More Than Meets the Eye: BIM, Data & the Transformation of Deliverables

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Denver International Airport: by the numbers...

- 54 million passengers in 2013
- 5\textsuperscript{th} busiest airport in the US
- 24/7/365 Operations
- 53 square miles of campus
- 20 million square feet of facilities
- 30,000 (approx.) people employed
- Economic impact to Colorado: $26.3 billion annually
DEN BIM Program History

• Launched in 2010
• Goal is to better integrate design and construction with the asset management and maintenance programs
• First project: $700m Hotel & Transit Center
BIM & Asset Management

• VDC v. BIM
  • Asset Management?
  • Yes: BIM
  • No: VDC
• BIM is a disruptive process
• What's your disaster?
What's Your Disaster?
What's Your Disaster?

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Traditional Deliverables at DEN

- Stamped & Signed design documents (drawings & specs) – CAD & Paper
- The built facility/systems
- Record / As-Built Drawings
- Facility Maintenance Manual
What hasn’t changed... Much.

• Stamped drawings & specifications
  • Right of Reliance
  • If Model and Drawings conflict, the Drawing wins…
  • Although the owner might not be too thrilled about that discrepancy!
• The built facility/systems
Owner Deliverables to Project Teams

- More information available with the RFP
  - Laser scans available to bidders
  - BIM Models
  - Preliminary design models with more information
What has changed...

- Contracts
  - Project Execution Plans
  - Electronic Info Requirements (EIR)
  - Level of Development (LoD) Matrix
- Design
  - BIM Models
  - Spatial Coordination Models
  - Electronic Drawing Formats
  - Facility & Asset Information
- Construction Deliverables
  - Clash Detection Models
  - 3D Verification Scans
  - R300 Coordinated Model
  - Integrated Asset Commissioning Data
- Final Deliverables
  - Facility Model
  - Record Design Model
  - Integrated Asset Data
Digital Construction Documents

- 6,800 Sheets
- $6k+
- 1000lbs+ 1 Tablet -
- City didn't want <$1k -
   it!
- 1lb - Portable -
- Multiple projects -
- Photos, models, etc. -
New Deliverables

• Reconciled Level 300 Model (R300)
  • Design Model coordinated with Construction model
• Emphasis on:
  • Designated Asset types
  • Design Impacts
R300 Challenges

- Unknown process for many consultants
- Can alienate some consultants
New Deliverables

• Facility Model
  • Design Model > R300 + Commissioning Data
  • Model is duplicated/split
  • One model becomes the Record model
  • One model becomes Facility model
  • Design documentation removed (Sheets, details, text, linework, etc.)
  • Remaining: geometry and asset data
Facility Model Challenges

• Commissioning typically covers LEED only
• Owners don't always know what information they need
• Owners don't always know HOW to use the information they get
• Using a design model for Facility Management freaks out designers
All to inform Asset Management

Facility Model

GIS Data

CAD Info

Asset Mgmt

Operations

Other Depts.
Centralized Data Hub... Single Source of Truth

- Facility Model
- GIS Data
- CAD Info
- Asset Mgmt
- Operations
- Other Depts.
More Changes?

• Greater integration of 3D scanning tools
• Integration with more facility departments:
  • Properties/Concessions
  • Parking
  • Finance
  • Etc.
• Broader scope of data collection
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