

Fuzor

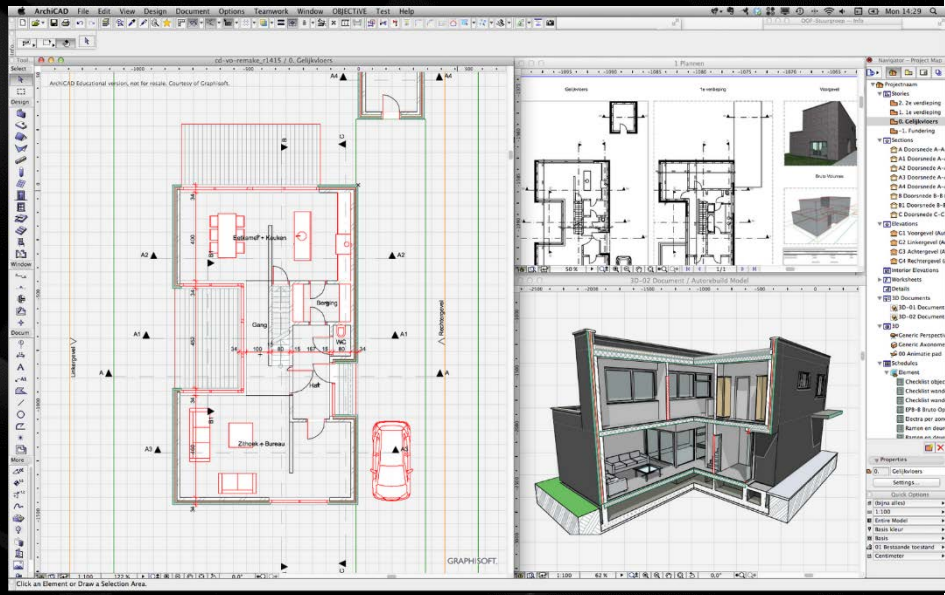

Fuzor Ultimate: 35A02.rvt
General
Visibility
Section
Annotate
Adjust Camera Effect
Zoom
Focus
Aperture
Exposure
Bloom
Weather
Time Of Day
10:00 AM
Move Following Nodes as a Group
Current Time:
S
00:00:00.0000
E
00:00:24.8000

Fuzor

Avatar Customization
Fitness
Entourage Settings
Entourage Placement
Create Path
Delete Path
Male Business
Entourage Manager
Sedan Mod0
Male Business1
Male Business2
Element Properties
Annotation
Edit
0.370 m
4.270 m

BIMx

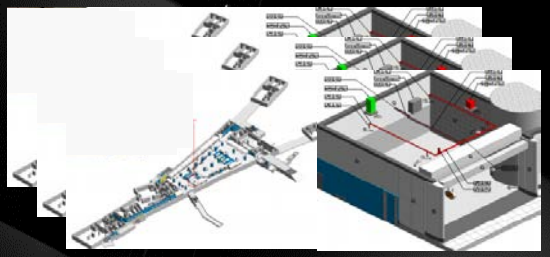
1:03
A-01.4 First floor
History
A-01.4 First floor
A-02.1 A1 Section
A-03.1 South Elevation
Favorites
History
Relevants
South Elevation


ArchiCAD File Edit View Design Document Options Teamwork Window OBJECTIVE Test Help
GRAPHISOFT

Possible Asset Management

MODELLING + INDIVIDUAL DATABASE

S1



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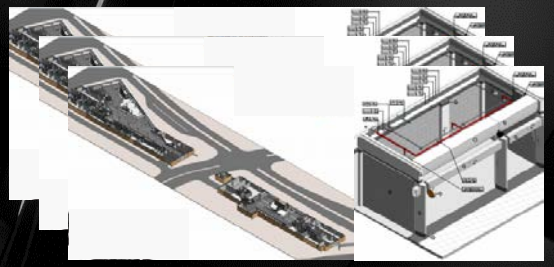

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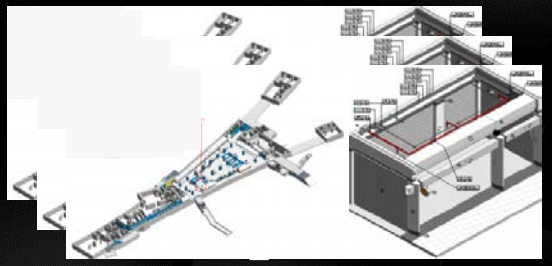


FLEET WIDE DATABASE

MEGA DATABASE

OTHER DATABASES

APPLICATIONS

APP 1

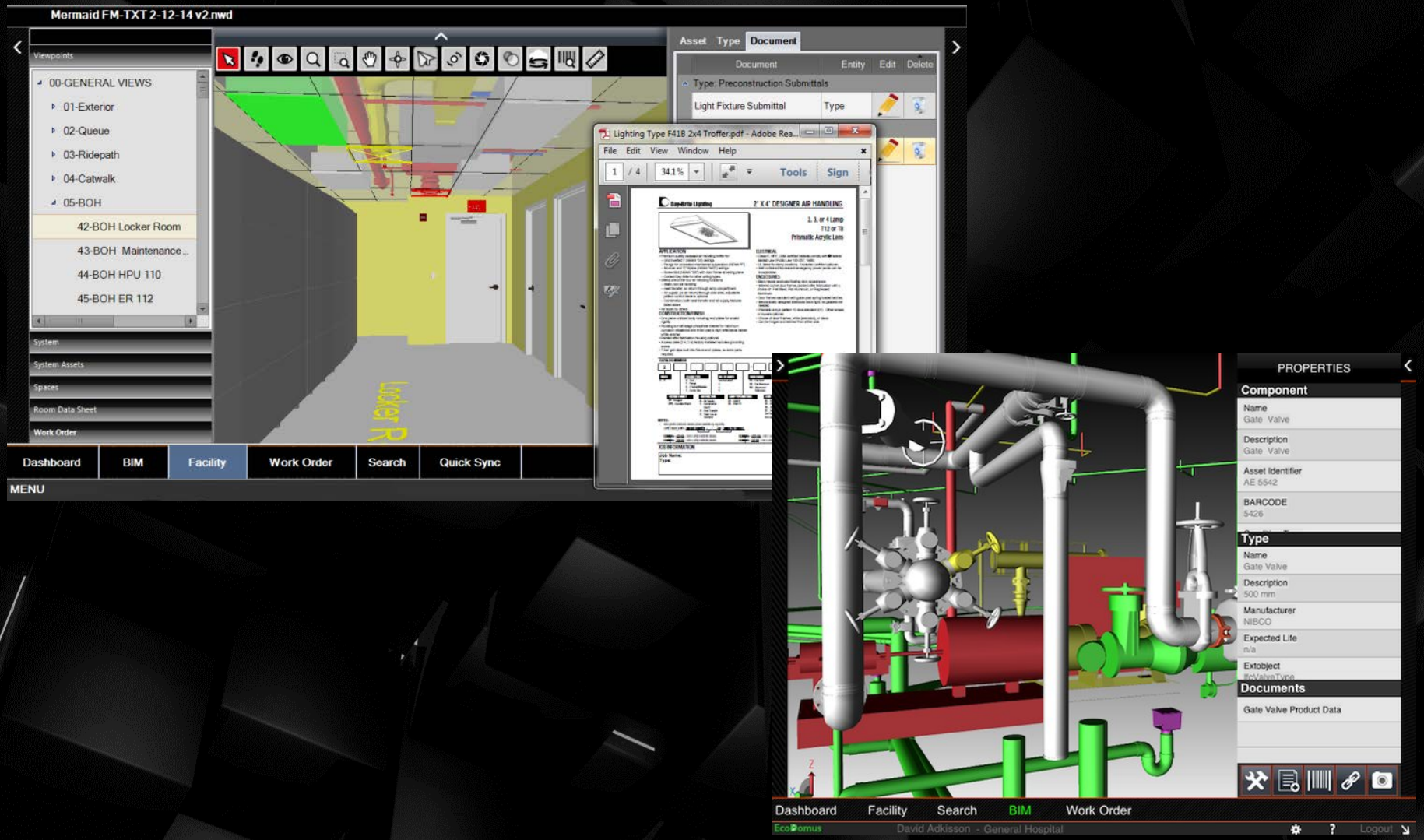
E.G. CCTV MONITORING

APP 2

E.G. RETAIL

APP 3

Ecodomus


Mermaid FM-TXT 2-12-14 v2.nwd
Viewpoints
00-GENERAL VIEWS
01-Exterior
02-Queue
03-Ridepath
04-Catwalk
05-BOH
42-BOH Locker Room
43-BOH Maintenance...
44-BOH HPU 110
45-BOH ER 112
System
System Assets
Spaces
Room Data Sheet
Work Order
Asset Type Document
Document Entity Edit Delete
Type: Preconstruction Submittals
Light Fixture Submittal Type
Lighting Type F418 2x4 Troffer.pdf - Adobe Rea...
File Edit View Window Help
Tools Sign
2' X 4' DESIGNER AIR HANDLING
Dashboard BIM Facility Work Order Search Quick Sync
MENU
PROPERTIES
Component
Name Gate Valve
Description Gate Valve
Asset Identifier AE 5542
BARCODE 5426
Type
Name Gate Valve
Description 500 mm
Manufacturer NIBCO
Expected Life n/a
Documents
Gate Valve Product Data
Dashboard Facility Search BIM Work Order
Ecodomus David Adkisson - General Hospital
Logout

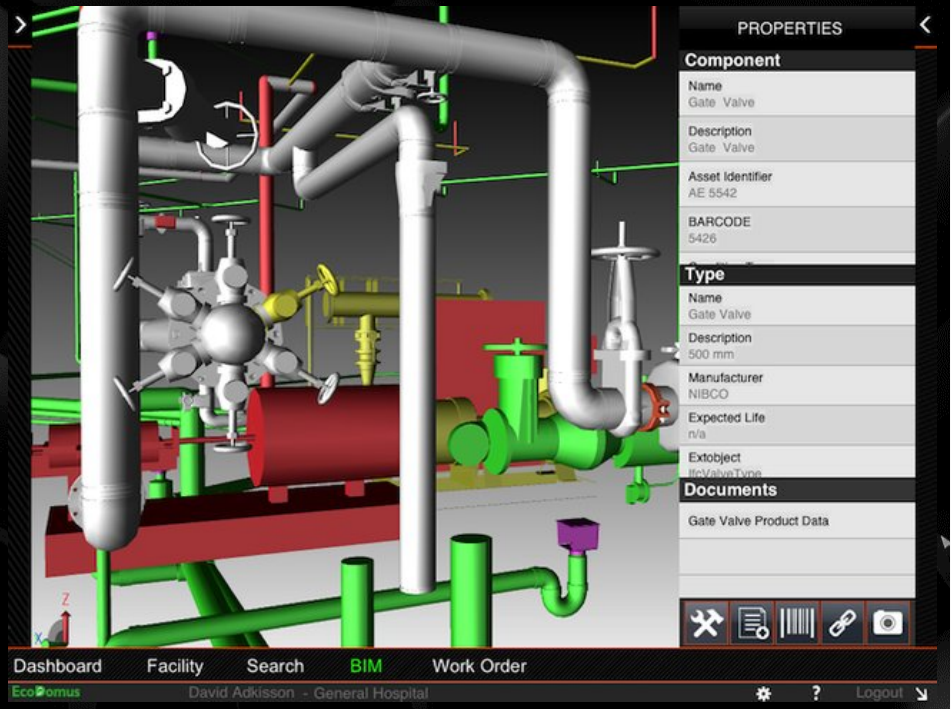
Ecodomus

Mermaid FM-TXT 2-12-14 v2.nwd
Viewpoints
00-GENERAL VIEWS
01-Exterior
02-Queue
03-Ridepath
04-Catwalk
05-BOH
42-BOH Locker Room
43-BOH Maintenance...
44-BOH HPU 110
45-BOH ER 112
System
System Assets
Spaces
Room Data Sheet
Work Order
Asset Type Document
Document Entity Edit Delete
Type: Preconstruction Submittals
Light Fixture Submittal Type
Lighting Type F418 2x4 Troffer.pdf - Adobe Rea...
File Edit View Window Help
Tools Sign
2' X 4' DESIGNER AIR HANDLING
Dashboard
BIM
Facility
Work Order
Search
Quick Sync
EcoDomus
MENU
LOGOUT

EcoDomus PM Desktop Client 1.5.8 - [Model Viewer]
Model Viewer
Properties

Ecodomus

Dashboard
Facility
Search
BIM
Work Order
Barcode
Demouser Demouser - Demo_House
Logout


PROPERTIES
Component
Name
Gate Valve
Description
Gate Valve
Asset Identifier
AE 5542
BARCODE
5426
Type
Name
Gate Valve
Description
500 mm
Manufacturer
NIBCO
Expected Life
n/a
Extobject
Documents
Gate Valve Product Data
Dashboard
Facility
Search
BIM
Work Order
David Adkisson - General Hospital
Logout

Asset Information System

The Real Estate Cash Flow-25 years

- Setting realistic expectations of BIM from the facility maintenance operation team's perspectives.

Virtual Asset

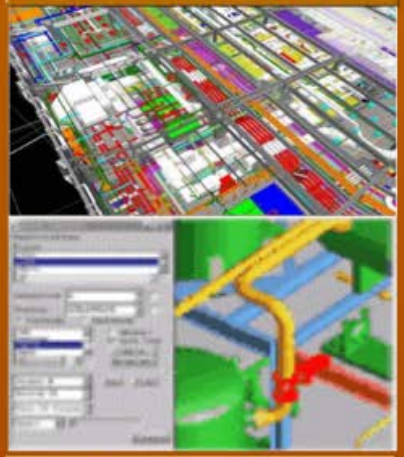
Physical Asset

Physical Asset

Virtual Asset

As-built BIM Field Checking

As-Built Data

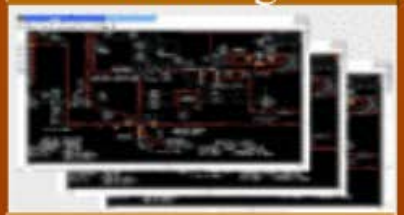


Inspection Data

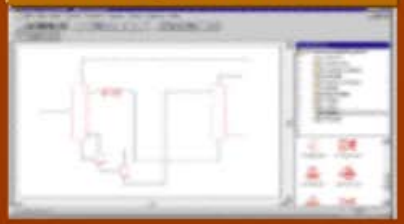
Operation (DCS/PI)

