

BIM

(Building Information Modeling)

Daniel KAZADO

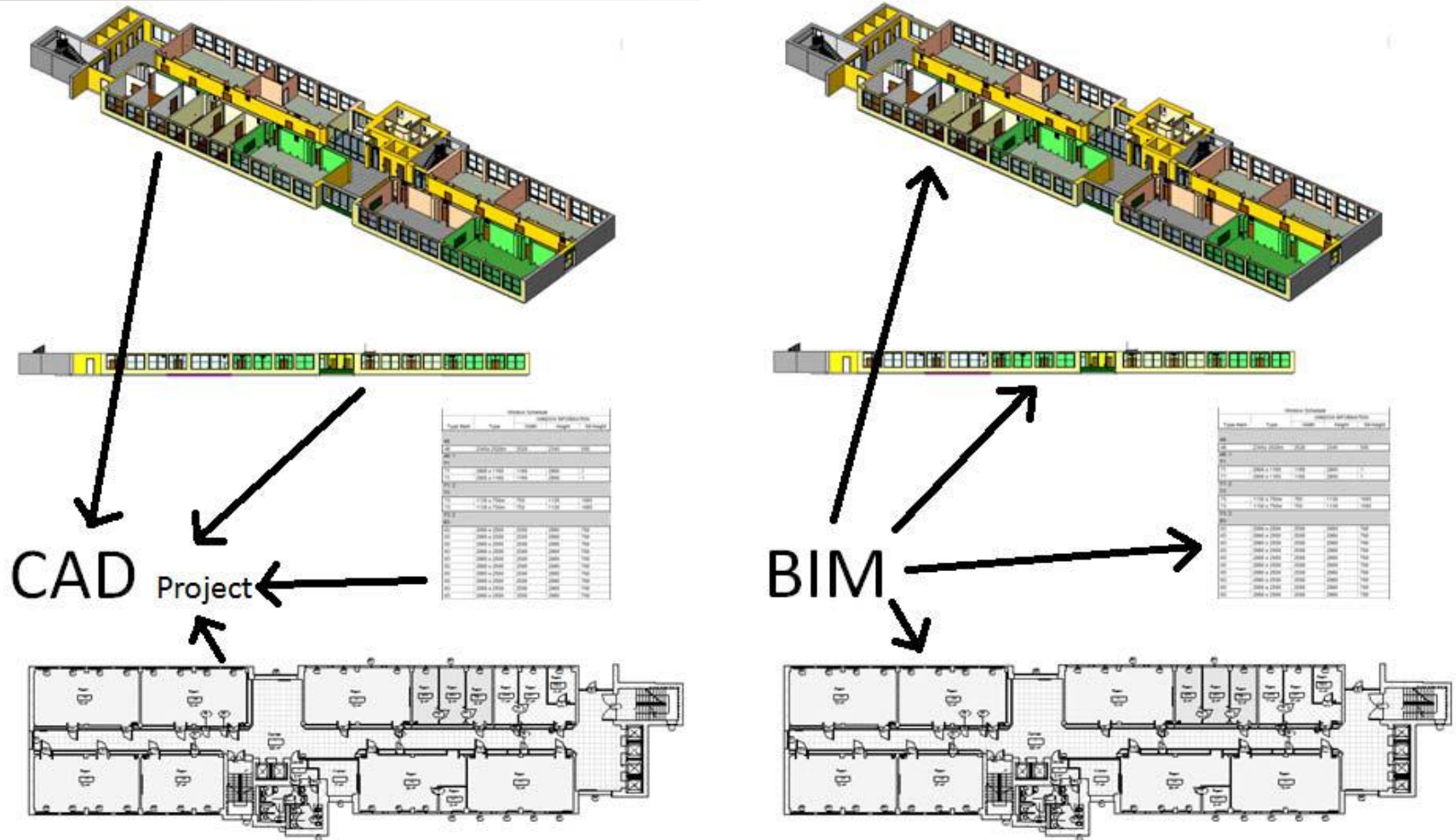
BIM Consultant, ProCS Ltd.

www.bimturkiye.blogspot.com.tr - daniel.kazado@procs.com.tr

What is BIM ?

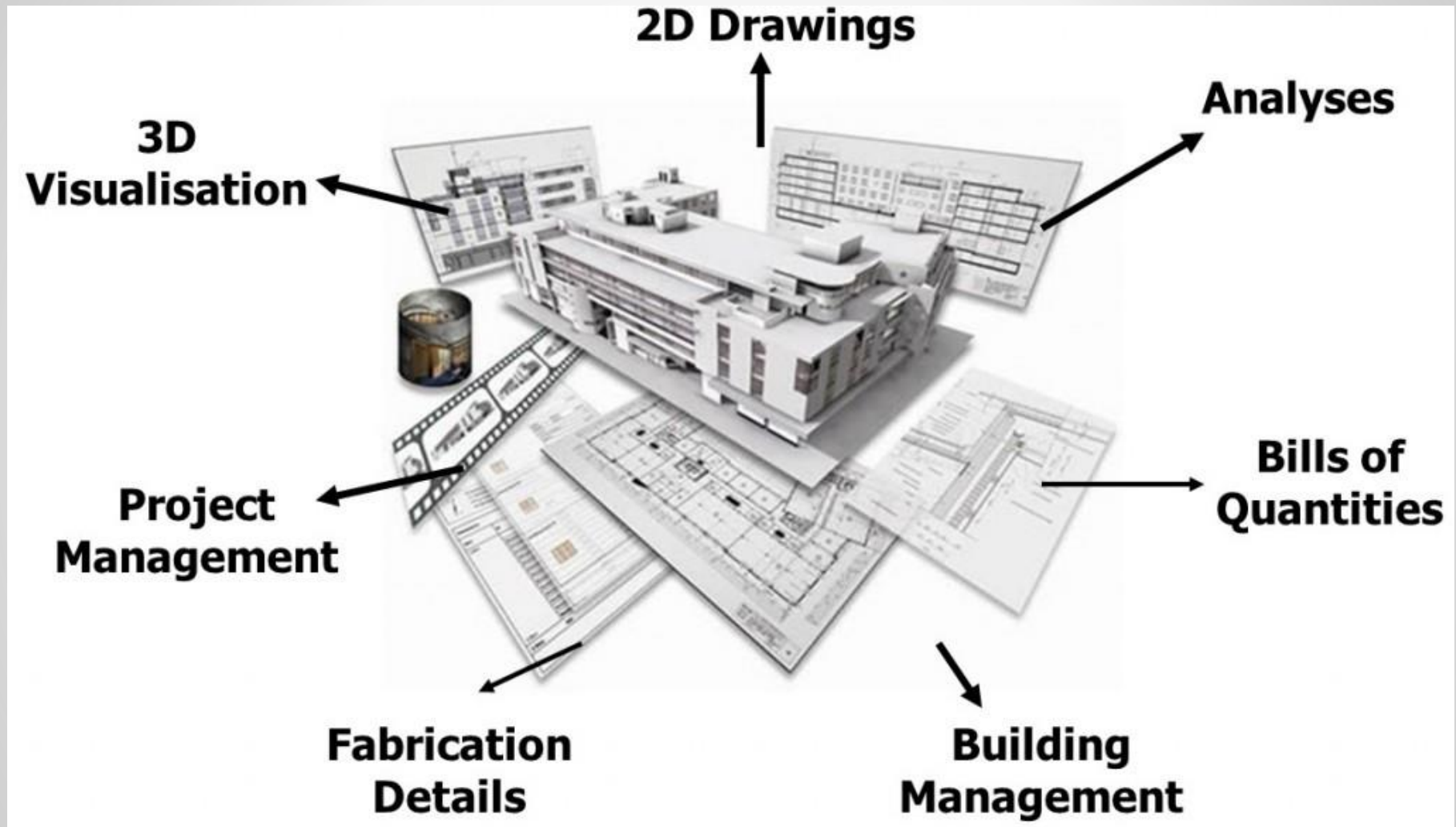
- **Building Information Modeling**
 - **BIM** enables creation of a **digital model of a building or a facility** using **intelligent objects** that can be shared among project team members to **enhance communication and collaboration**.
 - **BIM** is a digital representation of the building process to facilitate exchange and interoperability of information in digital format.
(Charles Eastman , CRC Press,1999)
 - The big idea in a **BIM** process is not only the ability to store information within the model but also to **communicate** better.
- BIM is not just software.**
BIM is a process & software.
- What many don't realize, though, is that **BIM** means not only using three-dimensional modeling software but also implementing a new way of thinking.

What is BIM ?

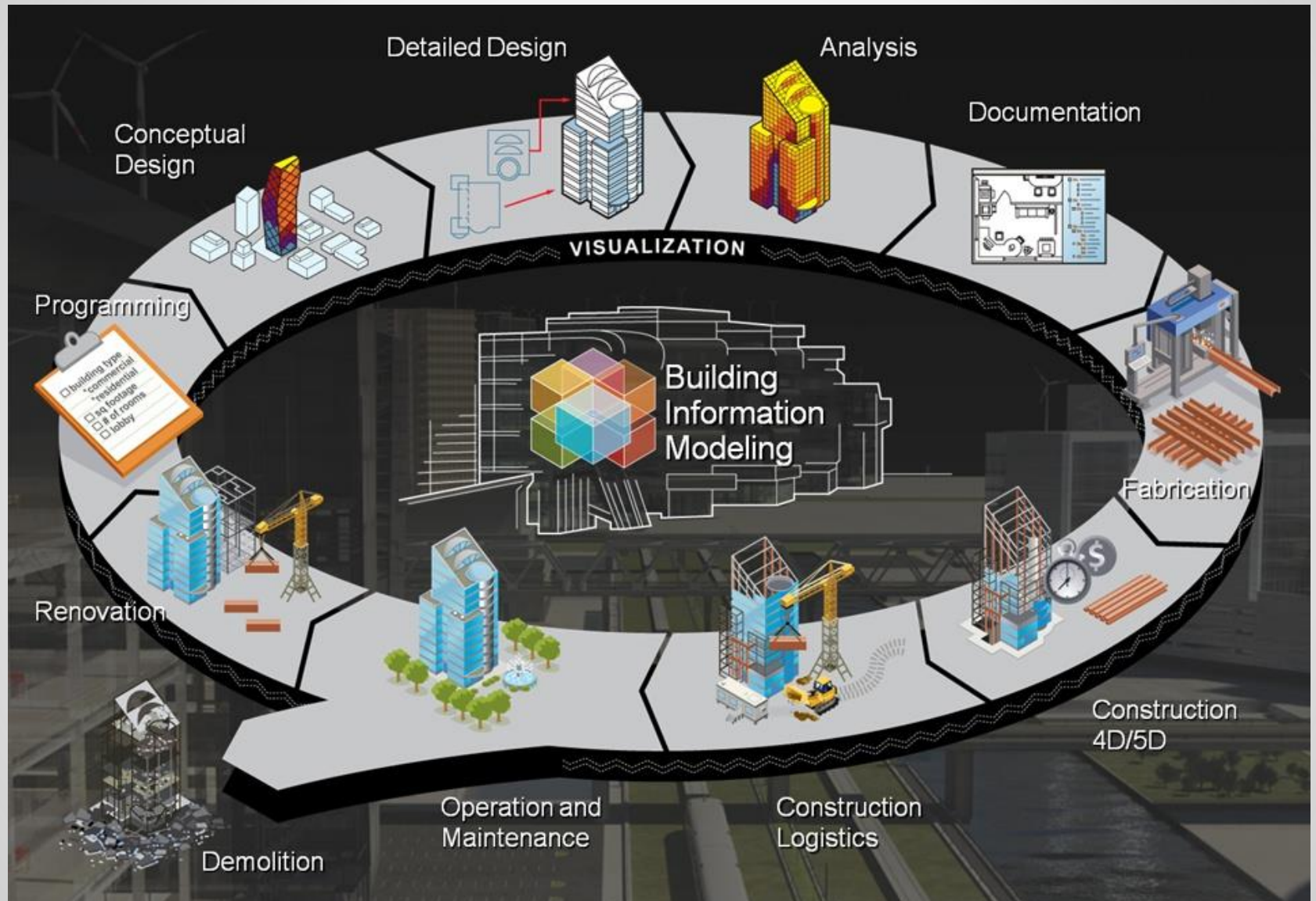


CAD helps people to draw. BIM helps people to construct.

