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Collaborative Leadership for Advancing Interoperability

Faith B. Junghans, PE
Fiatech Project Manager

October, 2012

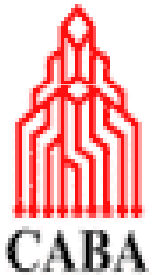
PCA Australasian Forum
Brisbane, Australia

Fiatech is a global community of passionate stakeholders working together to lead development and adoption of innovative practices and technologies to realize the highest business value throughout the life cycle of capital assets

Our Members

Subject Matter Experts

Fiatech Partners and Key Industry Relationships



ISO 15926 Allied Industry Efforts

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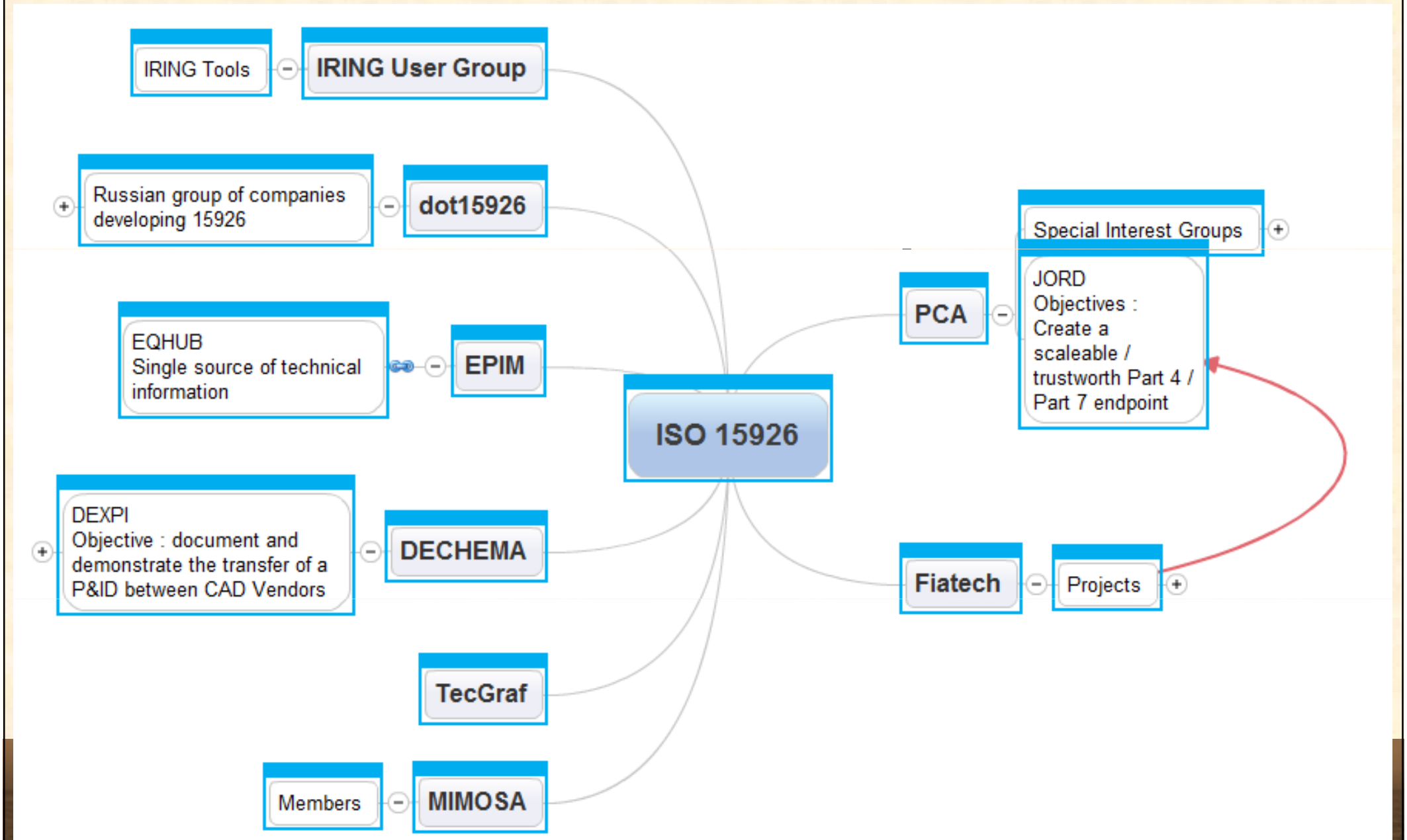