Virtual Asset Portal

Engineering Drawings



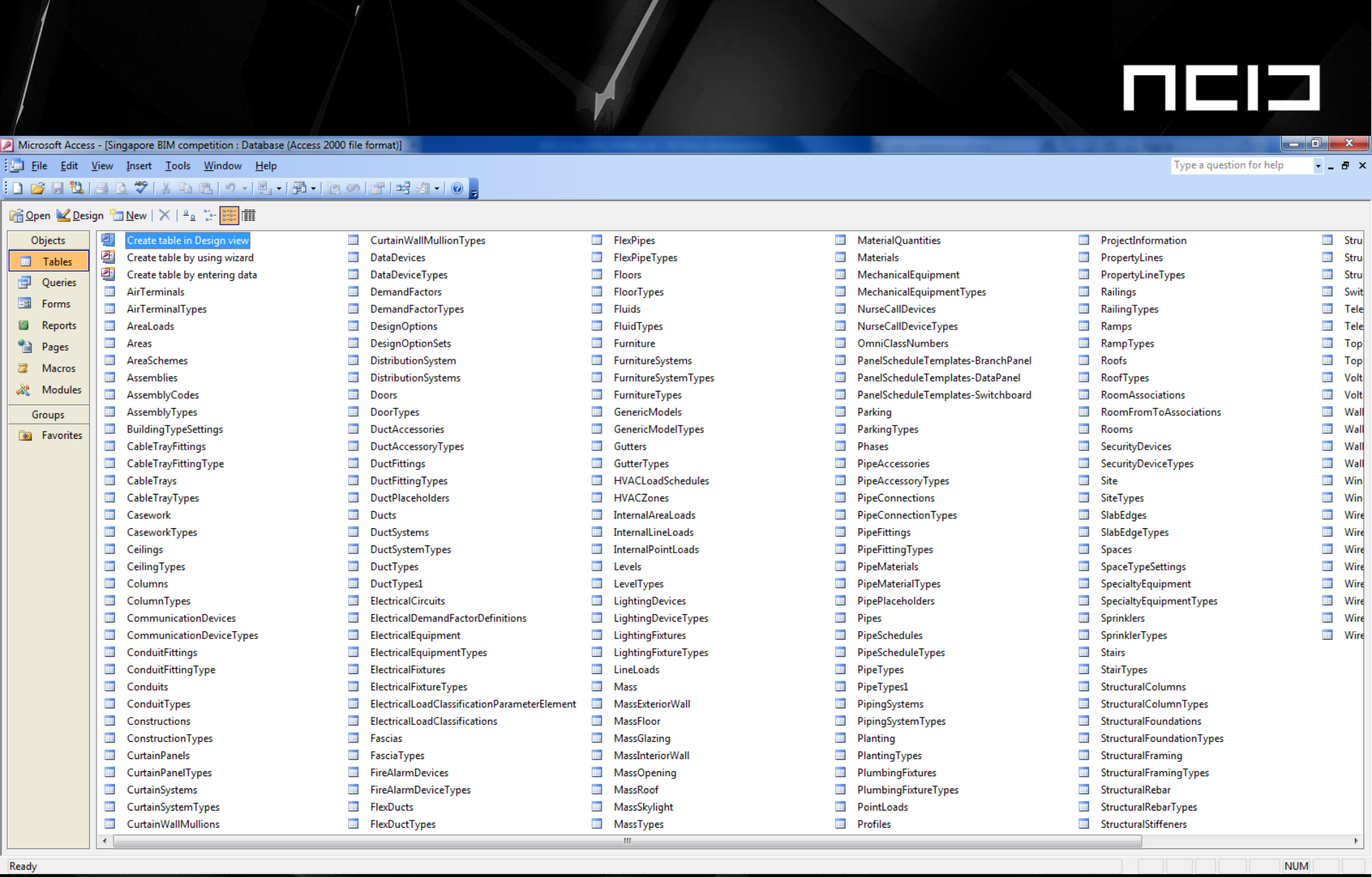
Intelligent P&ID

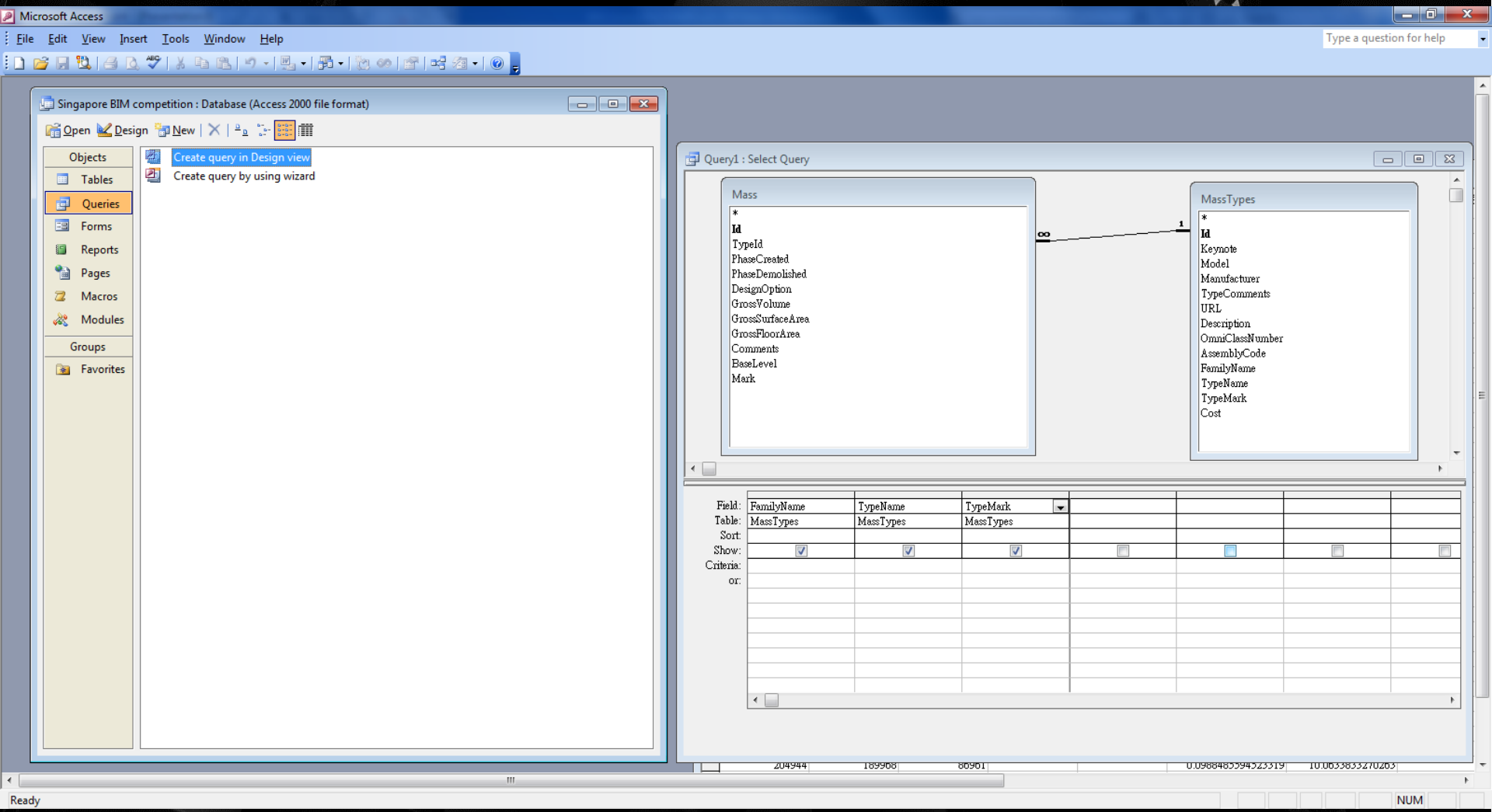


Operation Safety Procedures

FI HR CRM KM

Maintenance


Microsoft Access - [Singapore BIM competition : Database (Access 2000 file format)]
File Edit View Insert Tools Window Help
Type a question for help
Open Design New
Objects
Tables
Queries
Forms
Reports
Pages
Macros
Modules
Groups
Favorites
Create table in Design view
Create table by using wizard
Create table by entering data
AirTerminals
AirTerminalTypes
AreaLoads
Areas
AreaSchemes
Assemblies
AssemblyCodes
AssemblyTypes
BuildingTypeSettings
CableTrayFittings
CableTrayFittingType
CableTrays
CableTrayTypes
Casework
CaseworkTypes
Ceilings
CeilingTypes
Columns
ColumnTypes
CommunicationDevices
CommunicationDeviceTypes
ConduitFittings
ConduitFittingType
Conduits
ConduitTypes
Constructions
ConstructionTypes
CurtainPanels
CurtainPanelTypes
CurtainSystems
CurtainSystemTypes
CurtainWallMullions
CurtainWallMullionTypes
DataDevices
DataDeviceTypes
DemandFactors
DemandFactorTypes
DesignOptions
DesignOptionSets
DistributionSystem
DistributionSystems
Doors
DoorTypes
DuctAccessories
DuctAccessoryTypes
DuctFittings
DuctFittingTypes
DuctPlaceholders
Ducts
DuctSystems
DuctSystemTypes
DuctTypes
DuctTypes1
ElectricalCircuits
ElectricalDemandFactorDefinitions
ElectricalEquipment
ElectricalEquipmentTypes
ElectricalFixtures
ElectricalFixtureTypes
ElectricalLoadClassificationParameterElement
ElectricalLoadClassifications
Fascias
FasciaTypes
FireAlarmDevices
FireAlarmDeviceTypes
FlexDucts
FlexDuctTypes
FlexPipes
FlexPipeTypes
Floors
FloorTypes
Fluids
FluidTypes
Furniture
FurnitureSystems
FurnitureSystemTypes
FurnitureTypes
GenericModels
GenericModelTypes
Gutters
GutterTypes
HVACLoadSchedules
HVACZones
InternalAreaLoads
InternalLineLoads
InternalPointLoads
Levels
LevelTypes
LightingDevices
LightingDeviceTypes
LightingFixtures
LightingFixtureTypes
LineLoads
Mass
MassExteriorWall
MassFloor
MassGlazing
MassInteriorWall
MassOpening
MassRoof
MassSkylight
MassTypes
MaterialQuantities
Materials
MechanicalEquipment
MechanicalEquipmentTypes
NurseCallDevices
NurseCallDeviceTypes
OmniClassNumbers
PanelScheduleTemplates-BranchPanel
PanelScheduleTemplates-DataPanel
PanelScheduleTemplates-Switchboard
Parking
ParkingTypes
Phases
PipeAccessories
PipeAccessoryTypes
PipeConnections
PipeConnectionTypes
PipeFittings
PipeFittingTypes
PipeMaterials
PipeMaterialTypes
PipePlaceholders
Pipes
PipeSchedules
PipeScheduleTypes
PipeTypes
PipeTypes1
PipingSystems
PipingSystemTypes
Planting
PlantingTypes
PlumbingFixtures
PlumbingFixtureTypes
PointLoads
Profiles
ProjectInformation
PropertyLines
PropertyLineTypes
Railings
RailingTypes
Ramps
RampTypes
Roofs
RoofTypes
RoomAssociations
RoomFromToAssociations
Rooms
SecurityDevices
SecurityDeviceTypes
Site
SiteTypes
SlabEdges
SlabEdgeTypes
Spaces
SpaceTypeSettings
SpecialtyEquipment
SpecialtyEquipmentTypes
Sprinklers
SprinklerTypes
Stairs
StairTypes
StructuralColumns
StructuralColumnTypes
StructuralFoundations
StructuralFoundationTypes
StructuralFraming
StructuralFramingTypes
StructuralRebar
StructuralRebarTypes
StructuralStiffeners
Ready
NUM


Microsoft Access
File Edit View Insert Tools Window Help
Type a question for help
Singapore BIM competition : Database (Access 2000 file format)
Open Design New
Objects
Tables
Queries
Forms
Reports
Pages
Macros
Modules
Groups
Favorites
Create query in Design view
Create query by using wizard
Query1 : Select Query
Mass
*
Id
TypeId
PhaseCreated
PhaseDemolished
DesignOption
GrossVolume
GrossSurfaceArea
GrossFloorArea
Comments
BaseLevel
Mark
∞
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MassTypes
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Keynote
Model
Manufacturer
TypeComments
URL
Description
OmniClassNumber
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TypeName
TypeMark
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or:
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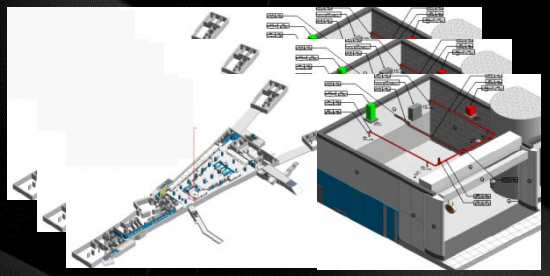
MODELLING + INDIVIDUAL DATABASE

S1



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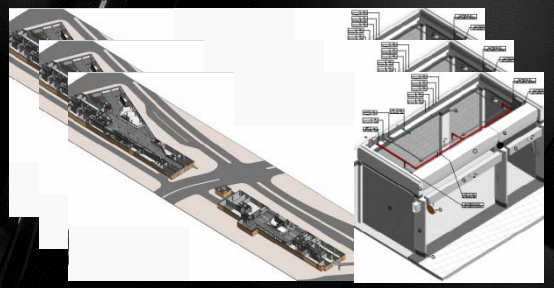
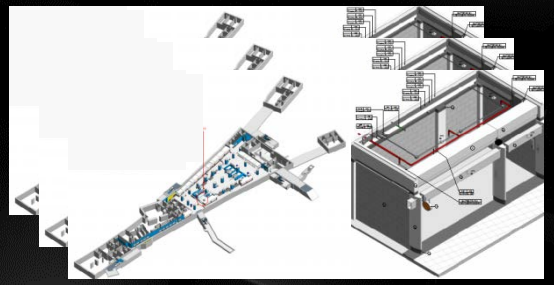


S3



FLEET WIDE DATABASE

MEGA DATABASE

OTHER DATABASES

APPLICATIONS

APP 1

E.G. CCTV MONITORING

APP 2

E.G. RETAIL

APP 3

Query1 : Select Query

FamilyName	TypeName
SAT Tower Mullion	SAT Tower Mullion
SAT Tower Surface Ref	SAT Tower Surface Ref
Tower Panel	S01-P001
Tower Panel	S01-P002
Tower Panel	S01-P003
Tower Panel	S01-P004
Tower Panel	S01-P005
Tower Panel	S01-P006
Tower Panel	S01-P007
Tower Panel	S01-P008
Tower Panel	S01-P009
Tower Panel	S01-P010
Tower Panel	S01-P011
Tower Panel	S01-P012
Tower Panel	S01-P013
Tower Panel	S01-P014
Tower Panel	S01-P015
Tower Panel	S01-P016
Tower Panel	S01-P017
Tower Panel	S01-P018
Tower Panel	S01-P019
Tower Panel	S01-P020
Tower Panel	S01-P021
Tower Panel	S01-P022
Tower Panel	S01-P023
Tower Panel	S01-P024
Tower Panel	S01-P025
Tower Panel	S01-P026
Tower Panel	S01-P027
Tower Panel	S01-P028
Tower Panel	S01-P029
Tower Panel	S01-P030
Tower Panel	S01-P031
Tower Panel	S01-P032
Tower Panel	S01-P033
Tower Panel	S01-P034
Tower Panel	S01-P035
Tower Panel	S01-P036
Tower Panel	S01-P037
Tower Panel	S01-P038
Tower Panel	S01-P039
Tower Panel	S01-P040

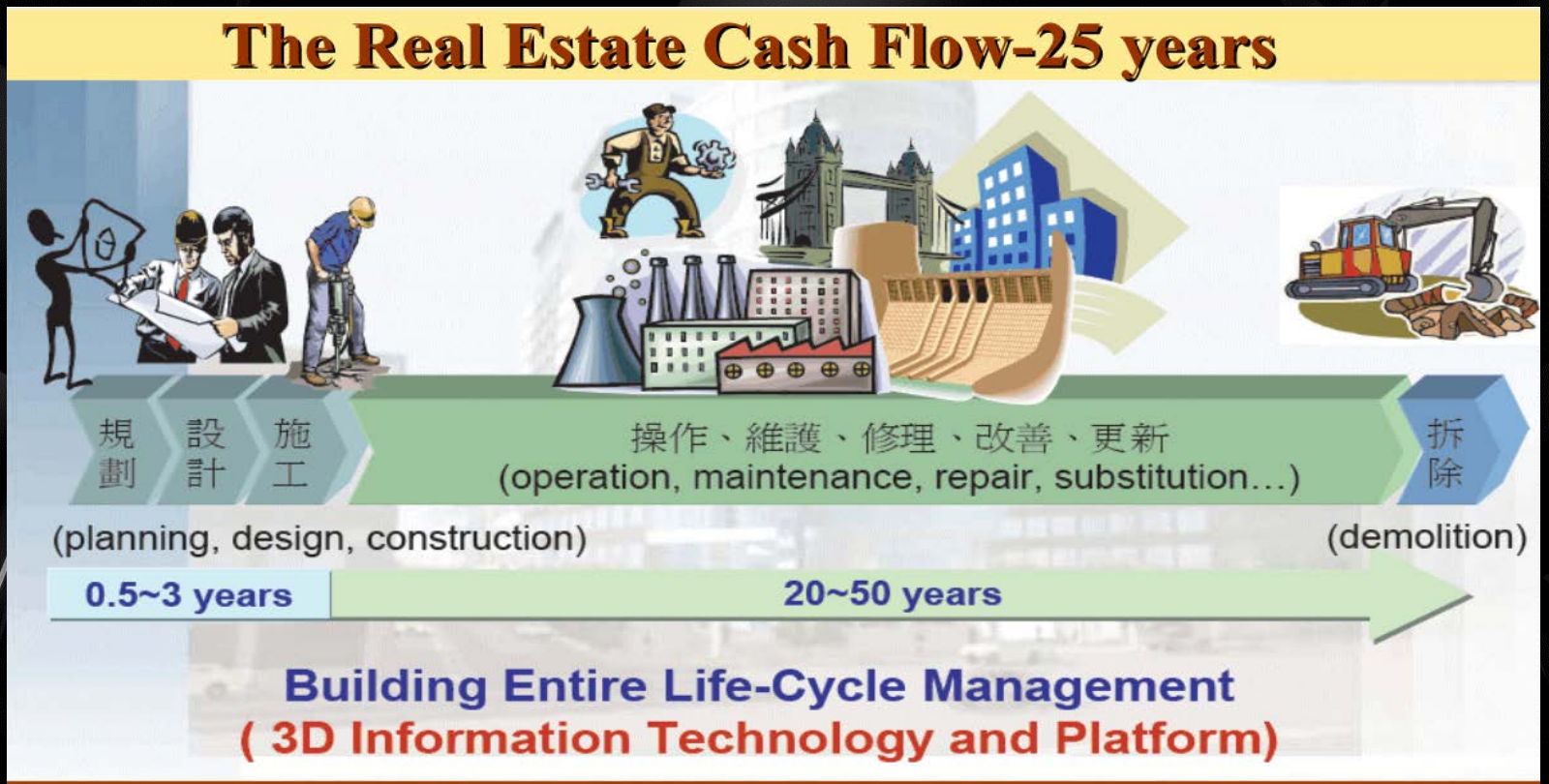
Record: 1 of 2503

atelier

TOTAL IMMERSION
TOTAL
IMMERSION

AUDITOIRE
TOTAL
IMMERSION

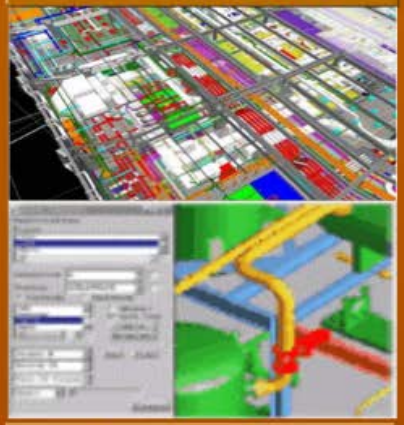
BIM in Operation Phase



- Setting realistic expectations of BIM from the facility maintenance operation team's perspectives.

BIM in Operation Phase

As-Built Data



Inspection Data

Operation (DCS/PI)

