Streamlining the Project Turnover Process with BIM Deliverables

Ohio State’s BIM Project Delivery Standard
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Buckeye BIM Initiative
Buckeye BIM Initiative

BIM for Existing Buildings

BIM for Design & Construction

Build  Maintain  Integrate
Project Objective

Enhance planning and communication resulting in improved quality and speed of decision-making
BIM for Existing Buildings
Project Background
Owner’s Model

Design Intent vs. Work Intent vs. As-Built vs. As-Maintained

What do we need?
What do we not need?

What supports our planning and operations efforts?
What can be reasonably maintained?
Progress

Total Buckeye BIM Implementation

- 208 Buildings
- 24,064,948 Sqft.
- Completed

Expected 62% Complete May 2017

67.9%

Total Goal: 35,500,000 sqft
Base Model Development

#BIMForumED @DavidPifher @fayeosu @OSU_FITS
Internal BIM Competency

Technical Skills
Conceptual Design Skills
BIM for Design and Construction
BIM Feasibility Study
# TOTAL COST AVOIDANCE

If a BIM Standard is fully adopted.

<table>
<thead>
<tr>
<th></th>
<th>Chiller Plant</th>
<th>McCampbell Hall</th>
<th>Kennedy Commons</th>
<th>Total</th>
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<tbody>
<tr>
<td><strong>Project Statistics</strong></td>
<td></td>
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<td></td>
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<tr>
<td>Size:</td>
<td>94,737 SF</td>
<td>104,000 SF</td>
<td>30,000 SF</td>
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<td>Cost:</td>
<td>$77,302,597</td>
<td>$17,171,045</td>
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<td>Design:</td>
<td>$54,784,978</td>
<td>$13,882,483</td>
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<td><strong>Total Size</strong></td>
<td>$229,737 SF</td>
<td>$135,088,528</td>
<td>$30,000 SF</td>
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<tr>
<td><strong>Total Cost</strong></td>
<td>$204,258</td>
<td>$50,212</td>
<td>$49,801</td>
<td>$951,110</td>
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<td><strong>2004 NIST Report</strong></td>
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<tr>
<td>Planning Costs</td>
<td>A/E: $86,163</td>
<td>A/E: $39,400</td>
<td>A/E: $270,000</td>
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<td></td>
<td>Cm: $151,264</td>
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<td>Cm: $447,460</td>
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<tr>
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<td>Owner: $128,923</td>
<td>Owner: $172,283</td>
<td>Owner: $49,801</td>
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<td>Total:</td>
<td>$396,350</td>
<td>$403,660</td>
<td>$124,200</td>
<td>$951,110</td>
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<tr>
<td>Design Costs</td>
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<td></td>
<td>$194,133</td>
<td>$116,615</td>
<td>$50,212</td>
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<td><strong>2007 NIST Report</strong></td>
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<td>Trade Package Creation</td>
<td>Total: $447,849</td>
<td>Total: $138,824</td>
<td>Total: $79,313</td>
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<tr>
<td></td>
<td>$244,733</td>
<td>$216,949</td>
<td>$79,313</td>
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<td>Coordination</td>
<td>Total: $3,865,129</td>
<td>Total: $858,552</td>
<td>Total: $426,965</td>
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<tr>
<td></td>
<td>$3,865,129</td>
<td>$858,552</td>
<td>$426,965</td>
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<td><strong>2004 NIST Report</strong></td>
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<tr>
<td>Recapture of Data</td>
<td>A/E: $1,915</td>
<td>A/E: $2,080</td>
<td>A/E: $660</td>
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<td>Cm: $20,105</td>
<td>Cm: $21,840</td>
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<td>Owner: $16,275</td>
<td>Owner: $17,680</td>
<td>Owner: $5,100</td>
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<td>Total:</td>
<td>$388,529</td>
<td>$41,600</td>
<td>$12,000</td>
<td>$91,185</td>
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<td><strong>Total Project Cost</strong></td>
<td>$5,170,571</td>
<td>$1,537,709</td>
<td>$892,690</td>
<td>$7,600,970</td>
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<tr>
<td>Avoidance</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>% of Total Project Cost</td>
<td>6.6%</td>
<td>8.9%</td>
<td>7.1%</td>
<td>Avg. = 7.1%</td>
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<tr>
<td>Cost Per Square Foot</td>
<td>$54</td>
<td>$16</td>
<td>$30</td>
<td>Avg. = $33</td>
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BIM Project Delivery Standard
What is a Project Delivery Standard?