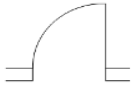
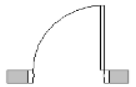

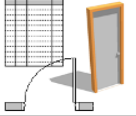
What is BIM ?

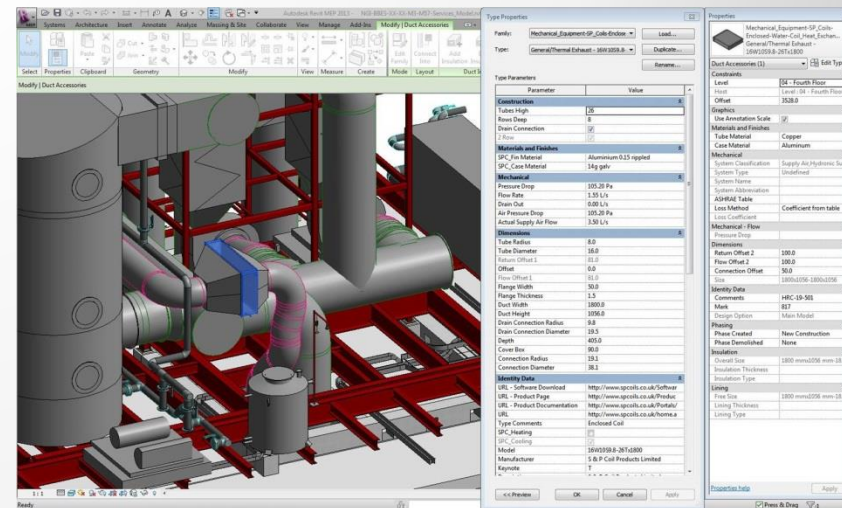
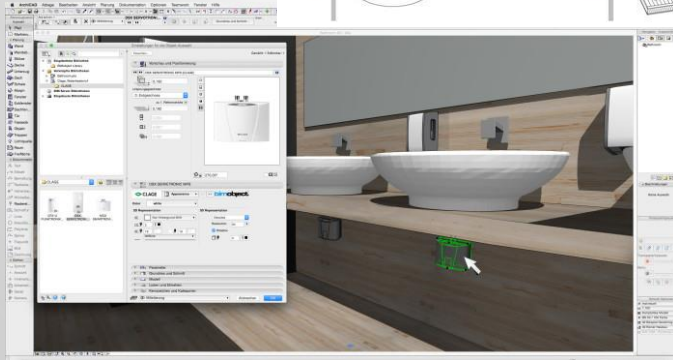
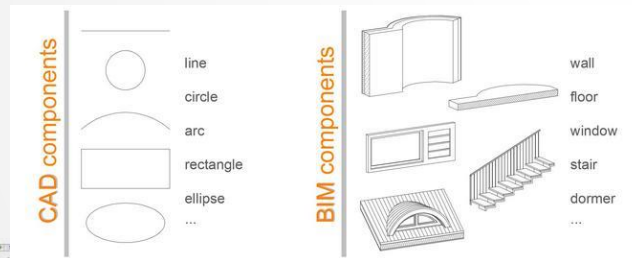
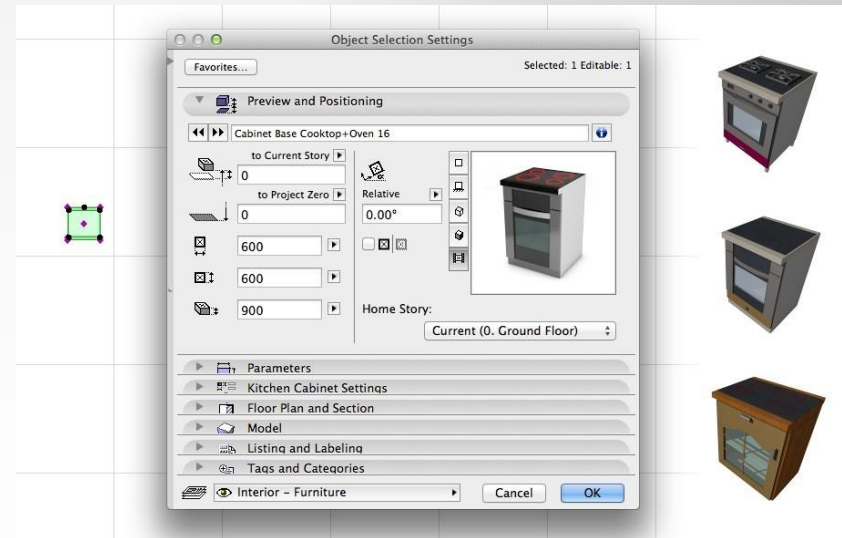


BIM Process



BIM Intelligent Objects

| Information model | Output | Interpretation | |
|-------------------------------------|---|----------------|--------------------|
| | | Human | Computer |
| Picture information model (scanned) |  | Door | Pixels |
| Drawing information model |  | Door | Lines / arcs |
| Geometry information model |  | Door | Surfaces / volumes |
| Building information model |  | Door | |



Software used in BIM process

Architectural

- Autodesk Revit Architecture
- Graphisoft ArchiCAD
- Nemetschek Allplan Architecture
- Gehry Tech. - Digital Project Designer
- Nemetschek Vectorworks Architect
- Bentley Architecture
- 4MSA IDEA Arch. Design (IntelliCAD)
- CADSoft Envisioneer
- Softtech Spirit
- RhinoBIM (BETA)



4D & 5D

- Autodesk Navisworks
- Solibri Model Checker
- Vico Office Suite
- Vela Field BIM
- Bentley ConstrucSim
- Tekla BIMSight
- Glue (by Horizontal Systems)
- Synchro Professional
- Innovaya



Sustainability

- Autodesk Ecotect Analysis
- Autodesk Green Building Studio
- Graphisoft EcoDesigner
- IES Sol. Virt. Environment VE-Pro
- Bentley Tas Simulator
- Bentley Hevacomp
- DesignBuilder



Structural

- Autodesk Revit Structure
- Bentley Structural Modeler
- Bentley RAM, STAAD and ProSteel
- Tekla Structures
- CypeCAD
- Graytec Advance Design
- StructureSoft Metal Wood Framing
- Nemetschek Scia
- 4MSA Strad and Steel
- Autodesk Robot Structural Analysis



MEP

- Autodesk Revit MEP
- Bentley Hevacomp Mech. Designer
- 4MSA FineHVAC + FineLIFT + FineELEC + FineSANI
- Gehry Techn. - Digital Project MEP Systems Routing
- CADMEP (CADduct / CADmech)



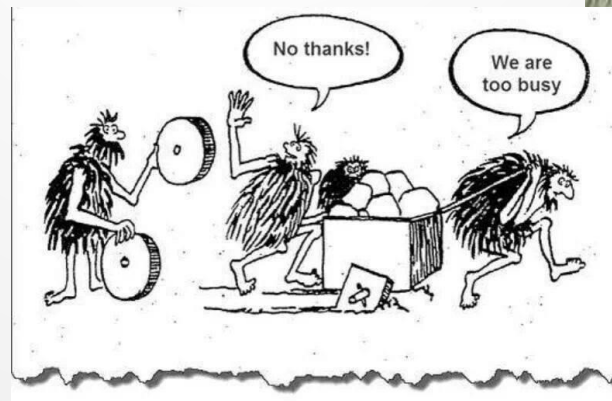
FM

- Bentley Facilities
- FM:Systems FM:Interact
- Vintocon ArchiFM
- Onuma System
- EcoDomus



BIM is not...

- ...magic
- ...new
- ...perfect
- ...a panacea solving all the problems
- ...a software
- ...a program
- ...only 3D model
- ...just for Architects
- ...replacement of people
- ...faster version of CAD
- ...something designers do
- ...models that allow changes in one view that are not automatically reflected in all other views
- ...optional?



Who is asking for BIM ?

- **European Parliament** recommends BIM Mandate for publicly funded building projects
- 28 EU member states can recommend, specify or mandate the use of BIM for publicly funded projects in the European Union by 2016.
- **FRANCE**, French Ministry of Dwellings and Territories announced a plan March 2014 for 500,000 BIM-developed houses built by 2017.
- **GERMANY**, Reform Commission by Federal Minister of Construction representation from government, industry, and academia seek solutions to cost and schedule overruns in large projects. Federal Minister of Transport and Digital Infrastructure sponsor of the Commission.
- **UK**, The UK Government has mandated the use of BIM in all government construction projects by 2016. The government recently announced that £1.7 billion has been saved on major projects over the past year!
- **Norway, Denmark, Finland, Sweden and Netherlands**, Public sector BIM standards and/or requirements in place.



Who is asking for BIM ?

- **Hong Kong**, The Hong Kong Housing Authority require BIM for all new projects from 2014.
- **South Korea**, The Public Procurement Service made BIM compulsory for all projects over S\$50 million and for all public sector projects by 2016.
- **UAE**, Dubai Municipality has mandated use of BIM for Architectural and MEP services for ; all buildings ≥ 40 stories or higher, facilities/buildings $\geq 25,000$ m², All projects by an international party, all hospitals, universities and similar buildings
- **Qatar**, Nashwan Dawood, professor at Teesside University, is advising the Qatar government on its BIM strategy. Qatar Rail has already appointed Germany's Hochtief ViCon, a BIM services supplier, as its adviser, while the Qatar 2022 World Cup committee has developed guidelines on testing companies compliance with their information flows.
- **Saudi Arabia** and **Kuwait**, multiple projects with BIM requirements.



Who is asking for BIM ?

- **Mexico**, New Mexico City Airport will require BIM.
- **Panama**, New locks project adopted BIM from start (MWH).
- **Brazil**, DNIT (National Department of Transport Infrastructure) is embracing BIM. Major road schemes BR-040 937km and BR-116 817km are expected to adopt BIM
- **China**, Ministry of Housing and Urban-Rural Development launched national standards for BIM.
- **Singapore**, Has Corenet e-submission regulatory platform for architecture and engineering projects.
- **Australia**, BIM strongly embraced but states and ministries generally have independent approaches.
- **Japan**, MLIT (Ministry of Land, Infrastructure, Transport and Tourism) is running many 'CIM' pilots. Task Force is in place with public sector, industry and vendor participants
- **USA and Canada**, Many BIM standards and plans exist.

There's no argument about whether it's worth it. BIM is already working.

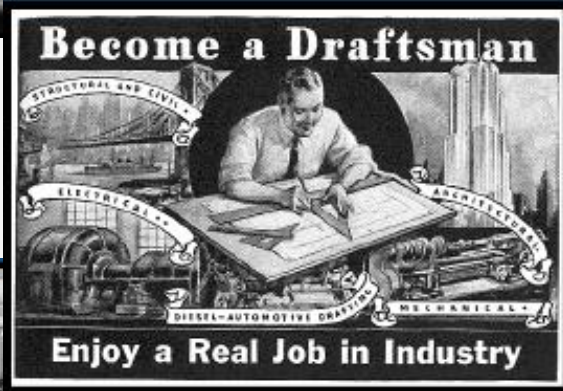
Who is asking for BIM ?

■ TURKIYE

- Istanbul Metropolitan Municipality (IBB), Department of Rail Systems, mandated the use of **BIM** in all metro construction projects. In addition using **BIM** for FM is planned.
- Istanbul Metropolitan Municipality (IBB), Directorate of Rail System Projects, mandated the use of **BIM** in all design development.
- Kartal Municipality, projects with **BIM** requirement and organizing seminars.
- Multiple projects including, Emaar Square , Istanbul New Airport, Integrated Health Campus Projects and many others are using **BIM**.
- Istanbul Technical University, BIM Expert Certificate Program.
- BIM Seminar, Webinars and Competitions.