Virtual Asset Portal

Engineering Drawings

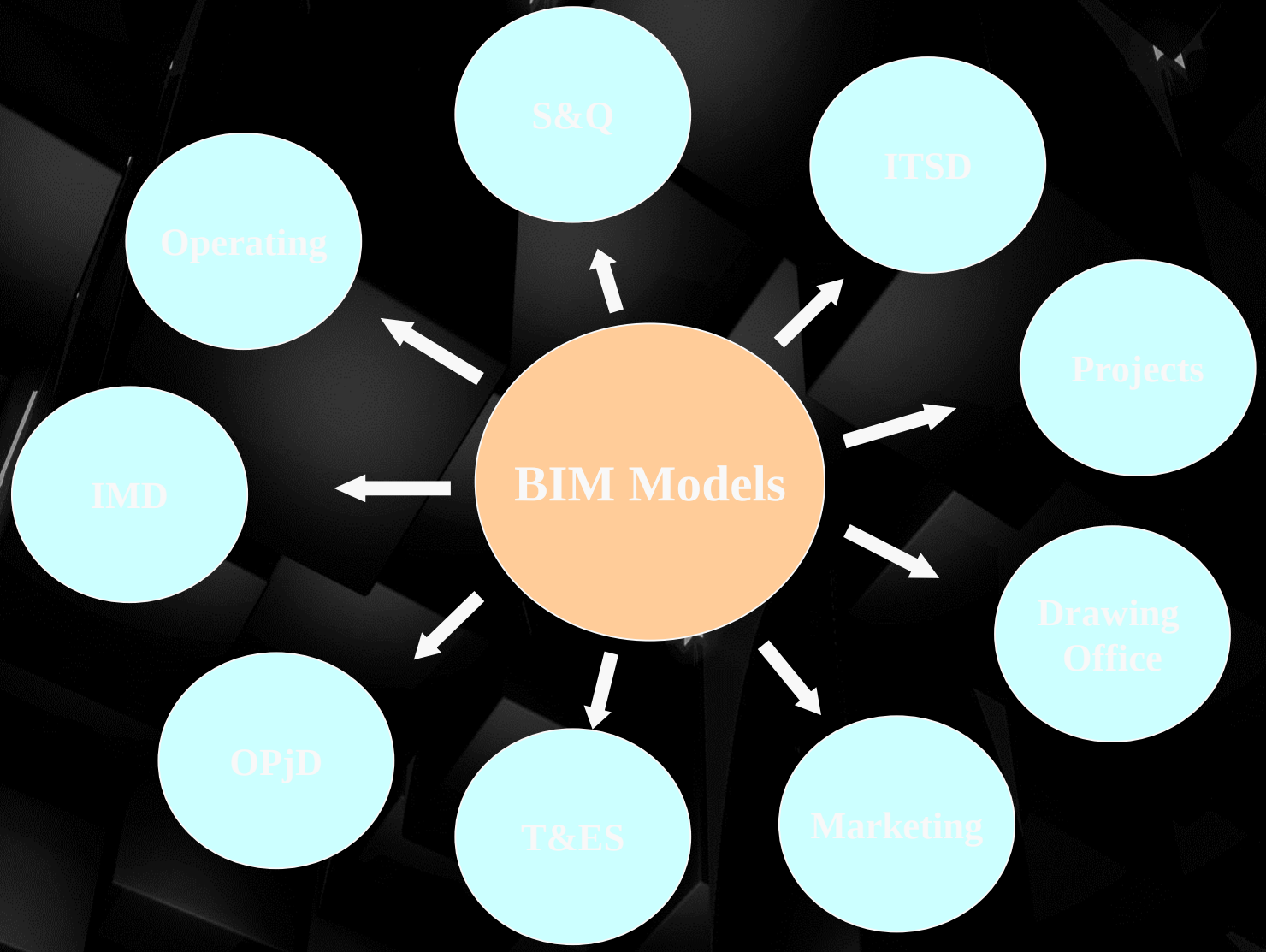
Intelligent P&ID

FI HR CRM KM

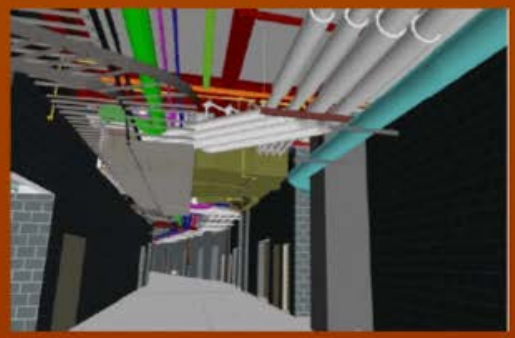
Maintenance

Operation Safety Procedures

BIM in Operation Phase



Assets



Virtual Asset

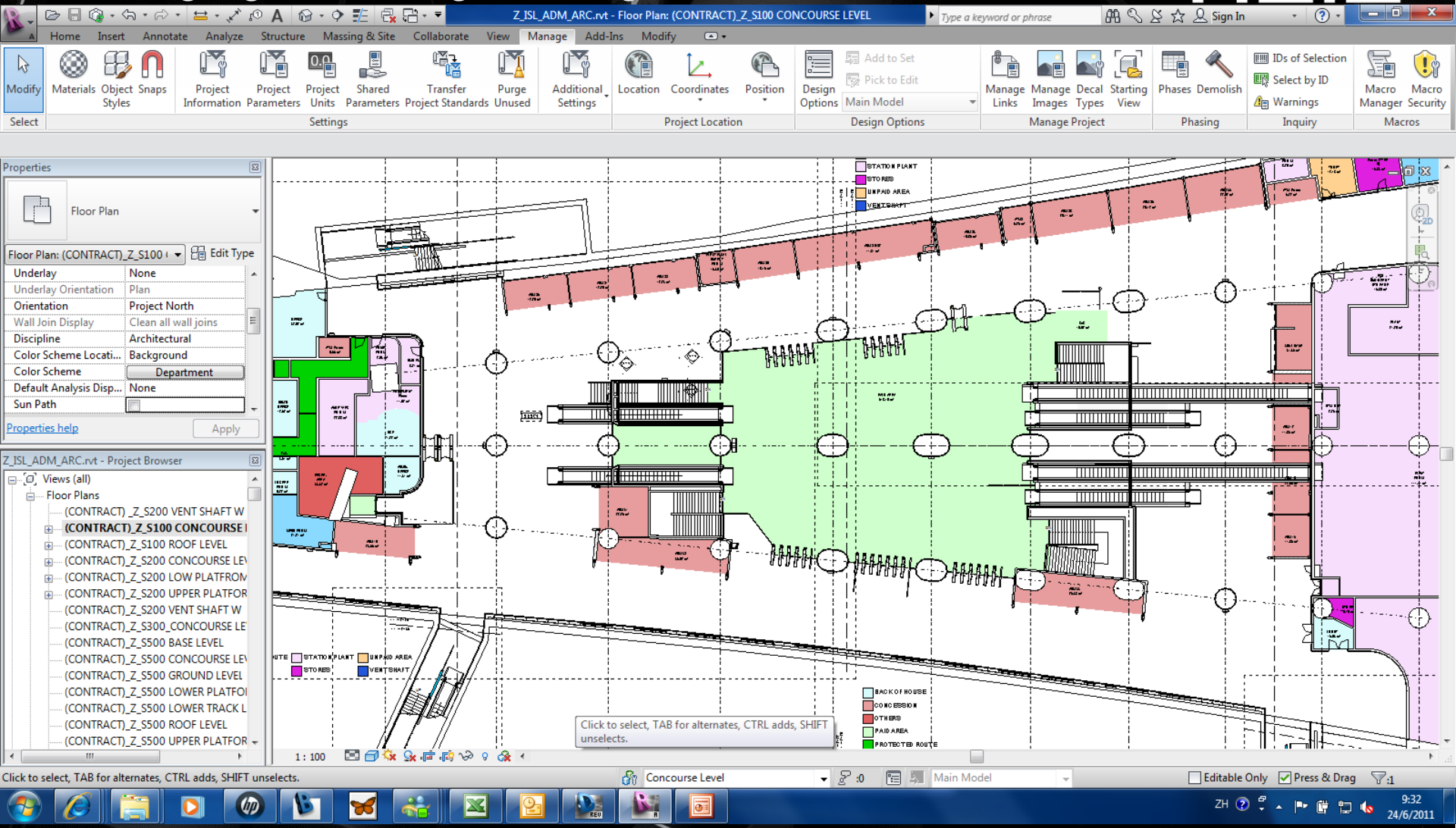
Physical Asset

Physical Asset

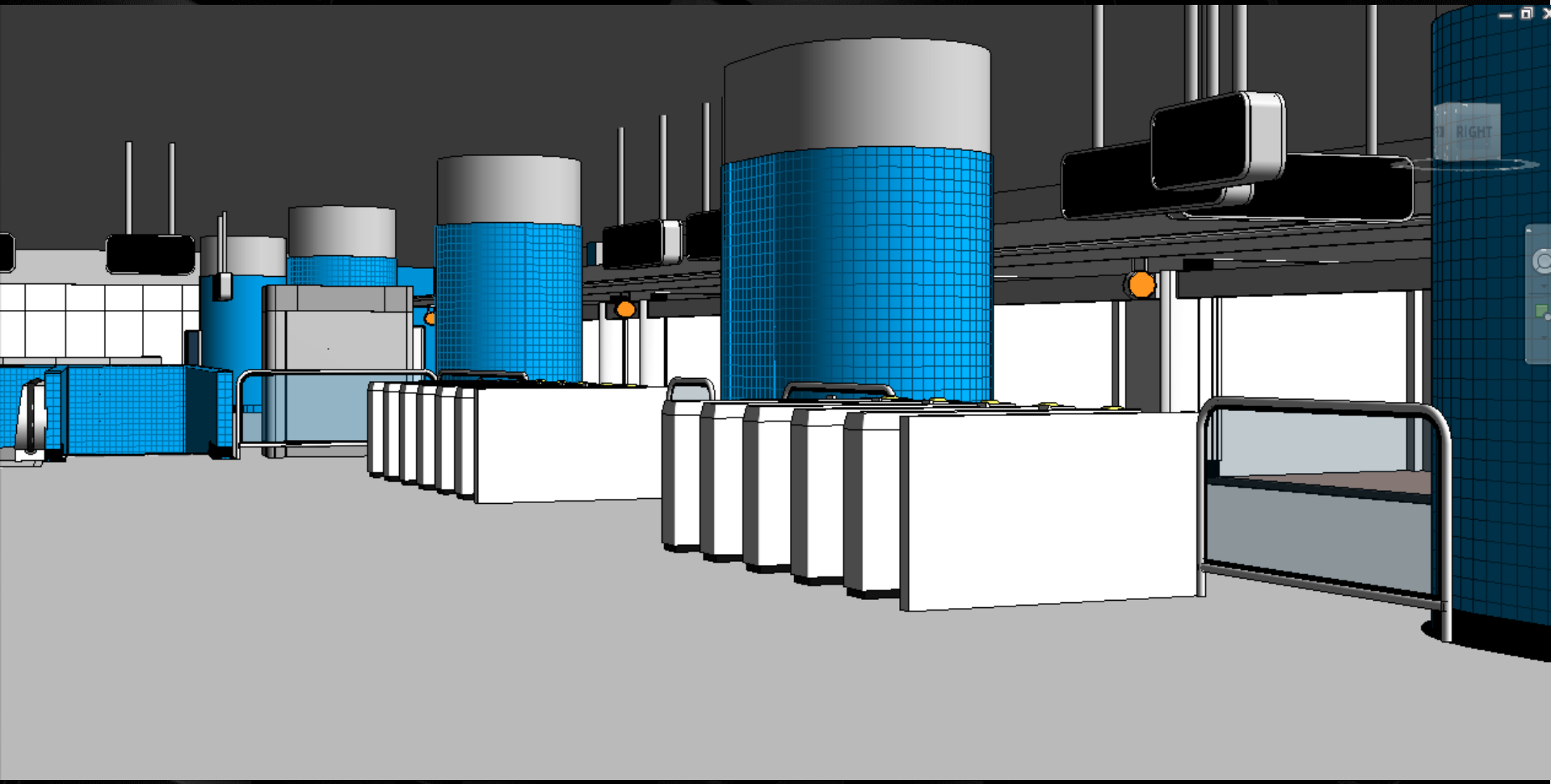
Virtual Asset

As-Built Field Checking

Signage/ Marketing Checking



Signage/ Marketing/ Security Checking



Possible Kiosk/ Marketing Management

Shop D

Level	Shop No.	Shop Name	STA No.	Shop Location (Paid/Unpaid)	Usable Floor Area	Type of Shop	Toilet Inside Shop	Floor Finish	Wall Finish	Ceiling Finish	TV Points No.	Tel. Outlet No.	Fire Shutter					
													Fire Shutter No.	Operation/ Fire Rating	A/V Unit	Intercom	Shutter No.	Meta
CONCOURSE LEVEL	16	ADM 16			23.00 m²		☑											☑
CONCOURSE LEVEL	17	ADM 17			14.89 m²		☑											☑
CONCOURSE LEVEL	18	ADM 18			22.55 m²		☑											☑
CONCOURSE LEVEL	19	ADM 19			14.89 m²		☑											☑
CONCOURSE LEVEL	20	ADM 20			17.75 m²		☑											☑
CONCOURSE LEVEL	21	ADM 21			17.76 m²		☑											☑
CONCOURSE LEVEL	22	ADM 22			17.73 m²		☑											☑
CONCOURSE LEVEL	23	ADM 23			16.89 m²		☑											☑
CONCOURSE LEVEL	24	ADM 24			18.05 m²		☑											☑
CONCOURSE LEVEL	25	ADM 25			18.19 m²		☑											☑
CONCOURSE LEVEL	26-27	ADM 26-27			41.84 m²		☑											☑
CONCOURSE LEVEL	28	ADM 28			25.14 m²		☑											☑
CONCOURSE LEVEL	29	ADM 29			26.12 m²		☑											☑
CONCOURSE LEVEL	30	ADM 30			27.52 m²		☑											☑
CONCOURSE LEVEL	31	ADM 31			22.20 m²		☑											☑
CONCOURSE LEVEL	32	ADM 32			30.67 m²		☑											☑
CONCOURSE LEVEL	33	ADM 33			29.38 m²		☑											☑

Shop Detail			ECS (A/C System)															
			Refrigerant System			Fresh Air Provision			Medhanical Ventilation (For F&B Kiosk)					Cabin Concept				
Level	Shop No.	Shop Name	VRV Unit -	Split Type Unit -	Total Installed	Supply Air Flow Rate	Treated Air via PAUU	Untreated Outdoor Air	Supply Flow	Treated Air via PAU	Untreated Outdoor air	Exhaust Flow Rate	Air Curtain Nos.	Yes/No	Smoke Zone	Smoke Free Height (m)	Tenent's Perforated	% of Fr Area
CONCOURSE LEVEL	16	ADM 16					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	17	ADM 17					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	18	ADM 18					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	19	ADM 19					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	20	ADM 20					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	21	ADM 21					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	22	ADM 22					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	23	ADM 23					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	24	ADM 24					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	25	ADM 25					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	26-27	ADM 26-27					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	28	ADM 28					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	29	ADM 29					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	30	ADM 30					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	31	ADM 31					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	32	ADM 32					☑	☑		☑	☑			☑				
CONCOURSE LEVEL	33	ADM 33					☑	☑		☑	☑			☑				

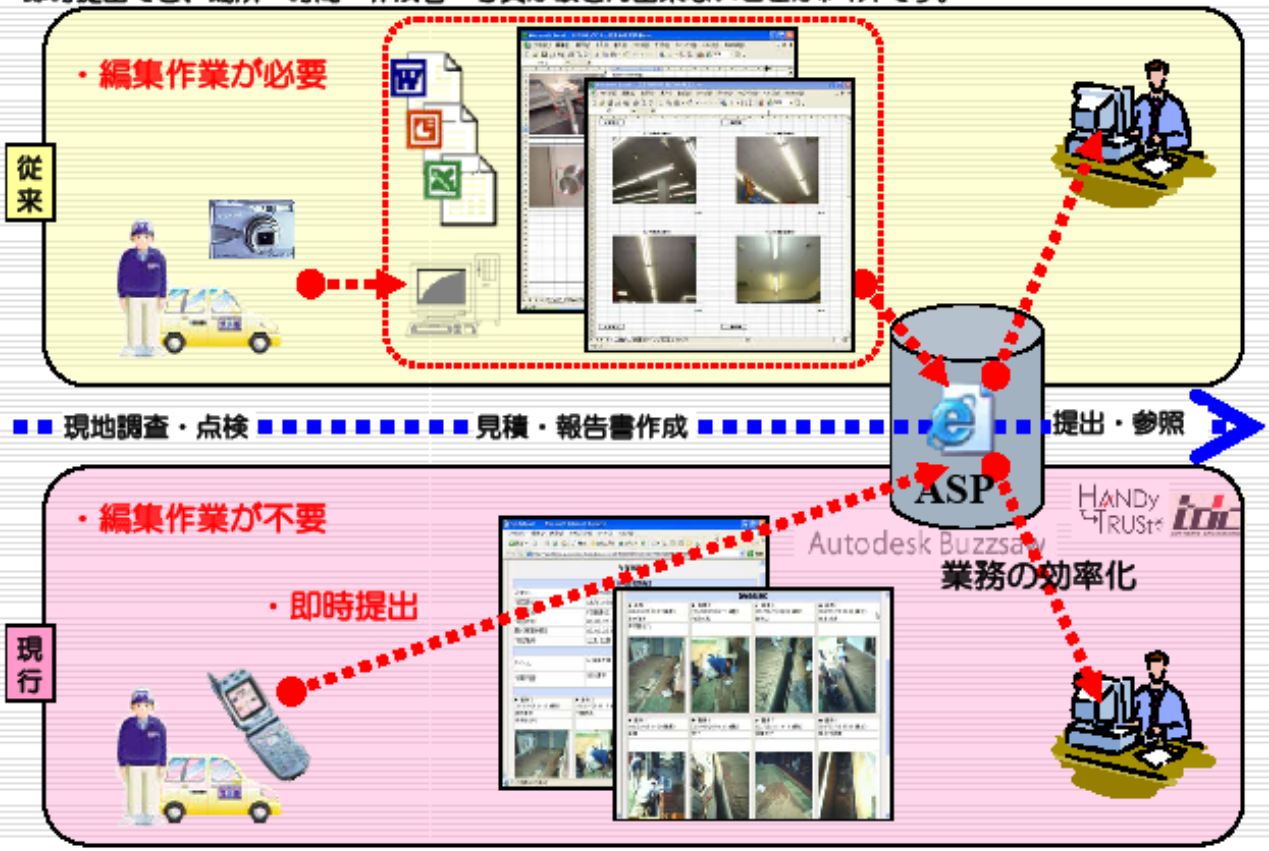
BIM Database

Building Lifecycle Management

1

HandyBuz (Handy Trust + Buzzsaw)

作業の立証・証明のため、ｶﾒﾗ付き携帯電話を用いて報告書を作成するｼｽﾃﾑで、作業現場から簡単な操作で即時提出でき、場所・時間・作成者・写真が改ざん出来ないことがﾒﾘｯﾄです。



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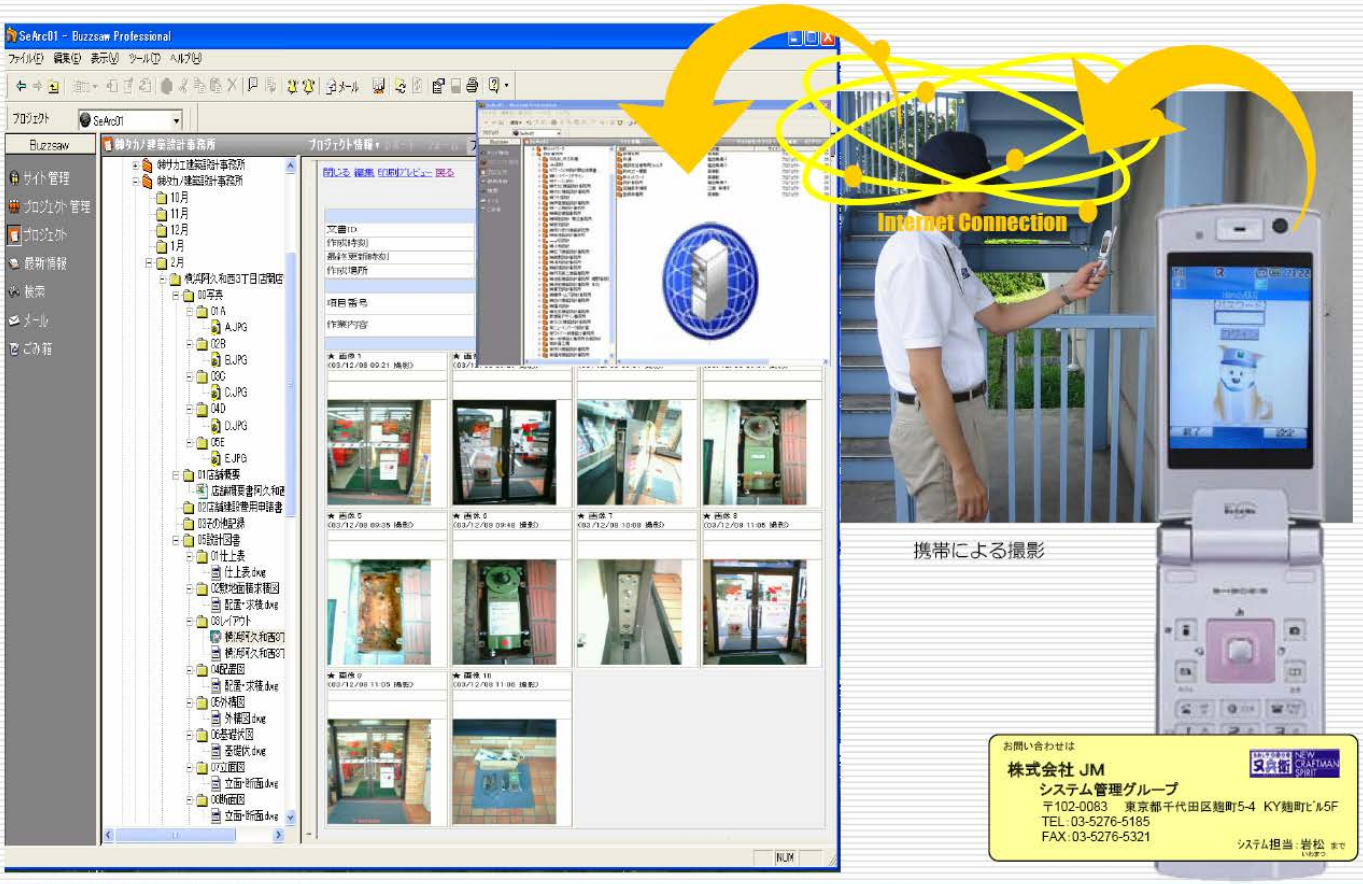
HandyBuz (Handy Trust + Buzzsaw)



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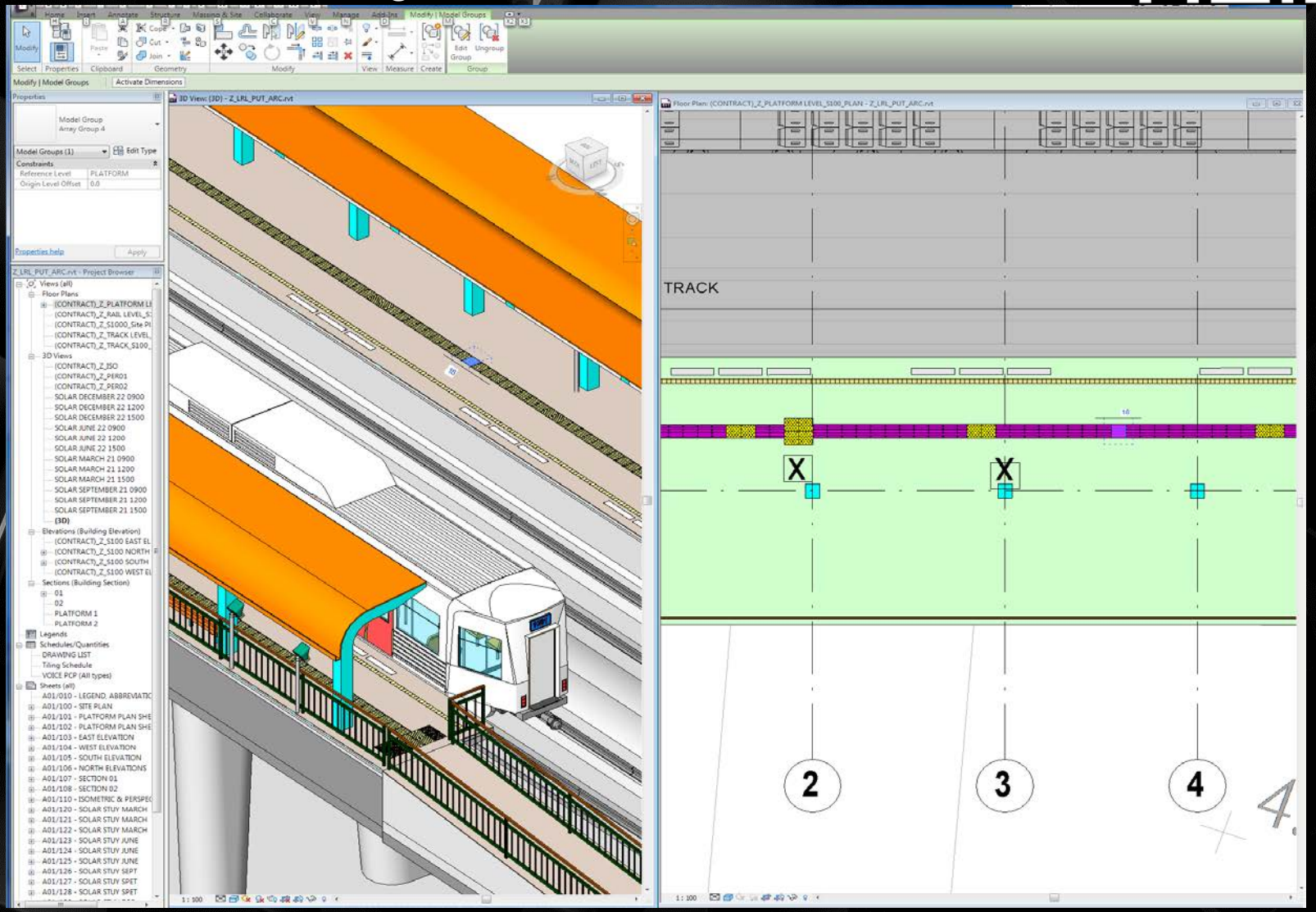
Maintenance

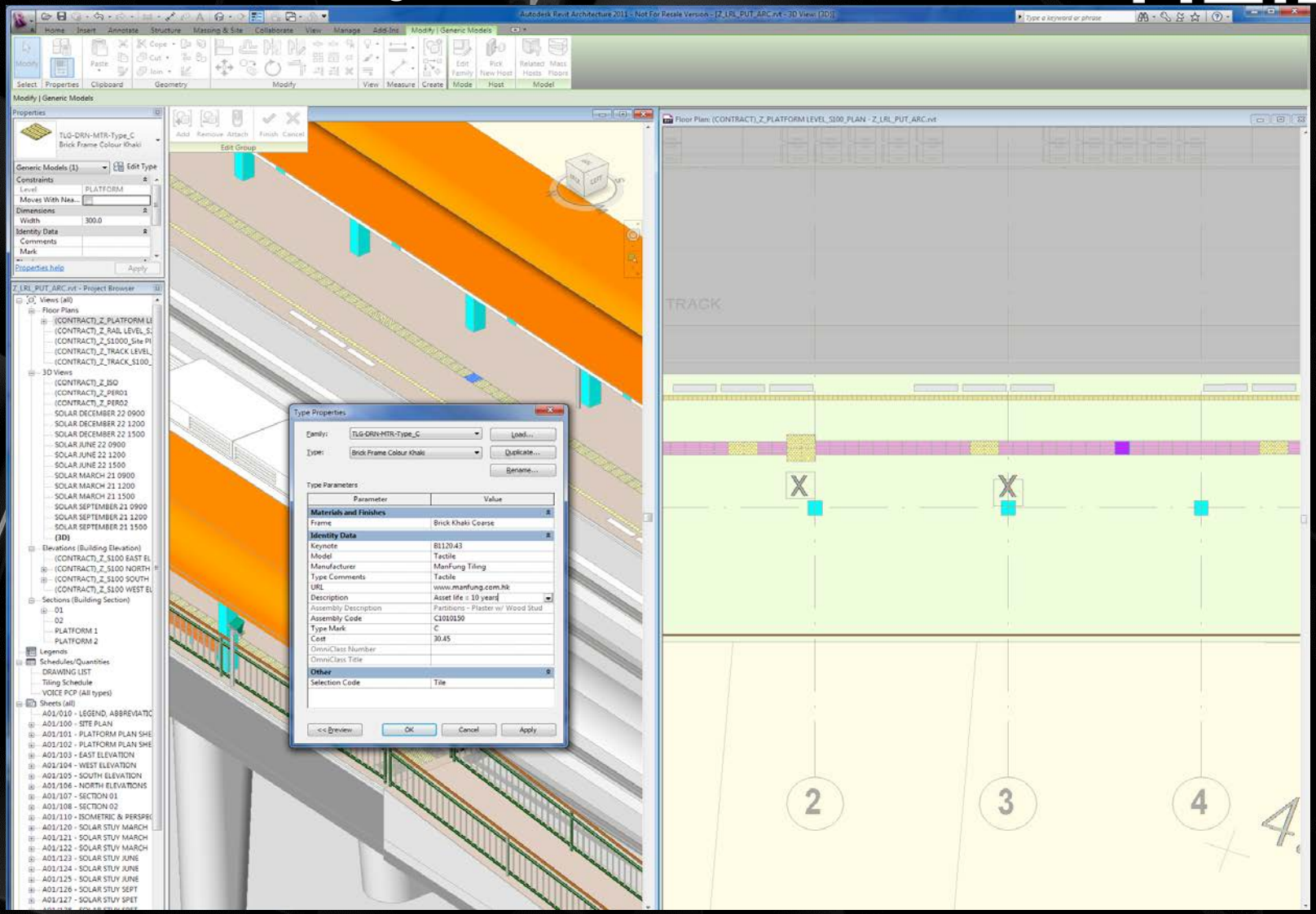
Possible Asset Management

AS BUILT BIM MODEL DEMONSTRATION

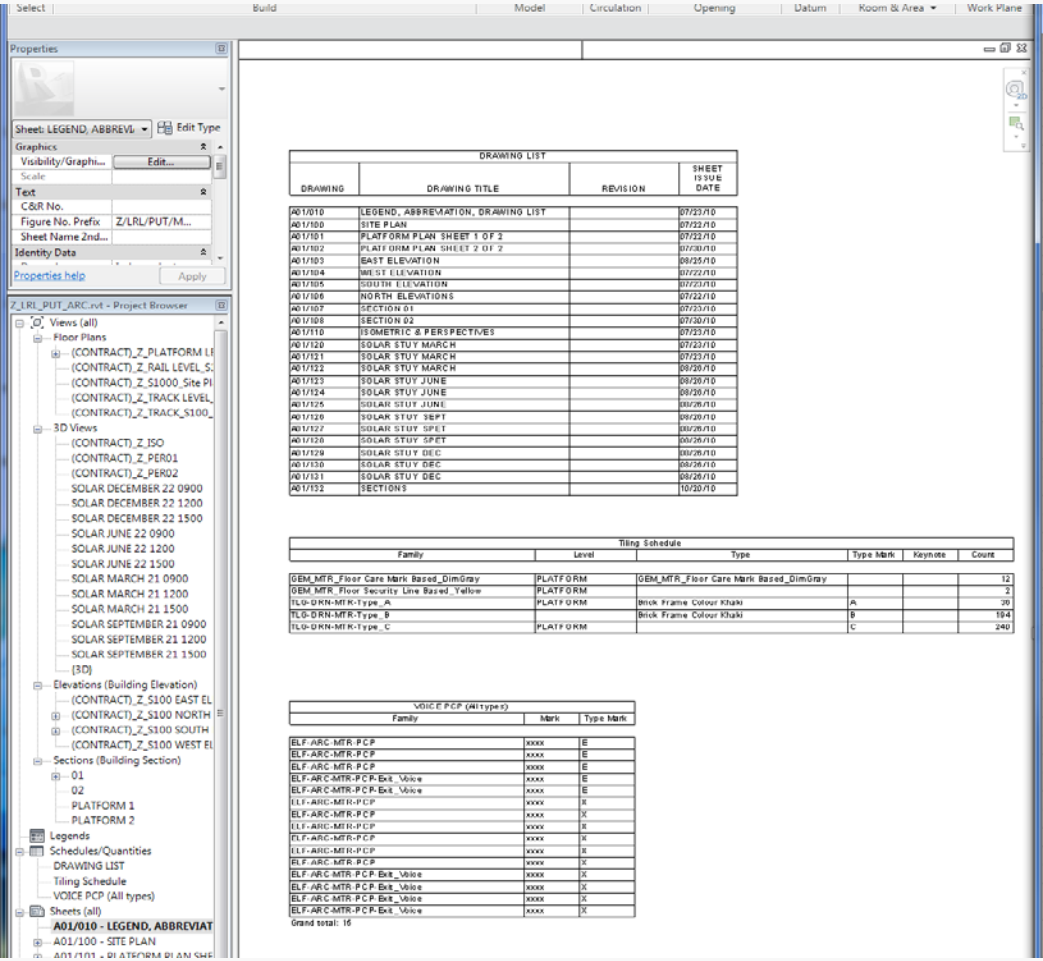


Possible Asset Management

AS BUILT BIM MODEL



AS BUILT BIM MODEL



DRAWING LIST

DRAWING	DRAWING TITLE	REVISION	SHEET ISSUE DATE
A01/010	LEGEND, ABBREVIATION, DRAWING LIST		07/23/10
A01/100	SITE PLAN		07/22/10
A01/101	PLATFORM PLAN SHEET 1 OF 2		07/22/10
A01/102	PLATFORM PLAN SHEET 2 OF 2		07/30/10
A01/103	EAST ELEVATION		08/25/10
A01/104	WEST ELEVATION		07/22/10
A01/105	SOUTH ELEVATION		07/23/10
A01/106	NORTH ELEVATIONS		07/22/10
A01/107	SECTION 01		07/23/10
A01/108	SECTION 02		07/30/10
A01/110	ISOMETRIC & PERSPECTIVES		07/23/10
A01/120	SOLAR STUY MARCH		07/23/10
A01/121	SOLAR STUY MARCH		07/23/10
A01/122	SOLAR STUY MARCH		08/26/10
A01/123	SOLAR STUY JUNE		08/26/10
A01/124	SOLAR STUY JUNE		08/26/10
A01/125	SOLAR STUY JUNE		08/26/10
A01/126	SOLAR STUY SEPT		08/26/10
A01/127	SOLAR STUY SPET		08/26/10
A01/128	SOLAR STUY SPET		08/26/10
A01/129	SOLAR STUY DEC		08/26/10
A01/130	SOLAR STUY DEC		08/26/10
A01/131	SOLAR STUY DEC		08/26/10
A01/132	SECTION3		10/20/10

