Bentley BIM

Mattias Hemmingsson
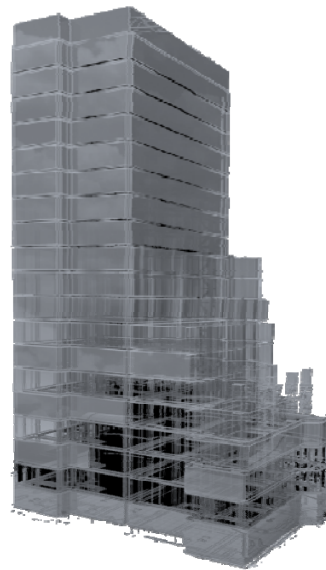
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What is BIM?

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BIM "is the process of generating and managing building data during its life cycle" (Automation in Construction 2006)

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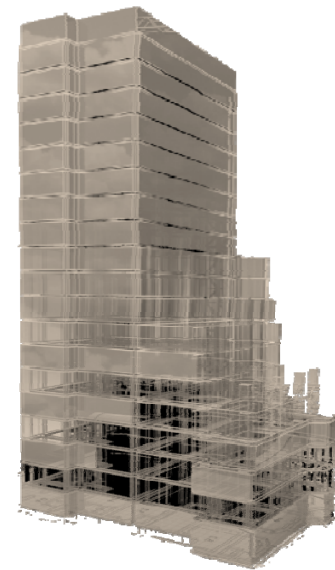
Big BIM (Federated) or Little BIM (Single)?

- Little BIM is the discipline based approach with varying degrees of integration within a building.
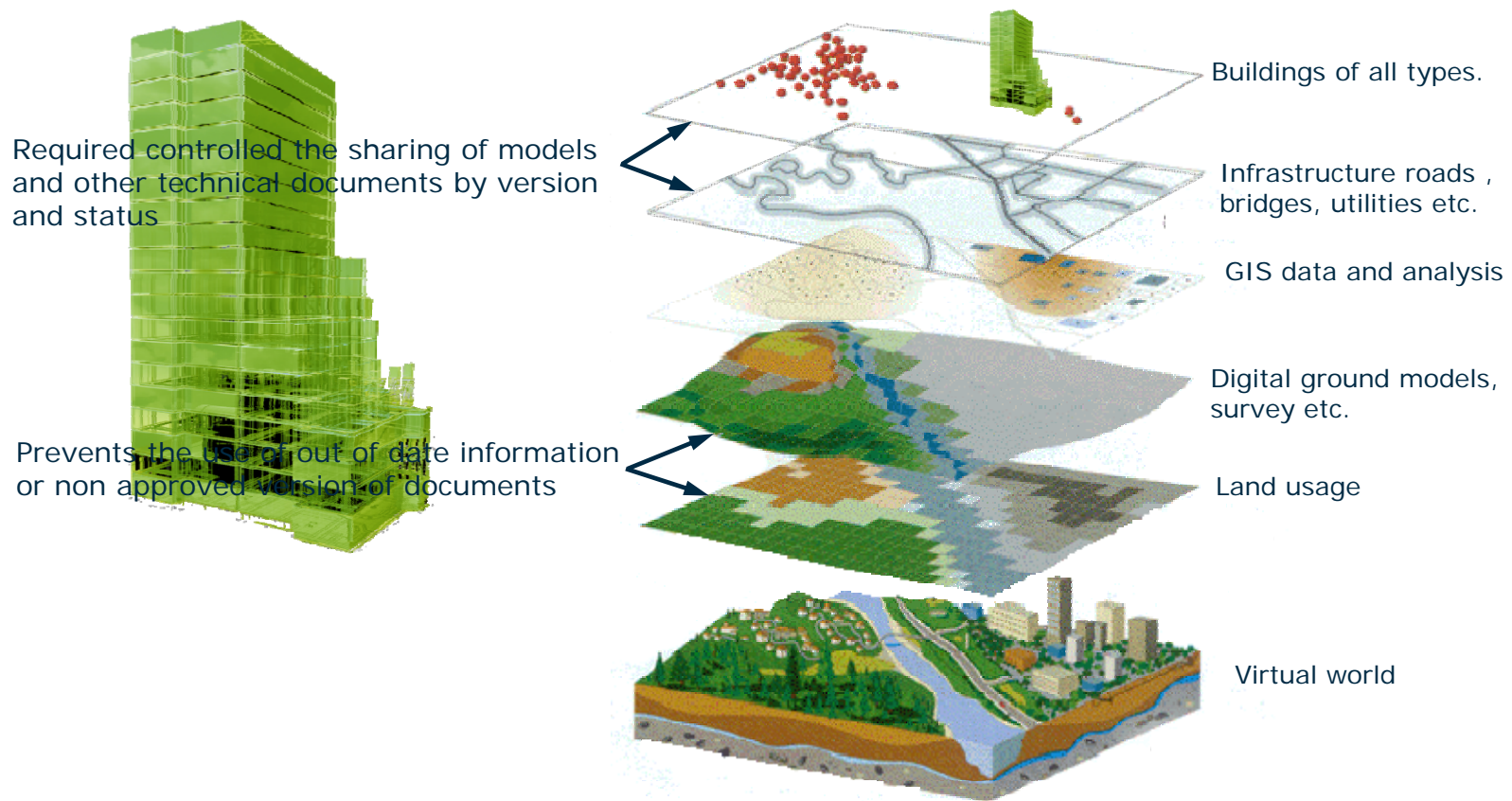

Architectural   Structural   M&E

Bentley

Big BIM or Little BIM?

- Big BIM the total integration of the building with the environment that surrounds it referred to as the federated approach.

Required controlled the sharing of models and other technical documents by version and status

Prevents the use of out of date information or non approved version of documents

Buildings of all types.

Infrastructure roads, bridges, utilities etc.

GIS data and analysis

Digital ground models, survey etc.

Land usage
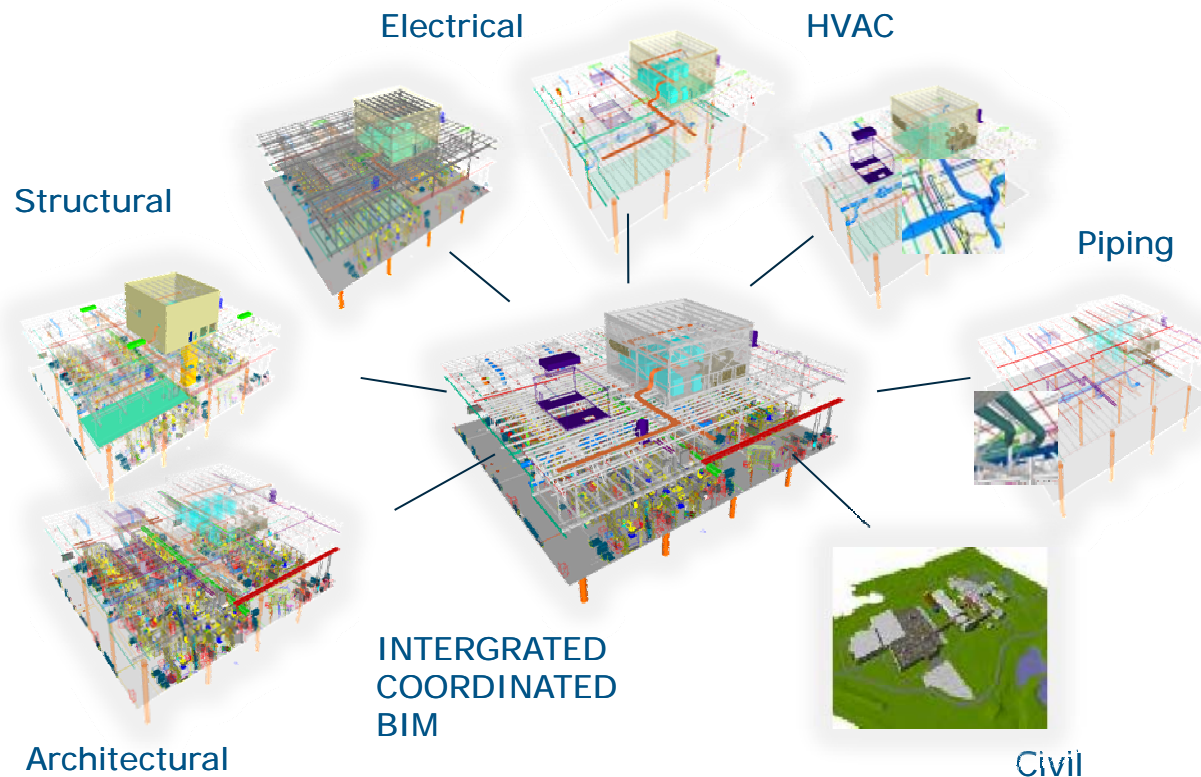
Virtual world

Bentley

Big BIM or Little BIM?

- Little BIM is often preferred by smaller design practices as it addresses their specific needs.

- Big BIM is preferred by clients where there is considerable value in the management of the asset and estate lifecycle.
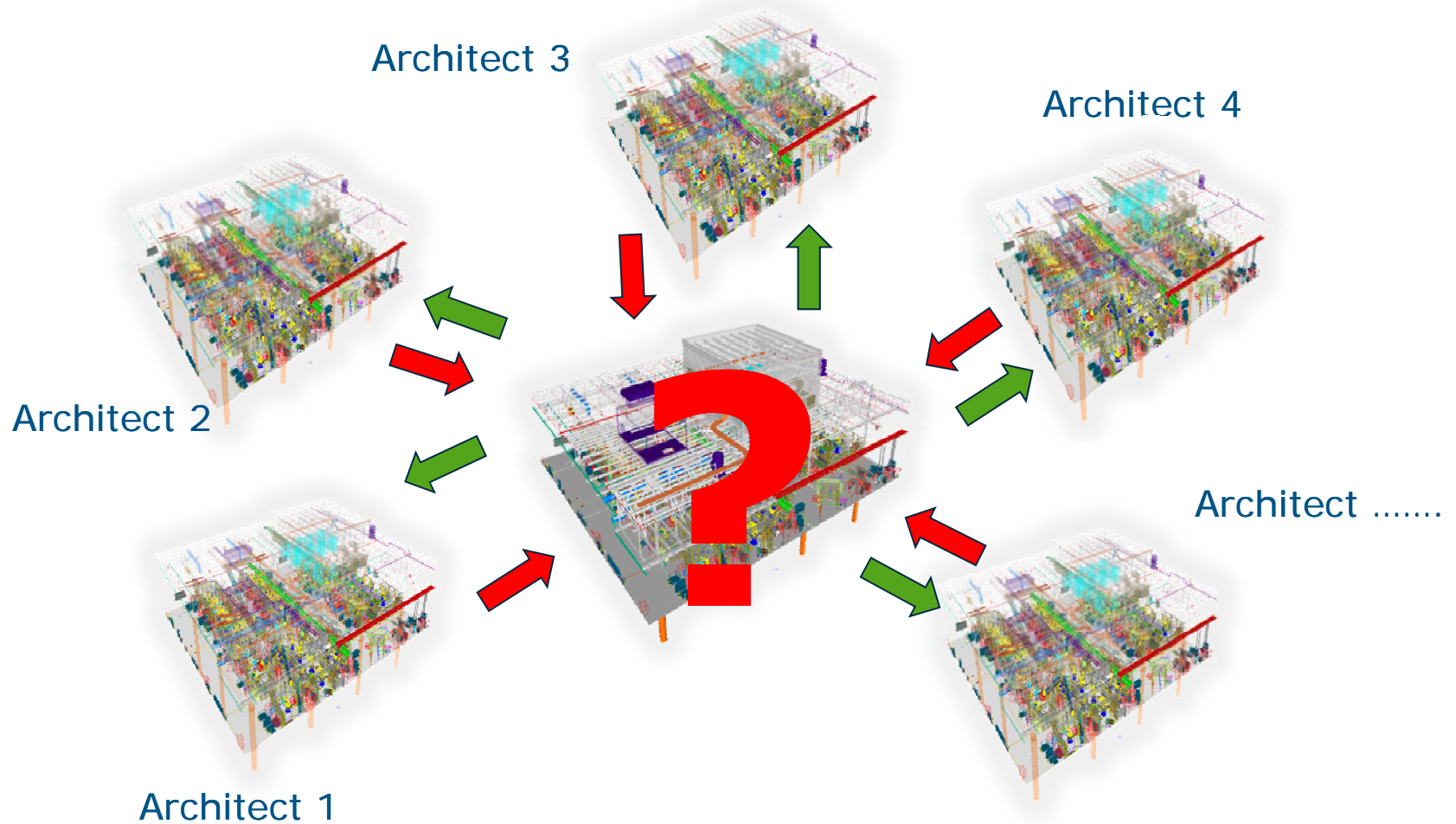

CROSSRAIL

LONDON 2012

FESTIVAL CITY

Bentley

But what is a BIM model?