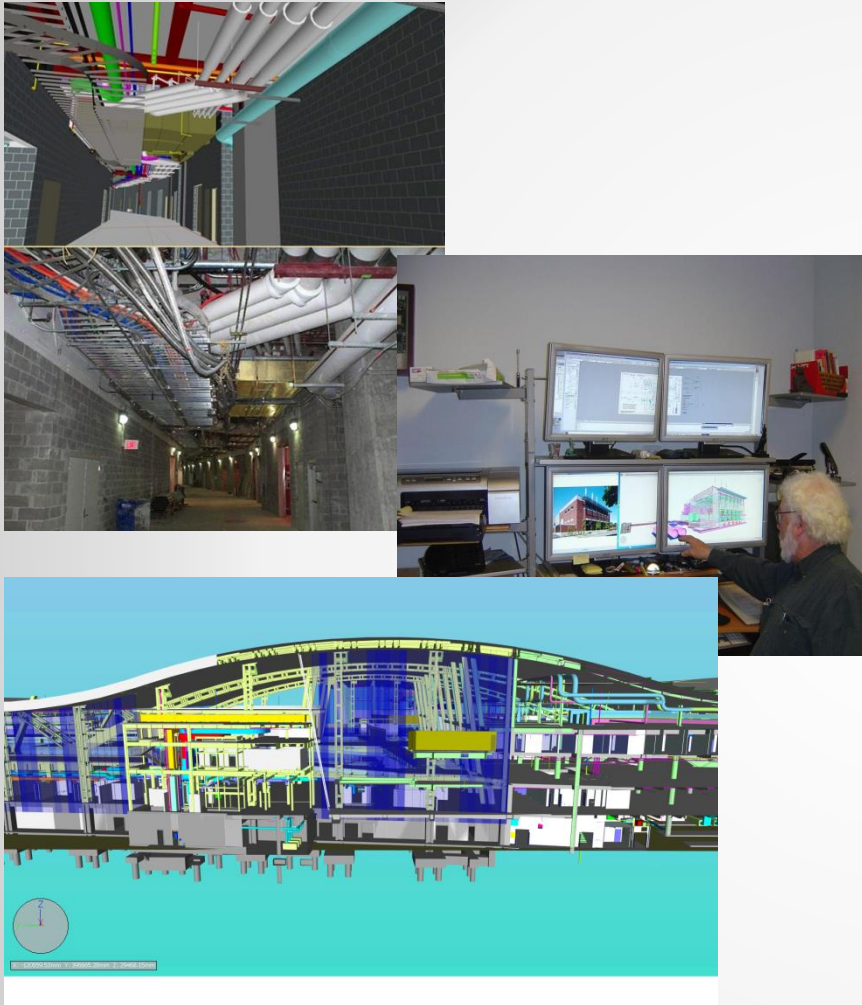
BIM timeline



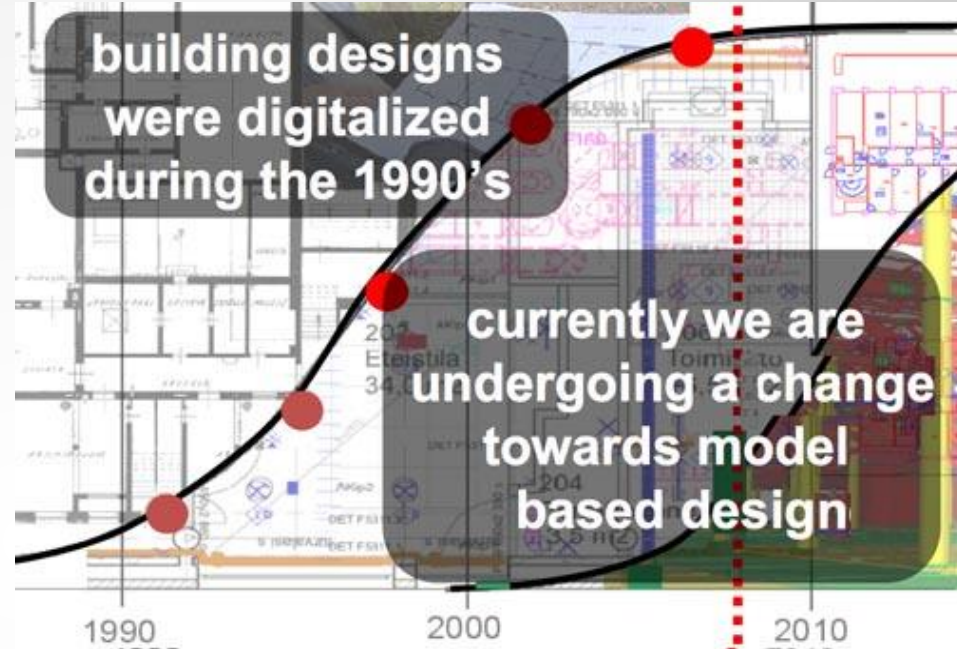
Before 1980

1980 - 2003

BIM timeline



2003 -



- 1986 Robert Aish from Generative Components **Building Modelling**
- Van Nederveen, G.A.; Tolman, F.P. (1992). "Modeling multiple views on buildings". **Building Information Model**
- Jerry Laiserin ,Autodesk (2003). Building Information Modeling. San Rafael, CA, Autodesk, Inc. **BIM**

BIM Scope

3D

- Existing Conditions Models
 - Laser scanning
 - Ground Penetration Radar (GPR) conversions
- Safety & Logistics Models
- Animations, renderings, walkthroughs
- BIM driven prefabrication
- Laser accurate BIM driven field layout

4D

SCHEDULING

- Project Phasing Simulations
- Lean Scheduling
 - Last Planner
 - Just In Time (JIT) Equipment Deliveries
 - Detailed Simulation Installation
- Visual Validation for Payment Approval

5D

ESTIMATING

- Real time conceptual modeling and cost planning (DProfiler)
- Quantity extraction to support detailed cost estimates
- Trade Verifications from Fabrication Models
 - Structural Steel
 - Rebar
 - Mechanical/Plumbing
 - Electrical
- Value Engineering
 - What-if scenarios
 - Visualizations
 - Quantity Extractions
- Prefabrication Solutions
 - Equipment rooms
 - MEP systems
 - Multi-Trade Prefabrication
 - Unique architectural and structural elements

6D

SUSTAINABILITY

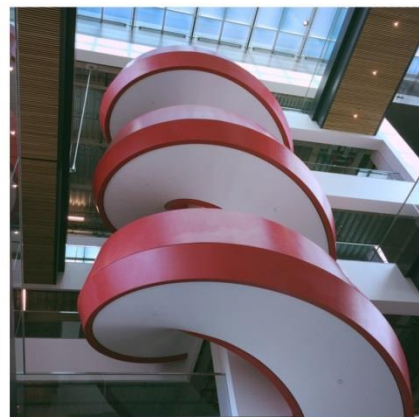
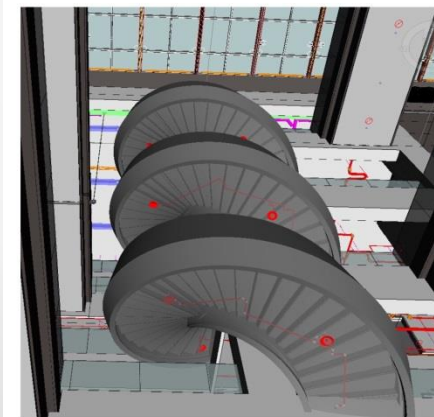
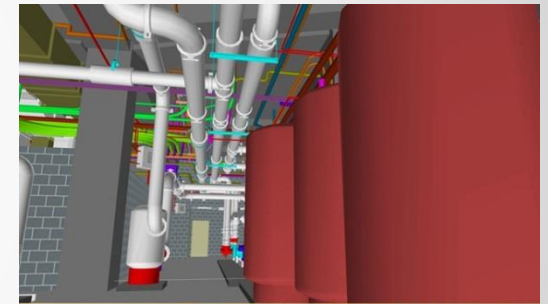
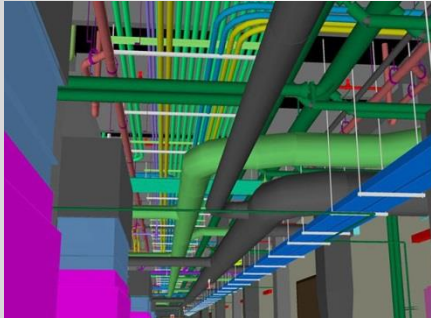
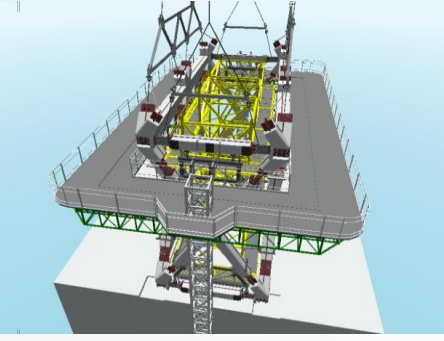
- Conceptual energy analysis via DProfiler
- Detailed energy analysis via EcoTech
- Sustainable element tracking
- LEED tracking

7D

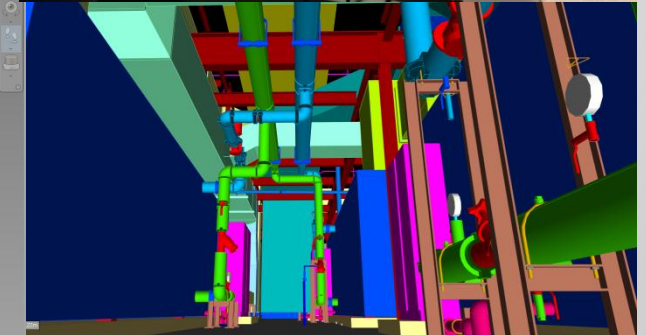
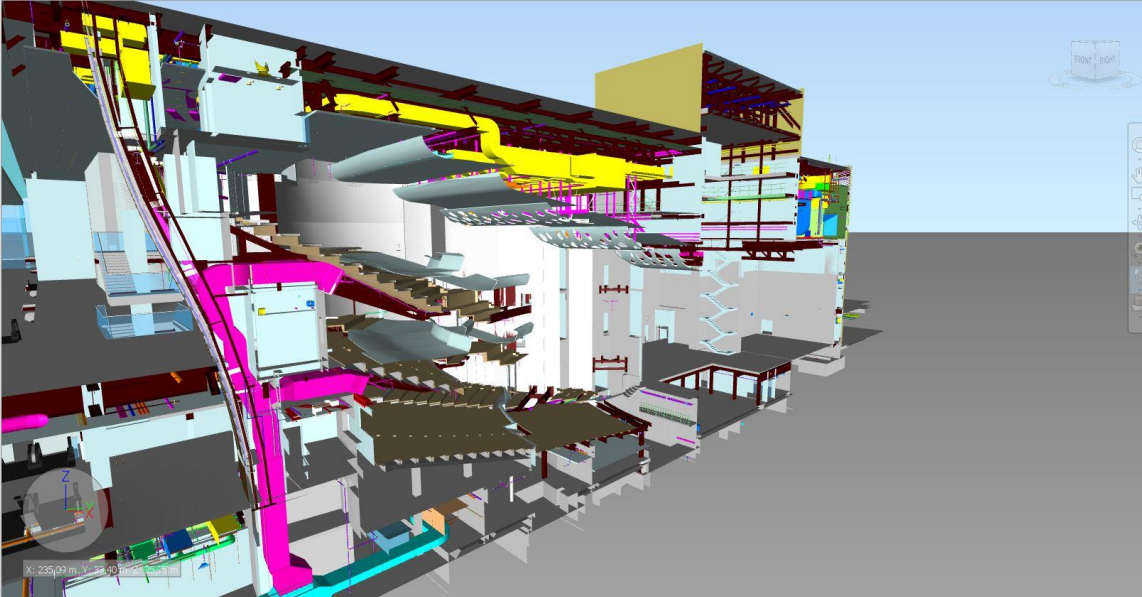
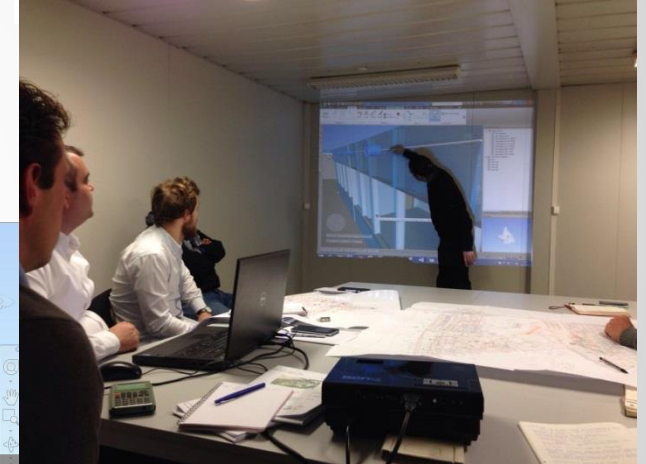
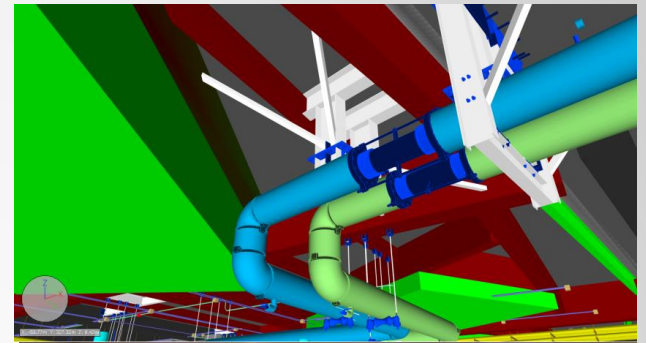
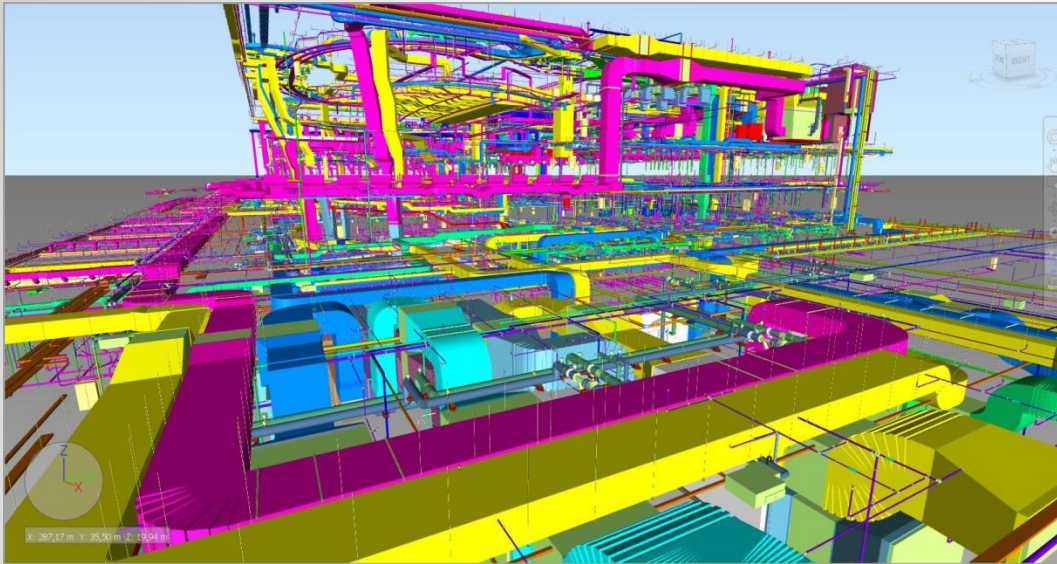
FACILITY MANAGEMENT APPLICATIONS