Tiling Schedule

Family	Level	Type	Type Mark	Keynote	Count
GEM_MTR_Floor Care Mark Based_DimGray	PLATFORM	GEM_MTR_Floor Care Mark Based_DimGray			12
GEM_MTR_Floor Security Line Based_Yellow	PLATFORM				2
TLG-DRN-MTR-Type_A	PLATFORM	Brick Frame Colour Khaki	A		20
TLG-DRN-MTR-Type_B		Brick Frame Colour Khaki	B		194
TLG-DRN-MTR-Type_C	PLATFORM		C		240

VOICE PCP (All types)

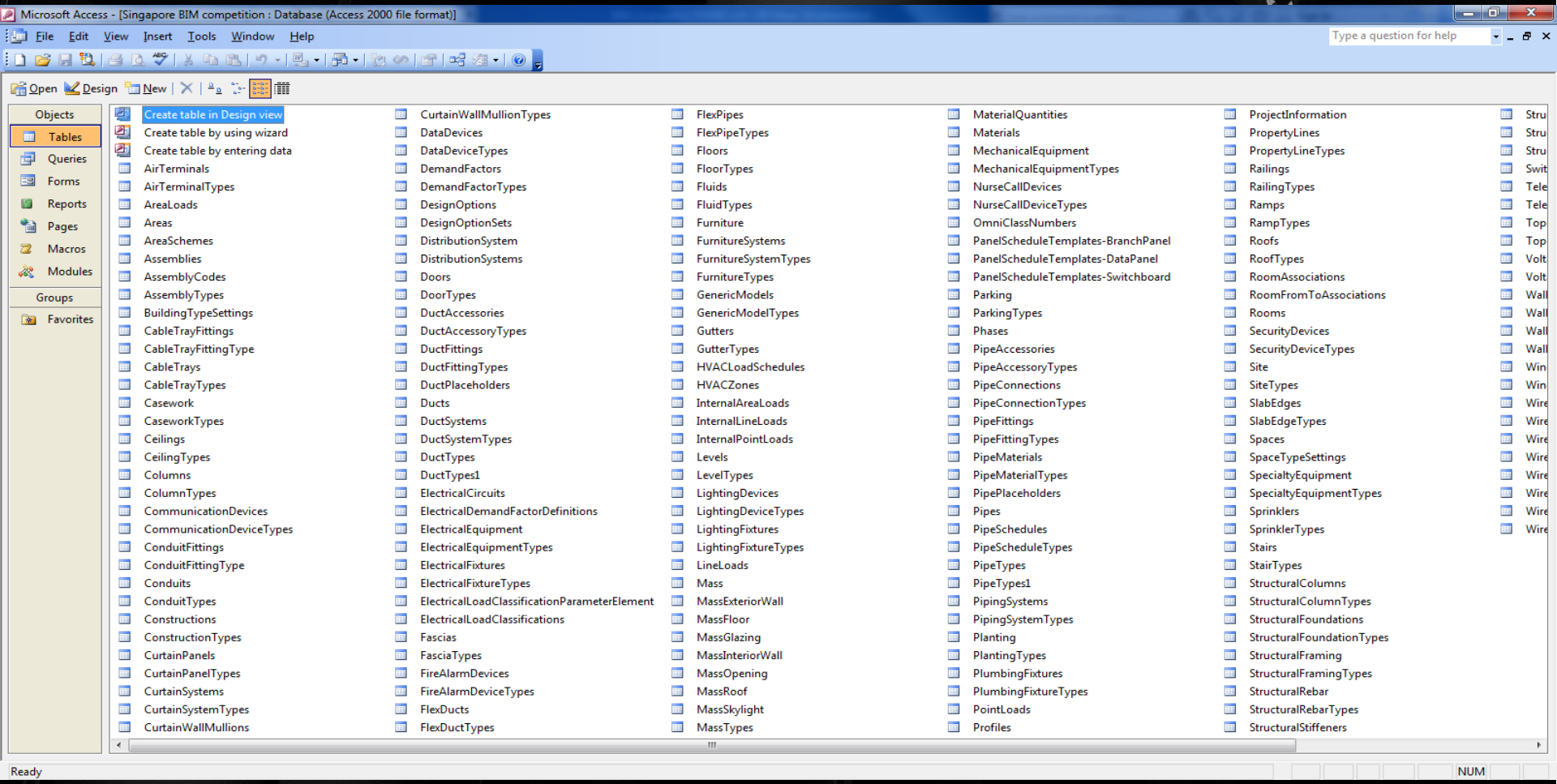
Family	Mark	Type Mark
ELF-ARC-MTR-PCP	xxxx	E
ELF-ARC-MTR-PCP	xxxx	E
ELF-ARC-MTR-PCP	xxxx	E
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	E
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	E
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP	xxxx	X
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	X
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	X
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	X
ELF-ARC-MTR-PCP-Exit_Voice	xxxx	X

Grand total: 16

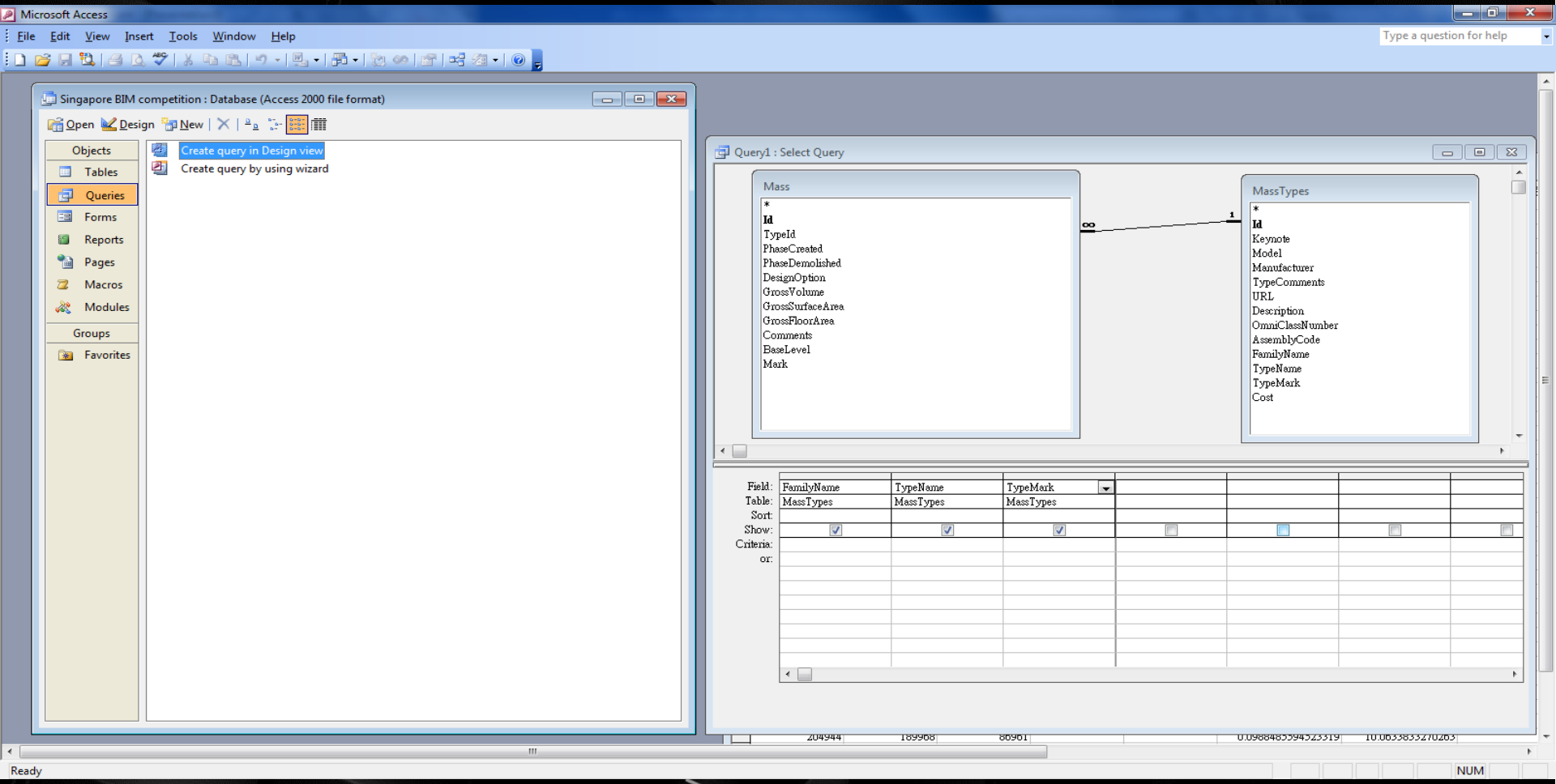
A14 1530141

	A	J	K	L
1	Id	FamilyName	TypeName	TypeMark
2	7848	Model Text	600mm Arial	
3	1148899	Model Text	200mm - wood	
4	1148901	Model Text	300mm - black	
5	1148904	Model Text	50mm - steel	
6	1193027	GEM_MTR_Floor Care Mark Based_DimGray	GEM_MTR_Floor Care Mark Based_DimGray	
7	1194842	GEM_MTR_Floor Security Line Based_Yellow	Security Line_MTR_Floor Based_Yellow	
8	1206709	GEM_MTR_Floor Security Line Based_Yellow	Security Line_MTR_Floor Based_Yellow W39600mm	
9	1282975	GEM_MTR_Floor Security Line Based_Yellow	Security Line_MTR_Floor Based_Yellow W39500mm	
10	1528388	TLG-DRN-MTR-Type_A	Brick Frame Colour Khaki	A
11	1528390	TLG-DRN-MTR-Type_A	Brick Frame Colour DimGray	
12	1529333	TLG-DRN-MTR-Type_B	Brick Frame Colour Khaki	B
13	1529335	TLG-DRN-MTR-Type_B	Brick Frame Colour DimGray	
14	1530141	TLG-DRN-MTR-Type_C	Brick Frame Colour Khaki	C
15	1530143	TLG-DRN-MTR-Type_C	Brick Frame Colour DimGray	
16	1532279	TLG-DRN-MTR-Type_C	Brick Frame Colour Khaki W200mm	C
17	1606926	TRN-TRN-MTR-LRL-Headstock	TRN-TRN-MTR-LRL-Headstock	
18	1618524	TRN-TRN-MTR-LRL-Coach	TRN-TRN-MTR-LRL-Coach	

Possible Asset Management



Possible Asset Management



Possible Asset Management

Query1 : Select Query

FamilyName	TypeName
SAT Tower Mullion	SAT Tower Mullion
SAT Tower Surface Ref	SAT Tower Surface Ref
Tower Panel	S01-P001
Tower Panel	S01-P002
Tower Panel	S01-P003
Tower Panel	S01-P004
Tower Panel	S01-P005
Tower Panel	S01-P006
Tower Panel	S01-P007
Tower Panel	S01-P008
Tower Panel	S01-P009
Tower Panel	S01-P010
Tower Panel	S01-P011
Tower Panel	S01-P012
Tower Panel	S01-P013
Tower Panel	S01-P014
Tower Panel	S01-P015
Tower Panel	S01-P016
Tower Panel	S01-P017
Tower Panel	S01-P018
Tower Panel	S01-P019
Tower Panel	S01-P020
Tower Panel	S01-P021
Tower Panel	S01-P022
Tower Panel	S01-P023
Tower Panel	S01-P024
Tower Panel	S01-P025
Tower Panel	S01-P026
Tower Panel	S01-P027
Tower Panel	S01-P028
Tower Panel	S01-P029
Tower Panel	S01-P030
Tower Panel	S01-P031
Tower Panel	S01-P032
Tower Panel	S01-P033
Tower Panel	S01-P034
Tower Panel	S01-P035
Tower Panel	S01-P036
Tower Panel	S01-P037
Tower Panel	S01-P038
Tower Panel	S01-P039
Tower Panel	S01-P040

Record: 1 of 2503

Room No. 3.3 - Cleaners' Room

Function	A room for storage of small volume of cleansing materials, tools and short stay of cleaners							
Size	15 - 20 m^2							
Occupants	3-5 persons							
Location	Non-public area							
Fire Rating	# In accordance with Fire Safety Standard for KTL/TWL/ISL Stations - S/ARC/PD/005							
Security Level	Low							
Finish	Floor		Skirting		Wall		Ceiling	
	Vitrified ceramic tiles, 150x150x8, on c/s screed - "Pilkington Dorset, colour Dark Grey" or equal approved; on liquid-applied waterproof membrane - "Lacticrete 9235 with fabric reinforcement" or equal approved		Coved ceramic tiles, 150x150x8, on c/s backing - "Pilkington Dorset, colour Dark Grey" or equal approved; on liquid-applied waterproof membrane - "Lacticrete 9235 with fabric reinforcement" or equal approved		Glazed ceramic tiles, 150x150x6.5, on c/s backing - "Pilkington Architectural Colours, colour Vellum White" or equal approved; Durallie paint on c/s render above 2100 high - "Alphadecor, colour 9010 White" or equal approved		Durable paint on fairface concrete -"Alphadecor, colour 9010 White" or equal approved	
Door Set	Size	Fire Rating	Acting	Frame	Inside Finish	Outside Finish	Air Resistance	Others
	900 x 2100 mm	# (see above)	Swing In 90°	Painted/ S/S *	Painted/ S/S *	Painted/ S/S *	N/A	Durable kickplate to u/s of push plate
Ironmongery	Lock Set	Security Level	Access Card: Inside	Access Card: Outside	Remote Control	Inside Handle	Outside Handle	Accessories
	Night Latch	Low	No	No	No	Lever handle on back plate	Pull handle on back plate	Door closer, door stop
Signage	Door Plate (supply by Ops)							
Environment	Temperature	Ventilation	Humidity		Acoustic		Thermal	
	24 °C A/C	N/A	50% ± 10%		NC 50		---	
Lighting	Normal Illuminance	Emergency Illuminance	Type		Diffusers		Source	
	300 Lux	10 Lux	Fluorescent, surface mounted		---		Direct	
Fire	Detection		Suppression		Extinguisher		Smoke Extraction	
	Smoke Detectors		N/A		Relocate existing		---	
Plumbing & Drainage	Water Supply				Drainage			
	Yes				Yes + Floor drain			
E & M, C & C	Equipment		Socket Type		Socket No. / Location		Communications	
	PABX (no outside call feature)		RJ11 provided by in-house C&C		1 / At 1440mm AFFL		Telephone wire to MTRC distribution box	
	General		Twin 13A		2 / Skirting level		---	
Fixtures & Furniture	Slop sink connect to foul drainage, storage cabinets, lockers, vacuum cleaner, table and chair.							
Others	---							

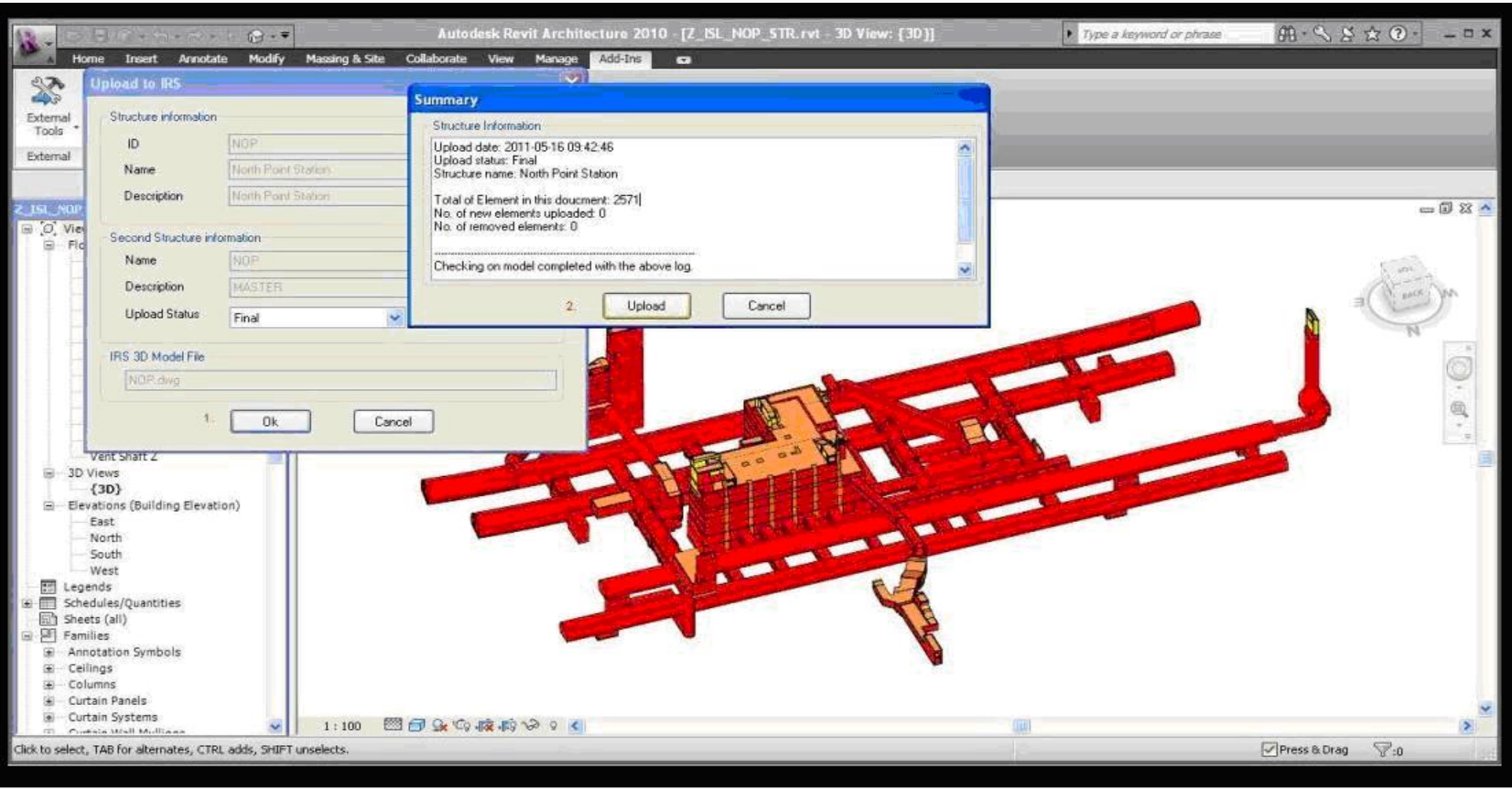
Revision D

* Dependent on location - stainless steel door to be used when facing public areas.
- painted doors to be used when facing BoH areas.