Graphic by Glen Worrall, Bentley Systems

Allied Industry Efforts – Information Management active projects

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Collaborating organisation	Project / Description
PCA	JORD – ISO 15926 Reference Data OGI - Information Handover ISO 15926 to CCOM IIP
Mimosa	OGI - Information Handover ISO 15926 to CCOM
buildingSMART (formerly called IAI) American Institute Steel Construction (AISC)	Harmonization of ISO 15926 and ISO 16739-IFCs: initial scope is structural steel
iRINGTools User Group	Industry group developing open source tools to facilitate the deployment of ISO 15926 IIP

Fiatech has set Procurement & Materials Management as a ***strategic priority***

Procurement & Supply Networks

Challenges & Opportunities

- Study by Marsh (1985) showed that the construction industry only invests 0.15% of its costs in materials management and control, versus 1% for the manufacturing industry *(Formoso and Revelo 1999)*
- Construction Industry Institute (CII) studies have shown that materials and installed equipment can comprise 50-60% of a project's total cost and control 80% of its schedule *(Ibn-Homaid 2002)*

CII Identified Improvement Areas	Avg. % Improvement
Reduced bulk supplies	40
Improved supplier performance	24
Cash flow savings	23
Reduced site storage & Handling	21
Improved craft labor productivity	16
Improved project schedule	16
Reduce management personnel	15
Reduced risk	5

CII sources: IR7-3, EM7-21, EM7-21A, RS7-2, RS7-1, SD-92, IR 166_3_v2

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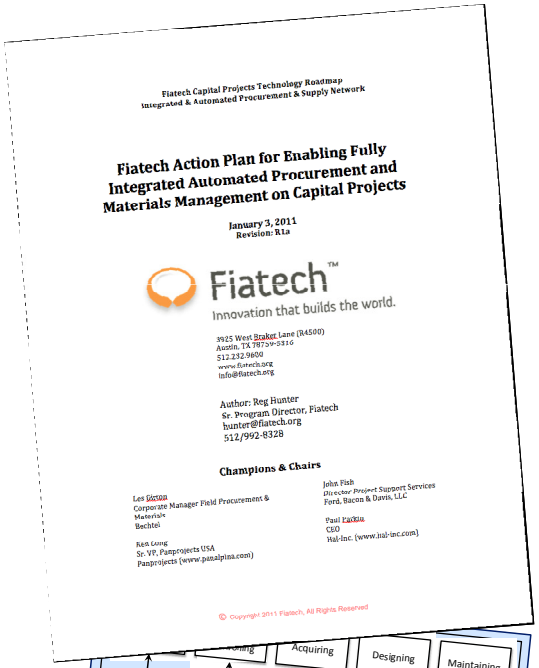
Procurement & Materials Management Action Plan

Procurement & Supply Networks


Fiatech Capital Projects Technology Roadmap
Integrated & Automated Procurement & Supply Network

Fiatech Action Plan for Enabling Fully Integrated Automated Procurement and Materials Management on Capital Projects

January 3, 2011
Revision: R1a

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Innovation that builds the world.

3925 West Braker Lane (R4500)
Austin, TX 78759-5316
512.232.9600
www.fiatech.org
info@fiatech.org

Author: Reg Hunter
Sr. Program Director, Fiatech
hunter@fiatech.org
512/992-8328

Champions & Chairs

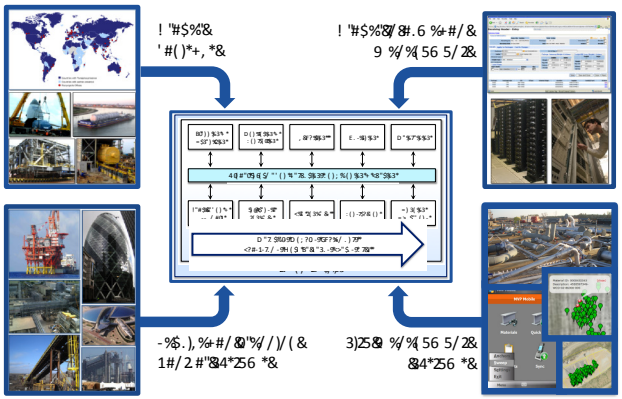
Les Sitton
Corporate Manager Field Procurement & Materials
Bechtel

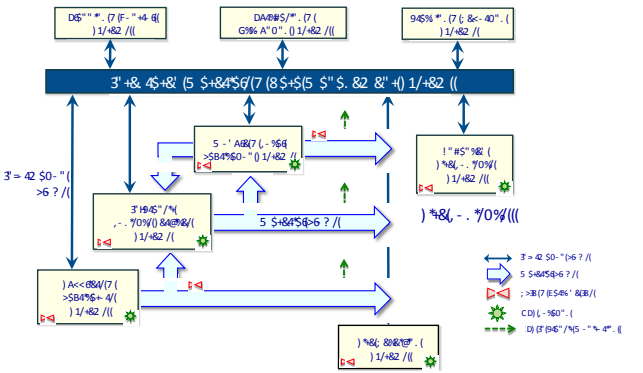
John Fish
Director Project Support Services
Ford, Bacon & Davis, LLC