Single model?

Federated model?

Electrical

HVAC

Structural

Piping

INTERGRATED
COORDINATED
BIM

Architectural

Civil

Bentley

But what is a BIM model?

Single model

Architect 3

Architect 4

Architect 2

Architect ……

Architect 1

Bentley

But what is a BIM model?

Single model

Electrical

HVAC

Structural

Piping

INTERGRATED
COORDINATED
BIM

Architectural

Bentley

But what is a BIM model?

Single model

Electrical

HVAC

Structural
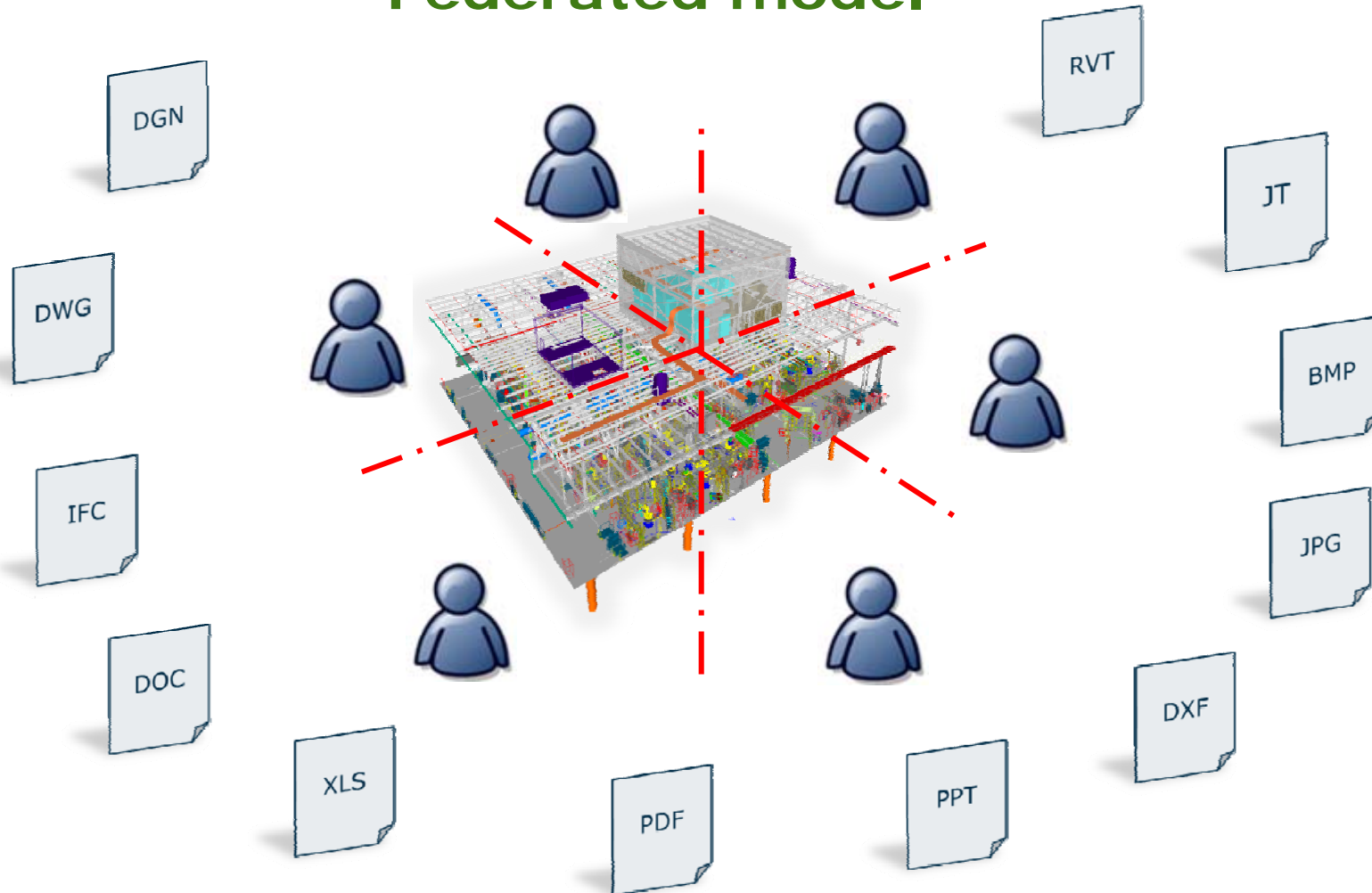
Piping

INTERGRATED
COORDINATED
BIM

Architectural

Bentley
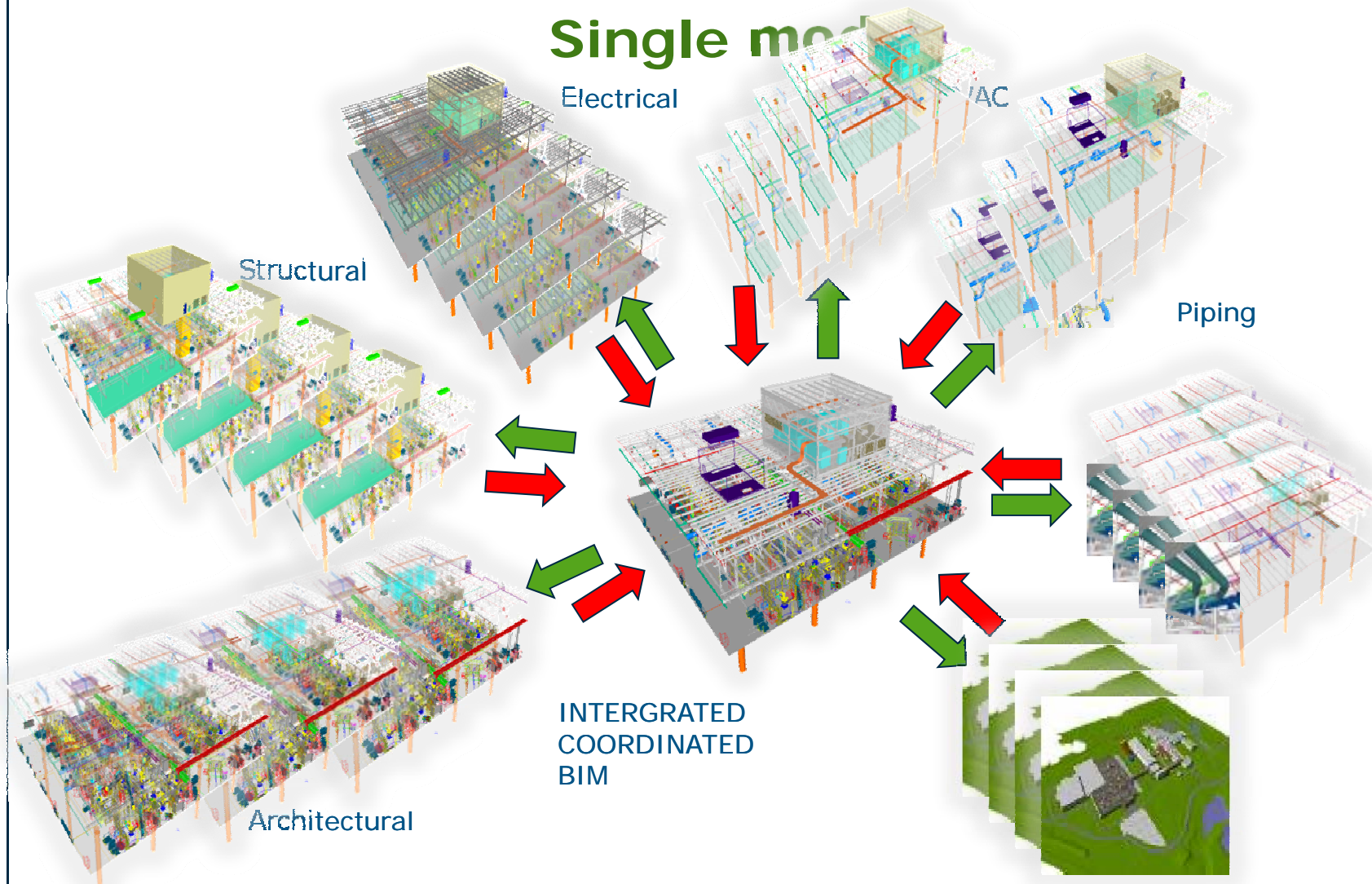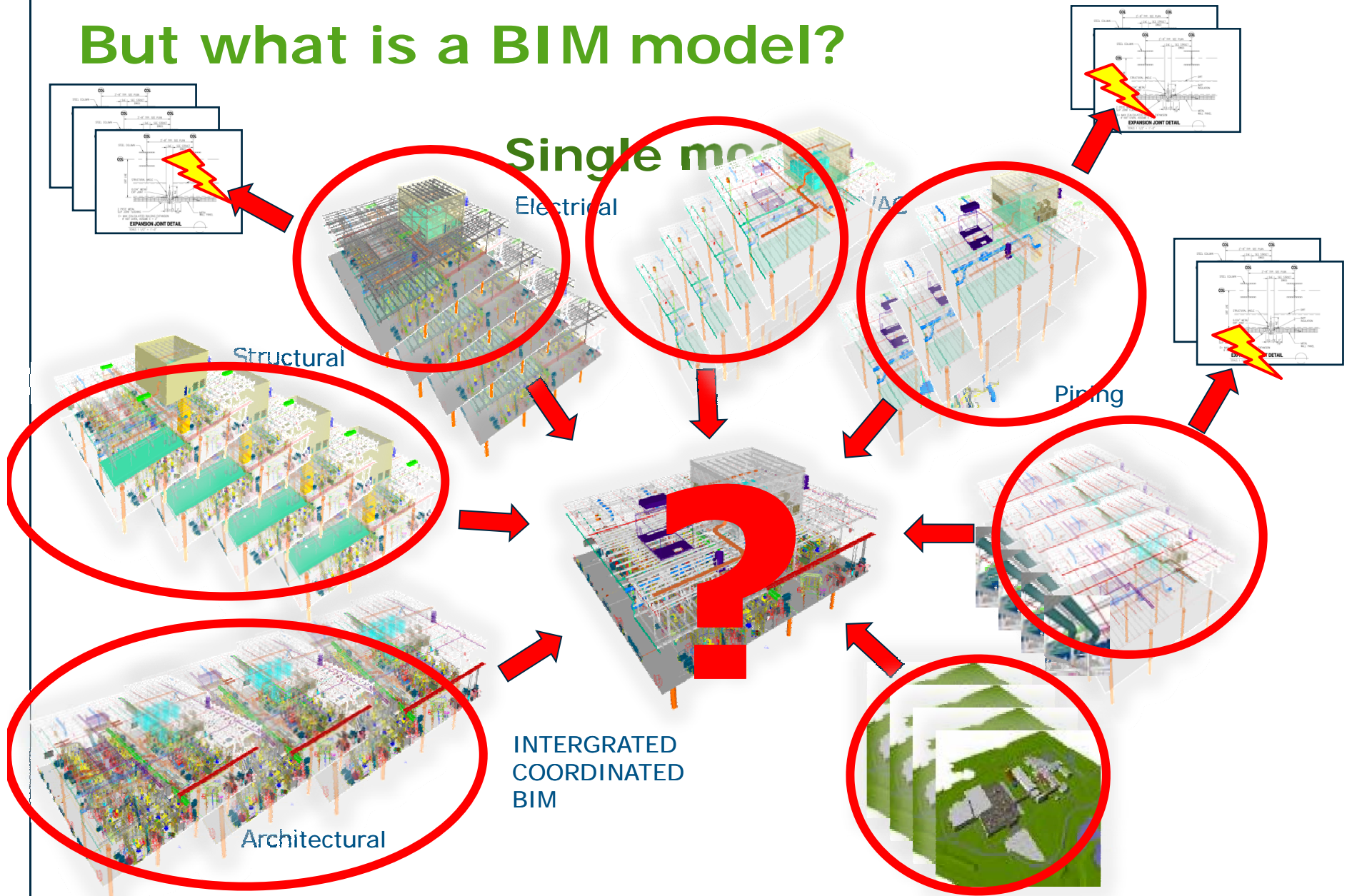
But what is a BIM model?