How project will be executed?
How deliverables will be formatted?
OSU’s Focus

Not prescriptive about how to run a project
Focuses almost entirely on turnover documentation
BIM
PDS
Development
Key Outcomes

Further the cultural change across the University, to enabling the use of BIM data throughout the building lifecycle.

Explore how BIM can reduce the Total Cost of Operations/Ownership

Improve the quality and speed of decision-making

Enable the BIM to serve as a single-source of truth for defined/specific information

Define a commitment to data sharing among the various data creators, while encouraging communication across departments to foster the currency of spatial and asset information
Key Outcomes

Define how BIM can drive more efficient and collaborative project delivery methods

Leverage structured data to streamline the turnover process and integration of data into new and existing technologies

Integrate BIM and GIS

Enable the BIM to be utilized for energy and sustainability projects to increase efficiency generating savings

Redefine the contractual obligation for design/construction team members to deliver building information/data in a digital format
Deliverables

BIM Execution Plan
  LOD Matrix of BIM Deliverables
Conformed Design Intent Models
Record Construction Models
COBie Worksheet
BIM Execution Plan

Project Information
Project Schedule and Milestones
Project BIM Goals
BIM Project Participants
Model Software
Model Collaboration, Transmission and Permitted Use Strategies
BIM Meeting Procedures
Model Element Table (LOD Matrix Spreadsheet)
Model Coordinate Systems
Model Structure
Floor/Level and Elevation Naming Conventions
# BIM Execution Plan

## LOD Matrix of BIM Deliverables

<table>
<thead>
<tr>
<th>Model Elements (Utilizing CSI UniFormat 2010)</th>
<th>Design Intent BIM</th>
<th>Construct Trade Coordination BIM</th>
<th>Operate Conformed Design Intent BIM</th>
<th>LOD Notes</th>
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<td></td>
<td>LOD</td>
<td>MEA</td>
<td>LOD</td>
<td>MEA</td>
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<tr>
<td>B2050 – Exterior Doors and Grilles</td>
<td></td>
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<tr>
<td>B2050.10 – Exterior Entrance Doors</td>
<td>300</td>
<td></td>
<td></td>
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<td>B2050.20 – Exterior Utility Doors</td>
<td>300</td>
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<td>B2050.30 – Exterior Oversize Doors</td>
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<tr>
<td>B2050.40 – Exterior Special Function Doors</td>
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<td>B2050.60 – Exterior Grilles</td>
<td>200</td>
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<td>B2050.70 – Exterior Gates</td>
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<tr>
<td>B2050.90 – Exterior Door Supplementary Components</td>
<td>5, 8</td>
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Turnover Documentation

Conformed Design Intent Models
Record Construction Models
COBie Worksheet
BIM Implementation Plan
People

Technology

Process
BIM Implementation Plan - People

Training
- BIM Basics
- BIM Execution Plan
- RFQ/RFP Considerations
- AEC Town Hall

University Model Manager
BIM Implementation Plan - Process

Pilot Projects
PDS/BEP Revisions
  Version 1 released January 2015
  Version 2 released January 2017
COBie Definition and Integration
GIS Integration
BIM Implementation Plan - Technology

Model Checker Tools (internal and external)
COBie Tools
BIM Middleware
Immersive BIM Environment
BIM Implementation Plan - Contract

Contract/Fee Schedule
Building Design Standards
Other Associated Documents
BIM Implementation Plan – Next Steps

AEC Toolkit
Turnover Data
Operations
Version 2 Changes

All charts moved from PDS and BEP to LOD Matrix of BIM Deliverables

Expanded LOD Matrix from Uniformat level 3 to level 4

Clarifications and simplifications throughout

  Added submission dates

  Removed use of LOD 500
Project Team Interaction Improvements

BIM PDS has been well received because it’s reasonable
BIM PDS has lead to better conversations between project team members
Feedback from the project teams (internal and external) helped develop version 2
Outcomes
The OSU Buckeye BIM Initiative Map

Legend

- BIM PDS
- OSU Existing Systems
- Future Interoperability Technology

AEC Project Record Information Delivery

- Record Conformed Design Intent BIMs
- Operation & Maintenance
- Record Construction BIMs

Archive Data Manager

- COBie
- Native/IFC/PDF

Revit

- RV1

FME

- RVZ

AutoCAD

- DWF

ESRI Arch GIS

Evolve FM (SIMS)

eQUEST Building Energy Simulation

AIM (Asset Works) O&M Management Capital Asset Management

Custom Maintenance Software (CMS)

Delta (enteliWEB) Building Automation

ATG Life Safety Management

Energy Consumption Tracking

Archive

BIM Middleware Technology (TBD)

@DavidPifher @fayeosu @OSU_FITS
Plan
Collaborate
Focus