Paul Parkin
CEO
Hal-Inc. (www.hal-inc.com)

Ken Long
Sr. VP, Pumprojects USA
Pumprojects (www.pumalpina.com)

Purpose: Consolidate Fiatech's vision, strategy, methodology & project descriptions to Enable Fully Integrated Automated Procurement & Materials Management





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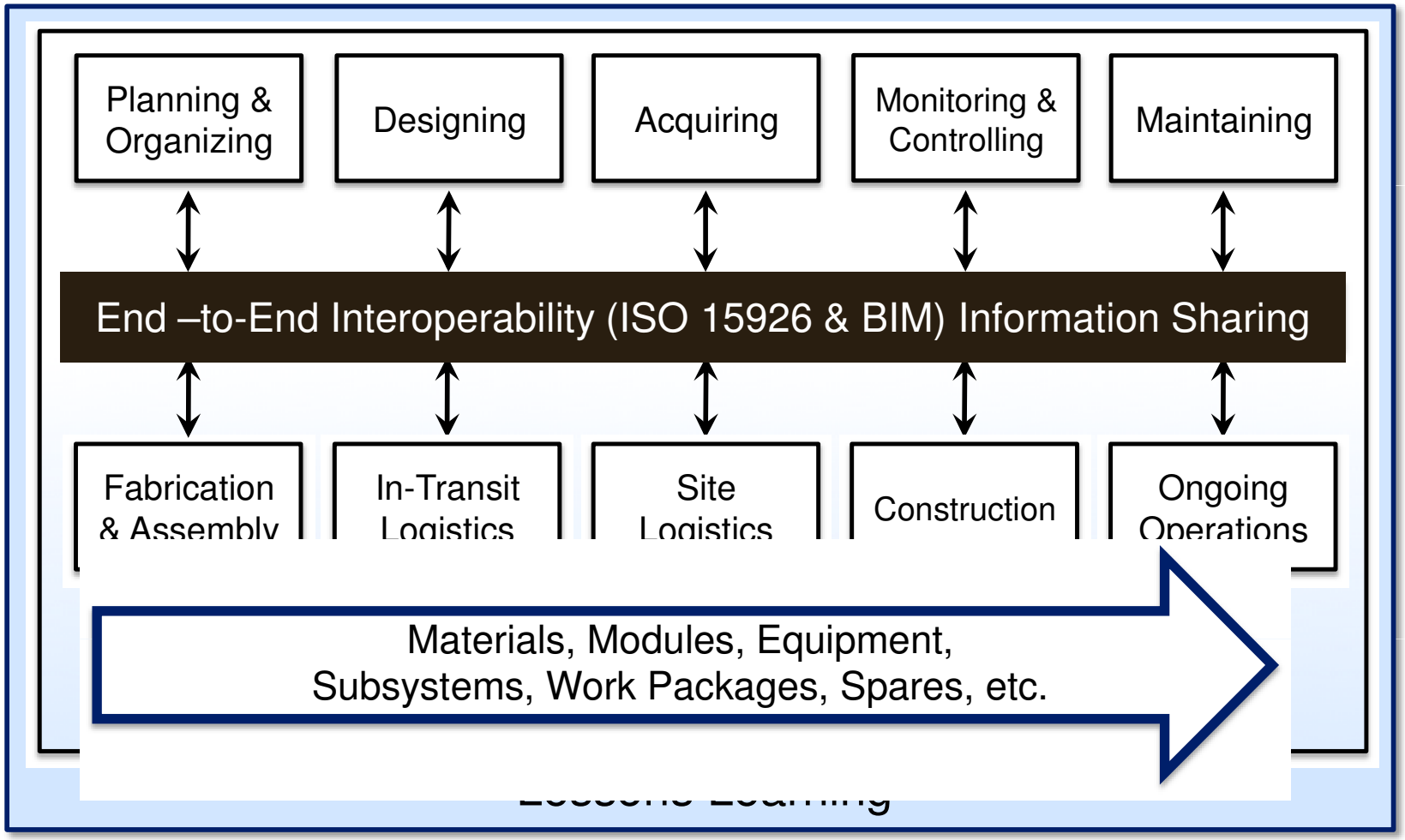
Interoperability Driven - Materials Management Enterprise

