UT20885 - Connecting the Dots! How to integrate BIM within the Enterprise

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Class summary

- BIM delivers value by providing an underpinning for the creation, aggregation and exchange of models and corresponding intelligent structured data. The availability of robust solutions in BIM paradigm both on-premise and in the cloud creates a challenge and hence opportunity to implement scalable integration architecture in the enterprise. While BIM Tools has largely focused in design and construction phases of assets, it also has important application across entire life cycle of assets and is therefore a key enabler of improving asset management. This class will attempt to showcase technology best practices in TOGAF Enterprise architecture to realize the vision of stakeholders to connect BIM data with other asset information and also make it available to entire enterprise and beyond.
Key learning objectives

At this class, you will learn:

- How Autodesk BIM solution architecture can be leveraged in your enterprise
- Explore and learn how to integrate BIM into your enterprise architecture
- Identify the BIM related data existing in the enterprise which needs to be related and distributed
- Use of Autodesk BIM Solution APIs for integrated flow of information through the enterprise
Concepts
BIM & Asset Management

- BIM and Asset Management are not isolated from each other

- **Asset management** – coordinated activity of an organization to realize value from assets (ISO 55000)

- **BIM** – Management of information **through the whole life cycle of a built asset**. It delivers value by providing the creation, collation and exchange of shared models and corresponding intelligent data. It reduces data loss when moving between different stages of lifecycle and transition to management of assets.

  - BIM is not a single software application, but the use of tools embedded in a process. Its use can be applied to all types of assets not just buildings.
Integrated BIM & Asset Management - Benefits

- **Greater Clarity** on long-term in-service performance expectations
- **Reduced project start-up costs** due to availability of better information at the beginning of the project.
- **Reduced construction and Operational costs** as a result of reduced construction defects.
- **Better life cycle management** due to availability of consolidated design and construction information as a single source of data.
- **Reduced management process costs** arising from incomplete data.
Survey Responses - #1

Are you extracting information out of your BIM tools today?
Answered: 20  Skipped: 0

- Yes: [Bar Chart]
- No: [Bar Chart]

How are you outputting BIM information?
Answered: 16  Skipped: 4

- Extracting using Custom...: [Bar Chart]
- Use OCTB mechanisms: [Bar Chart]
- I only output Drawings and...: [Bar Chart]

What are your main requirements with BIM data?
Answered: 20  Skipped: 0

- Would like to see Project...: [Bar Chart]
- Would like to mashup...: [Bar Chart]
- Would like to provide...: [Bar Chart]
- Would like to export to...: [Bar Chart]
- Would like to provide it...: [Bar Chart]

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
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</thead>
<tbody>
<tr>
<td>Would like to see Project level analytics</td>
<td>35.00%</td>
</tr>
<tr>
<td>Would like to mashup information with enterprise data</td>
<td>30.00%</td>
</tr>
<tr>
<td>Would like to provide value-add services with BIM data</td>
<td>75.00%</td>
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<tr>
<td>Would like to export to enterprise system</td>
<td>35.00%</td>
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<tr>
<td>Would like to provide it to collaborators</td>
<td>45.00%</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>10.00%</td>
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Total Respondents: 20
Survey Responses - #2

Do you use BIM360 or equivalent cloud tools today?

Answered: 20   Skipped: 0

- Yes
- No

What role(s) does your organization play in creation/use of BIM data?

Answered: 20   Skipped: 0

- Owner/Operator of Asset
- We Design and Construct
- We use someone else's BIM...
- Other
Stakeholder Concerns

- **Designer** – need to generate designs (outputs), cheap and fast.
- **Designer** – how much burden does BIM model creates on my design process?
- **Project Manager** – Where are we on the project (clashes/issues metric)?
- **Engineer** – I don’t want to use the BIM/CAD tool in order to access the information.
- **Construction** – There is not enough details in Design to apply construction best practices (manuf., code/standards, install instructions)
- **Owner/Operator** – What’s constructed is not fully represented in the construction drawings (markups and actual locations)
The Challenge – Integrated Flow of Information

**DESIGNER**  
Model  
Design  
Civil3D  
Outputs (Manual)

**ENGINEER**  
Spreadsheet calcfs  
Eng. Analysis Tools

**CONSTRUCTION**  
AutoCAD

**OWNER/OPERATOR**  
Survey using Construction markups

Drawing Sheet Outputs  
Manual input from Design outputs  
Recreate from Design outputs
BIM Maturity

- CAD transition to model
- Open, accessible and service oriented
BIM 360 Customer Example | JE Dunn

As a Construction Project Manager, I need to have access to the latest 3D model data so I can see it in the context of other data from my ERP systems.