- Life Cycle BIM Strategies
- BIM As-Builts
- BIM embedded O&M manuals
- COBie data population and extraction
- BIM Maintenance Plans and Technical Support
- BIM file hosting on Lend Lease's Digital Exchange System

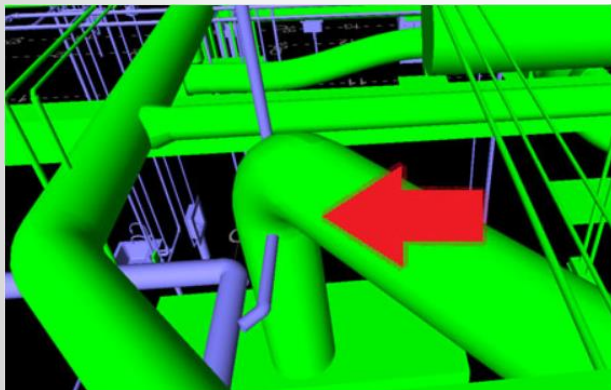
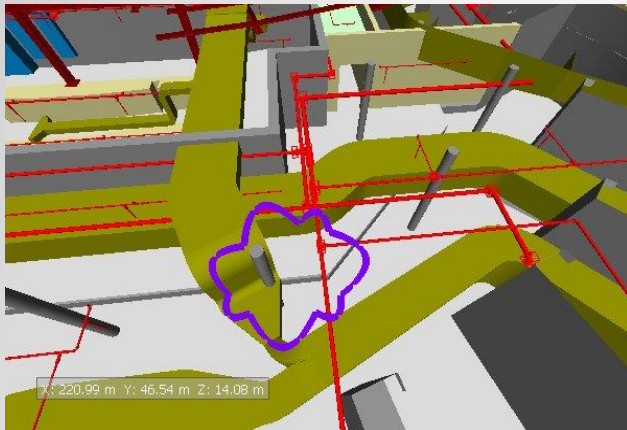
BIM Scope – 3D Model



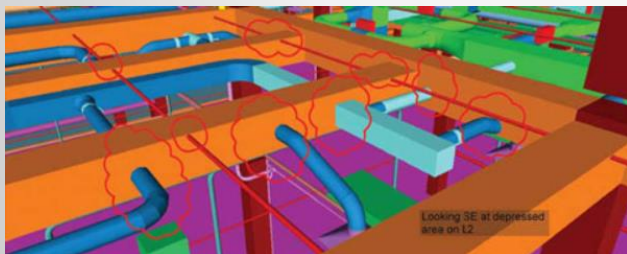
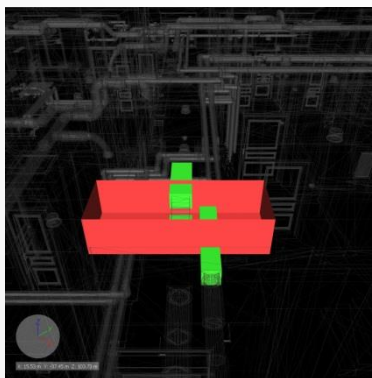
BIM Scope – Coordination



BIM Scope – Digital Clash Test



| Test 2 | | Item 1 | Item 2 | | | | | | | | | | | | | | | | |
|--------|------------|--------|------------|--|--------------------|--------|-----------------------------------|----------------------|------------------|----------------|-----------|--------------------|--------|-----------------------------------|----------------------|------------------|----------------|-----------|------|
| Image | Clash Name | Status | Date Found | Clash Point | Item ID | Layer | Item Name | Element Size | Element Diameter | Element Length | Item Type | Item ID | Layer | Item Name | Element Size | Element Diameter | Element Length | Item Type | |
| | Clash1 | New | 1/17 | 2018/12/21 10:34:18(-79.40, y:43.84, z:4.49) | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | 3D Solid | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | | Pipe |
| | Clash2 | New | 1/30 | 2018/12/21 10:34:18(-63.48, y:39.45, z:8.50) | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | 3D Solid | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | | Pipe |
| | Clash3 | New | 0/88 | 2018/12/21 10:34:18(-221.48, y:87.41, z:8.83) | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | 3D Solid | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | | Pipe |
| | Clash4 | New | 0/80 | 2018/12/21 10:34:18(-80.35, y:44.41, z:8.83) | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | 3D Solid | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | | Pipe |
| | Clash5 | New | 0/89 | 2018/12/21 10:34:18(-82.38, y:40.69, z:13.30) | Entity: Horizontal | 18250A | RCCOCCO(H)STR-COR-GF SCORE | RCCOCCO(H)STR-COR-GF | | | 3D Solid | Entity: Horizontal | 18250A | RCCOCCO(H)STR-COR-GF SCORE | RCCOCCO(H)STR-COR-GF | | | | Pipe |
| | Clash6 | New | 0/88 | 2018/12/21 10:34:18(-80.35, y:44.41, z:8.83) | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | 3D Solid | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | | Pipe |
| | Clash7 | New | 0/89 | 2018/12/21 10:34:18(-80.35, y:44.41, z:8.83) | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | 3D Solid | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | | Pipe |
| | Clash8 | New | 0/81 | 2018/12/21 10:34:18(-71.84, y:118.20, z:13.81) | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | 3D Solid | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | | Pipe |
| | Clash9 | New | 0/80 | 2018/12/21 10:34:18(-71.84, y:118.20, z:13.81) | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | 3D Solid | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | | Pipe |
| | Clash10 | New | 0/71 | 2018/12/21 10:34:18(-72.34, y:118.20, z:13.89) | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | 3D Solid | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | | Pipe |
| | Clash11 | New | 0/88 | 2018/12/21 10:34:18(-168.87, z:10.43, z:14.31) | Entity: Horizontal | 18250A | RCCOCCO(H)STR-COR-GF SCORE | RCCOCCO(H)STR-COR-GF | | | 3D Solid | Entity: Horizontal | 18250A | RCCOCCO(H)STR-COR-GF SCORE | RCCOCCO(H)STR-COR-GF | | | | Pipe |
| | Clash12 | New | 0/84 | 2018/12/21 10:34:18(-27.83, y:89.92, z:8.10) | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | 3D Solid | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | | Pipe |
| | Clash13 | New | 0/84 | 2018/12/21 10:34:18(-71.36, y:118.20, z:13.31) | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | 3D Solid | Entity: Horizontal | 18250A | RCCOCCO(H)STR-SUB-GF ISL -05000 | RCCOCCO(H)STR-SUB-GF | | | | Pipe |



Viewpoints — 2014-007_EMAAR SQUARE PROJECT.nwd

- USE THREADED FITTINGS**
Camera Position: -128.8 zft, -149.4 zft, 123.1 zft
- USE THREADED FITTING**
Camera Position: -128.8 zft, -149.4 zft, 123.1 zft
- USE MECHANICAL TEE**
Camera Position: -128.8 zft, -149.4 zft, 123.1 zft
- USE THREADED FITTINGS**
Camera Position: -128.8 zft, -149.4 zft, 123.1 zft
- NO ELBOW NEEDED MAIN LINE IN SAME LEVEL**
Camera Position: -128.8 zft, -149.4 zft, 123.1 zft

- MOVE PIPE SYSTEM UP. DISTANCE WITH BEAM 2cm**
Camera Position: -128.8 zft, -149.4 zft, 123.1 zft
MOVE PIPE UP. 2cm DISTANCE BETWEEN BEAM AND PIPE
- NOT PROPER VALVE. WE MENTIONED BEFORE.**
Camera Position: -128.8 zft, -149.4 zft, 123.1 zft
- NO MECH TEE. THIS 2 DIRECTLY ON PIPE**
Camera Position: -128.8 zft, -149.4 zft, 123.1 zft
- CHANGE THE TEST DRAIN VALVE. WE SEND YOU THE FAMILY**
Camera Position: -128.8 zft, -149.4 zft, 123.1 zft
- NOT PROPER TYPE OF CHECK VALVE. WE MENTIONED BEFORE.**
Camera Position: -128.8 zft, -149.4 zft, 123.1 zft

BIM Scope – 4D

The screenshot displays the Microsoft Office Project interface. At the top, a Gantt chart shows project tasks with their durations and start/end dates. Below the chart are two 3D BIM models of a building, one showing the overall structure and another showing a specific section with highlighted elements. The interface includes a task list on the left and a detailed task view on the right.