Procurement & Supply Networks



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Roadmap Integration & Project Relationships

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Design

- ISO 15926 Information Patterns (IIP)
- Supplier Information Exchange to Support Construction (completed)
- Managing Material Libraries & Catalogs
- Automated Specifications (completed)
- Collaborating with Neutral 3D Model

Procurement & Supply Networks

- Expediting Equipment & Material Selection and Acquisition (EMSA)
- Consolidating Logistics Control Attributes (CLCA)

ThomasNet Catalog, GVCC

Operations & Maintenance

- 3D EDE ALARA Planning Tool

Project Management

- Automated Code Checking
- Digital Seals & Signatures
- Guidelines for Replicable Buildings

Information Management

- HEED
- Structural Steel Interoperability
- JORD

Pumps-ISO 15926, AEX cfiXML, & HI 50.7, MOVs

Significant Interoperability (ISO 15926) Projects

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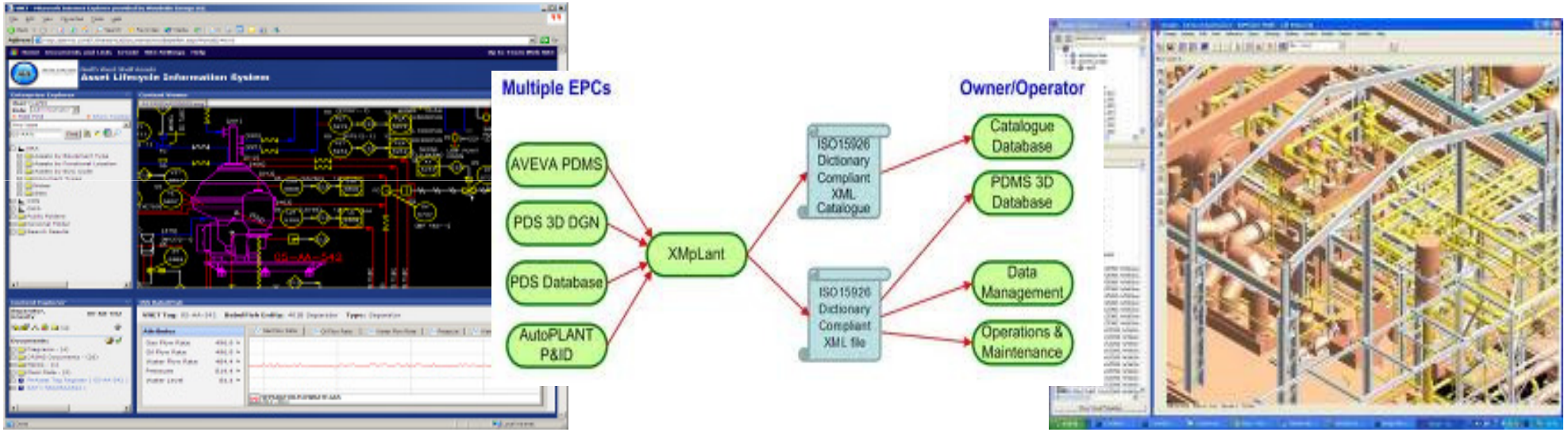
Project	Description
JORD	Joint Operational Reference Data for ISO 15926
Proteus (Deliverables)	Documented the engineering model and an XML Schema for ISO 15926 Dictionary Compliance
ISO 15926 Information Patterns (IIP) (multi-year)	Collecting requirements and developing Templates and Template Patterns to support these
Collaborating with a Neutral 3D Model (2013 Proposed)	Developing means to facilitate the use of ISO 15926 3D models for web based collaboration
Harmonization of ISO 15926 and ISO 16739-IFCs	Structural Steel Interoperability for the Building and Process Plant Industries
HEED	Harmonizing Industry Standards to Exchange Equipment Data
ISO 15926 PIF (multi-year)	ISO 15926 Project Information Flow
Capturing Equipment Data Reqrs. Using ISO15926 & Assessing Compliance (2013 Proposed)	How to capture data requirements & assess compliance using ISO 15926 Reference Data

Proteus Delivers Business Benefits from Deploying Industry Standards

- P&ID systems, 3D systems and visual navigation involved
- Test files exchanged between participating vendors for validation
- Major owner/operators deploying Proteus ISO 15926 DC XML (e.g. Alstom, BP, Dow, Dupont, Shell) – reporting significant savings in Millions of Dollars, applied on over a 100 projects



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ISO 15926 Information Patterns (IIP) Project: Overview of Phase 1