ROOM DATA SHEET

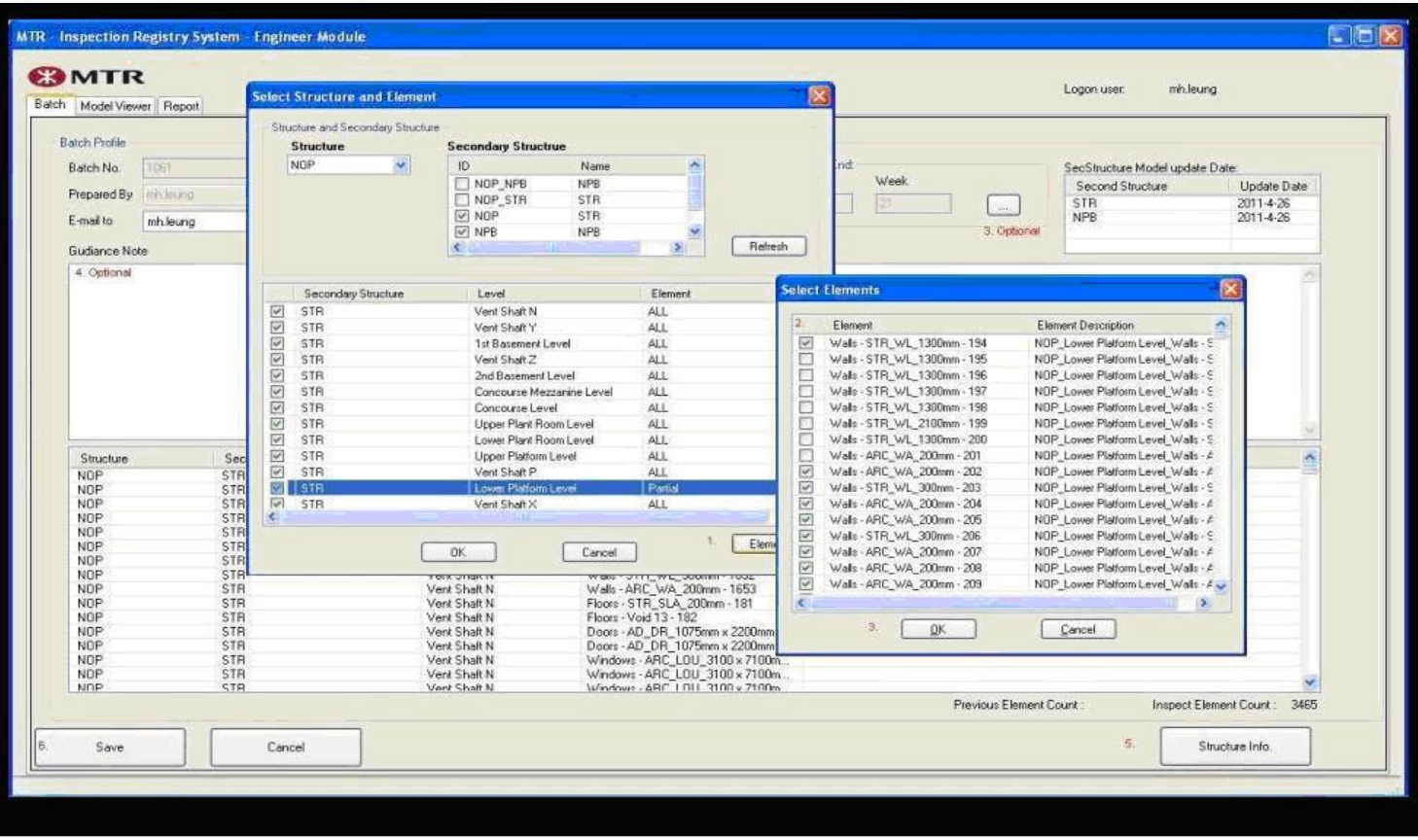
Possible Marketing Management

Possible Marketing Management



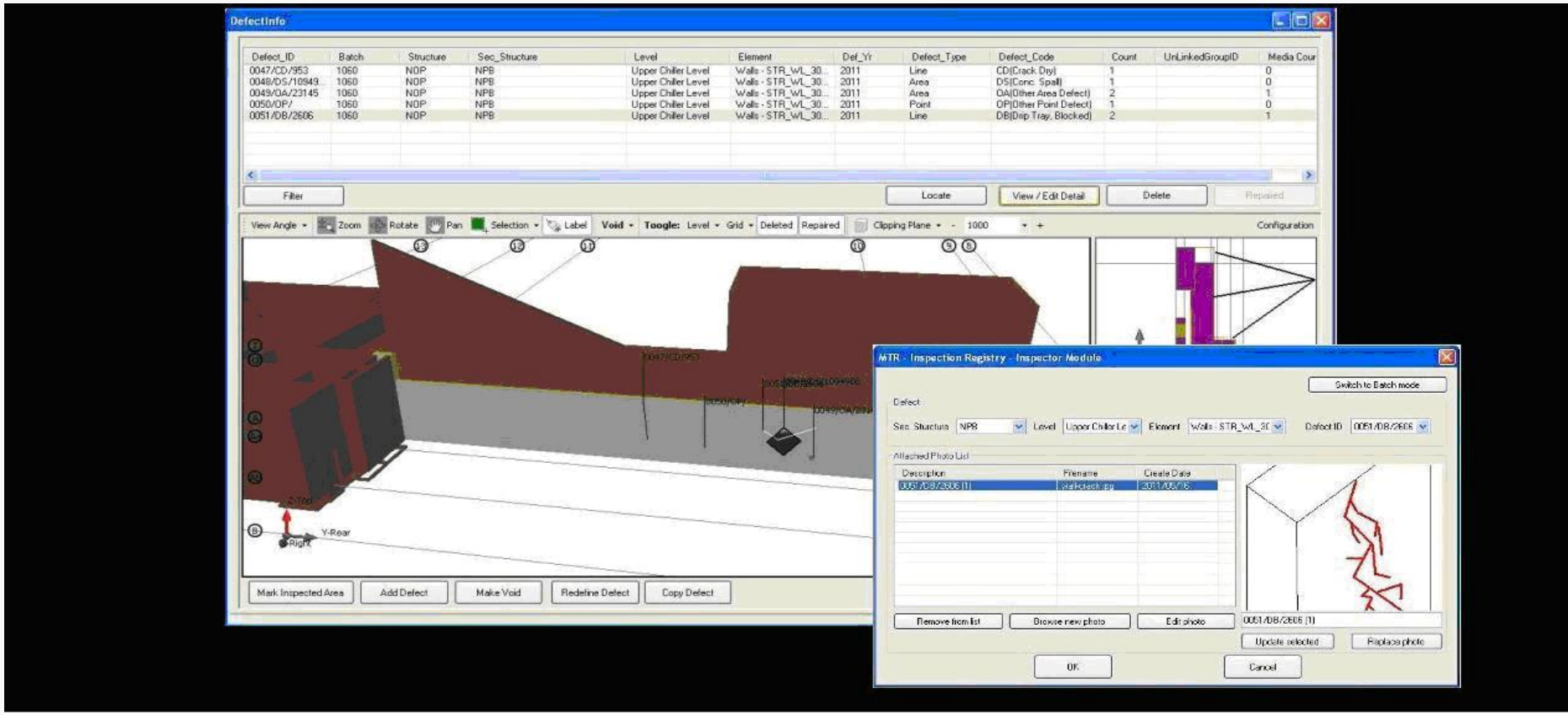
1. BIM model preparation

With the help of the Revit application, 3D model of the station structures with detail attributes are prepared. This is the starting point for the lifecycle of the inspection process. After that, the 3D model will be uploaded to the central system server by using customized Revit plug-in to complete the BIM model preparation process.



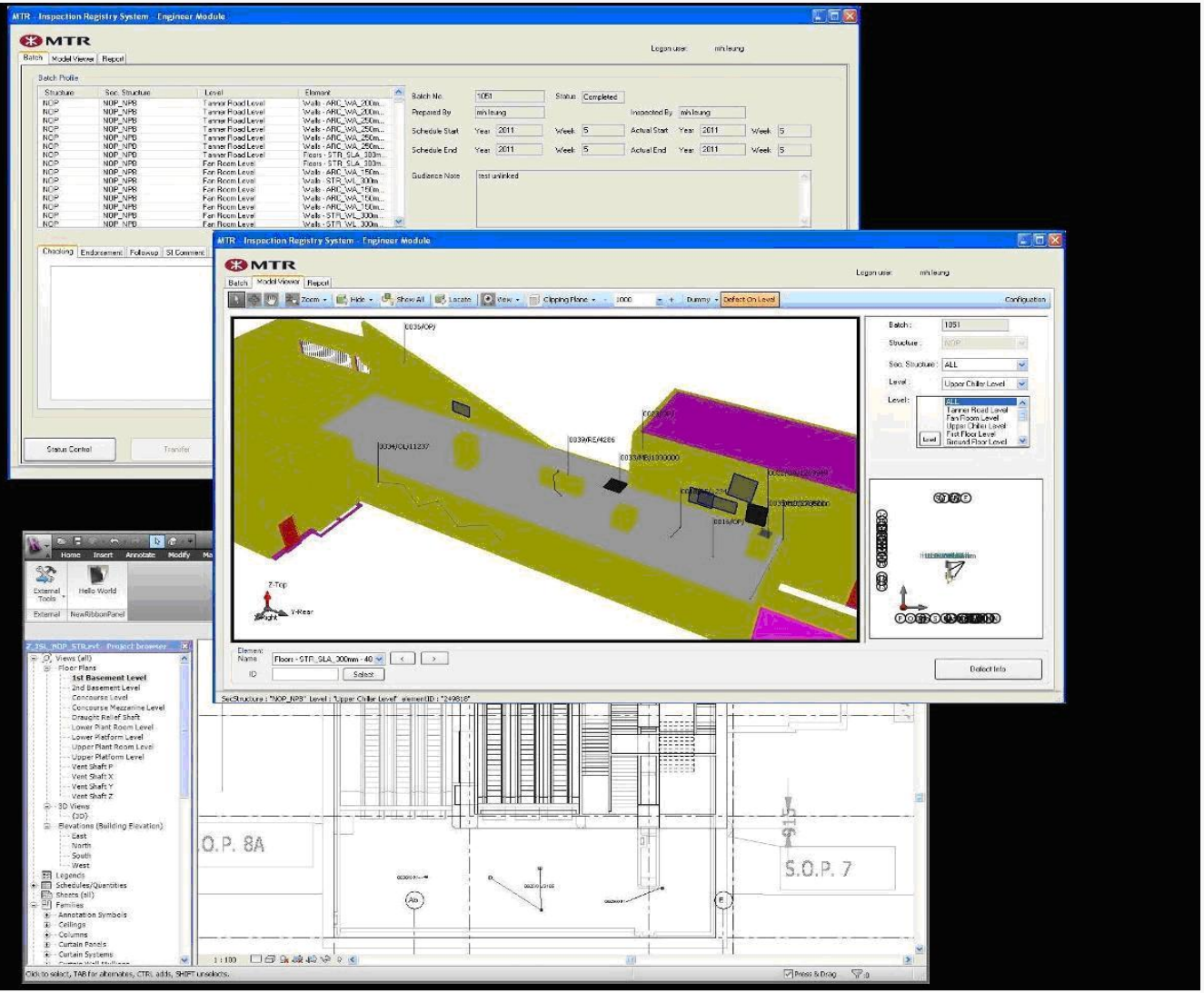
2. Creating inspection order

The second stage of process is creation of inspection order by Engineers. Previously prepared BIM model will be the targeted structure for inspection. Relevant parameters including levels to be inspected, inspection schedule, and responsible Inspector will be assigned in this stage.



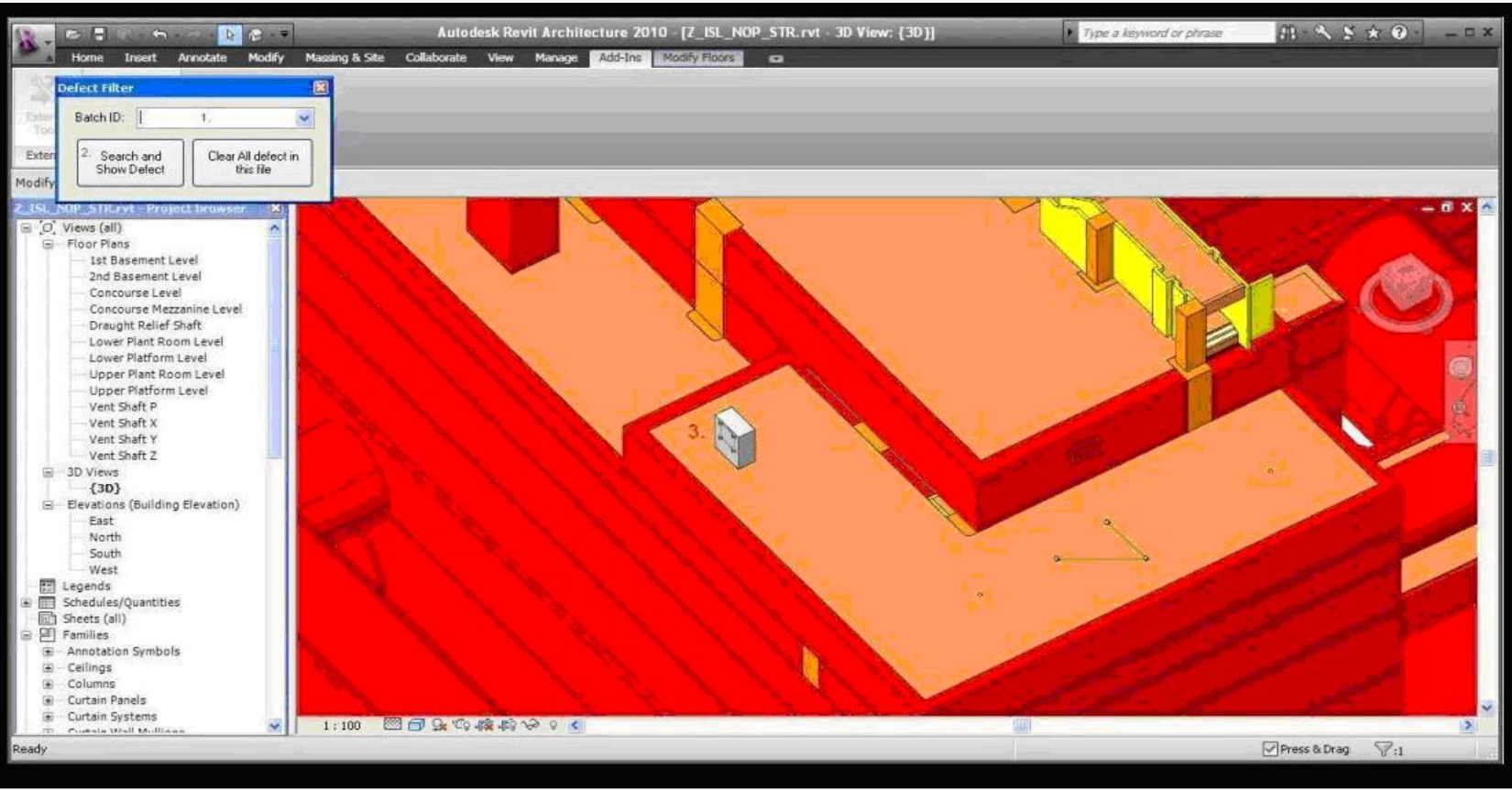
3. Inspection inside the 3D world

On-site inspection using handheld device will be performed by Inspectors after order assignment. Inspector will make use of the 3D model viewer to perform defect reporting and photo taking. Eventually, all reported defect will be uploaded to the system for Engineer's vetting process.



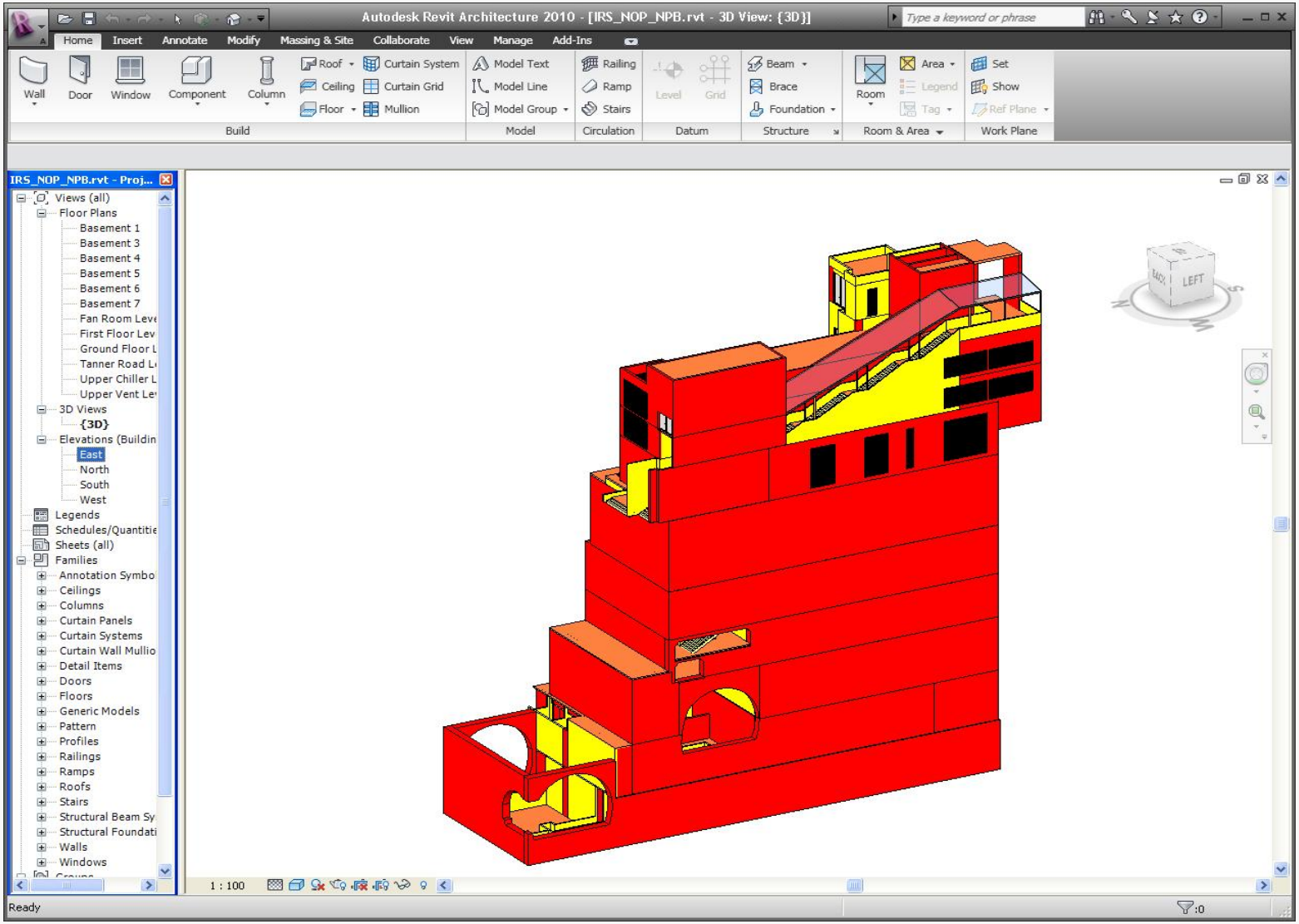
4. Vetting and follow Up

Upon Inspector completed inspection, Engineer can check the inspection result in the same 3D model. Report and layout printing showing the defect distribution can be generated as needed.



5. BIM model adjustment and checking

During the stage of on-site inspection, Inspector could also report discrepancy found between the BIM model and actual situation (modification, additional facility / feature, etc.). All information can be retrieved and displayed in BIM model inside Revit application thru the customized Revit plug-in tool. The BIM model can then be updated and reload back to IRS system.