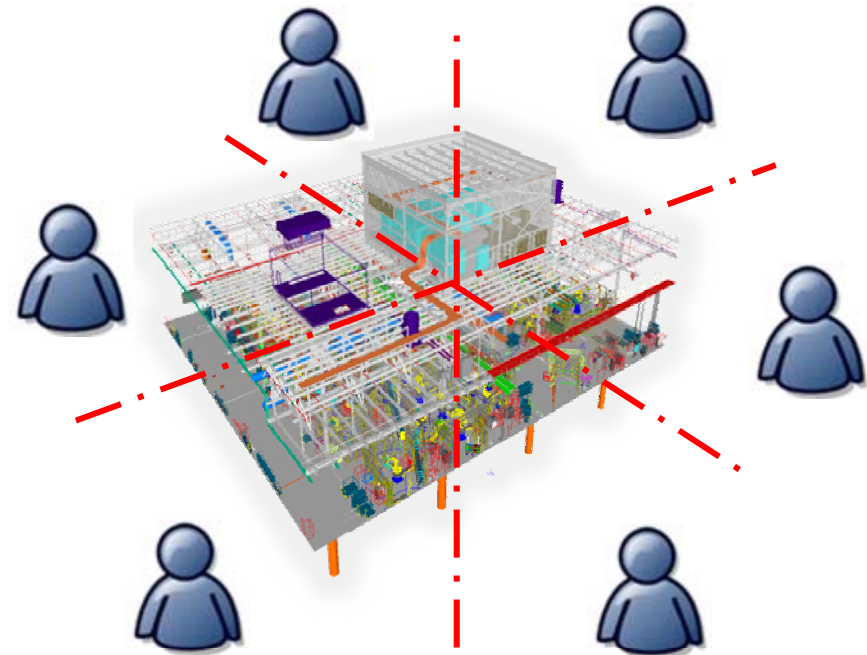## Federated model

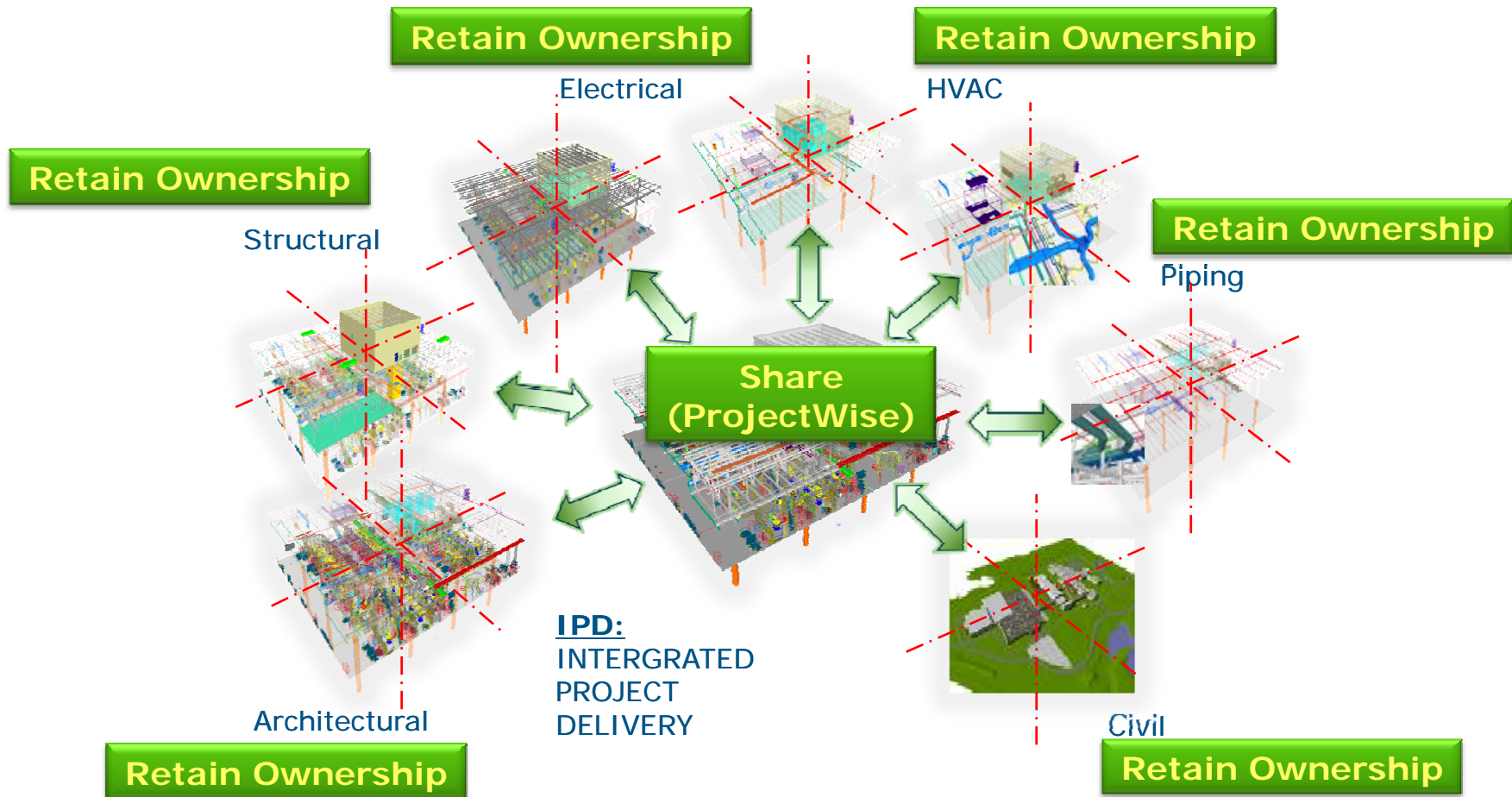**Bentley**

But what is a BIM model?

Federated model

- Project model is cut and sliced to project members

- Ownership remains with that project member!

- Share (via references) each others work

- Others only need to review others work on a selection basis

- Ownership is retained

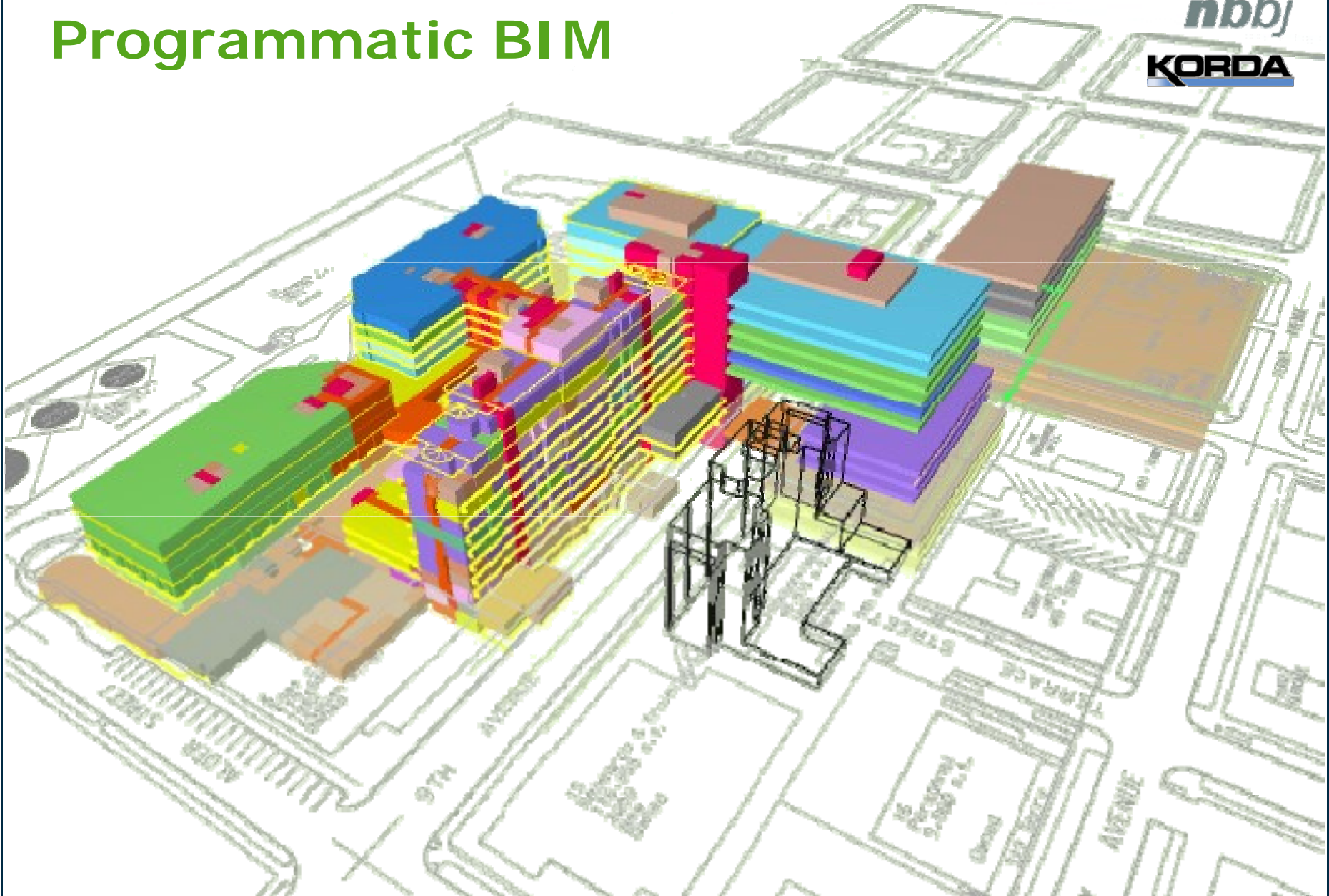With Bentley everything is always 100% synchronized, 100% of the time

