Capturing Equipment Data Requirements Using ISO 15926 & Assessing Conformance (EDRC) and OGI Pilot

Manoj Dharwadkar, Bentley Systems; Alan Johnston, MIMOSA; Mark Palmer, NIST
EDRC and OGI Pilot Outline

• 20 min, Overview of EDRC and its synergy with OGI Pilot & other projects

• 10 min, EDRC current status & progress (schedule)

• 30 min, Discussion & Feedback
### Fiatech Interop Vision Paper (2012) Calls to Action

#### Business Value
1. Develop a sustainable long-range plan to deliver meaningful progress - identify easiest opportunities first, and build business case for financing the cost of change
2. Create a business case analysis showing cost/time savings on specific information exchanges in current work processes

#### Culture Changes
1. Develop Best Practices to help adopters of new interoperability technologies and tools understand the impact on their people
2. Use case studies and research to explore and define key people issues to develop the most effective ‘enablers’ for the successful uptake of these new tools and technologies

#### Industry Calls to Action for Advancing Interoperability
*(enabling standardized, structured information exchanges)*

**Process Management**
1. Develop common process mappings, definitions and views to align and communicate information exchanges and workflow management
2. Establish a globally accessible automated & integrated supply chain system: incl. tracking industry IE, materials & manages access

**Information Management**
1. Develop a robust, common methodology for conformance and interoperability testing incl. well-defined test models for IE requirements
2. Initial mappings moving towards harmonizing between ISO 15926 and BIM (ISO/PAS 16739) to benefit both process facilities and buildings
Information management Develop a robust, common methodology for conformance and interoperability testing

Culture Changes Develop Best Practices to help adopters of new interoperability technologies and tools understand the impact on their people

Process management Develop common process mappings, definitions and views to align and communicate information exchanges and workflow management
EDRC Business Motivation & Objectives

Achieve plug and play interoperability and major savings for capital projects

Objectives:
- Deliver & demonstrate ISO 15926 conformance
- Establish common understanding on using ISO 15926 across all Fiatech Projects
EDRC Synergy with OGI Pilot

OGI Pilot is the primary driver for EDRC:
• OGI Phase 1 in 2012 confirmed that the lack of rigorous methods for defining and assessing conformance to ISO 15926 is a major barrier to industry adoption

• EDRC scope is a small subset of OGI with focus on Conformance

• EDRC findings and deliverables will be applied in the OGI Pilot on broader use cases and end-to-end testing
• The **OGI Ecosystem**
  – Is the open industrial interoperability ecosystem
  – Is driven by owner/operator defined, fully dressed use cases
  – Use cases leverage reusable scenarios, with implementation details
  – The scenarios provide reusable “utility services” for the ecosystem
  – Provides the interoperability test-bed for defined use cases

• The **OGI Pilot** is the OGI Ecosystem development program
  – Collaboratively managed under the Joint MIMOSA PCA O&M SIG
  – Coordinated with Fiatech projects including EDRC, JORD & IIMM
  – All OGI Pilot Artifacts are published on [MIMOSA.org](http://MIMOSA.org)

• The **ISO OGI Technical Specification**
  – Is under development by ISO TC 184/WG 6
  – IS based fully on proven output from the OGI Pilot
  – Incorporates standards by reference (e.g. ISO 15926, MIMOSA CCOM)
OGI Pilot Business Use Cases Roadmap
Part 1

Enterprise Capital Project Data Management Standards

Plan / Program / Contract  Engineer / Design  Procure  Fabricate / Construct  Complete / Commission / Startup  Operate / Maintain  Decommission / Dispose

Sustained Lifecycle Digital Asset Management

Continuous Handover of Structured Digital Assets
Establishing an Environment for Lifecycle System of Systems Interoperability

OGI Use Case 1: Capital project handovers to O&M
OGI Use Case 4: Enterprise Product Data Library Management
OGI Use Case 10: Automated provisioning of O&M systems
OGI Use Case 11: Enterprise Reference Data Library (RDL) Management