Customer Insight

*We are interested in a connected solution, not just stand alone applications so we could establish BIM 360 as 'the' way of doing design collaboration (not an option) for all the projects across all offices.*

John Jacobs, CIO and Senior VP

- Developed Transformation Business solution with
  - Real time virtual (VR) collaboration, with 4D (cost) integration and immersive functionality
  - Integrated virtual positioning - 2D linked to 3D (location)
  - All of this functionality delivered through the Forge platform, integrated with Dunn Dashboard – and its 50,000+ users
LENs Lite/ Large Model Viewer Dashboard

4 Story Shell Office Building ASE Cost Summary

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<th>Description</th>
<th>Cost</th>
<th>Cost/1000</th>
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<td>General Requirements</td>
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<td>Demolition</td>
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<td>Excavation</td>
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<td>Structure</td>
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<td>Rough Carpentry</td>
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<td>Finish Carpentry</td>
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<td>Roofing and Sheet Metal</td>
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<td>Thermal and Moisture Protection</td>
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<td>Equipment and Furnishings</td>
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<td>Area &amp; Perimeter</td>
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ASE Cost Details for Glass and Glazing $1,941,987

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<tr>
<th>Code</th>
<th>ASE Cost Subtotal</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Amount</th>
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<td>SF</td>
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<td>08 40 00</td>
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<td>08 40 00</td>
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Revit Classification for Glass and Glazing $1,941,987

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<th>Revit Element Color</th>
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<th>QTO 2</th>
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<tr>
<td>Punch Window</td>
<td>30411 SF</td>
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</table>
BIM for Utilities

- Model data linked to external system data
- Multiple systems (Access, SQL, Maximo)
- Common interface through staging area
In case You missed it!

- PT21093 - Get into It! Using Large Model Viewer, Virtual Reality, and Visualization to Bridge IT and Design - Robert Angus
- BU20628 - Drive Successful BIM to FM Practice—from a Large-Facility Owner’s Perspective – Sheryl / Princeton
- CS21022 - A Tale of Two Data Sources: Integrate and Extend your Construction Ecosystem with BIM 360 API and FORGE – Keith/Saikat
GOOGLE it!

- FORGE
- COMMON DATA ENVIRONMENT
- FORGE DERIVATIVE SERVICE
- FORGE DATA MANAGEMENT API
Autodesk BIM 360 Dashboard & Analytics

Executive Dashboard

Project Dashboard (cross product)

Subcontractor Score

Cross-Project Quality Executive Dashboard

Project Level Quality Dashboard

Project Level Coordination Dashboard

drill down to workflow specific dashboards for a project

e tc....
Integrating with Business Processes

- Live BIM 360 model embedded in SharePoint ®
- BIM 360 projects linked to CMiC, Constructware for Project Controls
- Document Management (Vault, Skysync, Imaginit Clarity)
- Field commissioning data linked to models
- Custom implementations with rich web services APIs
Autodesk BIM 360 | Facility Management Integration

- COBie/Standards
- Assets/Specs/Attributes
- Geometry
Autodesk BIM 360 | Integration with Project Control systems

- Create RFIs/Change orders directly from the BIM360 model and send it to project control system
- Bi-directional workflows to access RFIs, PCIs, and BIM360 content
How to Systematically Define the Integration to be Successful Across the Enterprise
Enterprise Architecture

Enterprise Architecture (EA) is devoted to improving the performance of the enterprises by enabling them to see themselves in terms of the holistic and integrated view.

A Business Strategy is implemented…
By offering business services…
Organized into a set of activities…
That process information…
Automated by an application functionality…
Running on a given platform

Which are delivered through business processes…
Composed from application services…
EA Stakeholders’ Centric Approach
Views & Viewpoints

A View
- Is what you see
- Is always specific to the architecture for which it is created
- Has an associated viewpoint that describes it, at least implicitly

A Viewpoint
- Is where you are looking from
- The vantage point or perspective that determines what you see
- Is generic and can be stored as a library for re-use
What is TOGAF?