Bentley
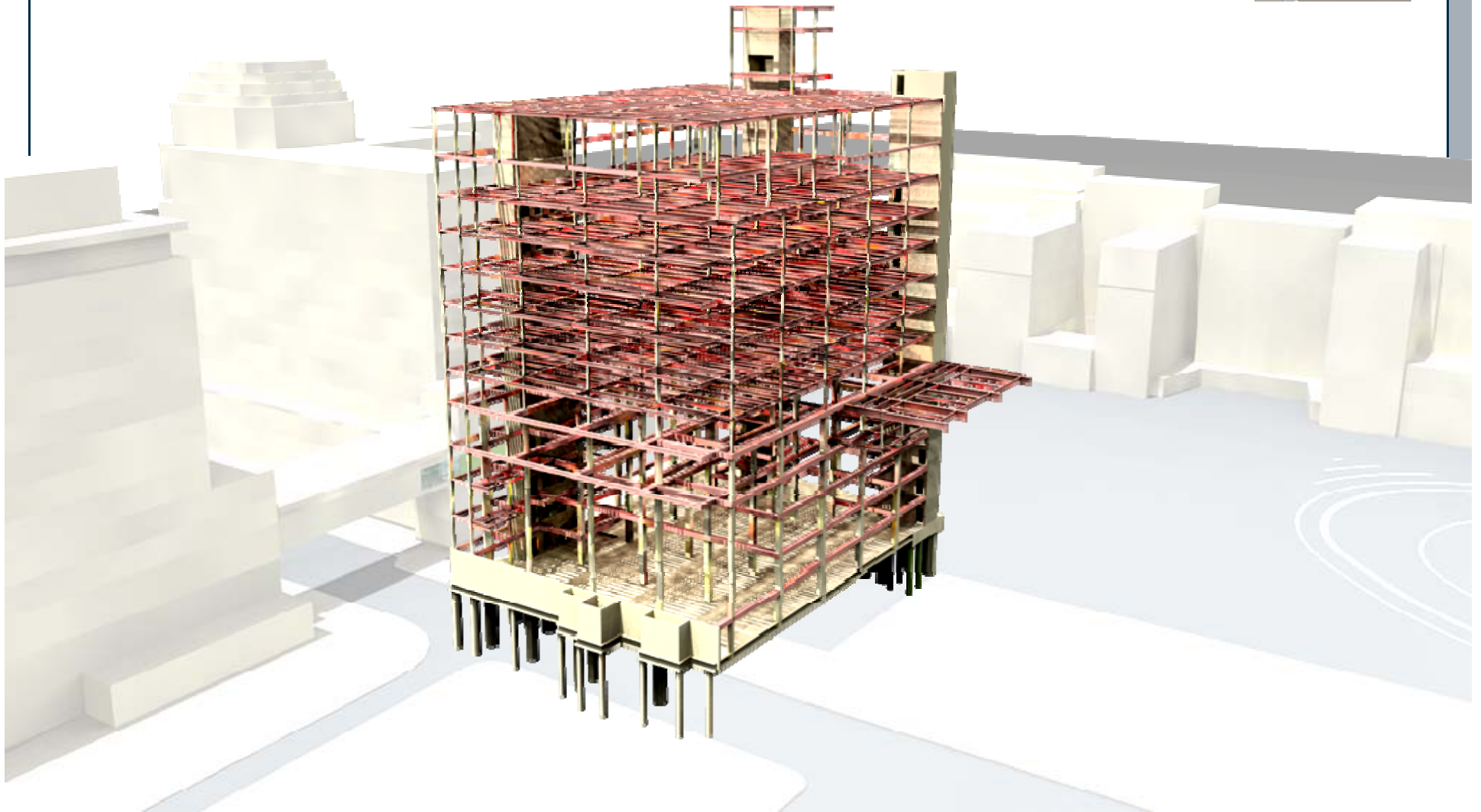
But what is a BIM model?

Federated model

Retain Ownership — Electrical

Retain Ownership — HVAC

Retain Ownership — Structural

Retain Ownership — Piping

Share (ProjectWise)

Retain Ownership — Architectural

IPD:
INTERGRATED
PROJECT
DELIVERY

Retain Ownership — Civil

Bentley

Programmatic BIM

Architecture

Structural Steel

Structural Concrete
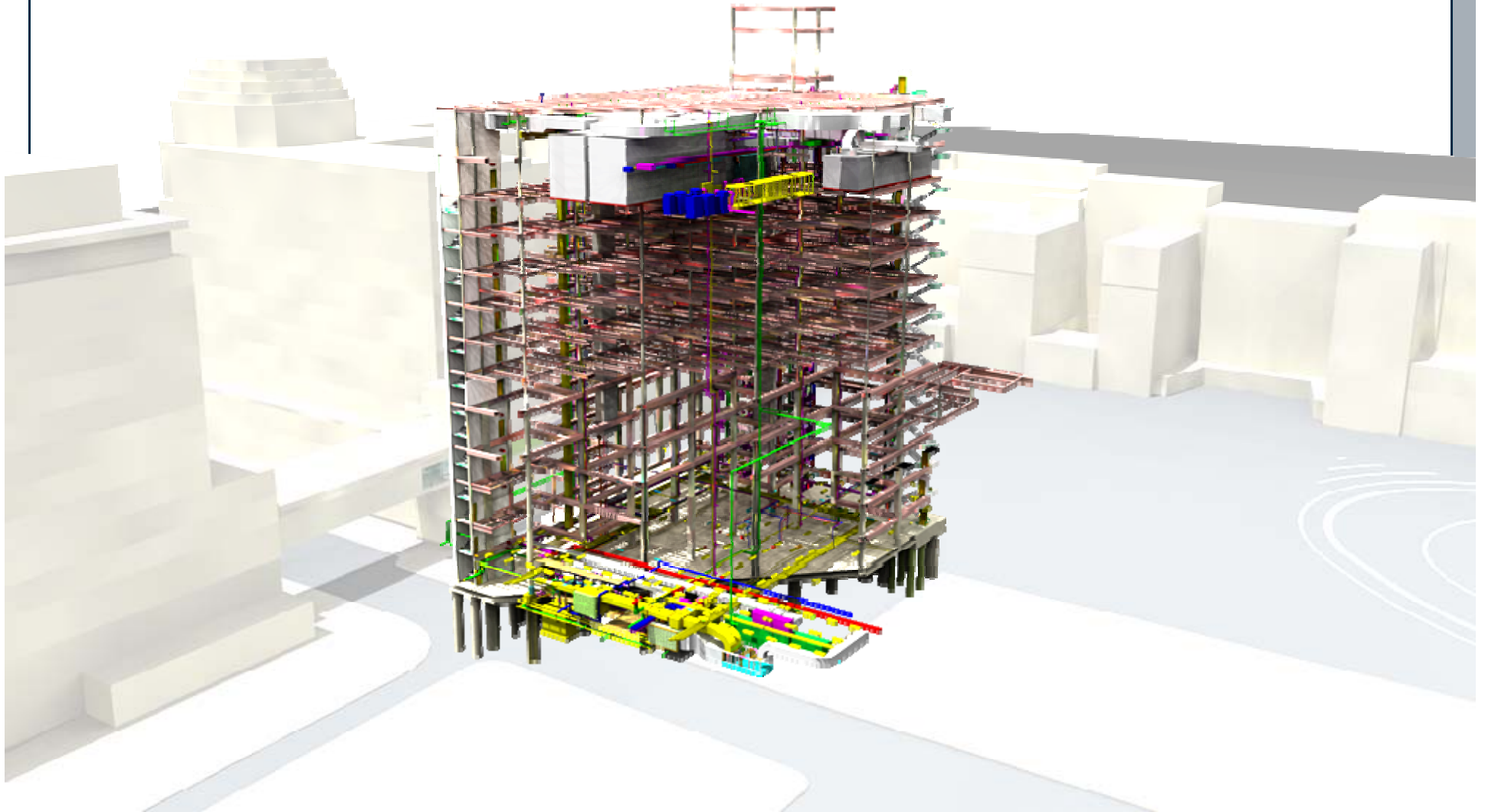
Mechanical Systems
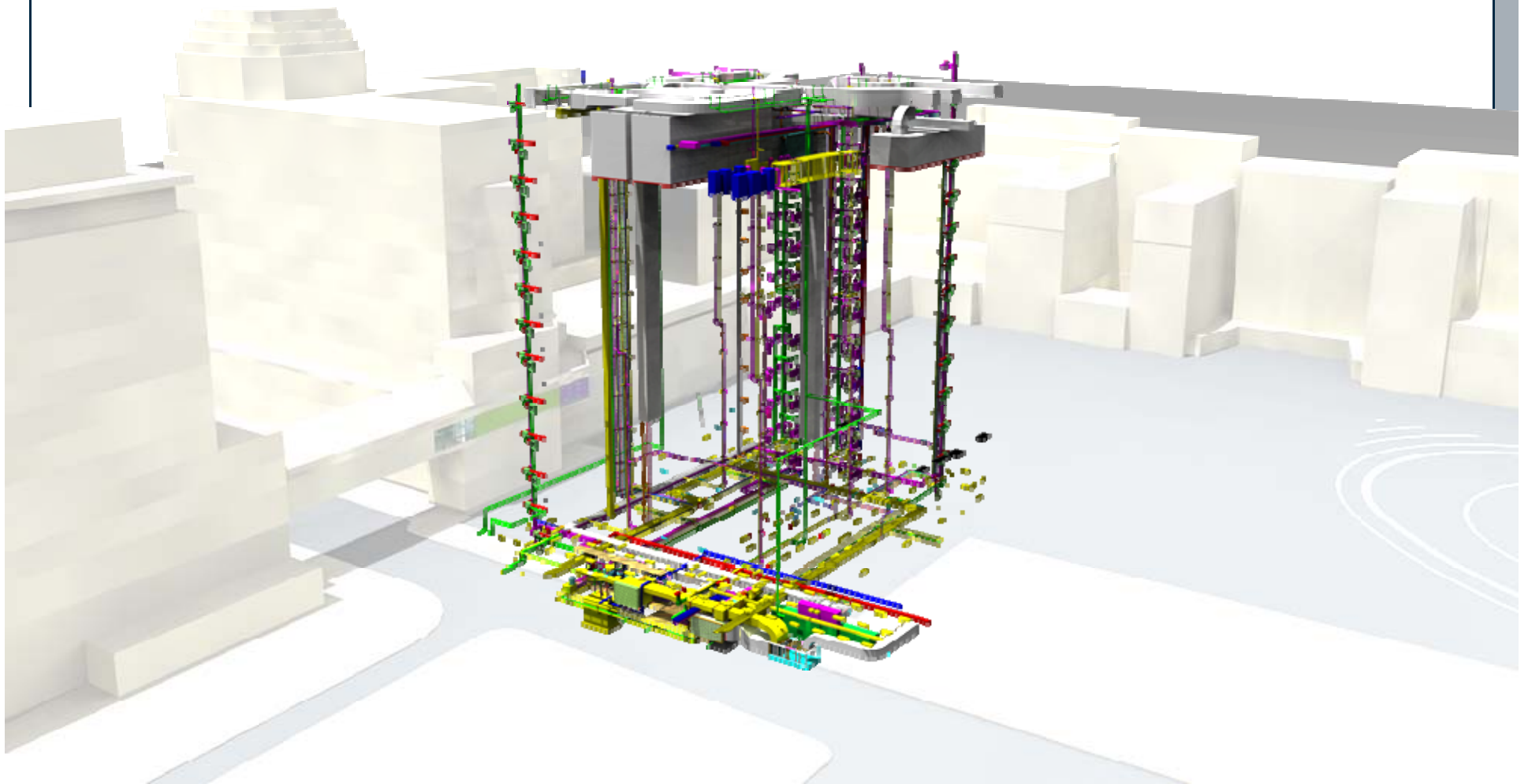
Bentley

Multi-Disciplinary Coordination

Interactive Views – All Together

The Bentley BIM Philosophy

- Data is paramount.

- Data is managed in a federated manner and shared throughout the entire lifecycle.

- Provide integrated technologies to enable the effective use of data across the entire lifecycle.