Microsoft Office
Project

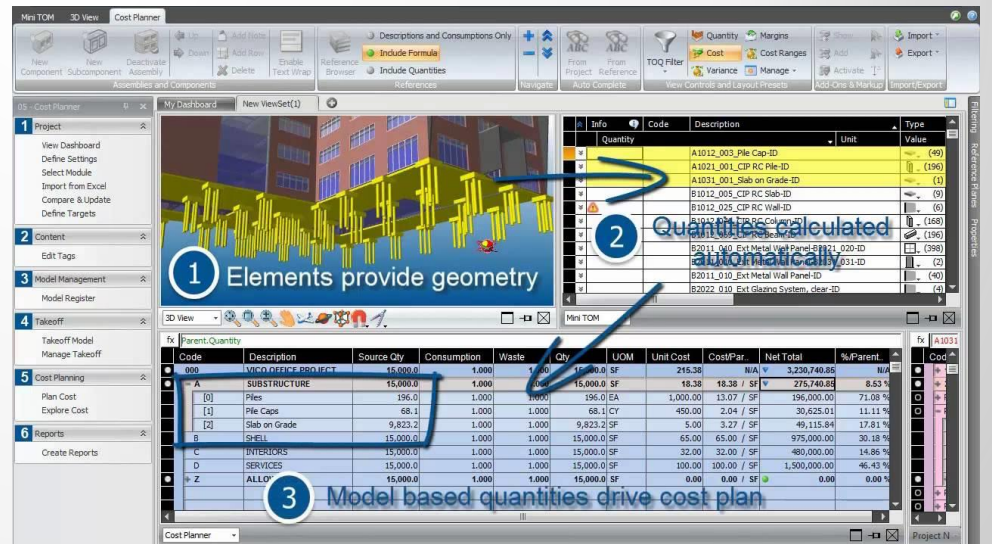
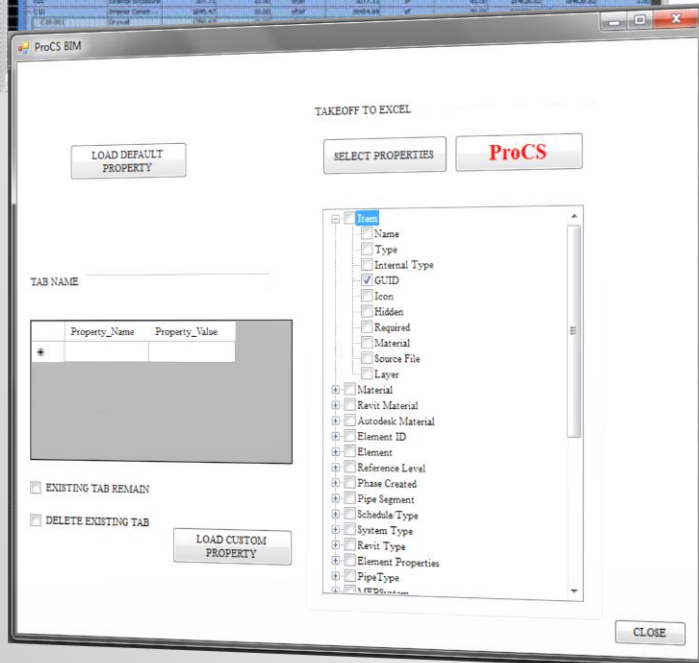
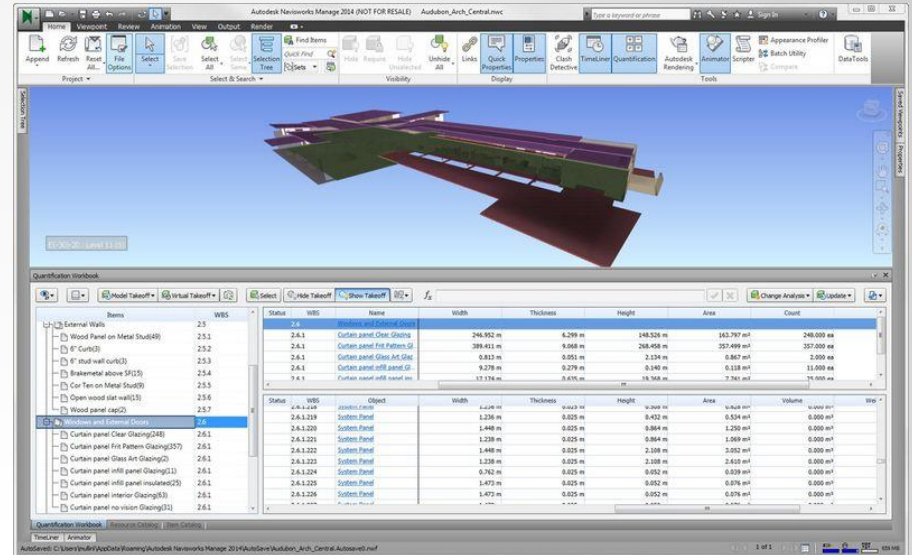
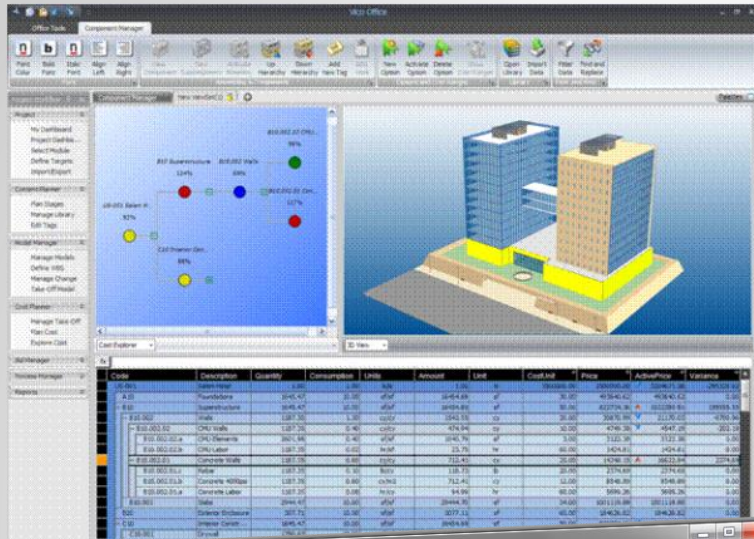
The screenshot shows the Autodesk Navisworks Manage interface. The main view is a 3D BIM model of a building under construction, featuring a large yellow construction crane. Below the model is a Gantt chart showing the project schedule. The interface includes various toolbars and a task list.

| Active | Name | Status | Start | End | Planned | March 2010 | April 2010 | May 2010 |
|-------------------------------------|----------------------|--------|----------------------|----------------------|----------------|------------|------------|----------|
| <input checked="" type="checkbox"/> | 3 STRUCTURAL FRAM... | | 3/19/2010 8:00:00 AM | 4/1/2010 5:00:00 PM | 1/25/2010 8:00 | | | |
| <input checked="" type="checkbox"/> | 3 STRUCTURAL FRAM... | | 4/2/2010 8:00:00 AM | 4/6/2010 5:00:00 PM | 2/1/2010 8:00 | | | |
| <input checked="" type="checkbox"/> | 3 STAIRS | | 4/7/2010 9:00:00 AM | 4/7/2010 5:00:00 PM | 2/14/2010 8:00 | | | |
| <input checked="" type="checkbox"/> | ROOF LEVEL | | 4/8/2010 8:00:00 AM | 4/16/2010 5:00:00 PM | 4/8/2010 8:00 | | | |
| <input checked="" type="checkbox"/> | ROOF SLAB PHASE 1 | | 4/8/2010 8:00:00 AM | 4/12/2010 5:00:00 PM | 4/26/2010 8:00 | | | |
| <input checked="" type="checkbox"/> | ROOF SLAB PHASE 2 | | 4/13/2010 8:00:00 AM | 4/13/2010 5:00:00 PM | 4/26/2010 8:00 | | | |
| <input checked="" type="checkbox"/> | ROOF SLAB PHASE 3 | | 4/16/2010 8:00:00 AM | 4/20/2010 5:00:00 PM | 5/4/2010 8:00 | | | |
| <input checked="" type="checkbox"/> | ROOF SLAB PHASE 4 | | 4/21/2010 8:00:00 AM | 4/23/2010 5:00:00 PM | 5/7/2010 8:00 | | | |
| <input checked="" type="checkbox"/> | ROOF SLAB PHASE 5 | | 4/26/2010 8:00:00 AM | 4/28/2010 5:00:00 PM | 5/12/2010 8:00 | | | |

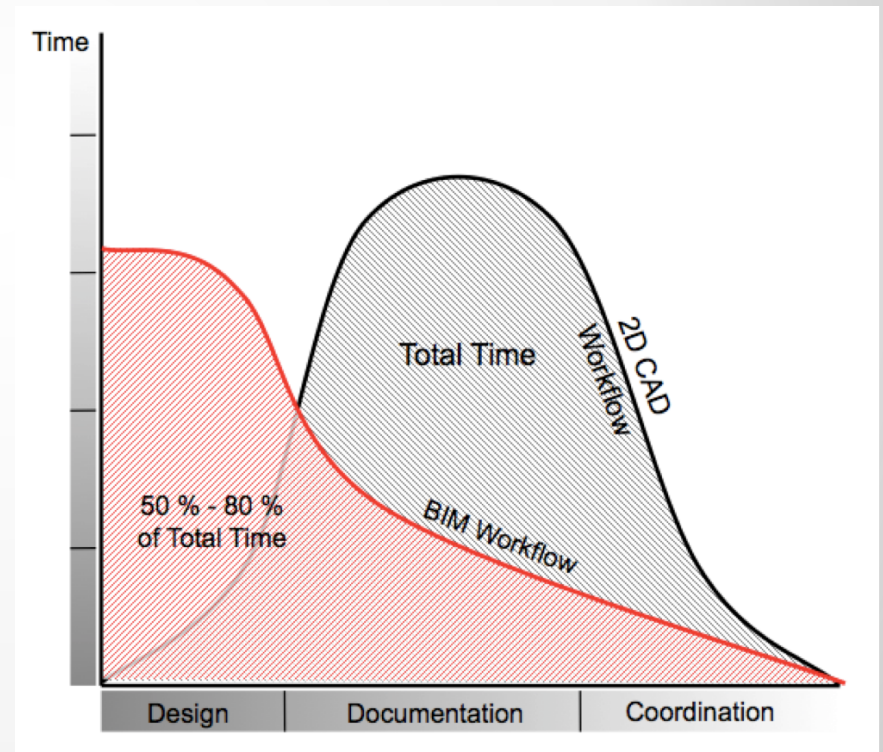
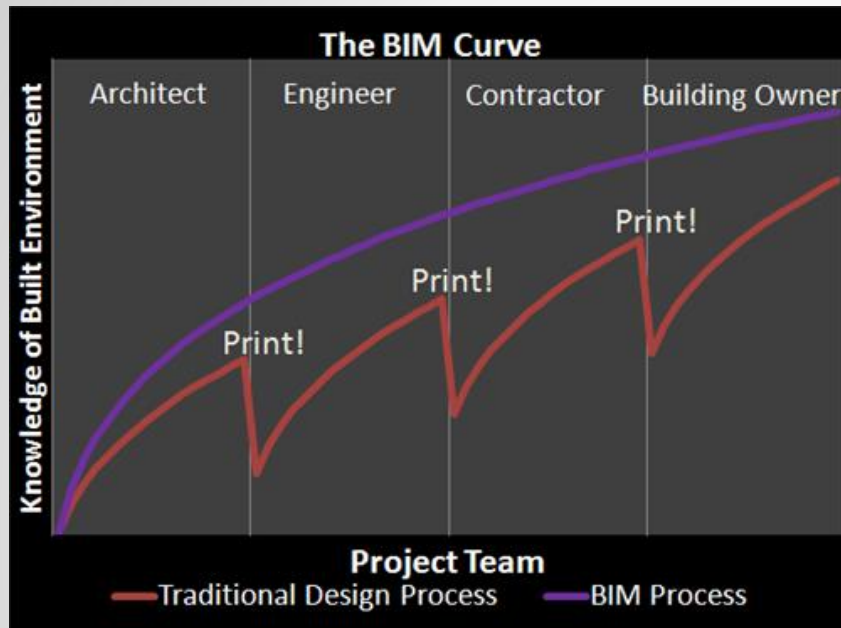
PRIMAVERA

The screenshot displays the Primavera software interface. The main view is a 3D BIM model of a building under construction, featuring a large yellow construction crane. Below the model is a Gantt chart showing the project schedule. The interface includes various toolbars and a task list.