Autodesk Revit Architecture 2010 - [IRS_NOP_NPB.rvt - 3D View: {3D}]
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Massing & Site
Collaborate
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Manage
Add-Ins
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Curtain Grid
Mullion
Model Text
Model Line
Model Group
Railing
Ramp
Stairs
Level
Grid
Beam
Brace
Foundation
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Room & Area
Work Plane
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Views (all)
Floor Plans
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Basement 5
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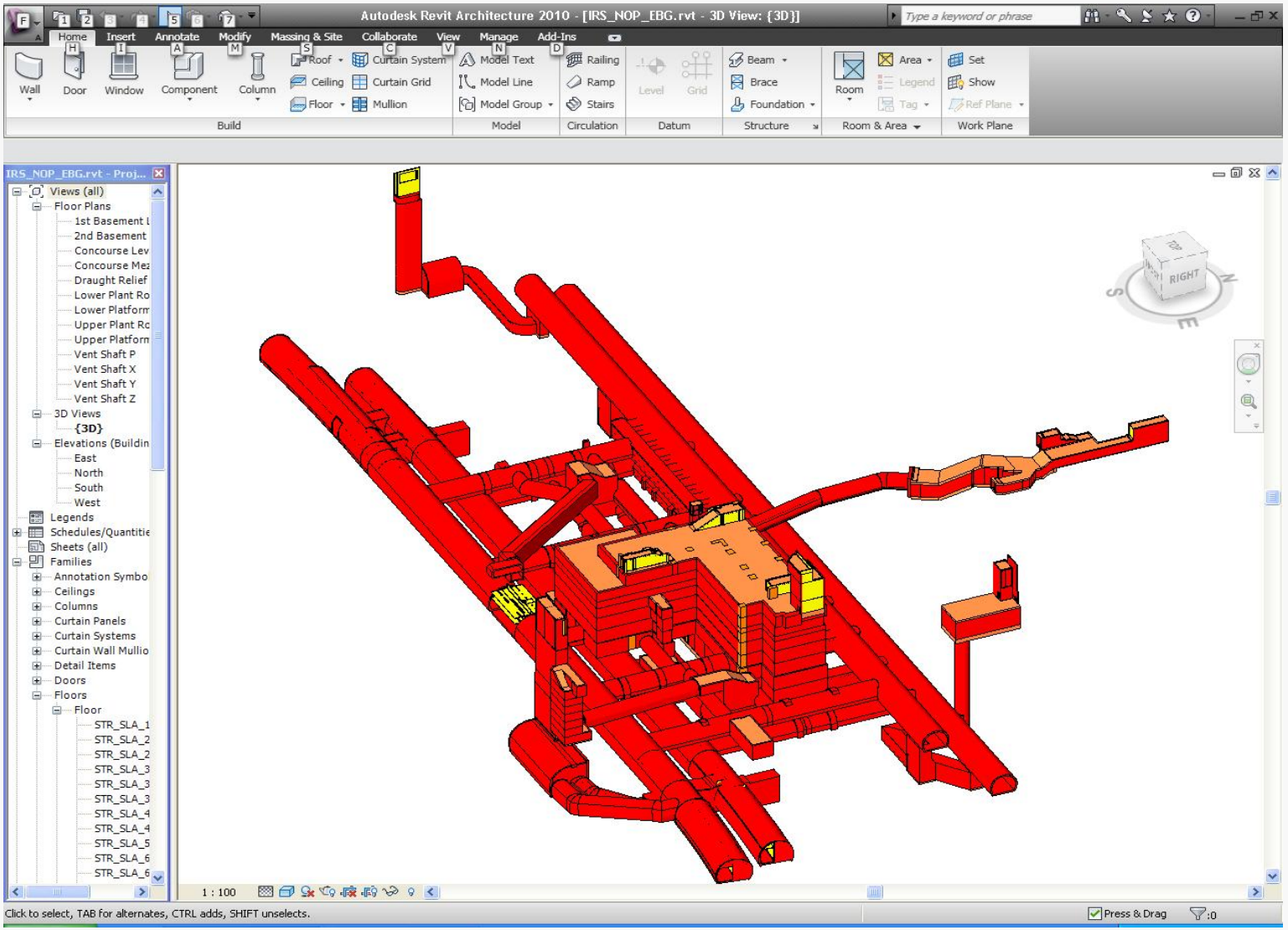
Autodesk Revit Architecture 2010 - [IRS_NOP_EBG.rvt - 3D View: {3D}]
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IRS_NOP_EBG.rvt - Proj...
Views (all)
Floor Plans
1st Basement
2nd Basement
Concourse Lev
Concourse Mez
Draught Relief
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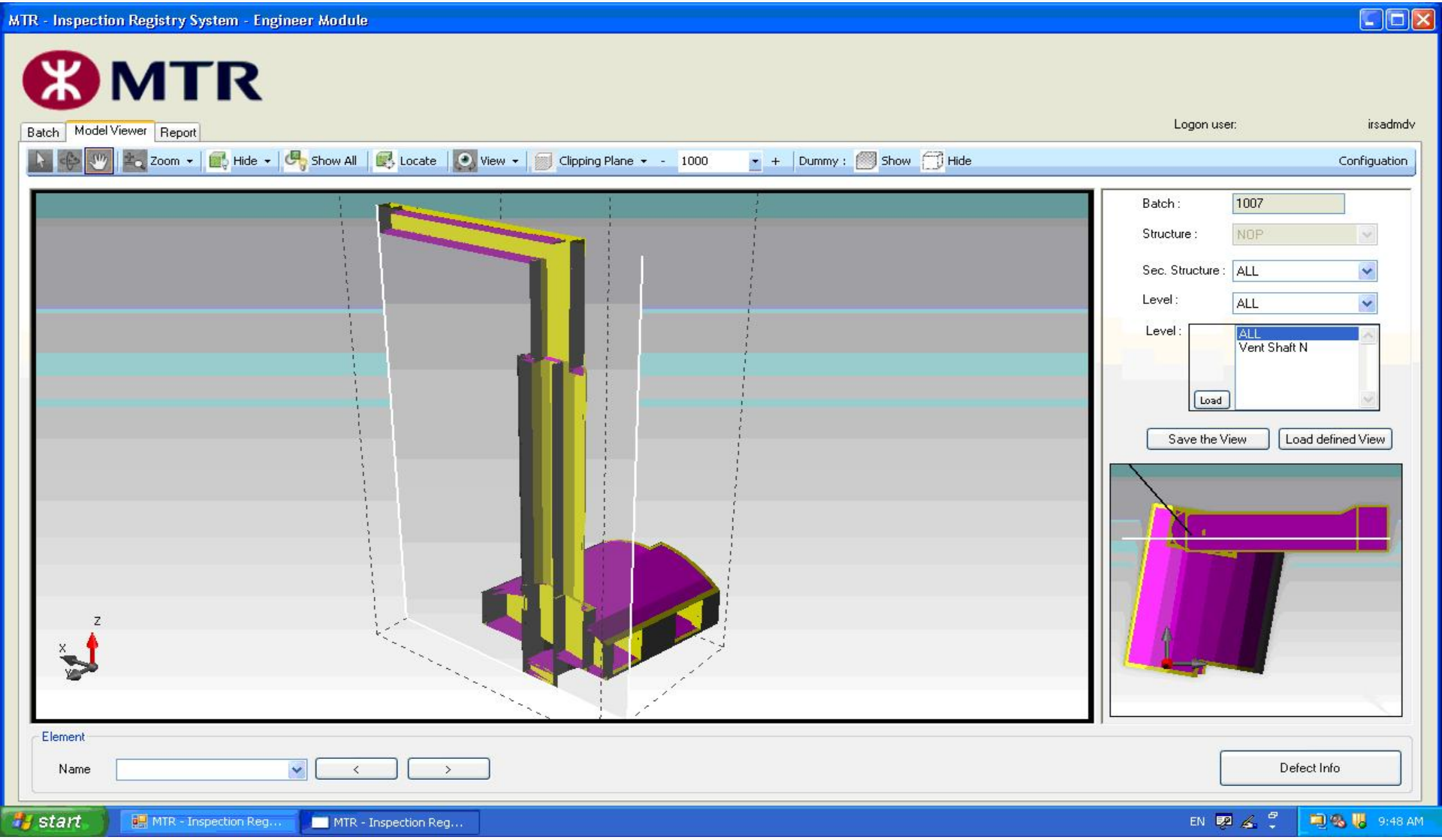
MTR - Inspection Registry System - Engineer Module
MTR
Batch
Model Viewer
Report
Logon user:
irsadmdv
Zoom
Hide
Show All
Locate
View
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Y
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Name
Defect Info
start
MTR - Inspection Reg...
MTR - Inspection Reg...
EN
9:48 AM

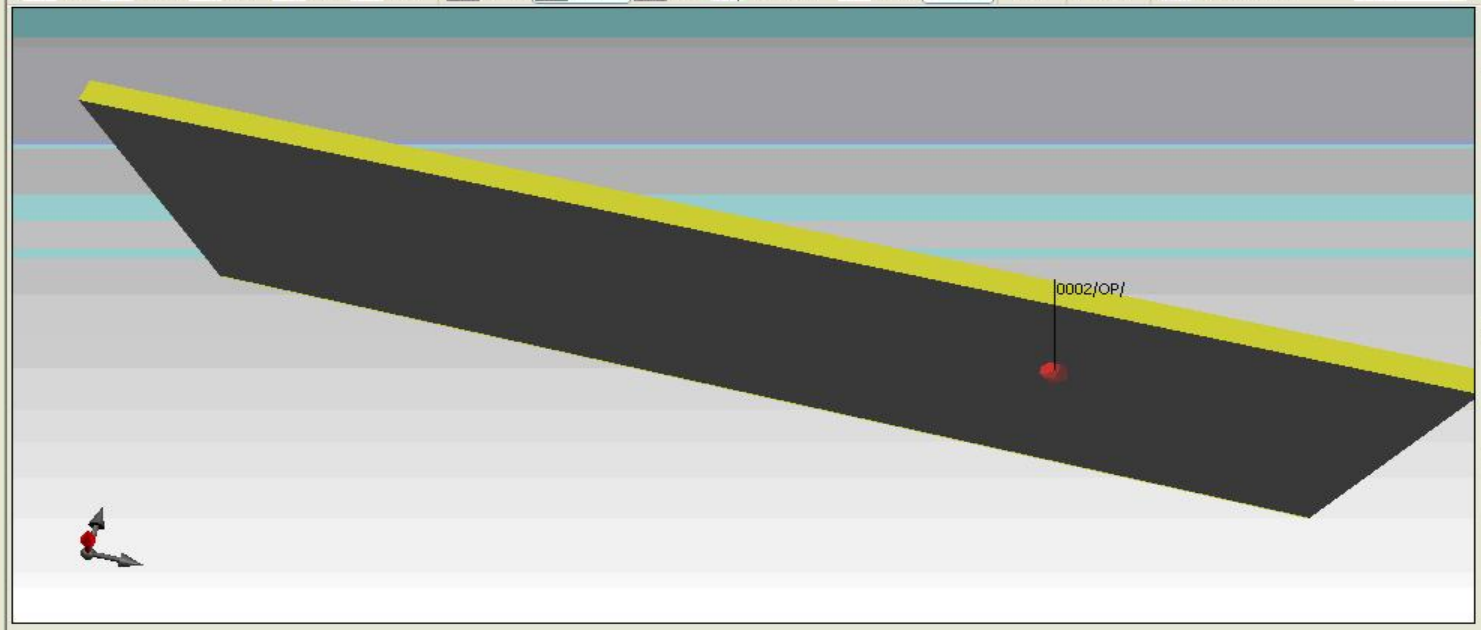
DefectInfo

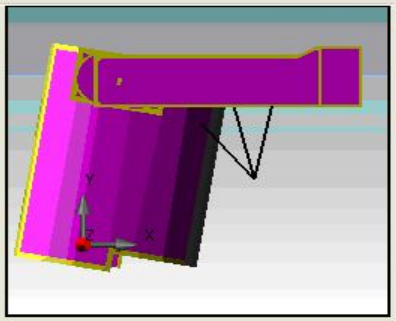
Defect_ID	Batch	Structure	Sec_Structure	Level	Element	Def_Yr	Defect_Type	Defect_Code	Count	UnLinkedGroupID
0002/OP/	1006	NOP	Vent Shaft N	Vent Shaft N	695641	2010	Point	OP(Other Point Defect)	10	

Filter

View / Edit Detail

Top Front Rear Left Right Zoom Rotate Pan Selection Label SubGrid Void toggle Clipping Plane - 1000 + Configuration





Element Note

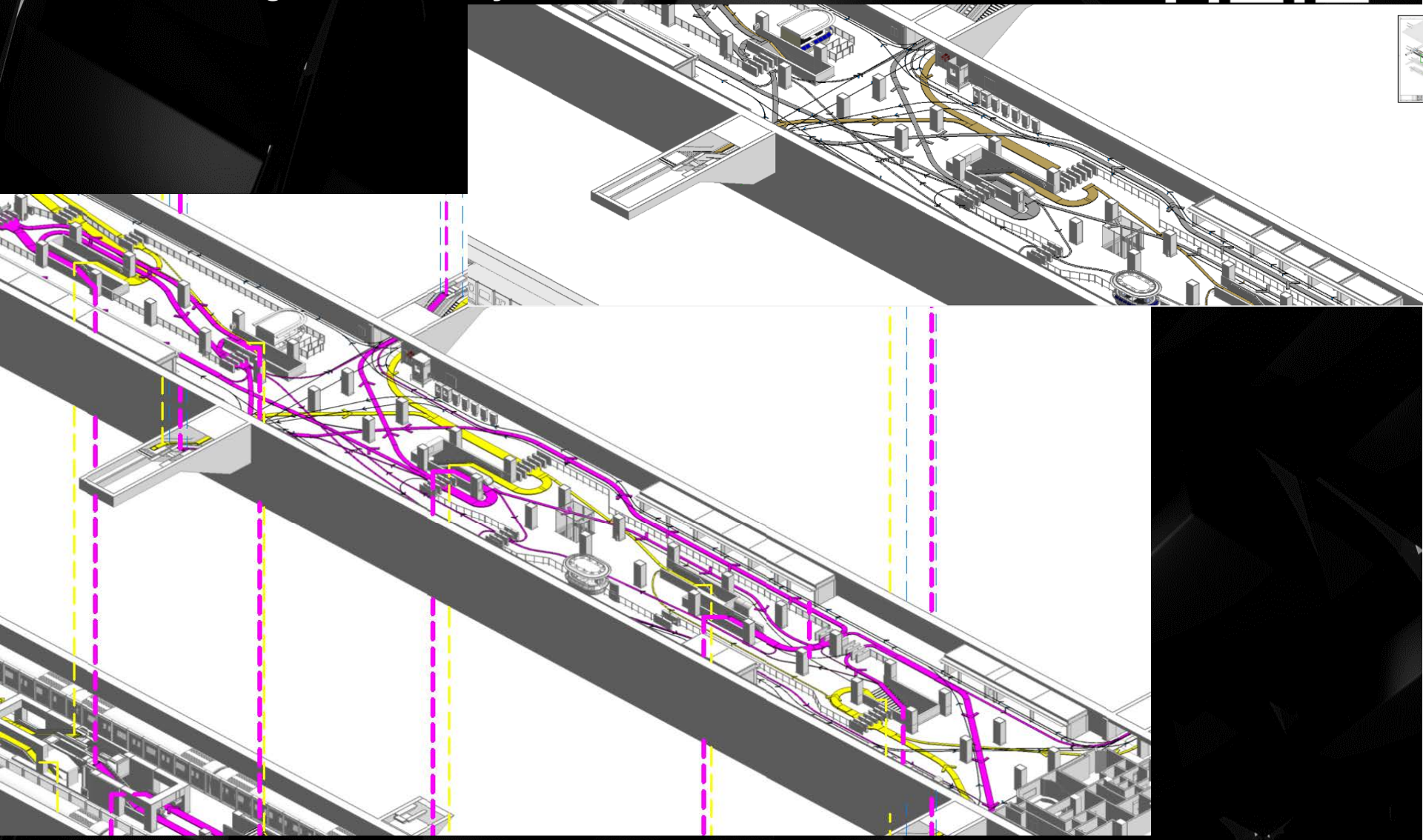
Inspected Area

0.00 mm^2

KeyBoard Close

start MTR - Inspection Reg... MTR - Inspection Reg... DefectInfo Document - WordPad EN 9:59 AM

Passenger Flow Study



Beyond BIM – Augmented Reality (AR)

Beyond BIM

VTT TECHNICAL RESEARCH CENTRE OF FINLAND

Building & Construction

ARScaleModel

ARWebCam

ARPhone

ARonPDA

Google Earth
"on Earth"

AROnSite

VTT

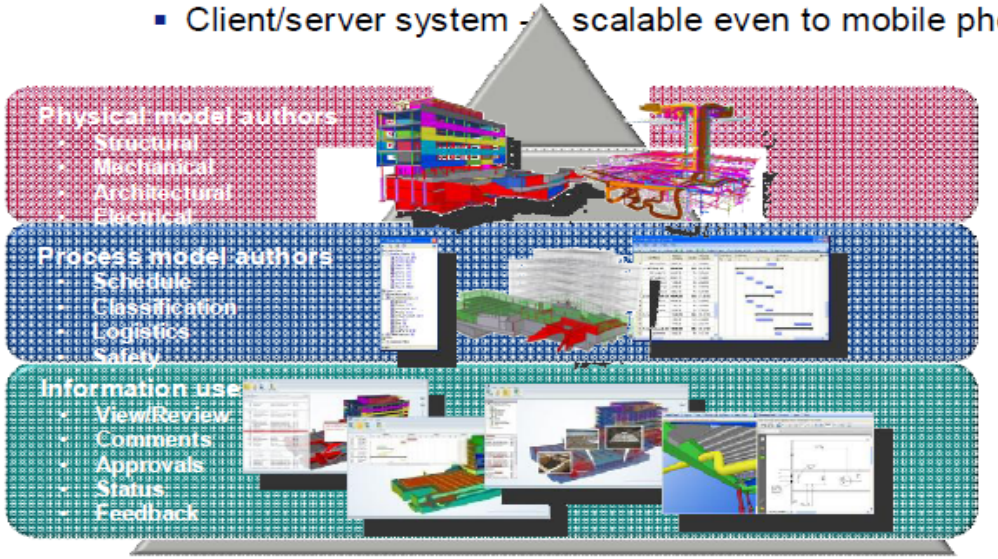
Beyond BIM

VTT TECHNICAL RESEARCH CENTRE OF FINLAND

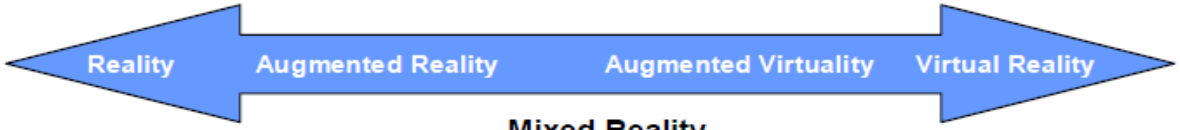
Project "AR4BC"

Augmented Reality for Building and Construction

- Compare project plans (4D BIM) with situation on site
- Provide real time mobile feedback from site to BIM system
- Client/server system - scalable even to mobile phones

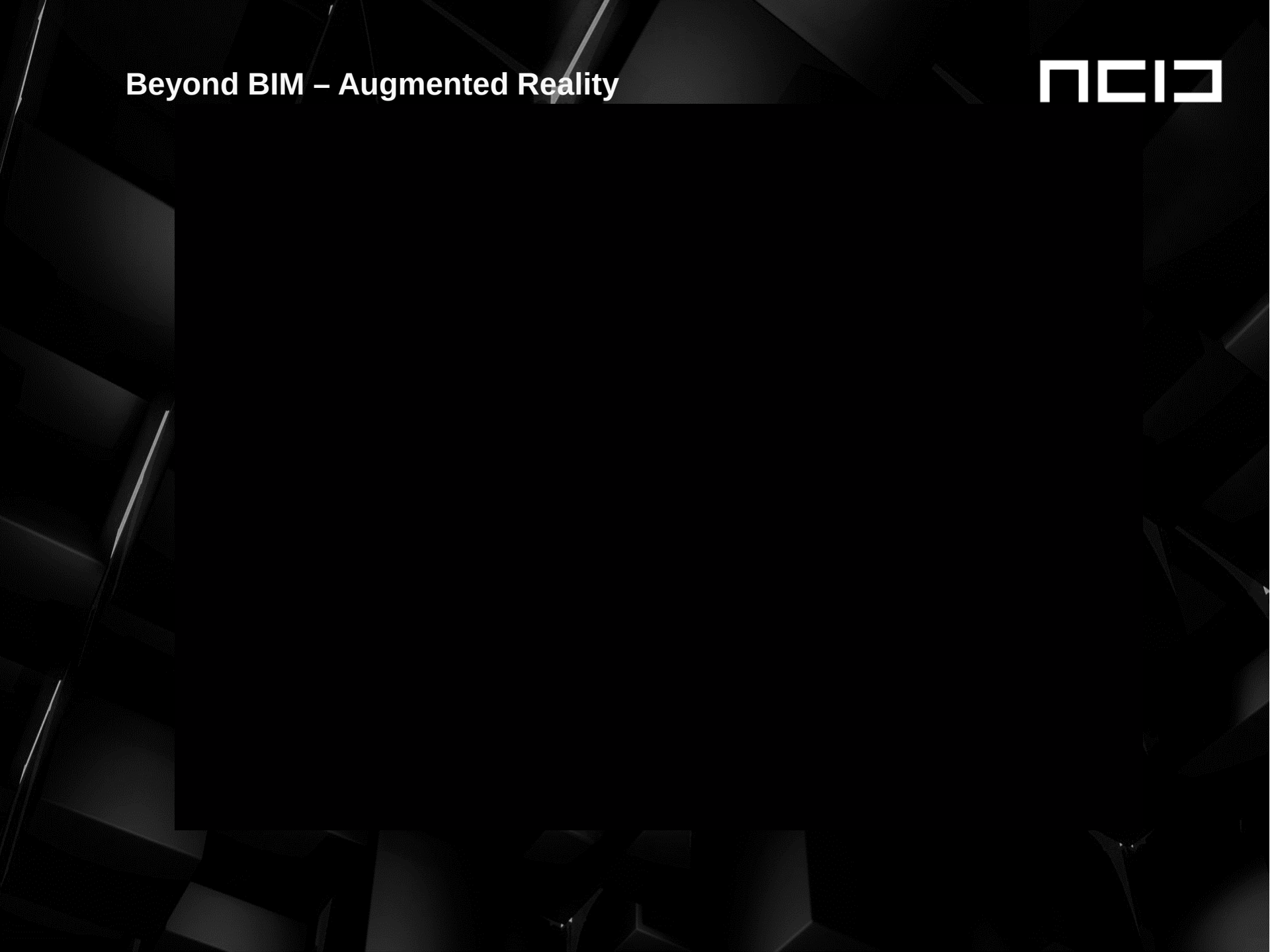


Building Information Models (BIM)