- Provide integrated consultancy, support and training services.
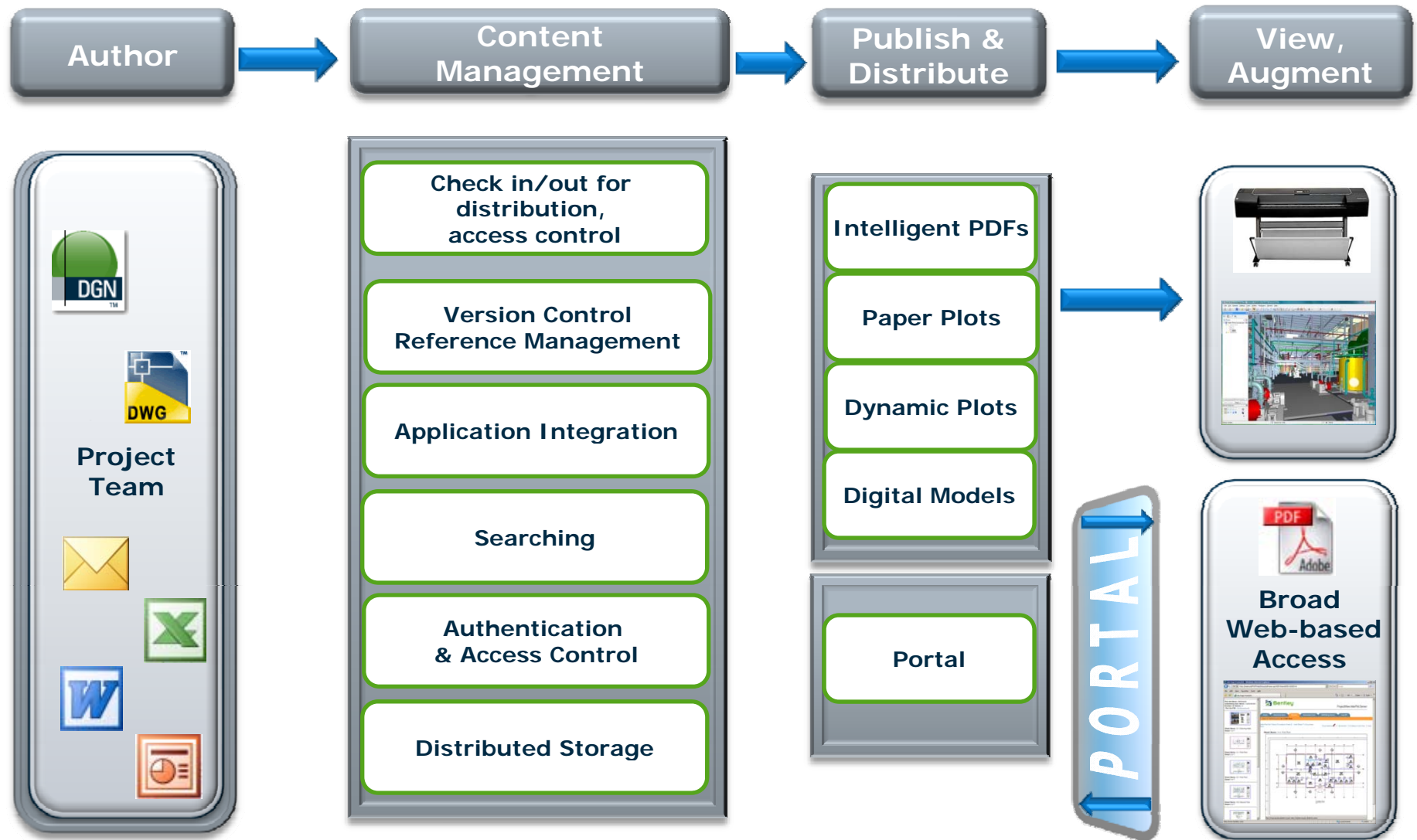
Bentley assumptions

- There will always be different file formats
  - Revit, Rhino, Maya, 3DS, Graphisoft, ADT, Autocad, Sketch up, Nemetschek, Catia .....

- Each industry (discipline) has it's own workflow

- The data is more important than the software

- Work to support industry standards (IFC, PDF, ISO 15926, ...)

- Open, not closed systems!

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Federated BIM

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Bentley®
Sustaining Infrastructure

The Federated Information Workflow:

Author → **Content Management** → **Publish & Distribute** → **View, Augment**

Author

DGN

DWG

Project Team

Content Management

- Check in/out for distribution, access control
- Version Control Reference Management
- Application Integration
- Searching
- Authentication & Access Control
- Distributed Storage

Publish & Distribute

- Intelligent PDFs
- Paper Plots
- Dynamic Plots
- Digital Models

Portal

PORTAL

View, Augment

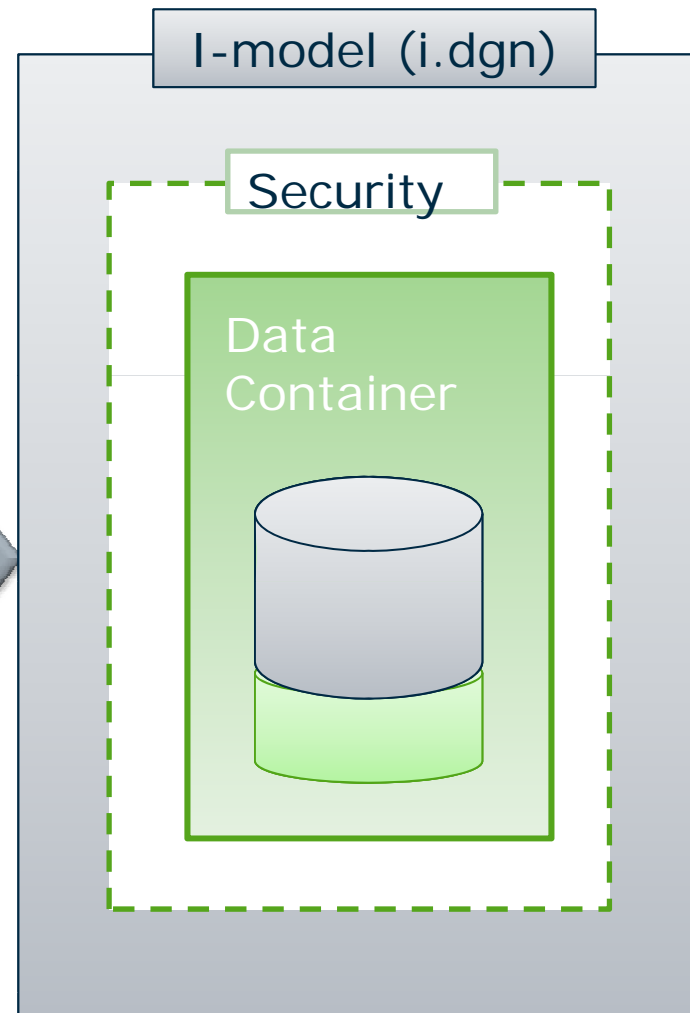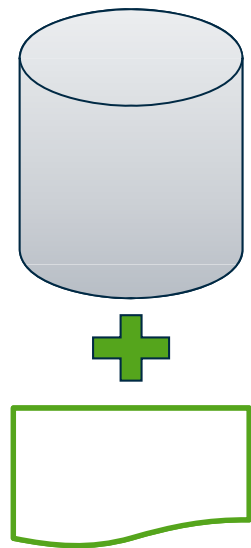PDF Adobe

Broad Web-based Access

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What is an i-model?

- Graphics & metadata in a DGN container that is:
  - Self-describing, immutable, & has provenance
  - Optimized for performance (size & visualization)

- Contains normal graphical data + business data from original package

- BIM standards: Architecture, Structural, Electrical, Mechanical, Civil design, Plant, Water, Hydrology

- Extension is "i.dgn" (example: *StructuralModel.i.dgn*)

- Still a dgn - Any software capable of opening a "dgn" can open an "i.dgn"

- Contents have been optimised for size legibility of xdata

- Read only file - onetime snap-shot of project
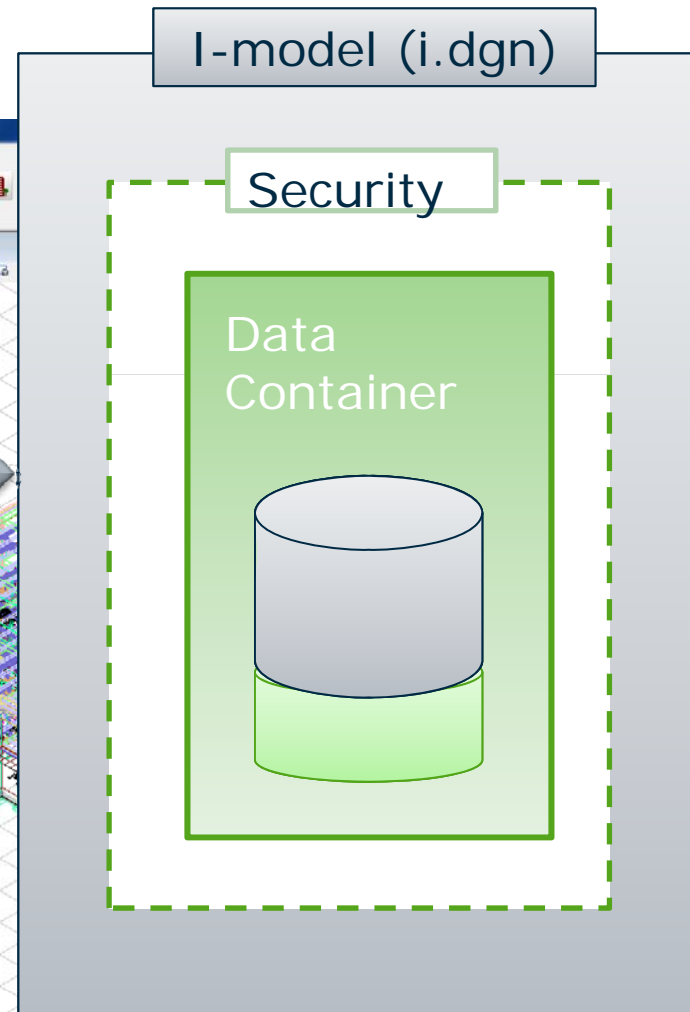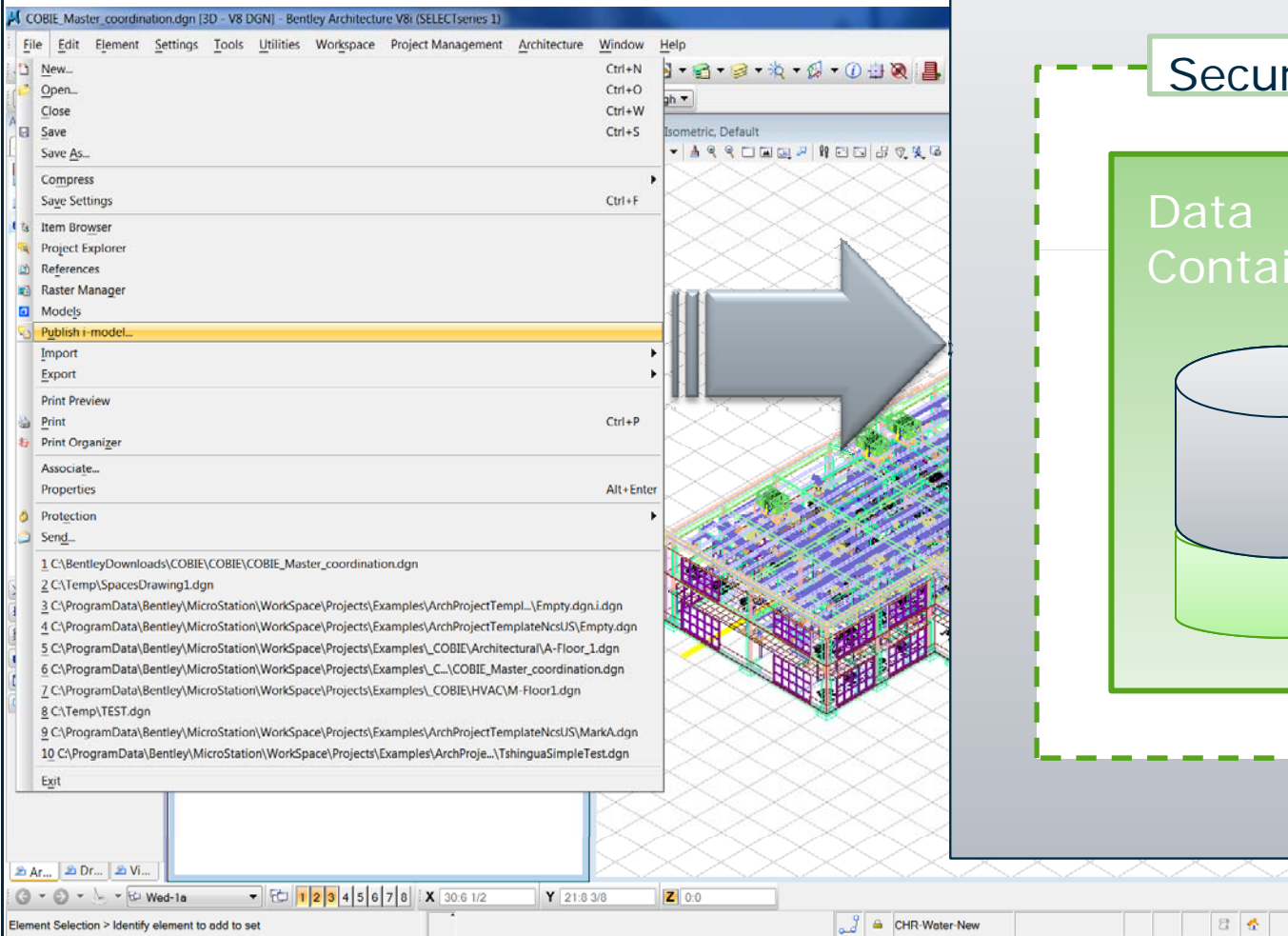 - Capable of being digitally signed

Bentley

What is an i-model? (visually)

Business Data
+
Graphics

I-model (i.dgn)

Security

Data
Container

Bentley

Bentley Building's i-model (2009):

I-model (i.dgn)

Security

Data Container

Revit to i-model (2009):

Bentley Building's i-model (2010):

I-model (i.dgn)

Security

Data Container

OpenBuilding Schema: shared by each Power Product.