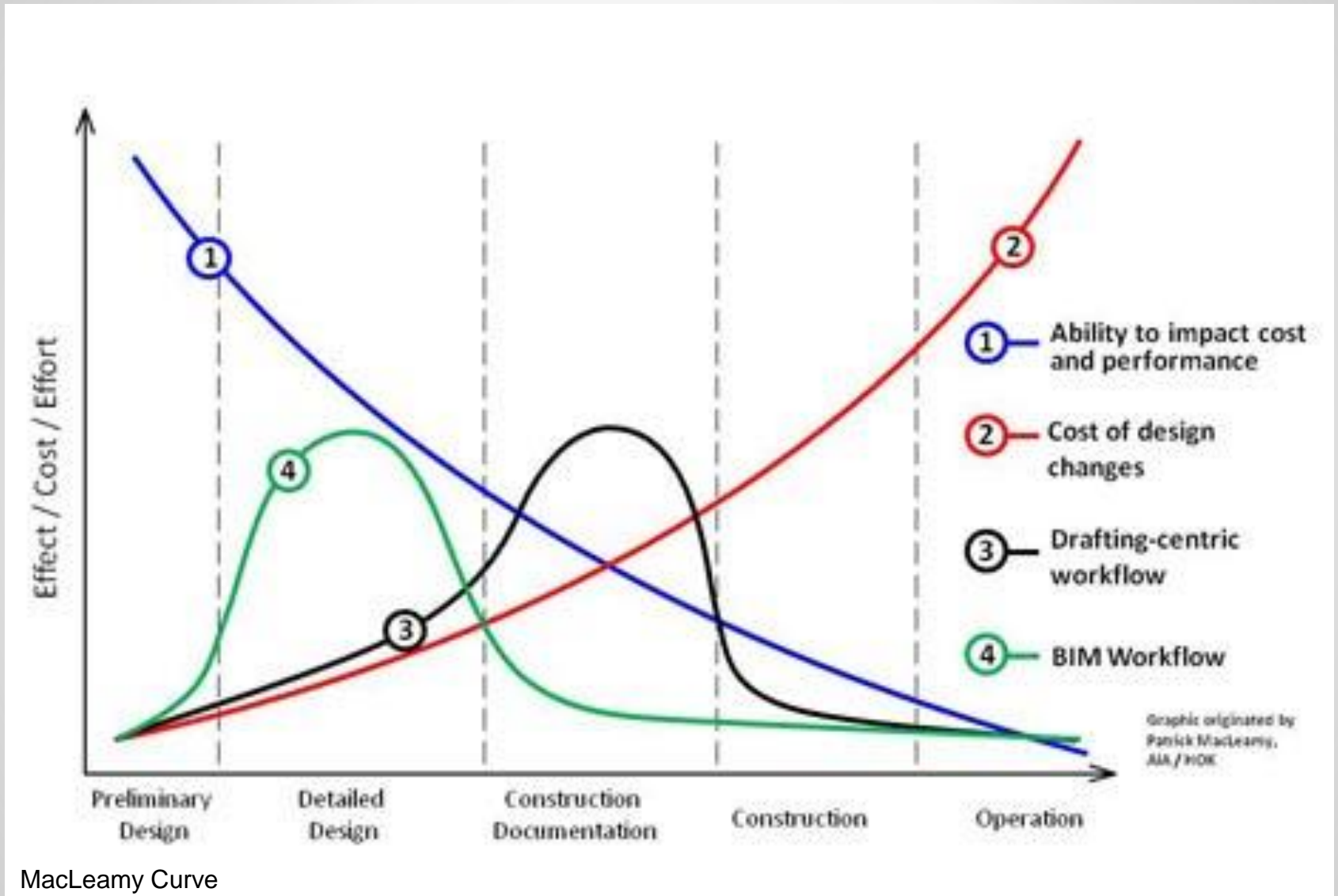
BIM Scope – 5D



BIM and cost

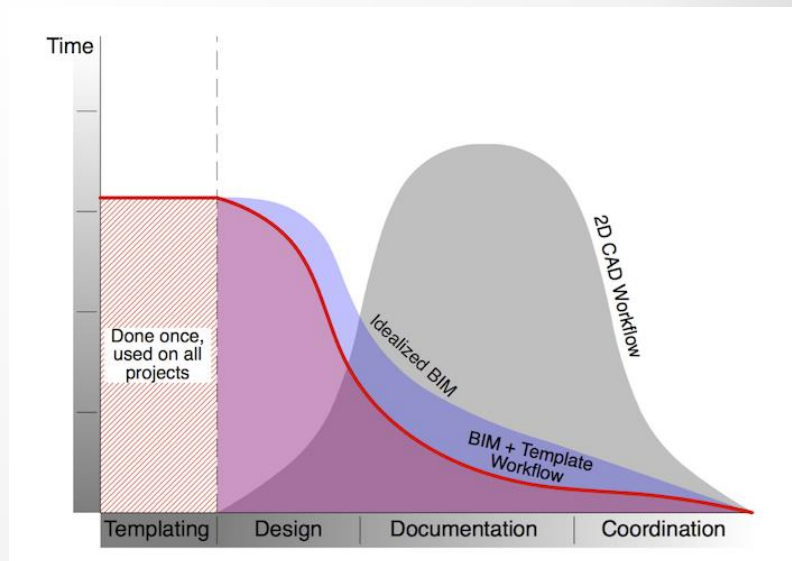
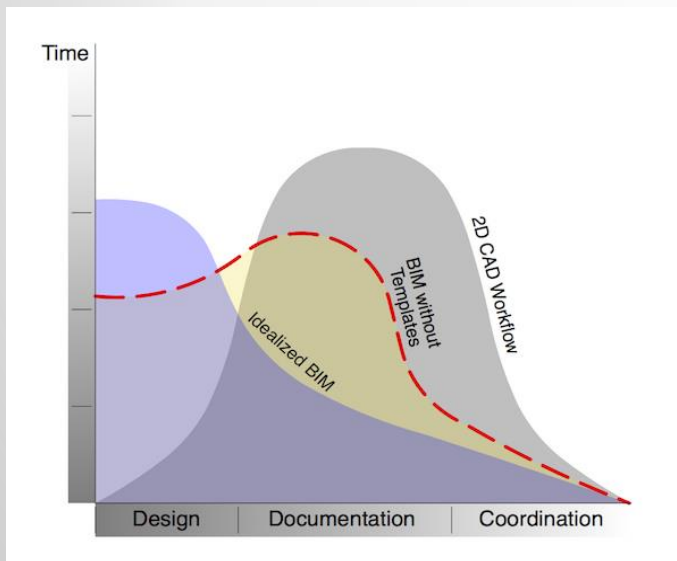
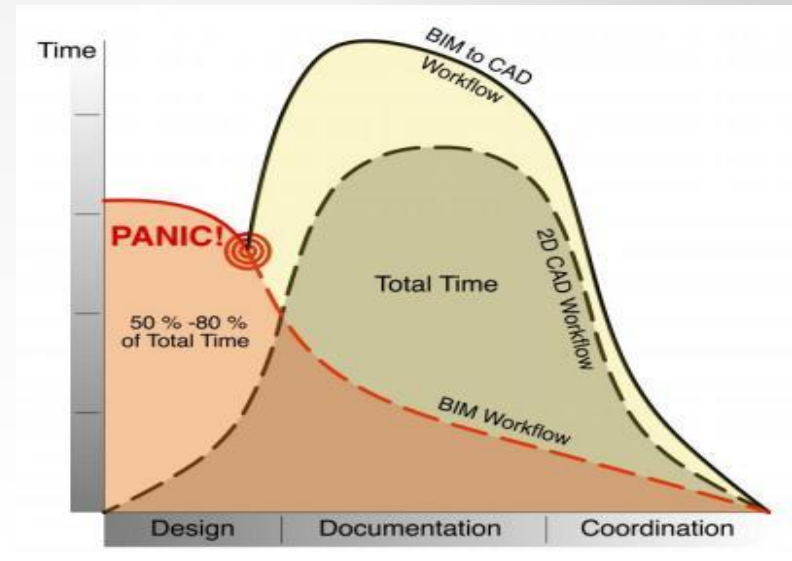
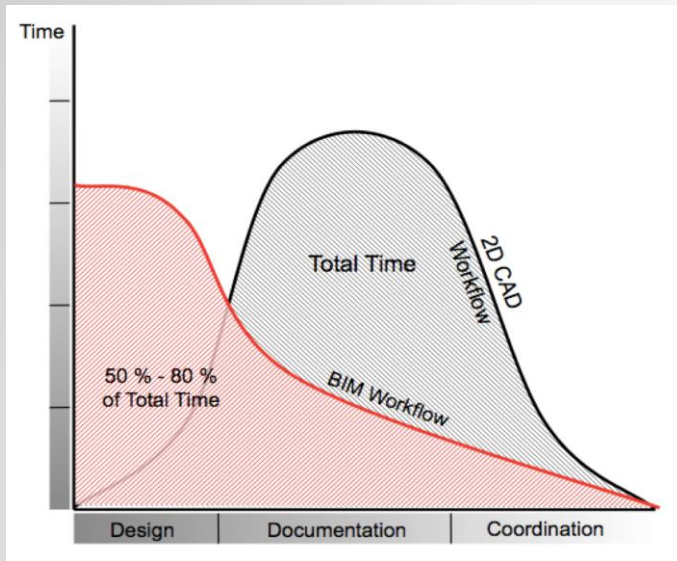


BIM and cost

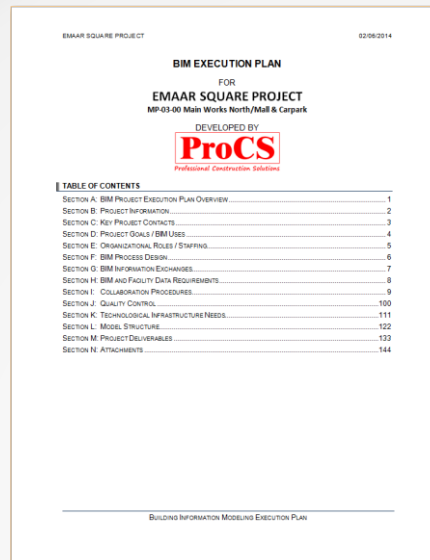


MacLeamy Curve

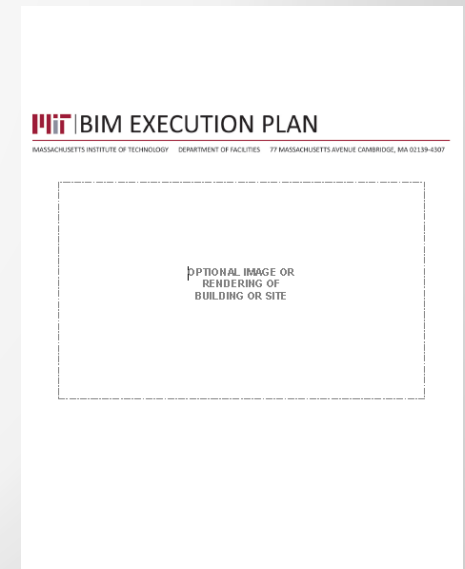
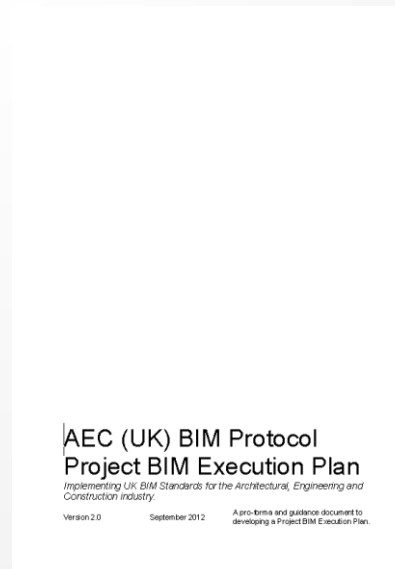
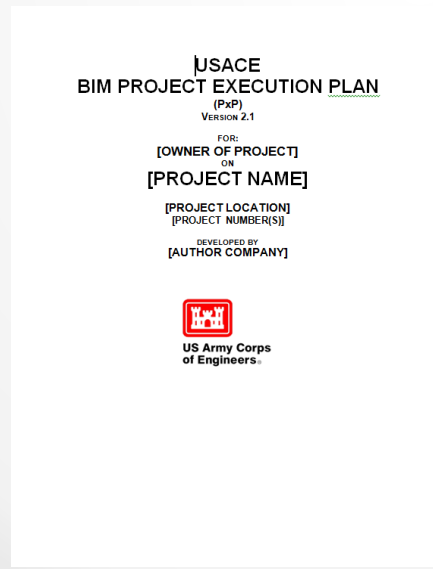
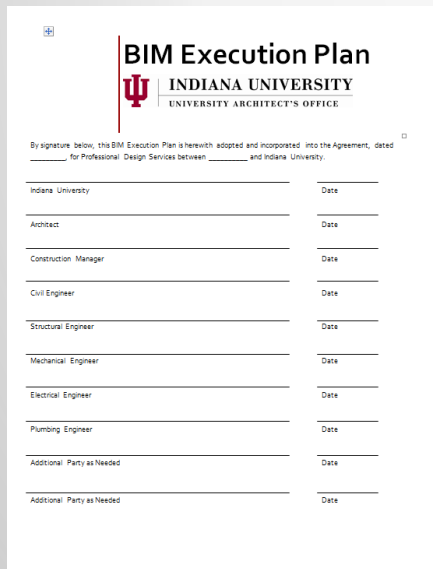
BIM and cost