Mixed Reality

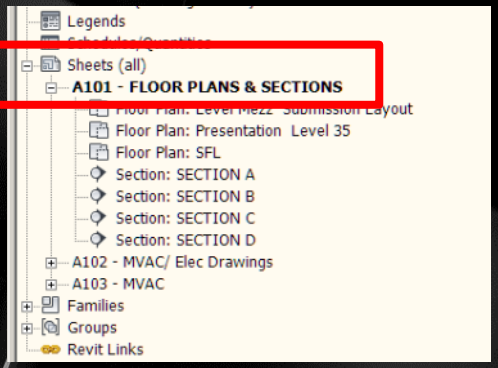
Beyond BIM – Augmented Reality

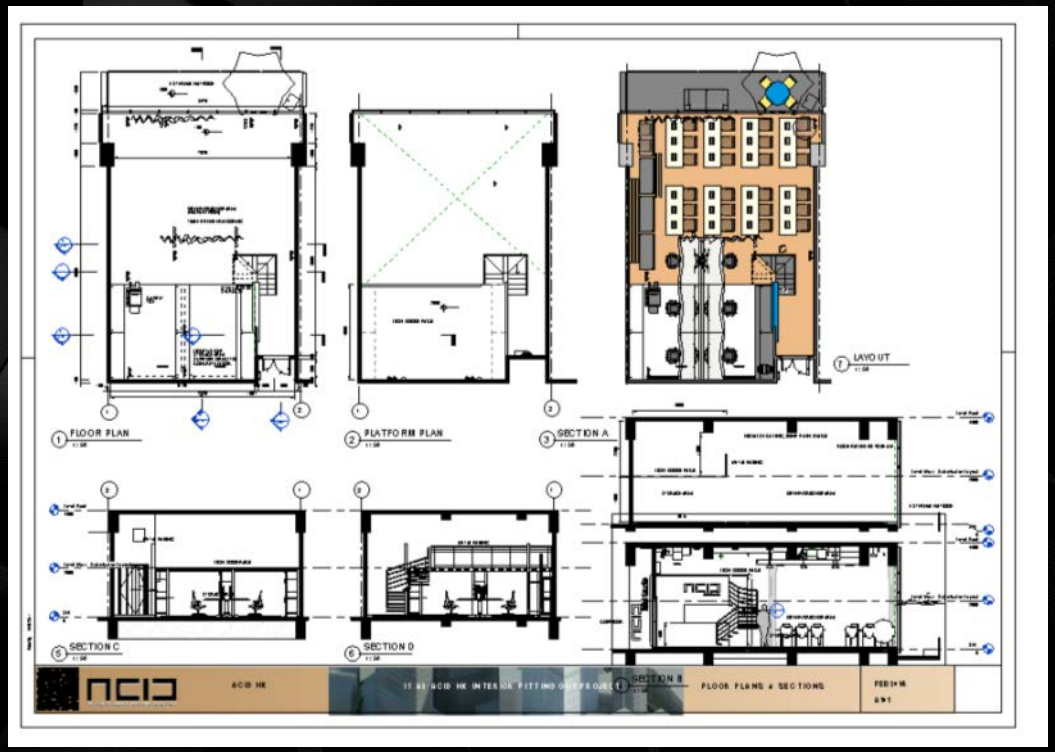


Beyond BIM – Augmented Reality

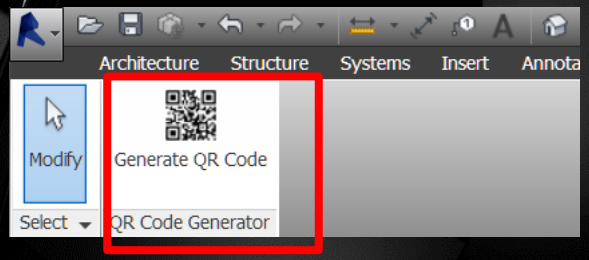
2D Print and BIM Model via QR Code

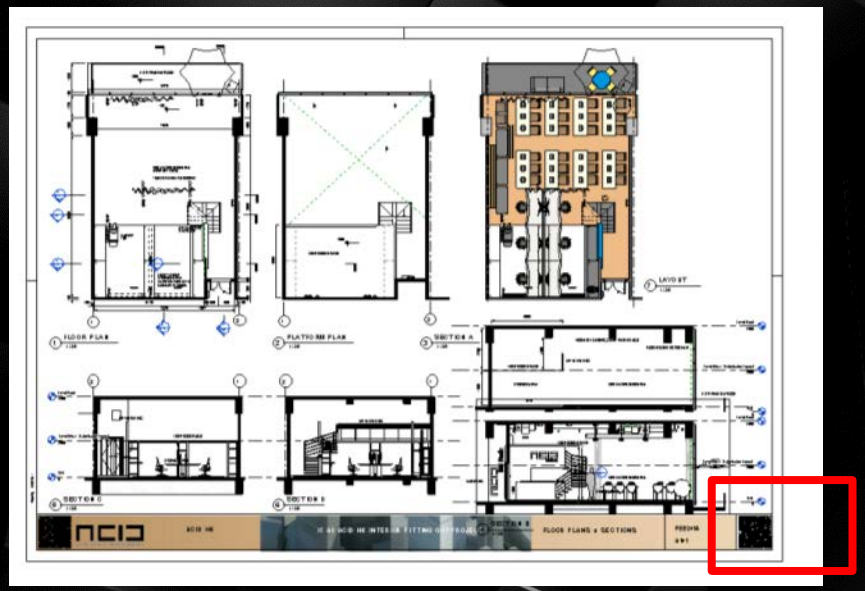
1.6 Prepare the drawing sheet from BIM model

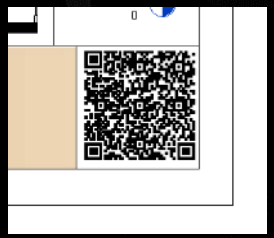




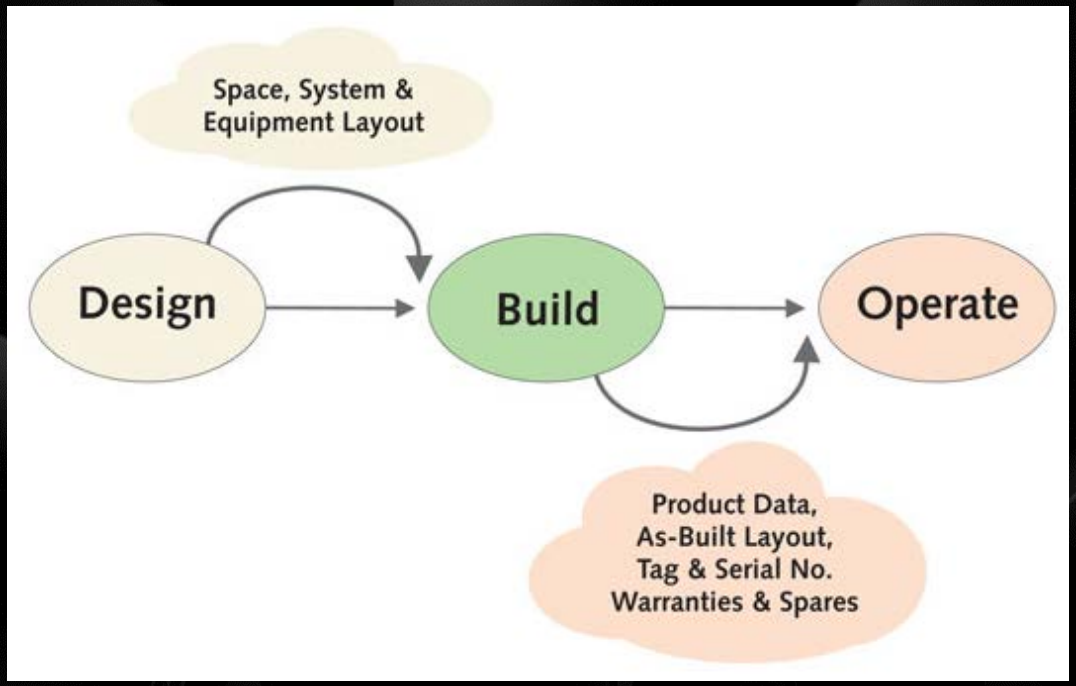
1.7 Generate and add QR Code on the drawing







What is COBie?



COBie…

… is a Model View Definition (MVD) as defined by buildingSMART

… is a subset of IFC with some additional data

… simplifies the work required to capture and record project handover data.

… captures data as it is created during design, construction, and commissioning

… does not require endless spreadsheet editing

… is a UK Government requirement by 1st 2016

Why COBie?

Once a validated COBie dataset has been delivered to the building operator matching the built asset; all operations and maintenance data can be interrogated from a single place.

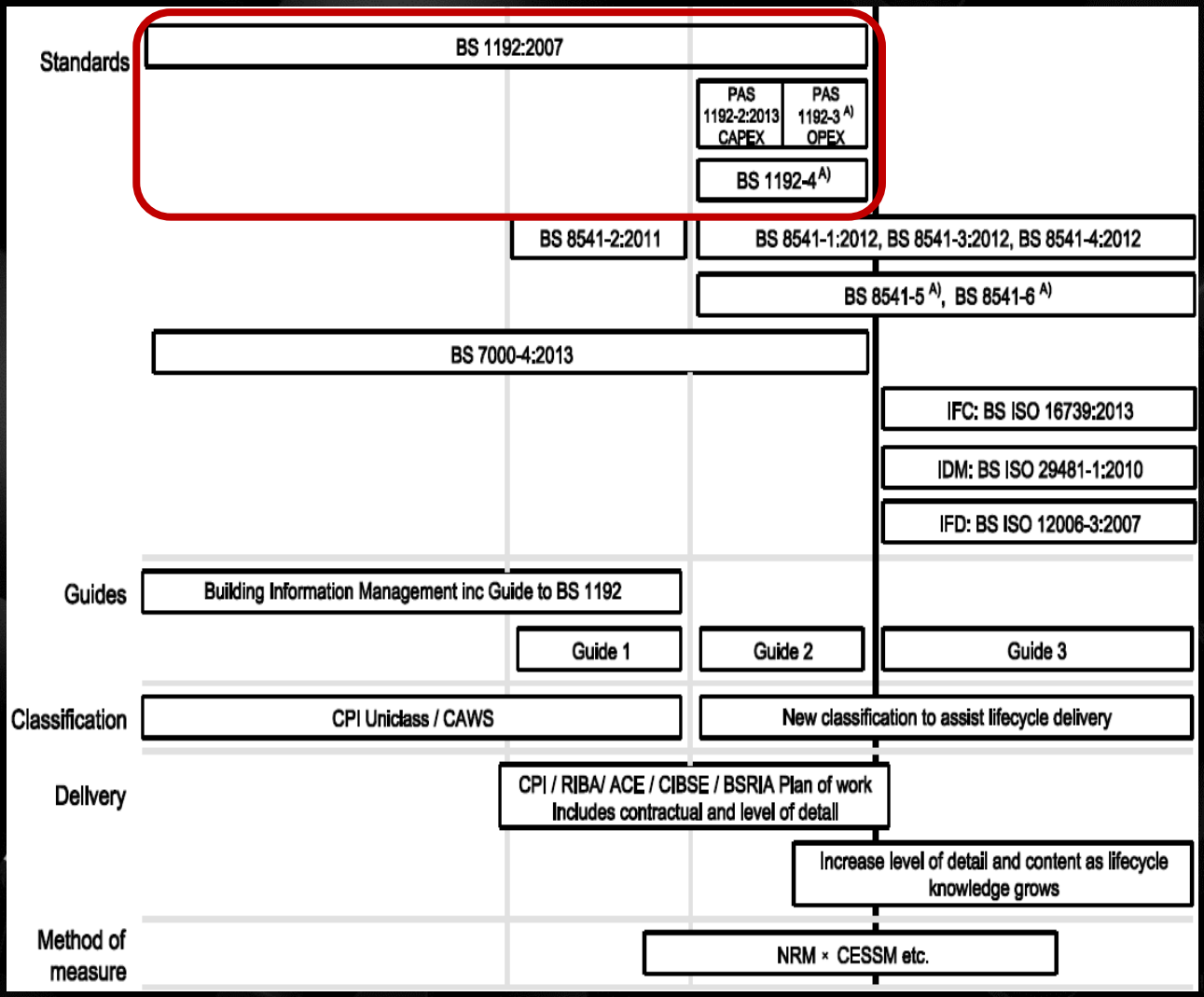
…Instead of this

Meaning this type of information about built assets…

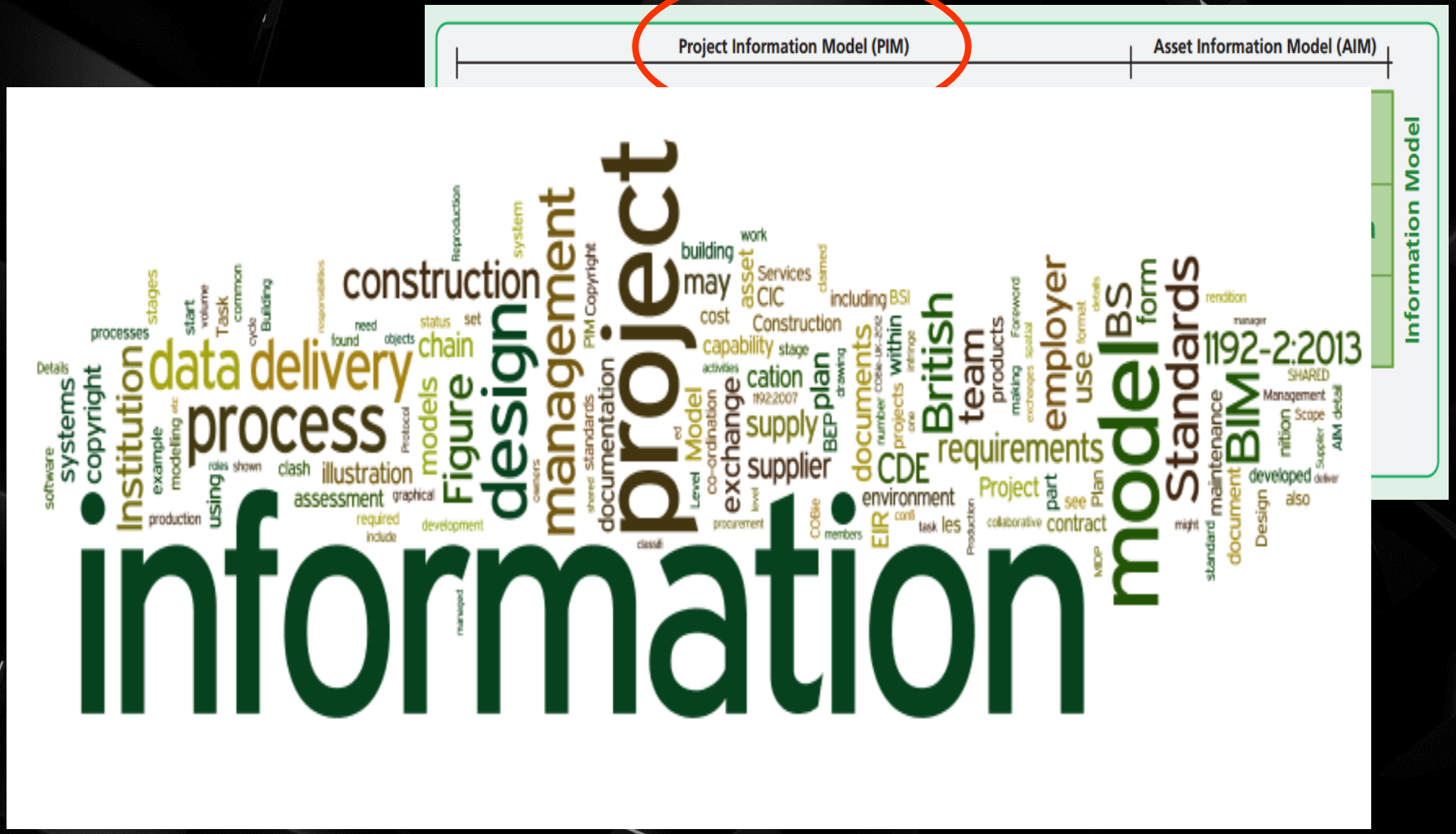
B 555 roadmap - The Mandate taking shape

The BS/PAS 1192 series of standards are the most important releases to date.

PAS 1192:2 Concerns the Level 2 Delivery of projects.



PAS1192:2 What's it all about?

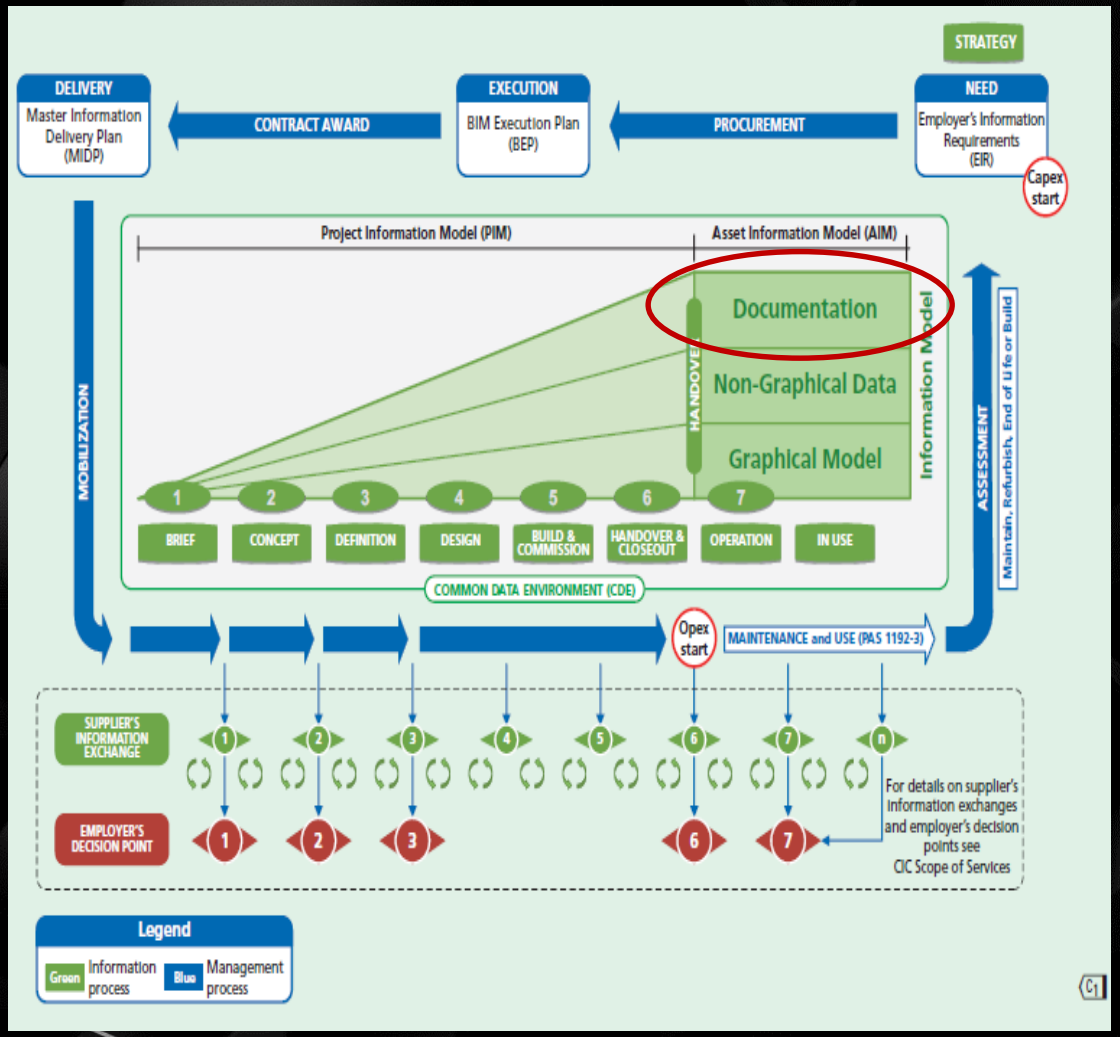


characters

What is BIM Data?

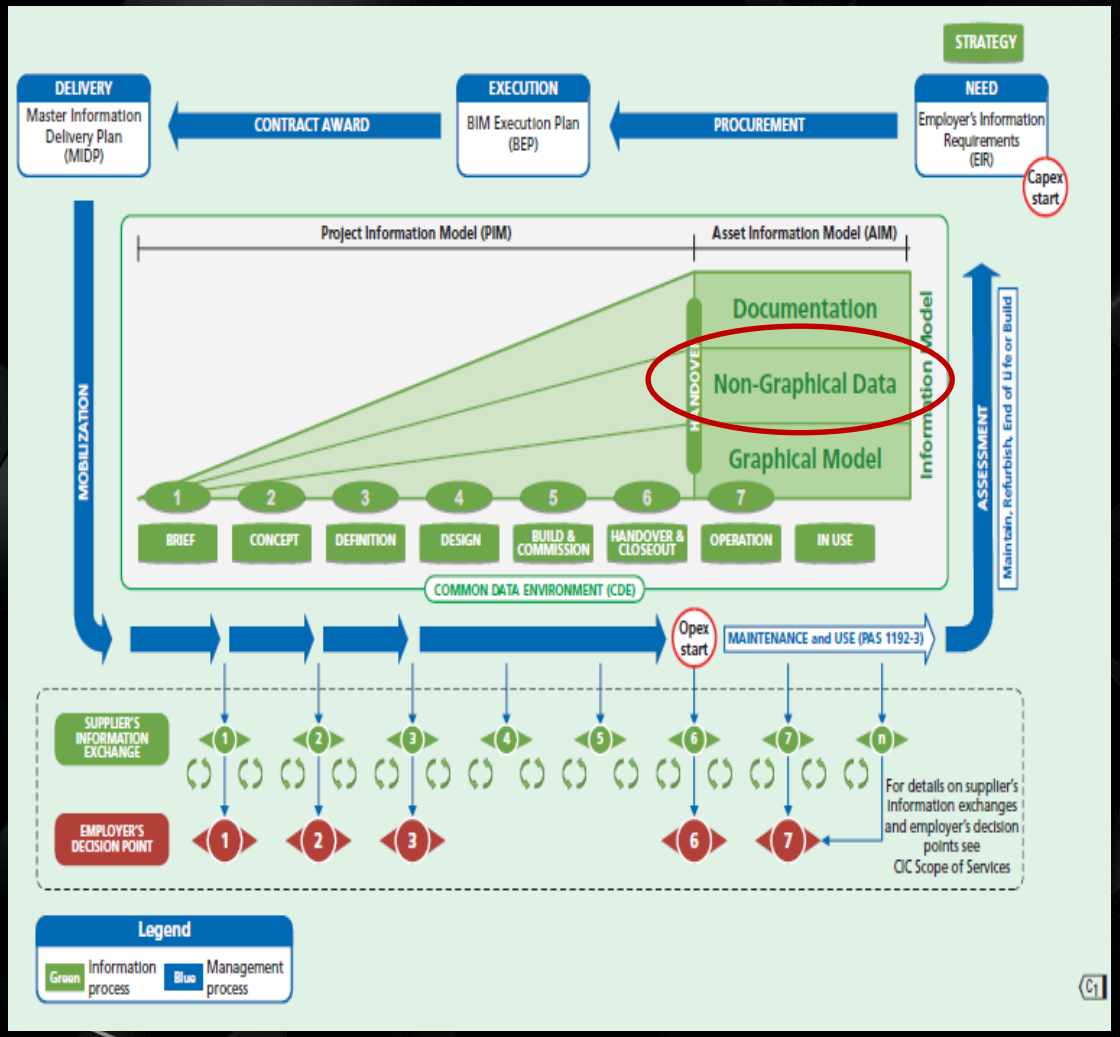
Documentation
Information for use in the briefing, design, construction, operation, maintenance or decommissioning of a construction project, including but not limited to correspondence, drawings, schedules, specifications, calculations, spreadsheets

NOTE Documents must either be immutable or incorporate a means of controlling changes.



What is BIM Data?