Power-BIM | PowerPlant | PowerStruct | Hevacomp | Other Power Products

Service Layer

EC \ DGN

Specific Tools EC Integration Using Service Layer methods.

(ie. DG to EC work)

Service Layer
1) What is needed in the Services Layer?
    a. for Building, b. for Plant, c. for Struct
2) What has the Plant team already provided?

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Back to Overview

IFC Model View Definition Diagram : Wall IFC2x3

VIEW ID	VIEW NAME	APPLICATION NAME	APP. VERSION	EXCHANGE TYPE	DIAGRAM STATUS	DIAGRAM VERSION	DIAGRAM DATE	DIAGRAM AUTHORS
BSA-001	AECOO: Concept Design to Quantity Takeoff/Estimating	Generic	Generic	Generic	Candidate	0.90	04-Mar-09	Richard See (Digital Alchemy)

Wall

Root Attributes
- GUID
- BIM Object Owner/History
- Name
- Description

Generic Definition → Property Definition → Property Set → Pset_WallCommon
- Wall Construction Type
- Wall Is Interior/Exterior
- Wall Fire Rating

Simple Element Quantities → Wall Base Quantities
- Wall Height
- Wall Length
- Wall Thickness
- Wall Gross Side Area
- Wall Net Side Area
- Wall Gross Volume
- Wall Net Volume

QTO Focus

Type Definition

Generic Associations → Classification Association → Uniformat Classification

Generic Material Association → Material Layer Set → Material Layers

Generic Object Placement → Local Relative Placement

OK   Cancel   Apply

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Bentley Building's i-model (2010):

OpenBuilding Schema: shared by each Power Product.

PowerBIM PowerPlant PowerStruct Hevacomp Other Power Products

Service Layer

EC \ DGN

Specific Tools EC Integration Using Service Layer methods.

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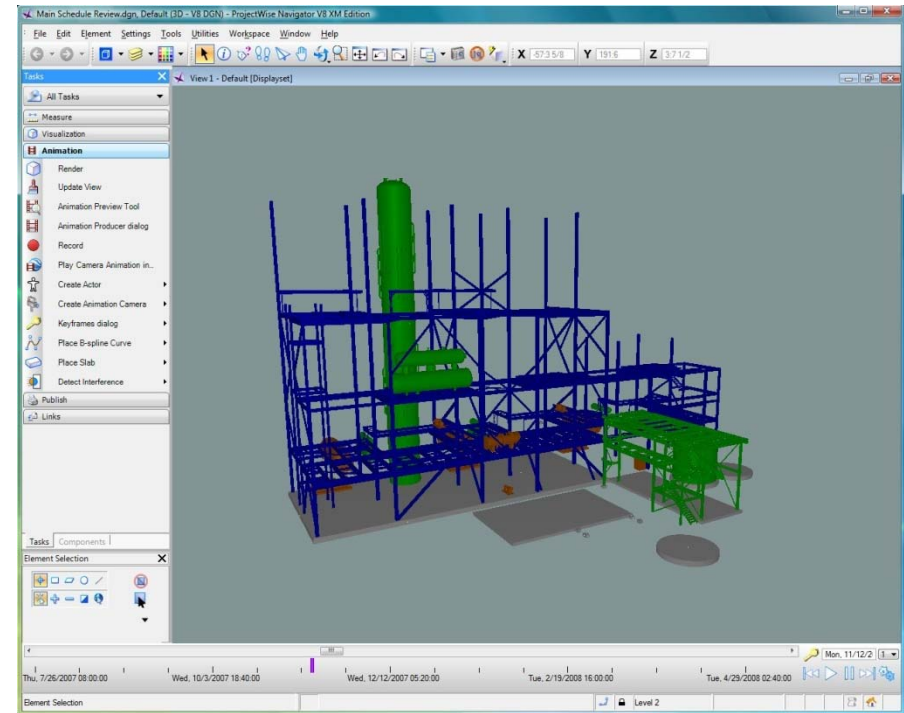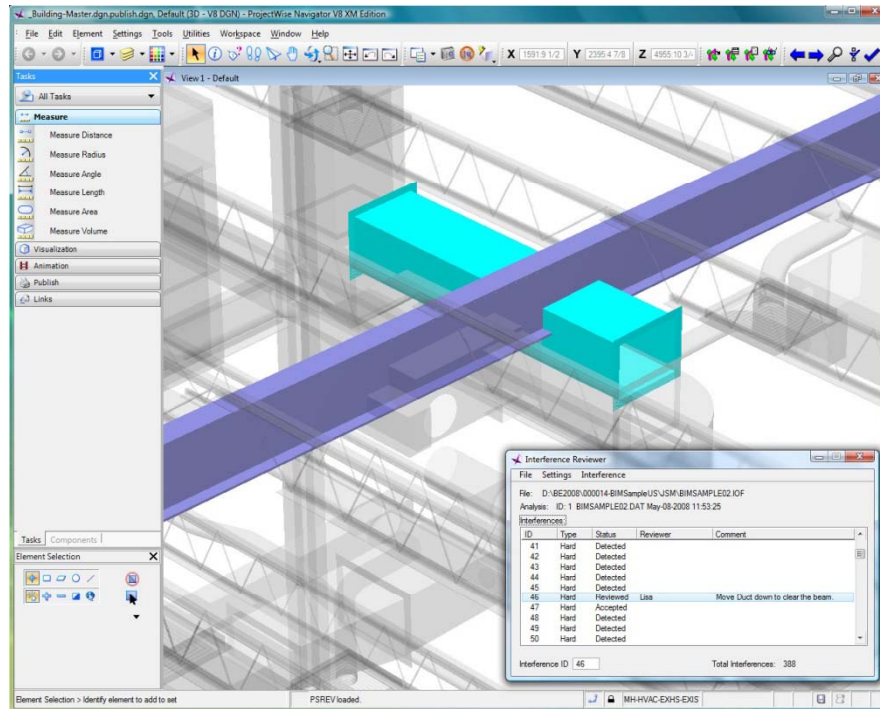Bentley

Data Interrogation & Item Sets

- Browse all component information stored in the file

- Create persistent, reusable item queries

- Change color and transparencies of graphics for status visualization

- Update sets based on changes to engineering data

- Isolate and zoom to graphics

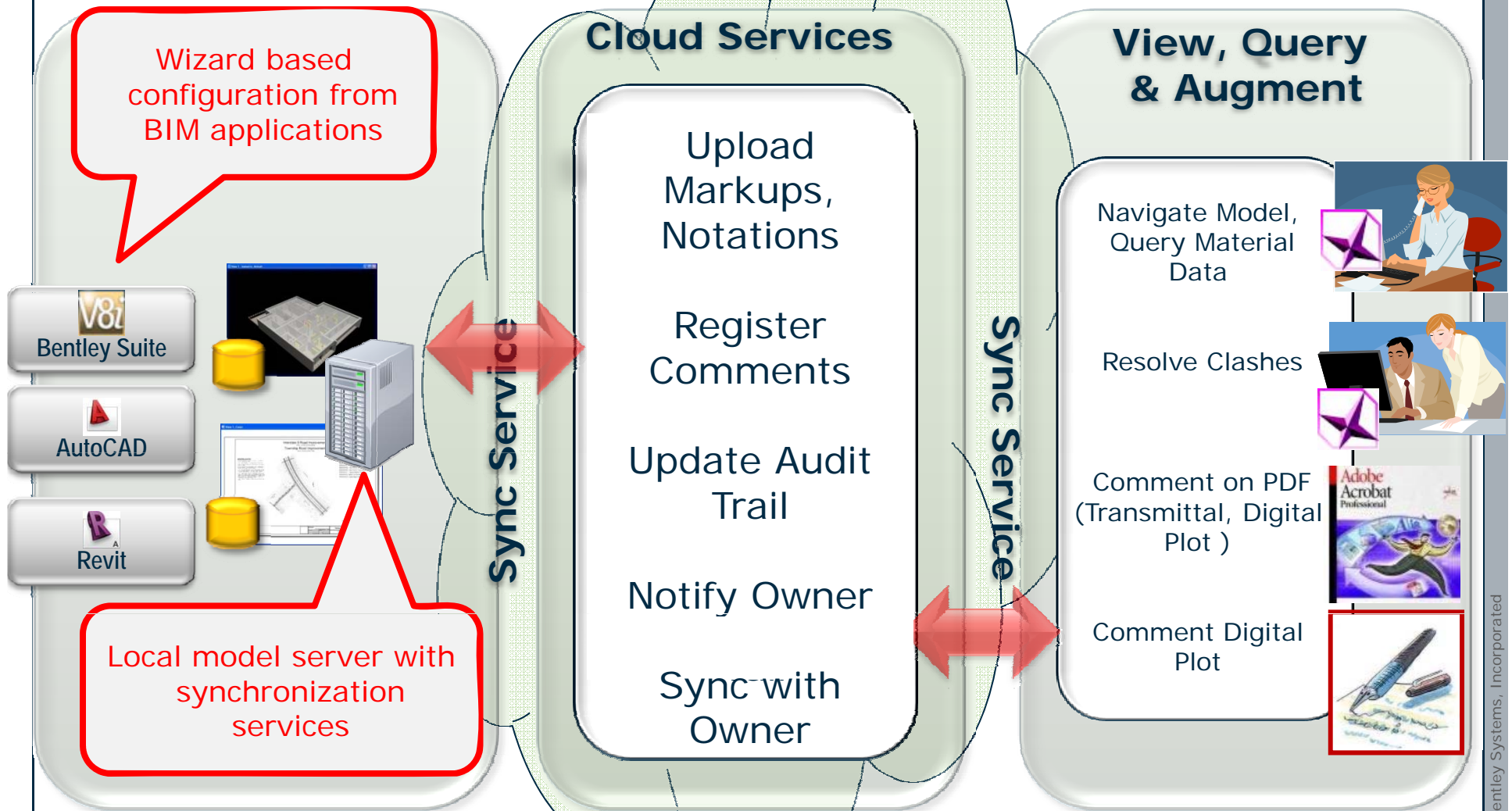# Clash Detection & Schedule Simulation

- • Detect clashes across different application data
- • Status tracking and commenting
- • Generate Reports
- • Rule suppression to reduce unwanted clashes
- • Import and export scheduling information from Microsoft Project and Primavera
- • Create new schedules and tasks
- • Dynamically modify tasks events
- • Preview results graphically

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Distributed Workflows
Change Management in the Cloud

Bentley

Vision

Cloud Services

View, Query & Augment

Wizard based configuration from BIM applications

Upload Markups, Notations

Register Comments

Update Audit Trail

Notify Owner

Sync with Owner

Navigate Model, Query Material Data

Resolve Clashes

Comment on PDF (Transmittal, Digital Plot)

Comment Digital Plot

Sync Service

Sync Service

V8i
Bentley Suite

AutoCAD

Revit

Local model server with synchronization services

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Drawing Views

www.bentley.com

Release – 8.11.7
Why DVs are **better** than the DEM

- 3d Modeling
    DEM: 2d/3d choice
    DV: Live concurrent documentation

- Dynamic Views
    Place shape to become cutting plane,
      any orientation, through any plane,
      forward can be transparent, cutting
      plane can be bold, filled, back
      plane can be wireframe, etc.