Fiatech EDRC Use Case 1: Pump Replacement Specification Handover (O/O to EPC)
Fiatech EDRC Use Case 2: Field Instruments & Control System (EPC to Supplier)
# OGI Pilot Business Use Cases Roadmap
## Part 2

<table>
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<th>Engineer / Procure / Construct</th>
<th>Operate / Maintain</th>
<th>Decommission / Dispose</th>
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### Continuous Handover of Structured Digital Assets

#### Sustained Lifecycle Digital Asset Management
* Sustaining the Interoperable O&M Environment

#### OGI Use Cases

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<th>Use Case</th>
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<td>OGI Use Case 2: Recurring Engineering Updates to O&amp;M</td>
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<td>OGI Use Case 3: Field Changes to Plant/Facility Engineering</td>
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<tr>
<td>OGI Use Case 4: Enterprise Product Data Library Management</td>
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<td>OGI Use Case 5: Asset Installation/Removal Updates</td>
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<td>OGI Use Case 6: Preventive Maintenance Triggering</td>
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<td>OGI Use Case 7: Condition-Based Maintenance Triggering</td>
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<td>OGI Use Case 8: Early Warning Notifications</td>
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<td>OGI Use Case 9: Incident Management/Accountability</td>
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<td>OGI Use Case 10: Provisioning of O&amp;M systems</td>
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**Enterprise Capital Project Data Management Standards**

**Sustained Lifecycle Digital Asset Management**

* Sustaining the Interoperable O&M Environment*

**Fiatech**
OGI Ecosystem Standards Landscape

**Context for Collaboration**

- **Reference Information Environment**
  - ISO 15926
  - Engineering & Construction
  - PCA
  - RDL/Ontology

- **Semantic Context**
  - Transform Engine
  - OpenO&M Information Service Bus

- **Execution Environment “P2B Stack”**
  - ISO 18435
  - MIMOSA
  - O&M Requirements Repository
  - Registry
  - ISO 13374

- **Controls**
  - Physical Assets

**Enterprise Business Systems**

- ISO TC 184/WG 6
OGI Pilot Phase 1+ Application Architecture

IBM ISBM Implementation Provides Connectivity Environment

- AVEVA P&ID
- Bentley OpenPlant
- Intergraph P&ID
- Proteus
  - Part 8 OWL
  - XMpLant
- UniSA 15926 Transform
- MIMOSA CCOM-ML
- IOM-OG Register
  - MIMOSA CCOM-ML
- IBM IIC

ISO 15926 Reference Data
- OPCUA
- OSIsoft PI/AF Historian
- MIMOSA CCOM Reference Data
Together Each Achieves More

- **EDRC Objective**: Deliver & demonstrate ISO 15926 conformance
- **EDRC Project Lead**: Manoj Dharwadkar, Bentley Systems Inc.
- **EDRC Technical Leads**: Mark Palmer, NIST; Alan Johnston, MIMOSA; Rob Brawn, CH2M HILL
- **EDRC Participating Members**:

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EDRC Deliverables

- Procedures for specifying and assessing conformance
- Demonstration of successful use of these procedures
- Input to complete core capabilities of ISO 15926
- Industry report
EDRC Project Interfaces

• Leveraging reference data and sample datasets developed in other projects (IIP, IIMM, HEED, and OGI)

• JORD (Joint Operational Reference Data)
  – RDS (Reference Data Services)
  – Validation and conformance

• POSC Caesar Association (PCA) MMT (Modeling, Methods and Technology) SIG
  – Agreement on core set of templates
  – Specification of implementation details

• Instrumentation & Control SIG (Special Interest Group)
  – RDL for Use Case 2

• PCA TAB (Technical Advisory Board)
Current status & progress (schedule)

• Progress to date
• Input to ISO
• Key Challenges
• Next Steps (leads for key areas)
EDRC Progress to Date

