Computable Closeout
Implementing Digital Sustainability on LACCD’s $6Bn Bond Program
Build LACCD Bond Program

- Largest Community College District in US
  - 9 Colleges serving 250,000 Students
- 3 Bonds passed since 2001 totaling $6.2Bn, due to complete 2019
- Prioritize Sustainability and Innovation
- First BIM Standards developed in 2009
  - Required on all projects exceeding $5M
  - 50+ BIM Projects on Program

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District Transformation

- 2X increase in District footprint
- 75% of District will be New or Modernized
- New facilities are high performing, energy efficient facilities (~90 LEED Buildings)
- Nearly 600 Projects Completed to date, 160+ remaining
Challenges

- How do you assimilate influx of new asset information with existing inventory?
- How do you manage more infrastructure with static operational Budgets?
- How do you accommodate facility change with ongoing operational requirements?
- How to ensure taxpayer funded infrastructure is optimized?

You cannot manage 21st Century buildings with 20th Century tools…
Digital Sustainability

• Bond invested in systems to manage facility lifecycle
• Improved contract specs for deliverable requirements so that they can be captured efficiently in these systems
• Collected and organized legacy facility data in systems

Make information “computable”…
BIM is “Computable”

- iModel
- MEP: Clash; Coordination
- EMS
- CMMS
- EDMS
- GIS
- Authoring File
- Walkthroughs; Animation
- Estimating
- Design Review
- CD’s/As-Buils
- 2D CAD
- 4D

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• Organized and searchable archive 3.5 TB (3M files) of As-Built/M&O data
• Submitted closeout deliverables archived in M&O defined folder structure
• Integrated with CMMS, GIS, and PMIS
GIS

- Organized and searchable inventory of all District space (10M gsf)
- Provides spatial source of truth for District
- Integrated with EDMS, CMMS, and EMS
BIM is “Computable”

- BIM Data is foundation for:
  - Space in GIS
  - Equipment in CMMS
  - Space in EMS
  - As-Builds in EDMS
WHY do BIM?

What is the benefit or final result which will best benefit the Client?
Involve all parties to improve all functions (Kaizen)
Equipment Data = Facilities Data
Equipment Data = As-Built Model Data

**Description** Metadata:

- Name
- Description
- ID Tag
- Location (Space Name; Room Number)
- Floor Number (Level)
- Mounting Height (Placement)
- Size (Dimension / Thickness)
- Material
- Quantity
- Omniclass 2010 Table 21 (Uniformat)
- Omniclass 2010 Table 23 Category
- System and Zone Information
- Clearance Requirements
Equipment Data = As-Built Model Data

**Performance Metadata:**

Example for VAV:
- Current
- Voltage
- Frequency
- Inlet size
- Air flow
- Pressure drop
- NC level
Equipment Data = As-Built Model Data

M&O Metadata:

- Asset Type (Fixed / Moveable)
- Manufacturer
- Model Number
- Warranty Guarantor Parts
- Warranty Duration Parts (in months)
- Warranty Guarantor Labor
- Warranty Duration Labor (in months)
- Replacement Cost
- Expected Life (in months)
- Serial Number
- Installation Date
- Warranty Start Date
- Tag Number
- Barcode / RFID Tag
- Asset Identifier
# As-Built Model Data

<table>
<thead>
<tr>
<th>Model Element</th>
<th>Elements to be Modeled in the BIM</th>
<th>Metadata in Native Authored BIM Elements</th>
<th>Design / Performance Metadata in BIM Elements</th>
<th>M&amp;G Attributes in the Asset Data Spreadsheet TYPE Tab</th>
<th>M&amp;G Attributes in the Asset Data Spreadsheet COMPONENT Tab</th>
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<tbody>
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<td>Architectural BIM</td>
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<td>Floor Slabs / Decks</td>
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* Please read full instructions at the bottom of this form.
# As-Built Model Data

<table>
<thead>
<tr>
<th>Information Needed</th>
<th>Responsible Discipline</th>
<th>Input Phase</th>
<th>Object Parameter Use</th>
<th>Object Parameter Name</th>
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<tbody>
<tr>
<td>Description (define for COBie Type description)</td>
<td>Architect / Engineer</td>
<td>100% DD</td>
<td>M&amp;O</td>
<td>COBie.Type.Description</td>
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<tr>
<td>Asset Type (Fixed / Moveable)</td>
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<td>M&amp;O</td>
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<td>Warranty Guarantor Parts</td>
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<td>Manufacturer's Warranty Duration (if different from Contractor warn)</td>
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<td>Replacement Cost</td>
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</table>
As-Built Model Data
As-Built Model Data

C - Construction
O - Operations
B - Building
i - information
e - exchange

https://www.youtube.com/watch?v=vf010XZ_7-Y (Search “Demystifying COBie Standards”)
As-Built Model Data

<table>
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<tr>
<th>As-Built Model Data</th>
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Questions?

Spring BIMForum
San Diego, CA
Hilton San Diego Bayfront
April 29-30, 2015

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