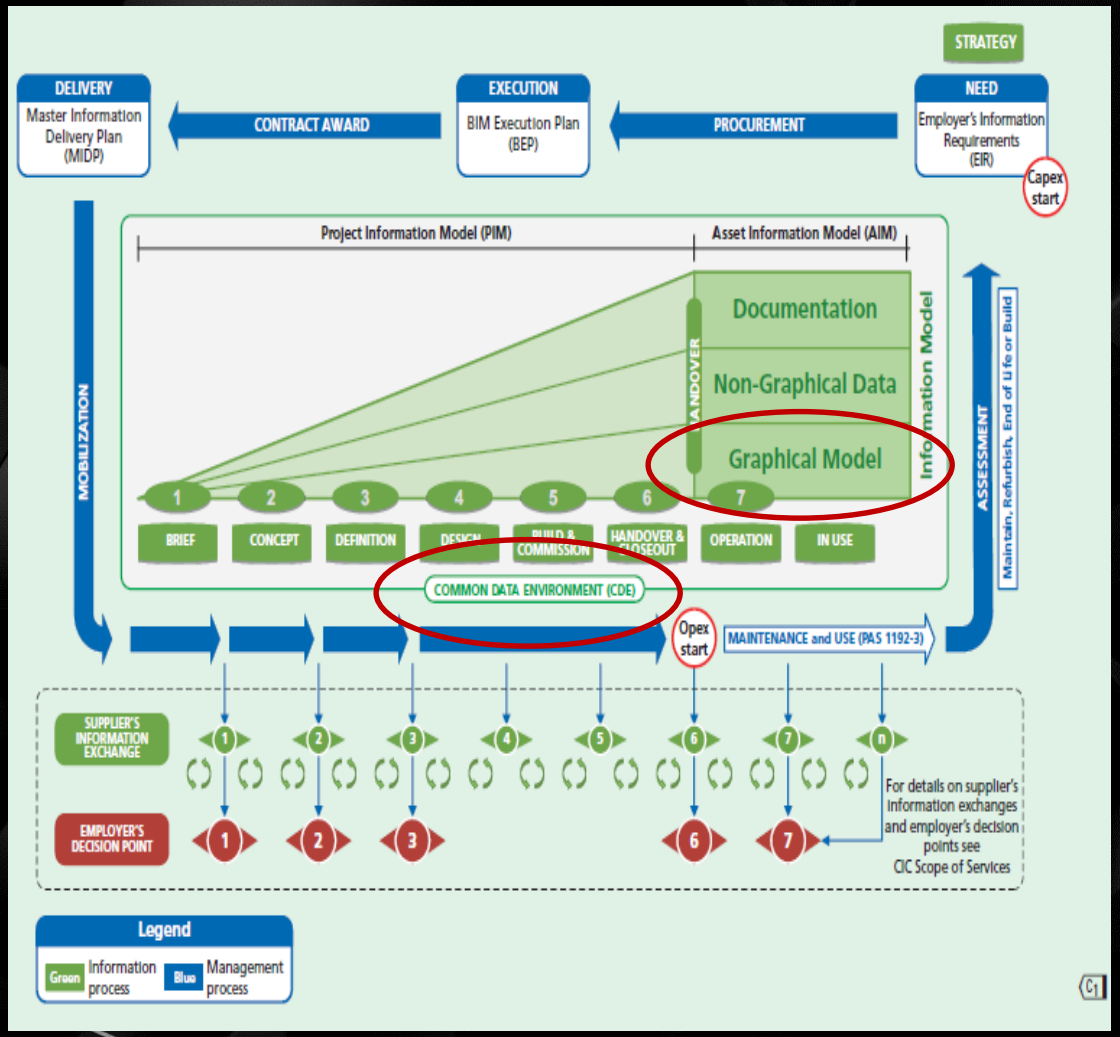
Non-graphical data
data conveyed using alphanumeric characters



What is BIM Data?

Graphical Model
data conveyed using shape and arrangement in space

… ALL of this data is to be delivered to and shared through a Common Data Environment approach. It is a *'Fundamental Principle for Level 2 information modelling'*



= **Common Data Environment**

Common Data Environment (CDE) – PAS1192:2

‘**Single source of information** for any given project, used to collect, manage and disseminate all relevant approved project documents for multi-disciplinary teams in a **managed process**.’

‘NOTE, A CDE may use a project server, an **extranet**, a file-based retrieval system or other suitable toolset’

What are the issues?

Documents and drawing are easy to share – 4Projects have been facilitating effect collaboration around these for years

But getting the most out of **sharing** Building Information Models presents a new challenge…..

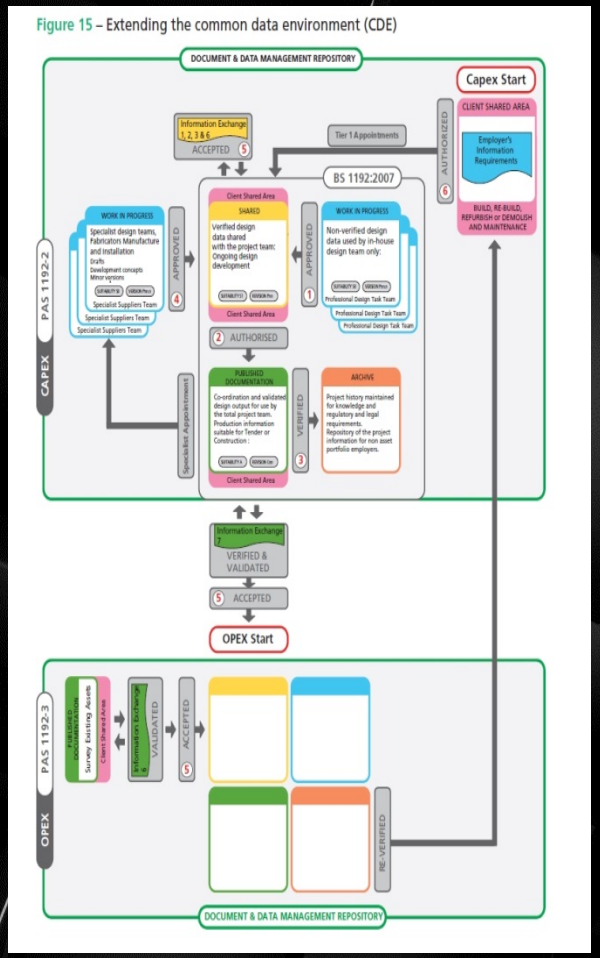
How does everybody see the model and it's **data**?

Ownership the federated information?

Can **unfinished worked** be shared to assist the design process?

How is the Information exchange data **compiled** and **validated**?

PAS 1192:2 and 4Projects Workflows are here to help



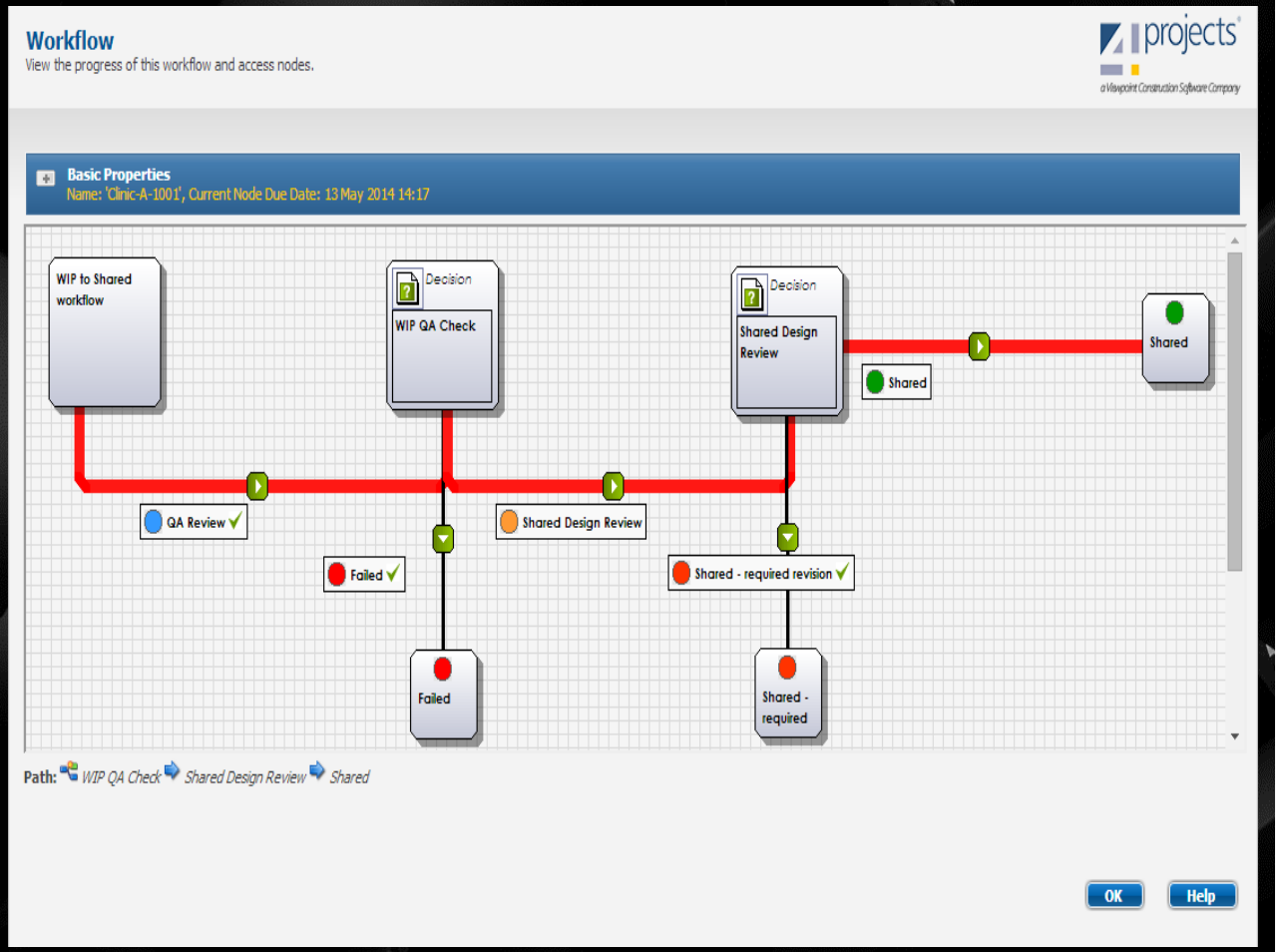
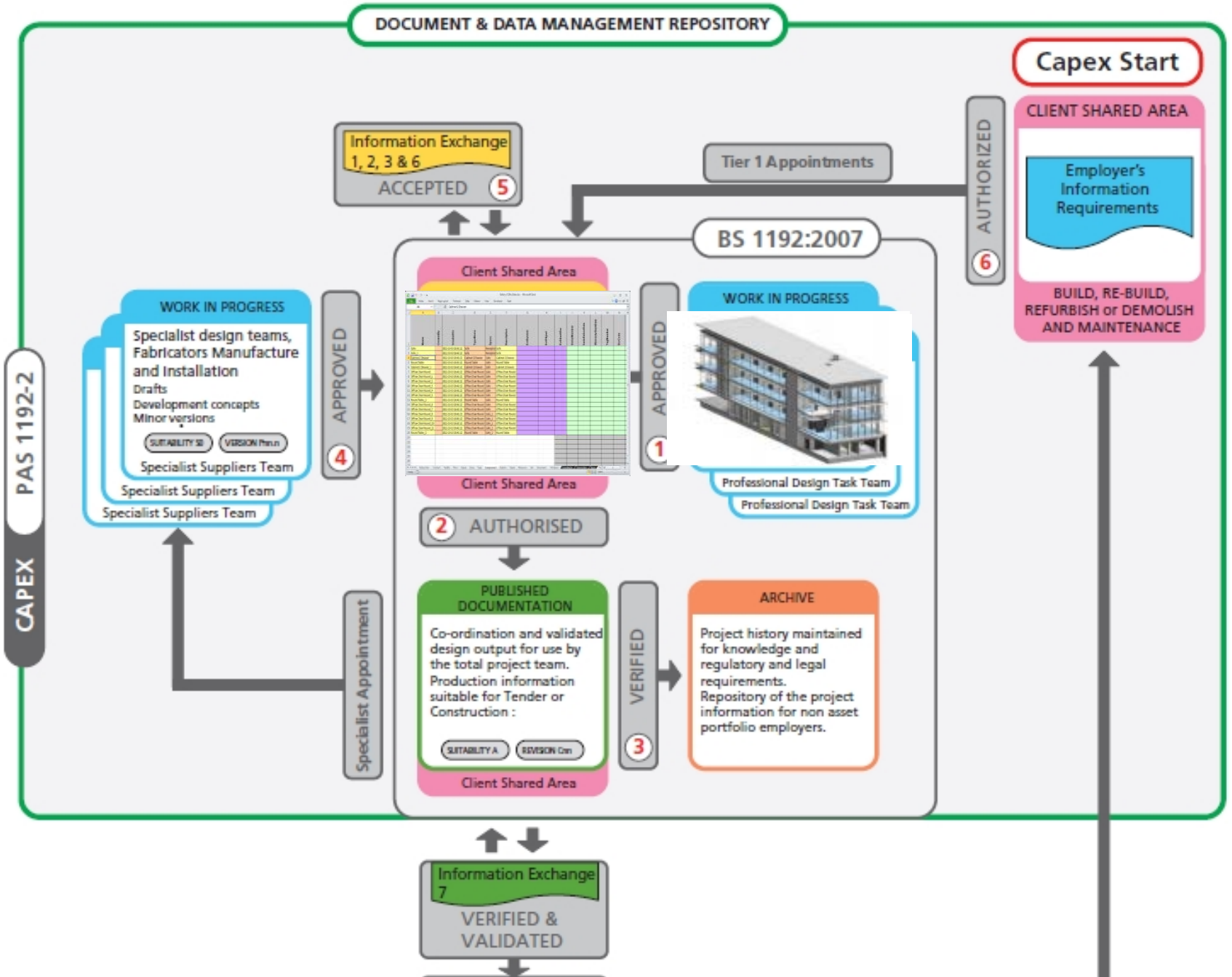
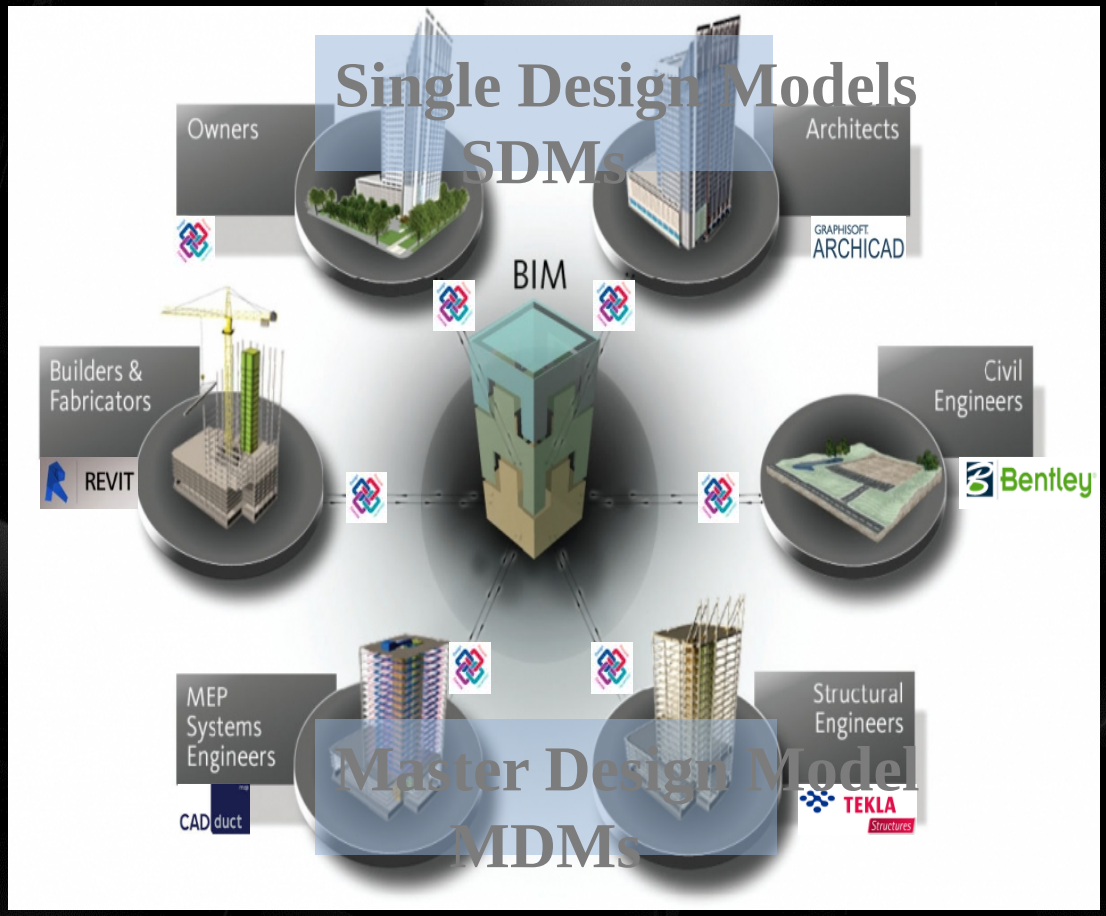


Figure 15 – Extending the common data environment (CDE)

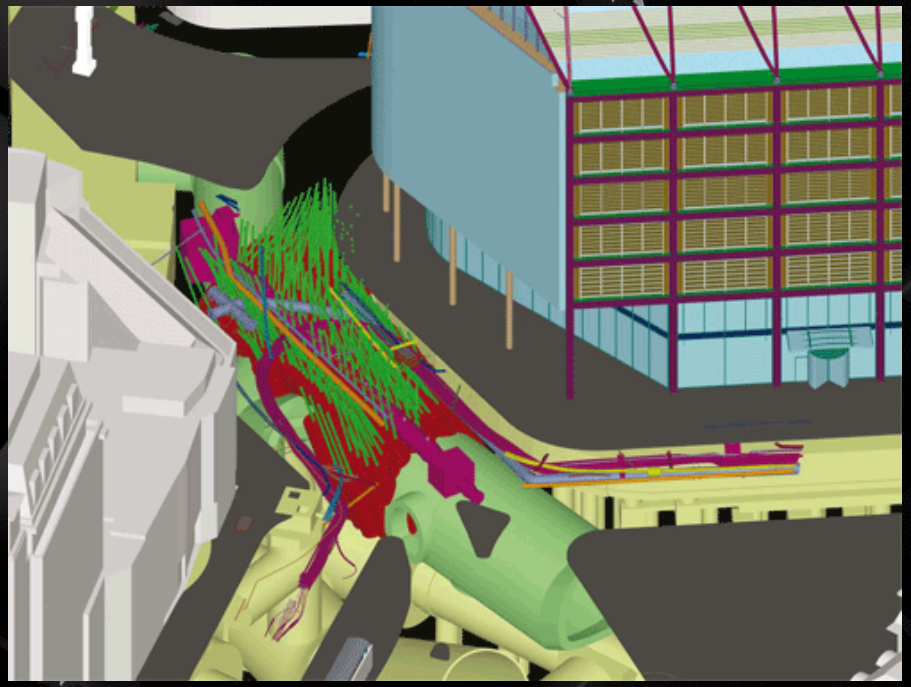


So that's the theory…. What about the practice?



But doesn’t this only apply to buildings?

The VSU model encompasses the entire project and incorporates 18 discrete design disciplines, showing how the entire project fits together.

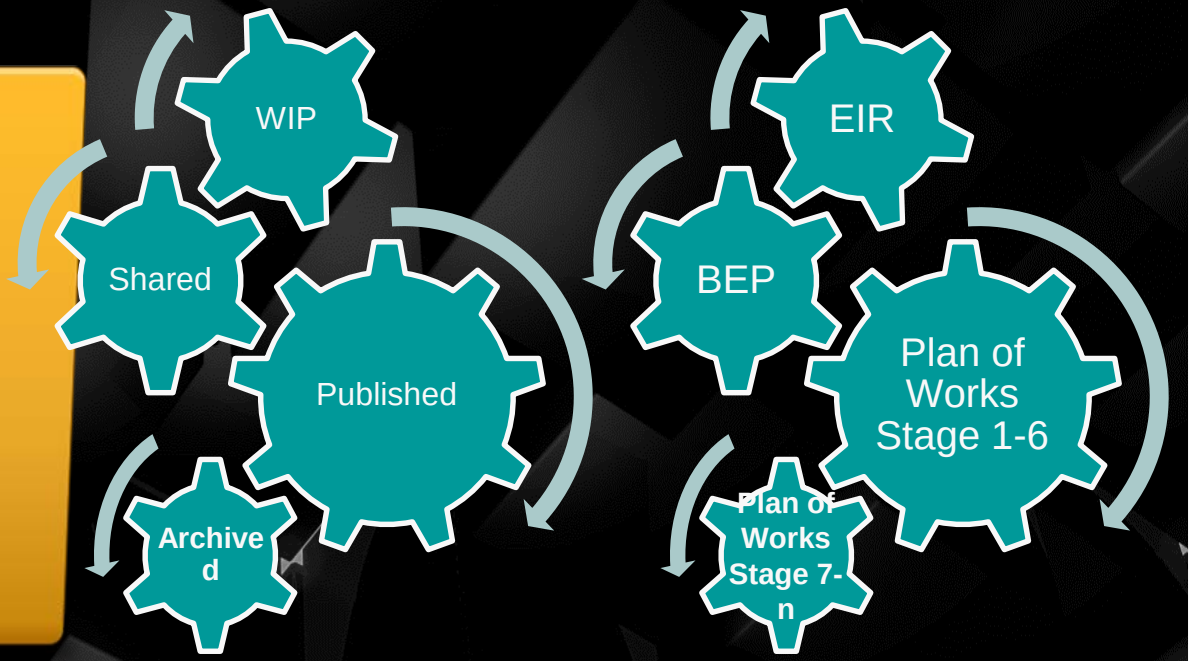


[The] Federated project supply chain [produced] a co-ordinated information model

To maximise interoperability between disciplines, LU’s preferred collaboration software, [ ]was used wherever practicable. When this was not possible, the transition of electronic information between the different platforms being used was assisted by tailoring software configurations and using **‘platform agnostic’ models**.

Translating the B555 Roadmap into the CDE.

- Employers Information Requirements
- BIM Execution Plan
- Single Design Models
- Master Design Models



How does this fit with contracts, appointments, briefs etc…

Confirmation from the major contract providers has been received that on minor clause amendments are required to incorporate BIM Protocol to sit above the contract. The clause changes must be cascaded throughout the project appointment for successful collaboration.

The PAS1192:2 Level 2 Fundamentals include the provision Employers Information Requirements, from Client to Supplier and a BIM Execution plan in return from Supplier to Client.

Thank You…