- Any discipline

- Any elements (MS solids, BStr,
  BBMS, BBES)

- Honors P/F info, 3d unification

- Drawing Production

- Performance – Huge difference

- Coordination
    Section markers (stepped sections are
      very easy)
    In-place activation (enables Federated
      workflow to be easy to navigate)
    Drag and Drop for composing drawing

- BIM App can attach BA drawings as
  background:
    1) Live DV,
    2) 2) Save AS (MVE),
    3) 3) PDF
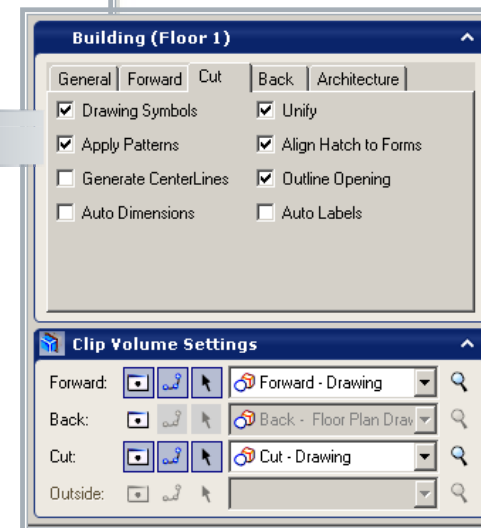
Bentley

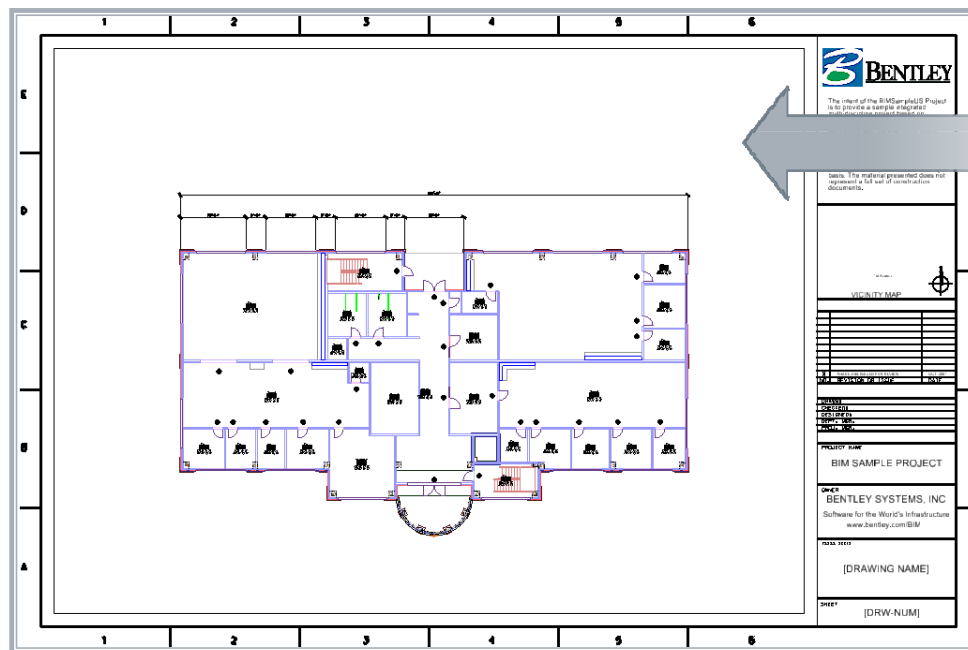# Overview - Building Views
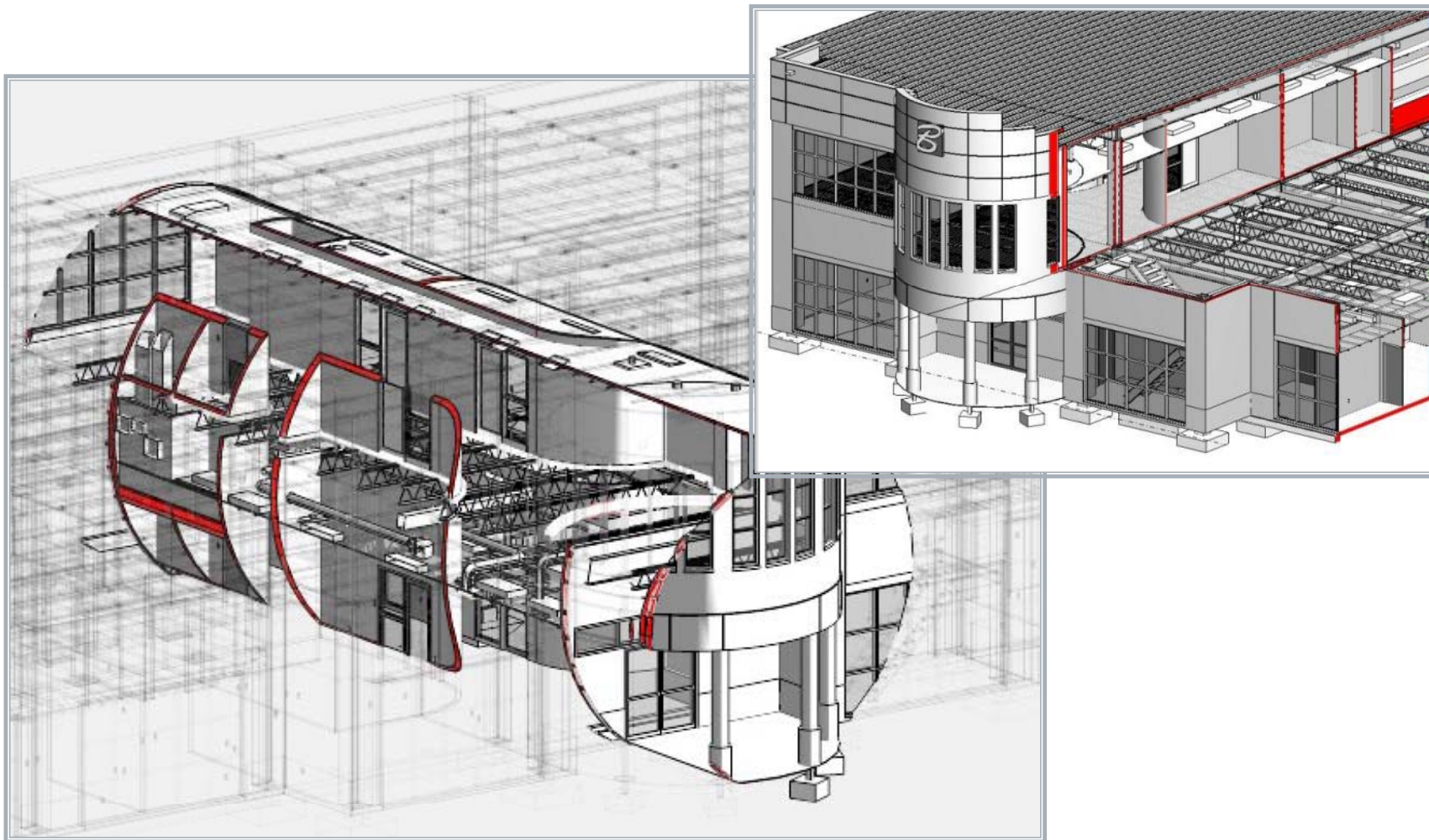
Overview - Building Views

Plans

1. Open 3D Model (Composition)
2. Create Building View
3. Attach to sheet
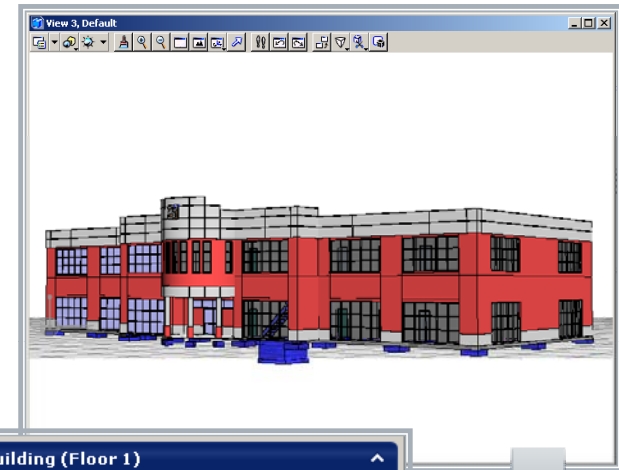
Building Views