BIM Execution Plan



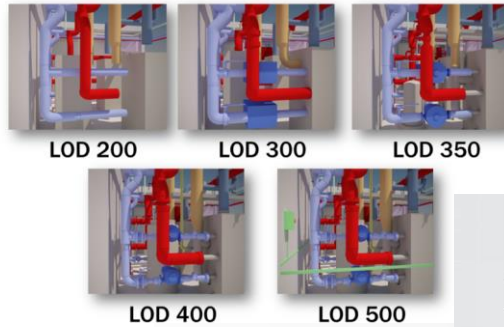
- **BIM Goals**
- **Workflows and Deliverables**
- **Responsibilities (BIM Manager)**
- **Collaboration procedures**
- **Common Language**
- **Naming conventions**
- **Standard method and procedures**
- **Allow time for Pre-Engineering**



BIM - LOD (Level of Development)

AIA Document E202™ – 2008
Building Information Modeling Protocol Exhibit

AIA Document G202™ – 2013
Project Building Information Modeling Protocol Form



§ 2.2 LOD 100

§ 2.2.1 Model Element Content Requirements. The Model Element may be graphically represented in the Model with a symbol or other generic representation, but does not satisfy the requirements for LOD 200. Information related to the Model Element (i.e. cost per square foot, tonnage of HVAC, etc.) can be derived from other Model Elements.

§ 2.3 LOD 200

§ 2.3.1 Model Element Content Requirements. The Model Element is graphically represented within the Model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.

§ 2.4 LOD 300

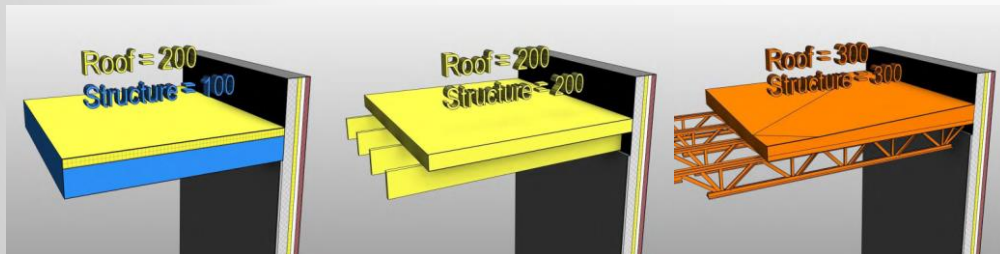
§ 2.4.1 Model Element Content Requirements. The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.

§ 2.5 LOD 400

§ 2.5.1 Model Element Content Requirements. The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing, fabrication, assembly, and installation information. Non-graphic information may also be attached to the Model Element.

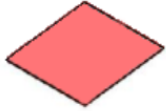
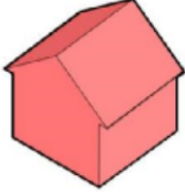
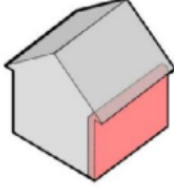
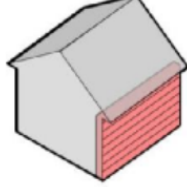

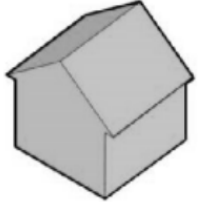
§ 2.6 LOD 500

§ 2.6.1 Model Element Content Requirements. The Model Element is a field verified representation in terms of size, shape, location, quantity, and orientation. Non-graphic information may also be attached to the Model Elements.


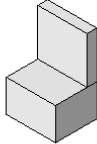




| LOD 100 | LOD 200 | LOD 300 | LOD 400 | LOD 500 |
|------------|----------------------|------------------|-------------|----------|
| Conceptual | Approximate geometry | Precise geometry | Fabrication | As-built |
| | | | | |

BIM – LOI / LOMD

| LOMD1 PREPARATION & BRIEF | LOMD2 CONCEPT DESIGN | LOMD3 DEVELOPED DESIGN | LOMD4 TECHNICAL DESIGN | LOMD5 CONSTRUCTION | LOMD6 HANDOVER |
|---|--|---|--|---|---|
|  |  |  |  |  |  |
| <ul style="list-style-type: none"> A model communicating the performance requirements and site constraints | <ul style="list-style-type: none"> A conceptual or massing model intended for whole building studies including basic areas & volumes, orientation, cost | <ul style="list-style-type: none"> Generalized systems with approximate quantities, size, shape, location and orientation. | <ul style="list-style-type: none"> Production, or pre-construction, “design intent” model representing the end of the design stages. Accurate and coordinated, suitable for cost estimation and regulatory checks. | <ul style="list-style-type: none"> An accurate model of the construction requirements and specific building components, including specialist sub-contract geometry and data. | <ul style="list-style-type: none"> An “as built” model showing the project as it has been constructed. The model and associated data is suitable for maintenance and operations of the facility. |

LOMD = LOD + LOI (Level Of Model Definition)

| LEVEL of DETAIL | | | |
|---|--|--|--|
| G0 | G1 | G2 | G3 |
|  |  |  |  |
| Schematic | Concept | Defined | Rendered |
| DESCRIPTION: Office Chair | DESCRIPTION: Office Chair | DESCRIPTION: Office Chair Arms, Wheels | DESCRIPTION: Office Chair Arms, Wheels |
| WIDTH: 700 | WIDTH: 700 | WIDTH: 700 | WIDTH: 700 |
| DEPTH: 450 | DEPTH: 450 | DEPTH: 450 | DEPTH: 450 |
| HEIGHT: 1100 | HEIGHT: 1100 | HEIGHT: 1100 | HEIGHT: 1100 |
| MANUFACTURER: | MANUFACTURER: | MANUFACTURER: Herman Miller, Inc | MANUFACTURER: Herman Miller, Inc |
| MODEL: | MODEL: | MODEL: Mirra | MODEL: Mirra |


(based on AEC [UK] BIMprotocol v2.0 - Component Grade) practicalBIM.net © 2013

LOD Matrix

EMAAR SQUARE

LOD MATRIX




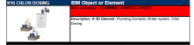
| F02 SPRINKLER | | BIM Object or Element |
|--|---------------------------|--|
| | | Item Category - Fire Protection |
|  | | Description: A 3D Element. Fire Protection System Sprinkler Element. |
| Level of Development | Information Category | Information Item |
| LOD 400-Fabrication | | |
| Specific Assemblies that are Accurate in Terms of Size, Shape, Location, Quantity, and Orientation with Complete Fabrication, Assembly, and Detailing Information. | Physical Properties | Nominal Connection Size |
| | Physical Properties | Connection Type |
| | Physical Properties | Length |
| | Physical Properties | Width |
| | Physical Properties | Height |
| | Location Properties | Building ID |
| | Location Properties | Building Name |
| | Location Properties | Floor ID |
| | Location Properties | Floor Name |
| | Location Properties | Zone/Space Name |
| | Location Properties | Zone/Space ID |
| | Location Properties | Elevation |
| | Annotation Properties | System Abbreviation |
| | Annotation Properties | Sub-System Abbreviation |
| | Annotation Properties | Fire Zone Abbreviation |
| | Annotation Properties | Sprinkler Type |
| | Quantification Properties | BOQ Reference No |
| | Quantification Properties | WBS number |
| FAMILY TYPES | | |
| | 1 | A1- Sprinkler 68:C Fast Response K=80 |
| | 2 | A2- Sprinkler 68:C Fast Response K=115 |
| | 3 | A3- Sprinkler 74:C Fast Response K=80 |
| | 4 | A4- Sprinkler 93:C Standart Response K=80 |
| | 5 | A5- Sprinkler 93:C Fast Response K=80 |
| | 6 | B1-Sprinkler 68:C Fast Response K=80 |
| | 7 | B2-Sprinkler 74:C Fast Response K=80 |
| | 8 | C-Duvar Tipi Sprinkler 68:C Fast Response K=80 |


EMAAR SQUARE LOD MATRIX.xlsx TAB: F02 SPRINKLER


Prepared By: Daniel Kazado

| EMAAR SQUARE | | LOD MATRIX |
|---|----------------------|---------------------------------|
|  | | BIM Object or Element |
| | | Item Category - Fire Protection |
| Level of Development | Information Category | Information Item |
| FAMILY TYPES | | |


| EMAAR SQUARE | | LOD MATRIX |
|---|----------------------|---------------------------------|
|  | | BIM Object or Element |
| | | Item Category - Fire Protection |
| Level of Development | Information Category | Information Item |
| FAMILY TYPES | | |

| EMAAR SQUARE | | LOD MATRIX |
|---|----------------------|---------------------------------|
|  | | BIM Object or Element |
| | | Item Category - Fire Protection |
| Level of Development | Information Category | Information Item |
| FAMILY TYPES | | |


| EMAAR SQUARE | | LOD MATRIX |
|---|----------------------|---------------------------------|
|  | | BIM Object or Element |
| | | Item Category - Fire Protection |
| Level of Development | Information Category | Information Item |
| FAMILY TYPES | | |

| EMAAR SQUARE | | LOD MATRIX |
|---|----------------------|---------------------------------|
|  | | BIM Object or Element |
| | | Item Category - Fire Protection |
| Level of Development | Information Category | Information Item |
| FAMILY TYPES | | |

| EMAAR SQUARE | | LOD MATRIX |
|---|----------------------|---------------------------------|
|  | | BIM Object or Element |
| | | Item Category - Fire Protection |
| Level of Development | Information Category | Information Item |
| FAMILY TYPES | | |

| EMAAR SQUARE | | LOD MATRIX |
|---|----------------------|---------------------------------|
|  | | BIM Object or Element |
| | | Item Category - Fire Protection |
| Level of Development | Information Category | Information Item |
| FAMILY TYPES | | |

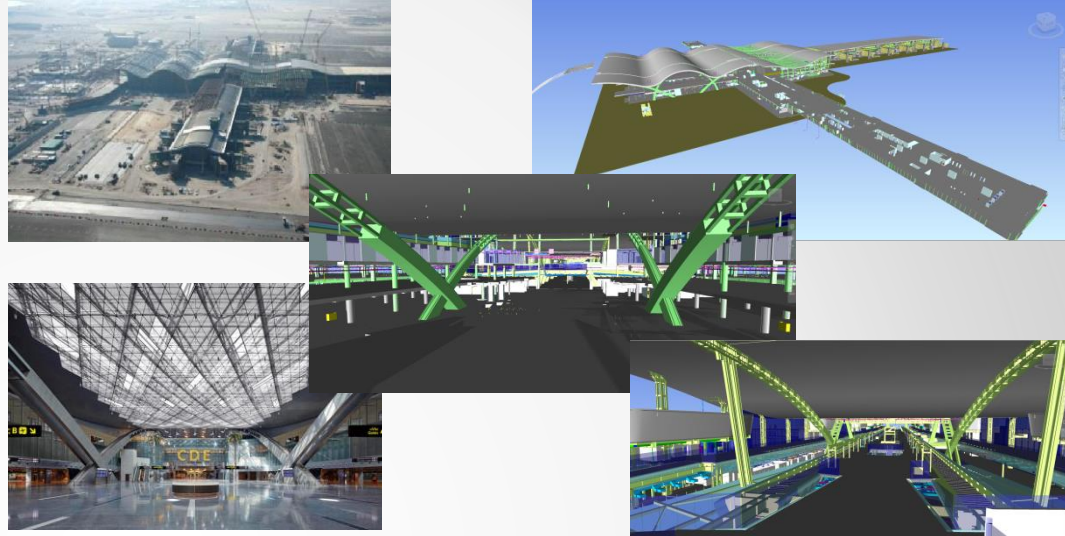
| EMAAR SQUARE | | LOD MATRIX |
|---|----------------------|---------------------------------|
|  | | BIM Object or Element |
| | | Item Category - Fire Protection |
| Level of Development | Information Category | Information Item |
| FAMILY TYPES | | |

| EMAAR SQUARE | | LOD MATRIX |
|---|----------------------|---------------------------------|
|  | | BIM Object or Element |
| | | Item Category - Fire Protection |
| Level of Development | Information Category | Information Item |
| FAMILY TYPES | | |

We do BIM...