• Developed priority use cases
  – Use case 1: Pump Replacement Specification, driven by OO
  – Use case 2: Field Instruments and Control System, EPC to supplier
  – Identifying relevant applications and implementation approaches
• Developed initial template mappings for use case 1
• Identified technical issues and working with MMT to resolve
Input to ISO

• ISO TC184/SC4/WG3: produces the ISO 15926 standard
  – provides more global participation
  – more modelers than commercial implementers
  – with new involvement by U.S. and recent negative vote on draft Part, committed to complete the core capabilities, including conformance

• Eleven “Parts” for ISO 15926
  – some complete, some in development (8, 9, 10, 11 and 12)
  – requirements for conformance defined in various Parts
    • based on implementation and deployment selections

• Part 10, Conformance testing
  – just starting, New Work Item to be submitted to ISO

• EDRC: develop and test recommendations for Part 10
EDRC Key Challenges

• Common understanding of data exchange vs. data query (online access)
• Template approval process and PCA RDL Change Management
• Alignment with JORD on validation and conformance
• Active engagement of major software vendors
Next Steps

EDRC Schedule

- Leads for key areas
Project Discussion & Feedback

• Use case: questions - feedback
• EDRC proposed conformance demonstration
  • Approach and schedule
  • Engagement of software implementers (COTS, iRINGTools)
• Input to ISO and project interfaces
• Expanding the involvement of software implementers
• Next steps & path forward
  • plans for March ‘14 Conference
Use Case 1 - Pump replacement specification (O/O to EPC)

EPC
- Receive handover requirements
  - Design engineering artifacts

Engineering Design System
- Engineering Data Specification (s. 1)
- Package engineering data for submittal
  - Transmit engineering data submittal
    - As-Designed Engineering Data (s. 2)
      - Approve submittal

Interface Management System

Owner/Operator
- Develop ISO 15926 RDL-based engineering data specifications
  - Develop and send handover requirements
  - Receive engineering data submittal
    - Receive engineering data submittal

Handover Review System
- Load engineering data
  - Review engineering data
  - Generate handover review report

Compile handover assessment report
Use Case 2: Field Instruments (EPC to Supplier)

- EPC Contractor
  - Develop ISO 15926 RDL based Engineering Data Specifications
  - Develop and Send Request For Quote & Requirement Data
  - Evaluate and develop requested information
  - Provide Comments and / or Changes
  - Review Field Instruments Specification and Model Numbers and Price
- Supplier
  - Receive Field Instruments Specifications
  - Request for Additional Data
- Proposal Development System
  - Transmitter Field Instruments Requirement Data
- Interface Management System
  - Transmit Field Instruments Specification with Model Numbers and Price
  - Transmit Changed Field Instruments Specifications
  - Is Data Sufficient to proceed?
- Engineering Design System
  - Engineering Data Specification for Field Instrumentation
  - Changed Engineering Data Specification for Field Instrumentation
  - Freeze Engineering Data Specification, Model Numbers for Field Instruments

Yes

No

Develop / Revise Proposal Model Number and Price

Transmit and Obtain Sizing Calculations and Quote for from 3rd Party Vendor
Use Case 2: Control System (EPC to Supplier)

Supplier

Receive Control System Specifications

Request for Additional Data

Is Data Sufficient to proceed?

Transmit and Obtain Quote for from 3rd Party Vendor

Proposal Development System

Transmit Control System Requirement Data

Develop System Architecture, B.O.M. & Compliance / Deviations

Interface Management System

Transmit Changed Control System Specifications

Transmit Control System Specification with B.O.M. and Price

EPC Contractor

Develop ISO 15926 RDL based Engineering Data Specifications

Evaluate and develop requested information

Review Control System Architecture, B.O.M. and Price

Request for Additional Data

Provide Comments and / or Changes

Freeze Engineering Data Specification, System Architecture and B.O.M.

Engineering Design System

Engineering Data Specification for Control System

Changed Engineering Data Specification for Control System

Is Data Sufficient to proceed?

Develop and Send Request For Quote & Requirement Data

Evaluate and develop requested information

Evaluate and develop requested information

Supplier

Receive Control System Specifications