Section, Elevations, Details

1. Place Plan in 2D Sheet

2. Place callout on Plan in 2D sheet

3. Place Building View on 2D Sheet (new or same)
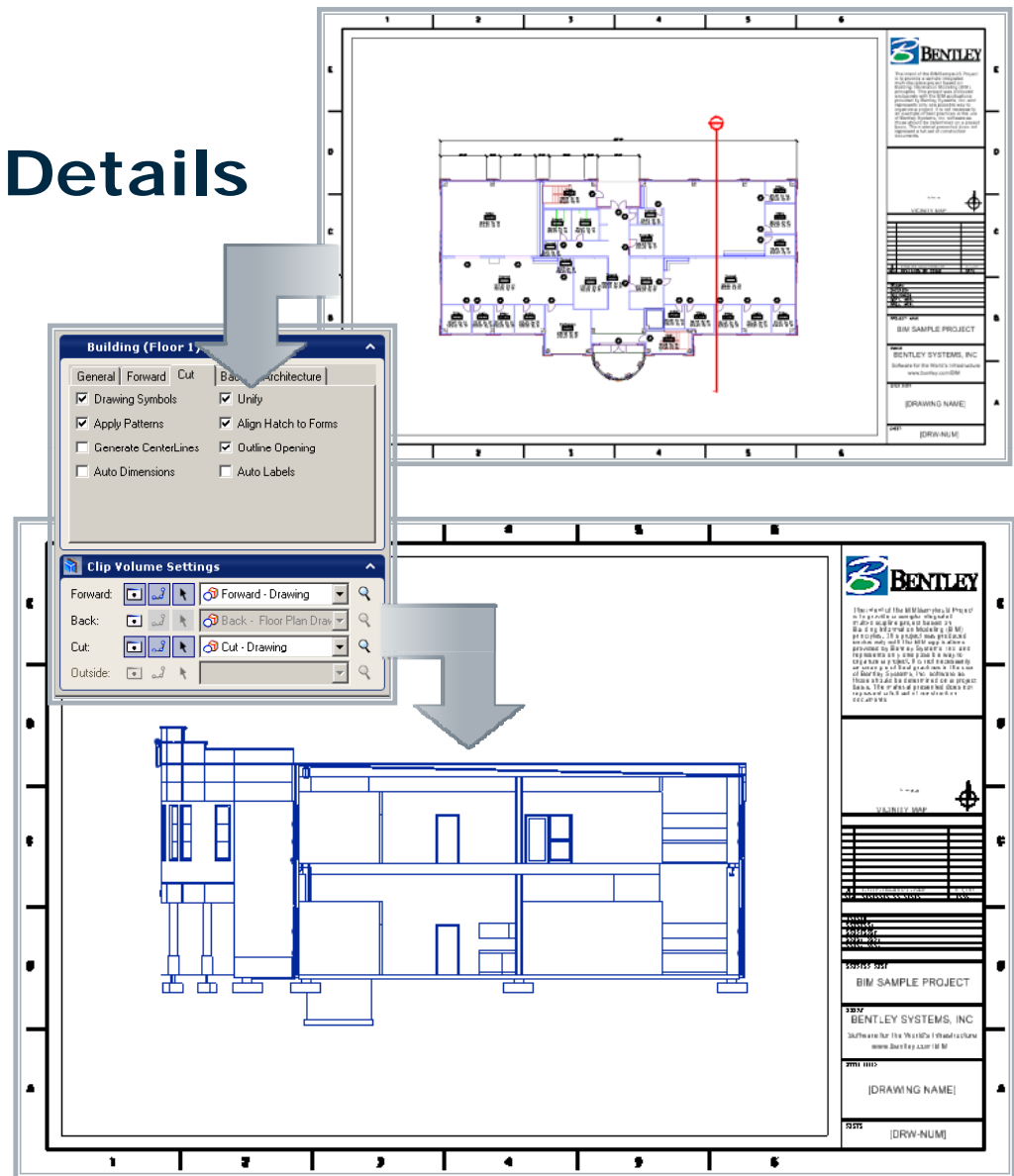
Performance Over the DEM

- Models are Drawings and Drawings are Models

- 9 seconds vs. ?? minutes/hours

Performance Over the DEM
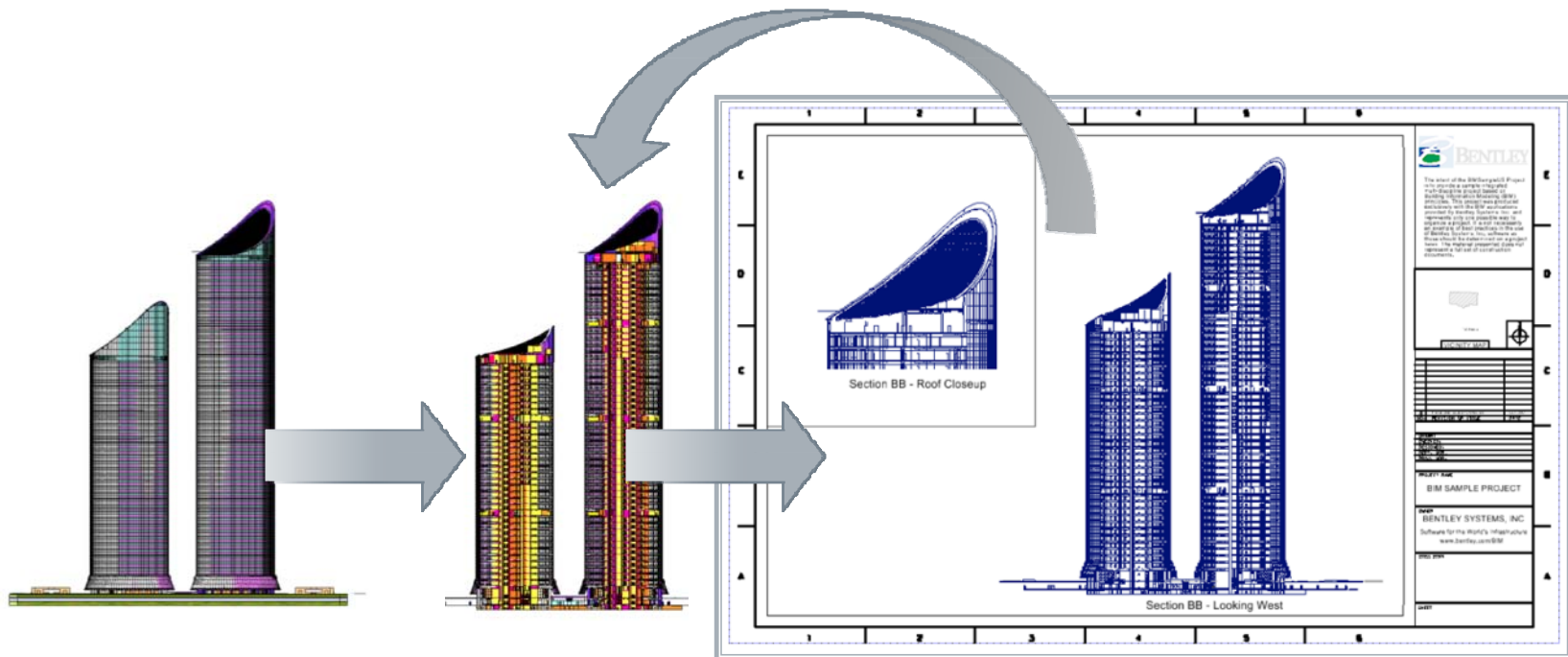
Performance Over the DEM
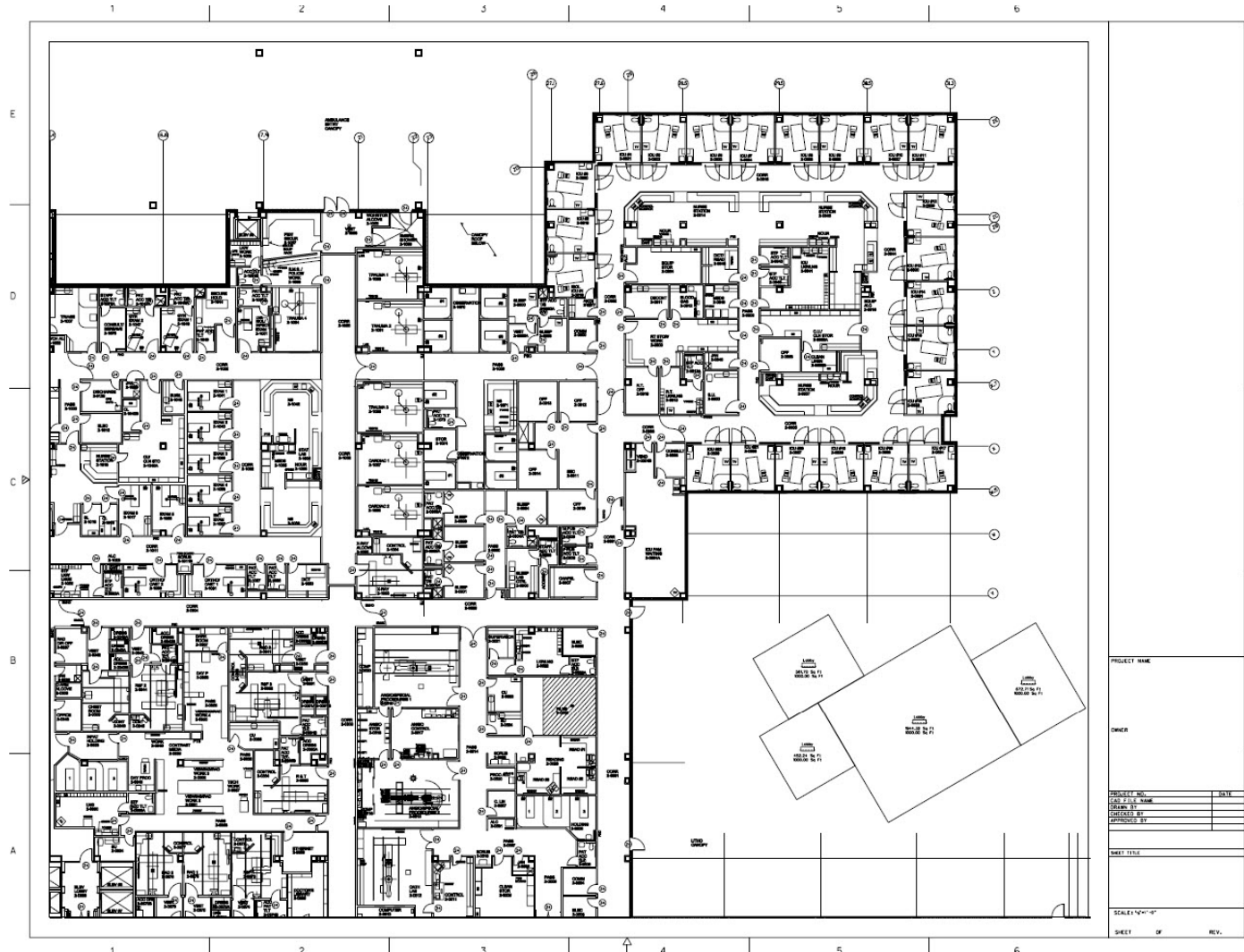
Performance Over the DEM

New release

www.bentley.com
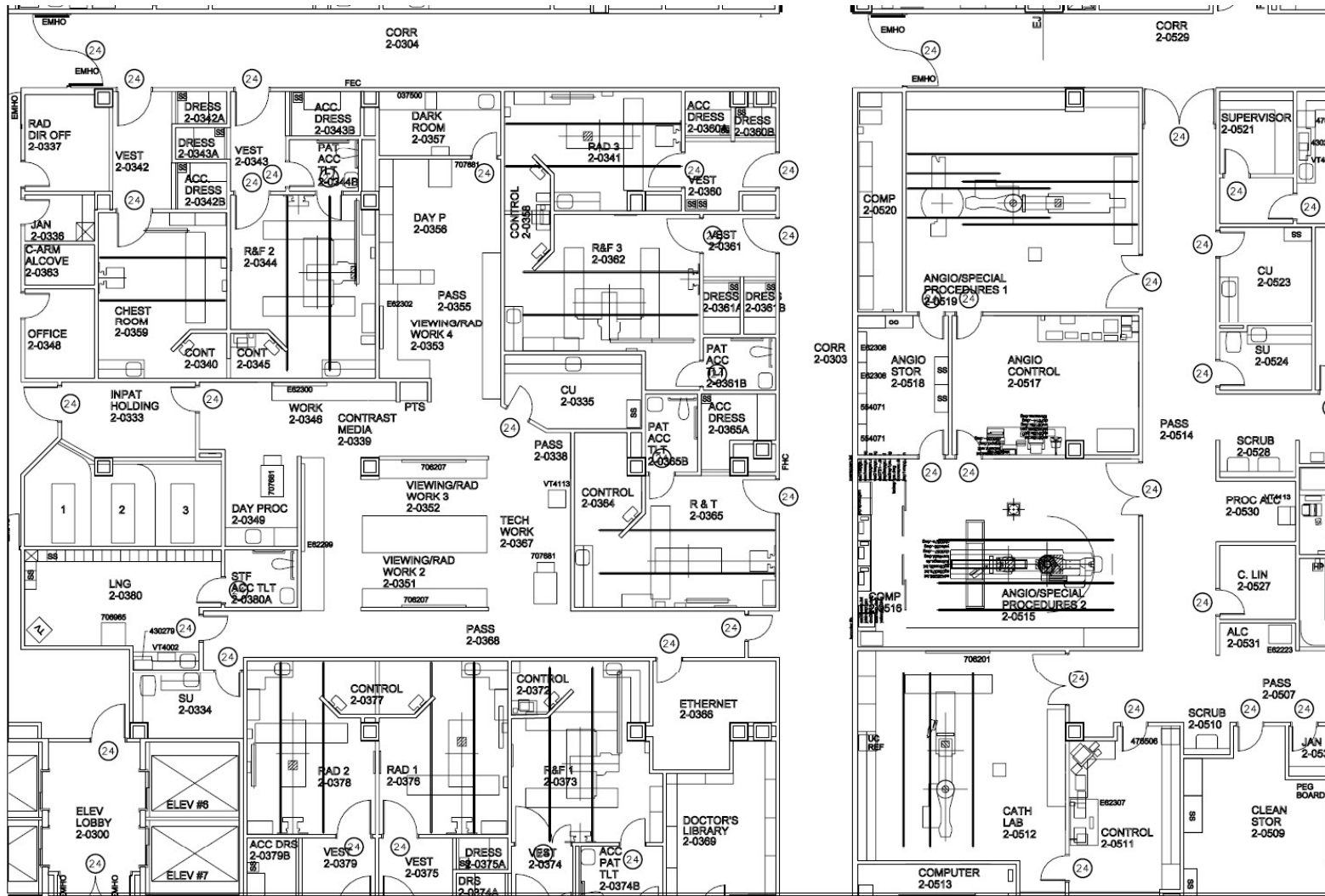
Soon to be released!

- Support for DataGroup System in a managed workspace environment

- Improved stairtool.

- Revit plug-in through i-model.

- Best Practice Guide.

- Point Clouds, Pointoo

Release schedule

- V8i – (SELECTSeries 1) 08.11.07.XX

- MicroStation – released Nov. 2nd.

- Bentley Structural – release Nov. 10th.

- Bentley Architecture – release Nov. 16th.

- BBMS/BBES – release Nov. 16th.

- Target: 2 SELECT releases/year. May + November.

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Typical Project Workflow

Project Progress →

- Shaping
- Pulling, Pushing
- Blocks, Surfaces
- Optioning
- Visualizing
- Sketching
- Quick Iterations

- Refine the Envelope
- Add Detail
- Meet Requirements
- Visualization
- Sketching
- Quick Interactions
- Create Drawings

- Fix the Envelope
- Add more Detail
- Meet Requirements
- Make Changes
- Develop Drawings
- Create Schedules
- Co-ordination

- Add more Detail
- Make Detail Changes
- Finalize Drawings
- Develop Schedules
- Co-ordination
- Dimension / Label
- Reference Details

SketchUp - SKP

Rhino - 3DM

3DMax - 3DS

Revit - RVT

Autocad - DWG

.dwg
.skp
.3dm
.3ds
.rvt

SKP — 3DM — 3DS — RVT — DWG — IFC — GBXML — STL

Generative Components - DGN

Bentley Architecture - DGN

.dgn

Microstation - DGN

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Thank You

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