- The Open Group Architecture Framework is a Framework combined with a detailed Method and a set of supporting Tools to develop an Enterprise Architecture in an organization

  ... The Open Group

- Developed and maintained by

- Vendor and technology-neutral industry consortium with over 400 members
  - Sponsors certification programs
  - Publisher of the TOGAF 9.1 specification
TOGAF Main Concept – Iteration and Phases

- **A. Architecture Vision**
  - Set the scope, constraints & expectations for a TOGAF project
  - Create Statement of Architecture Work
  - Conduct Stakeholder Analysis

- **B. Business Architecture**
  - Develop Business baseline and target architectures
  - Analyse gaps

- **C. Information System Architectures**
  - Develop Information System baseline and target architectures
  - Analyse gaps

- **D. Technology Architecture**
  - Develop Technology baseline and target architecture
  - Analyse gaps

- **E. Opportunities & Solutions**
  - Develop detailed implementation and migration plan
  - Analyse costs, benefits, and risks
  - Provide architectural oversight for the implementation
  - Define implementation governance processes and procedures

- **F. Migration Planning**
  - Ensure that every phase of the TOGAF project is based on and validates business requirements

- **G. Implementation Governance**
  - Perform initial implementation planning
  - Identify and categorize initiatives and implementation projects

- **H. Architecture Change Management**
  - Define change management process and provide continuous monitoring to ensure the architecture responds to the enterprise needs

- **Preliminary**
  - Prepare the organization for a successful project
  - EA Maturity Assessment
  - Awareness Sessions

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EA Maturity Assessment
Awareness Sessions
Tying it Together

**Stakeholder Concerns**
- **Designer** – need to generate designs (outputs), cheap and fast.
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**BIM Maturity**
- CAD transition to model
- Open, accessible and service oriented

**The Challenge – Integrated Flow of Information**
- **Designer**
  - Manual inputs from Design outputs
- **Engineer**
  - Manual inputs from Design outputs
- **Construction**
  - Re-create from Design outputs
- **Owner/Operator**
  - Survey using Construction markups

**BIM Maturity**

**Views**
- As-Is Process
- To-Be Process

**Viewpoints**
- Profitability
- Custom/er Satisfaction
- Operational Risk

**Concerns**
- TCO

**Stakeholders**
Structuring the Solution

Enterprise Architecture

Enterprise Architecture (EA) is dedicated to improving the performance of the enterprise by enabling them to see themselves in terms of the holistic, and integrated view.

- A Business Strategy is created...
- By defining business services...
- Organizing the set of activities...
- Transforming information...
- Automated by an application function...
- Running in a given pattern...

Tying it Together

Preliminary
A Architecture Vision
B Business Architecture
C Information System Architecture
D Technology Architecture
E Opportunities & Solutions
F Migration Strategies
G Implementation Governance
H Architecture Change Management

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- Project XXX
- 9 Business Architecture
  - 9.1 Business Architecture Models
- 5.2 Data Architecture
  - 5.2.1 Conceptual Data Architecture
- 5.3 Technology Architecture
  - 5.3.1 Conceptual Technology Architecture

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Why TOGAF can help Design the Integration

BIM is made up of

- Process & Standards
- Model Data & Attributes
- Tools & Technology

TOGAF uncovers architecture for

- Business
- Data
  - Application
  - Technology
Facilitating the Integration
- as a Building Block

**Foundation Services**

- Access Control
- Big Data Platform
- Object Store
- Transfer Avoidance
- Service Message Bus
- Derivative Service
- Machine Learning
- Event Services
FORGE and BIM 360 HQ
Integrating with Business Processes

BIM 360 services
- Model & data management
- Coordination & Quality
- Review & Collaboration
- Quantities / Resources
- Scheduling / Production Planning
- Point Layout and verification
- Field Documents
- Field Verification / Commissioning

BIM 360 web access
- Engage the extended team

BIM 360 mobile apps
- Glue
- Layout
- Look-ahead
- Field
- Targeted apps for the field

Desktop integration
- Support for 50+ Industry Formats
- Rich functionality for power users

Integration with business processes
- IBM maximo
- CMiC
- SharePoint
How to engage Autodesk Global Services?

- EBA and non-EBA Customers

- CSO/TO

- Discovery Workshops

- EA Report & Work Packages

- CSM

- Sales

- Kick-off Initiatives

- Budget & Schedule
Questions?

Take the Survey