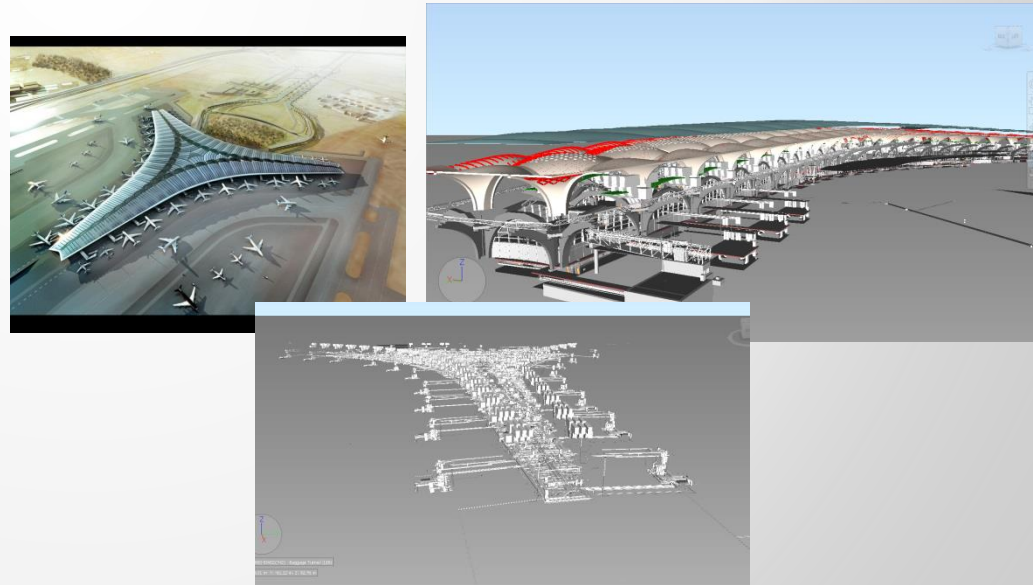
✓ Doha Hamad International Airport, Qatar

- ✓ Client: Sky Oryx JV
- ✓ Architecture, Structure and MEP modeling
- ✓ LOD 300, 400
- ✓ Managing RFI and updating BIM
- ✓ Clash Detection
- ✓ Trade Coordination
- ✓ BOQ Extraction
- ✓ Visualization
- ✓ Cost Estimation



✓ Kuwait International Airport, Kuwait

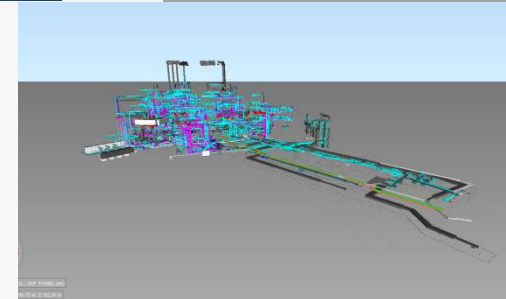
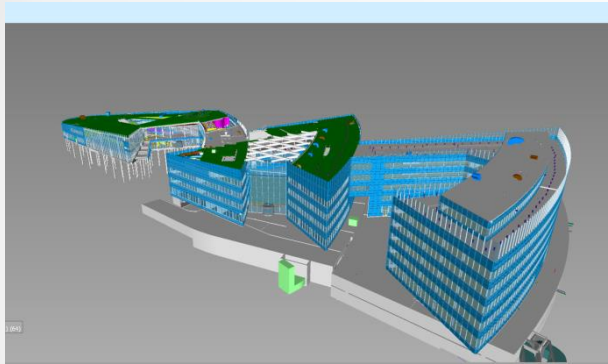
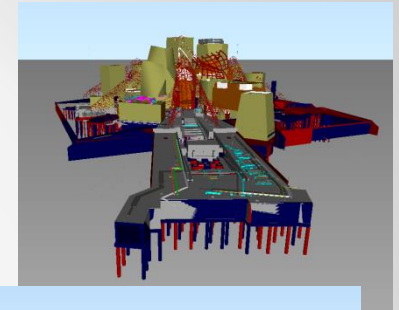
- ✓ Client: TAV-CCC-Ghafari JV
- ✓ Architecture, Structure and MEP modeling
- ✓ LOD 300
- ✓ Full Quantity Survey from BIM



We do BIM...

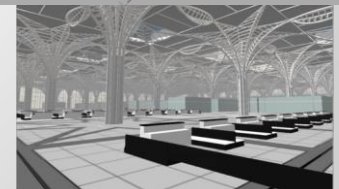
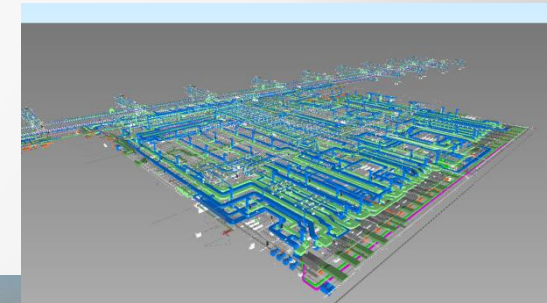
✓ **Guggenheim Museum, Abu Dhabi, UAE**

- ✓ Client: Arabtec-TAV JV
- ✓ MEP modeling
- ✓ LOD 300
- ✓ Full Quantity Survey from BIM



✓ **Medina Prince Mohamed Airport, KSA**

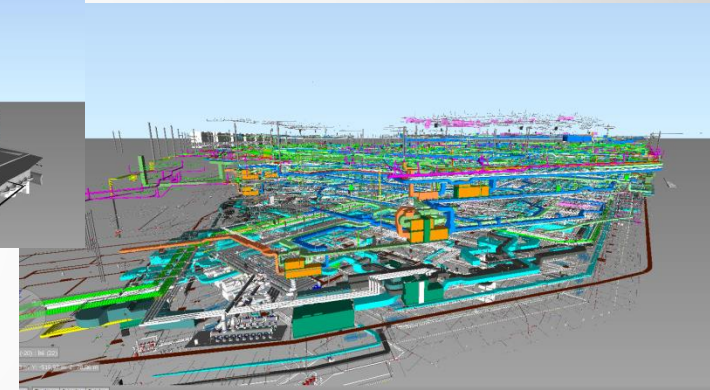
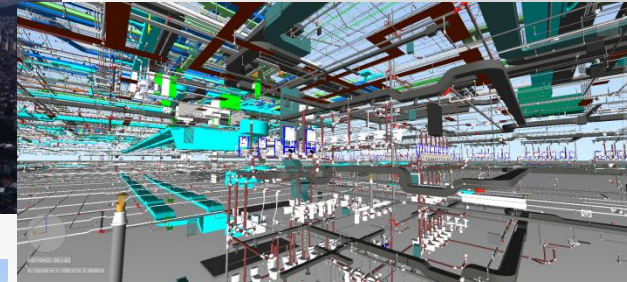
- ✓ Client: Tibah Airport Operation Co.
- ✓ Post design BIM modeling based on as-built drawings - LOD500
- ✓ Visualizations for ORAT familiarization
- ✓ BIM -Facility Management integration with CMMS



We do BIM...

✓ Istanbul Emaar Square, Turkey

- ✓ Client: TAV&Sera Construction
- ✓ Architecture, Structure and MEP modeling
- ✓ LOD 300, 400
- ✓ Managing RFI and updating BIM
- ✓ Clash Detection
- ✓ Trade Coordination
- ✓ Quantity Survey
- ✓ 4D Simulation
- ✓ Production of shop drawings
- ✓ Variation monitoring
- ✓ Laser scanning as-built verification checking



✓ Santiago Arturo Merino Benítez International Airport, Chile

- ✓ Client: ADPi, VINCI and Astaldi
- ✓ Architecture, Structure and MEP
- ✓ LOD 300, 400
- ✓ BIM System Consultancy
- ✓ Facilities Management

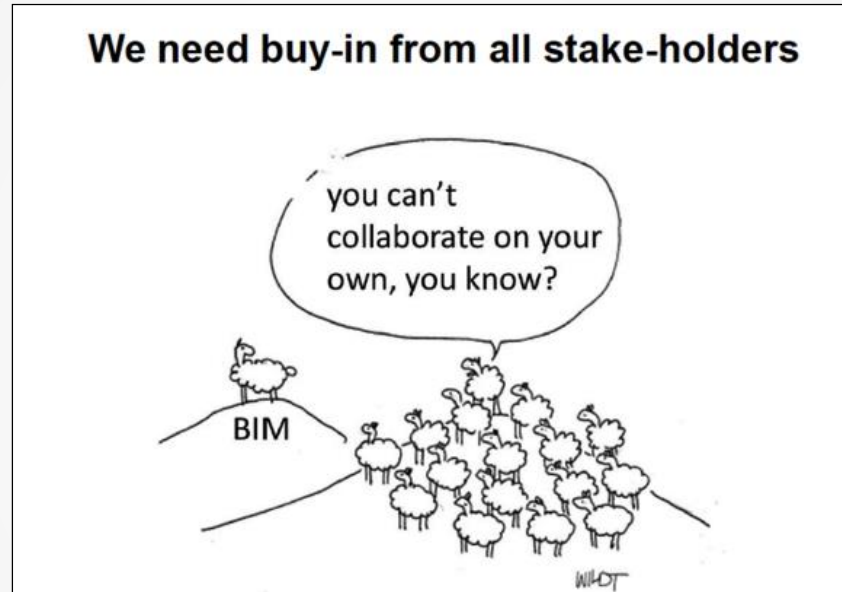
✓ ADP Headquarters, CDG, Paris, France

- ✓ Client: TAV Herve JV
- ✓ Architecture, Structure MEP, utilities and landscape modeling
- ✓ LOD 300, 400, 500
- ✓ Facilities Management
- ✓ Asset Management

✓ 11-15 Grosvenor Crescent, London, UK

- ✓ Client: AE UK
- ✓ MEP modeling
- ✓ LOD 400
- ✓ Coordination

Summary



We need a **BIM** Strategy for our Country and Industry.

References

- BIM and Construction Management: Proven Tools, Methods, and Workflows , Brad Hardin
- BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors, 2nd Edition ,Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston
- Building Information Modeling: A Strategic Implementation Guide for Architects, Engineers, Constructors, and Real Estate Asset Managers ,Dana K. Smith, Michael Tardif
- BIM and Integrated Design: Strategies for Architectural Practice, Randy Deutsch, AIA,LEED-AP
- MCGRAW-HILL-CONSTRUCTION. Building information modeling: Transforming design and construction to achieve greater industry productivity. *New York*.
- MCGRAW-HILL-CONSTRUCTION. The Business Value of BIM-Getting Building Information Modeling to the Bottom Line. *SmartMarket Report*.
- AIA Document E202-2008 Building Information Modeling Protocol Exhibit
- AIA Document G202-2013 Project Building Information Modeling Protocol Form
- The Impact of BIM/VDC on ROI; Developing a Financial Model for Savings and ROI Calculation of Construction Projects.
- Building Information Modeling (BIM): Now and Beyond ,Salman Azhar, (Auburn University, USA)