Is MUDDI Trying to do too much?

Robert Mankowski, Bentley Systems
Bentley’s mission is to provide innovative software and services for the enterprises and professionals who design, build, and operate the world’s infrastructure – sustaining the global economy and environment for improved quality of life.
MUDDI Use Cases

**Cross Owner Collaboration**
1. Routine street excavations (EX)
2. Planning, design and construction of large scale projects (AE)
3. Disaster planning and response (DP)
4. Smart Cities, Future Cities (SC)

**Single Owner Business Process**
3. Disaster planning and response (DP)
4. Utility Related Emergency Response (ER)
5. Private and public utility operations, maintenance, repair and replacement programs (OM)
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Challenges Facing Owner-Operators Today

- Safety
- Operating Costs
- Regulatory Compliance
- Managing Information Across Multiple Systems
- Optimizing Asset Performance
Life Cycle Management Activities

Asset Inventory
Know your assets and their location

Condition Assessment
Perform and manage inspections

Maintenance
Assign/Track maintenance needs

Planning & Prioritization
Use data-driven decisions on capital plans

Management
Apply full reports/trends for performance metrics
Data Challenge Facing Owner-Operators Today

Managing Information/Data Across Multiple Systems, Databases, Departments, Formats, People, etc.

- Lifecycle of Change: Plan, Design, Build, Operate
- Safety
- Regulatory Compliance
- Optimizing Asset Performance
- Operating Costs
AssetWise Water and Wastewater Asset Performance

- Capabilities:
  - An water and wastewater asset inventory
  - Development of a systematic and systemic condition assessment and rating system for all asset types
  - Providing the historic record of asset information, the physical infrastructure, and events
  - Assess the remaining useful life by establishing condition and performance decay curves
  - Determining asset value and replacement costs
### Selected features

#### Wastewater Inspections (2)

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<tr>
<th>Code</th>
<th>Description</th>
<th>Duration</th>
<th>Name</th>
<th>Planned End Date</th>
<th>Planned Start Date</th>
<th>direction</th>
<th>downstream mh</th>
<th>ignore_for_asset_score</th>
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#### Wastewater Pipes (1)

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<th>Name</th>
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<td>D</td>
<td>01A-3384.0</td>
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### Attributes

#### PACP Survey Details

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<th>Survey Date</th>
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<table>
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<td>Rat Investigation</td>
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<table>
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<tr>
<th>Reverse Setup</th>
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<th>Pre-Cleaning</th>
<th>Weather</th>
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### PACP Asset Data

### PACP Condition Details

### PACP Location Details

### PACP Supplementary Details
### PACP Inspection: 00000000000000000000136

**For: Wastewater Pipes, O1A-3385-0.01A-3384-0.01**

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PACP Observation: 00000000000000000000000000000000000001999 (Rev. 1)

For: Wastewater Pipew, 01A-3955-0.01A-3291-d.01. PACP Inspection, 0000000000000000000000000000000000000165

Actions

- Name: 01A-3955.001A-3991.0.6.10772013.325613004.jpg
  - Size: 266.69 kB
  - Uploaded On: 9/11/2017
iModel 2.0 Platform
Engineering Firm/Owner-operator CIO’s Problem

• Dark Engineering Data
  – Locked in files
  – Siloed in proprietary databases
  – Of limited value

• Difficulty Tracking Change
  – What changed?
  – Who changed it?
  – Why was it changed?
  – What does this change affect?
Typical Project Ecosystem

- Owner(s)
- EPCM
- Engineer (Feed)
- Module Fabricator 1
- Module Fabricator 2
- Spool Fabricator
- Fabricator sub.
- Steel Fabricator
- Engineering sub.
- Civil Contractor
- MEI Contractor
- Equipment Vendor
- Utilities Contractor
- Sub 1
- Sub 2
- Sub 1
- Sub 2
- Equipment Vendor
- Module Fabricator sub.
- Module Fabricator sub.
- Module Fabricator sub.
- Engineering sub.
- Engineering sub.
- Engineering sub.
Typical Project Ecosystem

- **Owner(s)**
  - Project A01

- **Module Fabricator 1**
  - Project C-A01

- **Module Fabricator 2**
  - Project D-A01

- **Subcontractor B**
  - Project B-C-A01

- **Subcontractor S**
  - Project S-D-A01
Typical Project Ecosystem… CONNECTED

- Owner(s)
  - Project A01
- Module Fabricator 1
  - Project C-A01
- Module Fabricator 2
  - Project D-A01
- Subcontractor B
  - Project B-C-A01
- Subcontractor S
  - Project S-D-A01
- Enterprise(s)
  - JV
  - Project A01
  - Asset BGR Plant
  - Project A01
  - Asset (D) BGR Plant
- Contractor D
  - Project D-A01
- User
  - Jane Smith
CONNECTED Data Environment – Modeling the supply chain
CONNECTED Data Environment – a platform for “Digital Worlds”
A Federated “Digital World”

- iModel(s)
- Documents
- Asset Registry
- Issues
- O365 Team
- IoT Streams
- Etc.

Contains the “backbone” physical and functional models
Maps to a real-world context: Enterprise, Asset, Project

Federates cloud-based or on-premise content from multiple repositories or services

Context

CONNECTED

Contents the “backbone” physical and functional models
Maps to a real-world context: Enterprise, Asset, Project

Federates cloud-based or on-premise content from multiple repositories or services

CONNECTED

Enterprise(s)

Reality Data

Documents

Asset Registry

O365 Team

IoT Streams

Etc.

Federates cloud-based or on-premise content from multiple repositories or services
iModel 2.0 Platform Themes

- **Alignment** of opaque data… to make it usable by services
- **Accountability** by gaining insights into data and change
- **Accessibility** of data and change for diverse digital workflows
iModel Schemas

• A set of cohesive, comprehensive schemas for engineering data in the Connected Data Environment and iModels
  – All disciplines
  – All lifecycle phases
  – Modularized into “domains”
  – Map to industry standards
  – Evolving…

• Describe information in a way that our services can understand… for insights and automation of high-level digital workflows
iModel 2.0 Platform
The Big Picture…

• **CIO’s Problem:**
  – Engineering data locked in files and proprietary databases, limiting its value
  – Difficulty tracking change in the engineering data

• **Solution:** Align it into a form that our services understand:
  **iModel 2.0**

• **Immediate Benefits:**
  – Data Insights
  – Change Insights
  – Web access (Browser and APIs)
  – Occasionally-connected mobile access
  – Automated high-level digital workflows
The iModel 2.0 Platform
Embracing Change

The Next Generation Cloud Platform for Digital Workflows

Infrastructure projects involve many collaborating disciplines where work is very interconnected, with distributed teams and thousands of asynchronous decisions and changes for design, material choices, aesthetics, structural integrity, safety, and more. If constant and unrelenting change characterizes infrastructure projects, then it would seem self-evident that our systems...
Questions?