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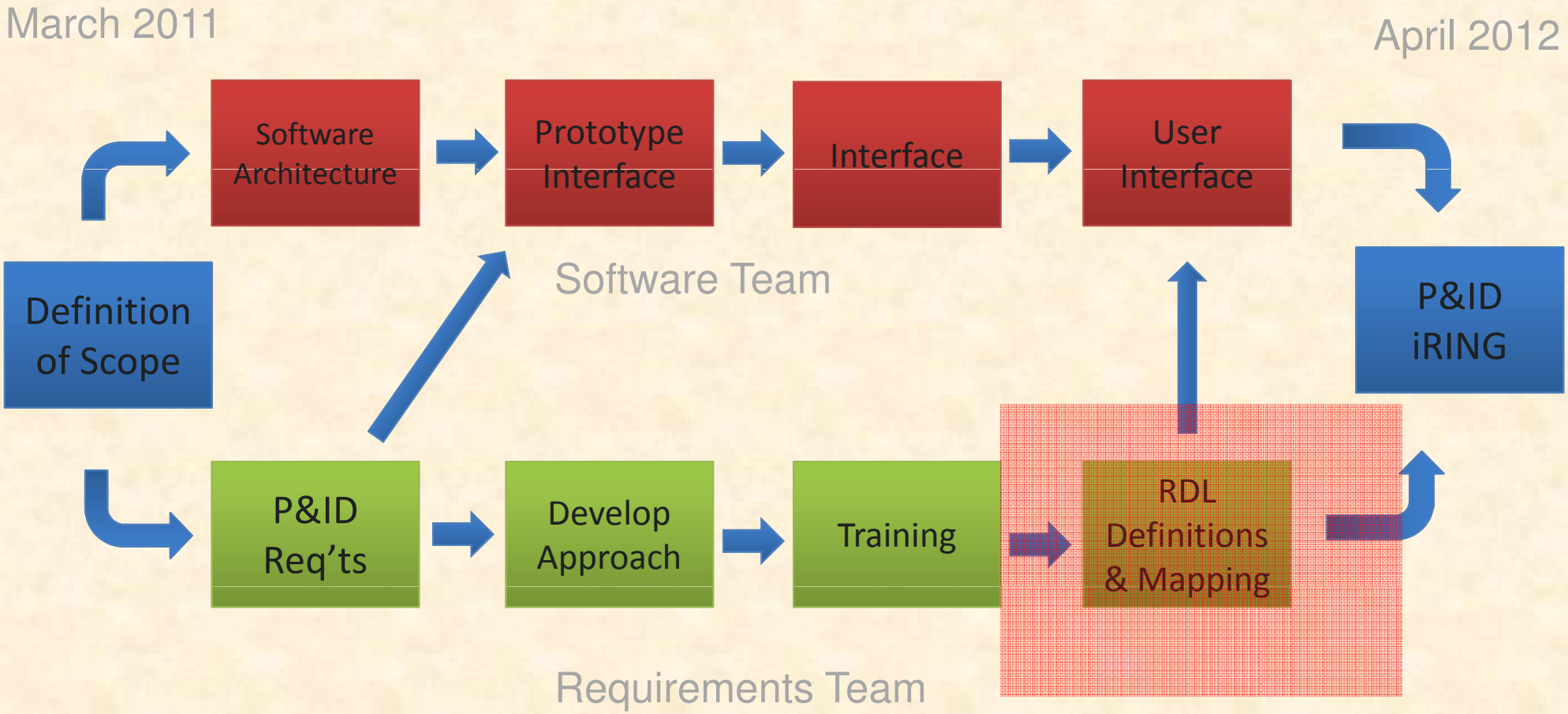

IIP Keynote Presentation, Rob Brawn, CH2M HILL and Hilbert Pretorius, Hatch 2012

ISO 15926 Information Patterns (IIP) Project: Developing consensus based Template Information Patterns (TIPs)

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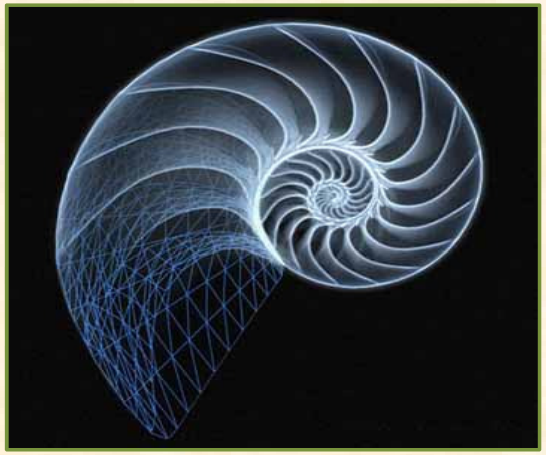
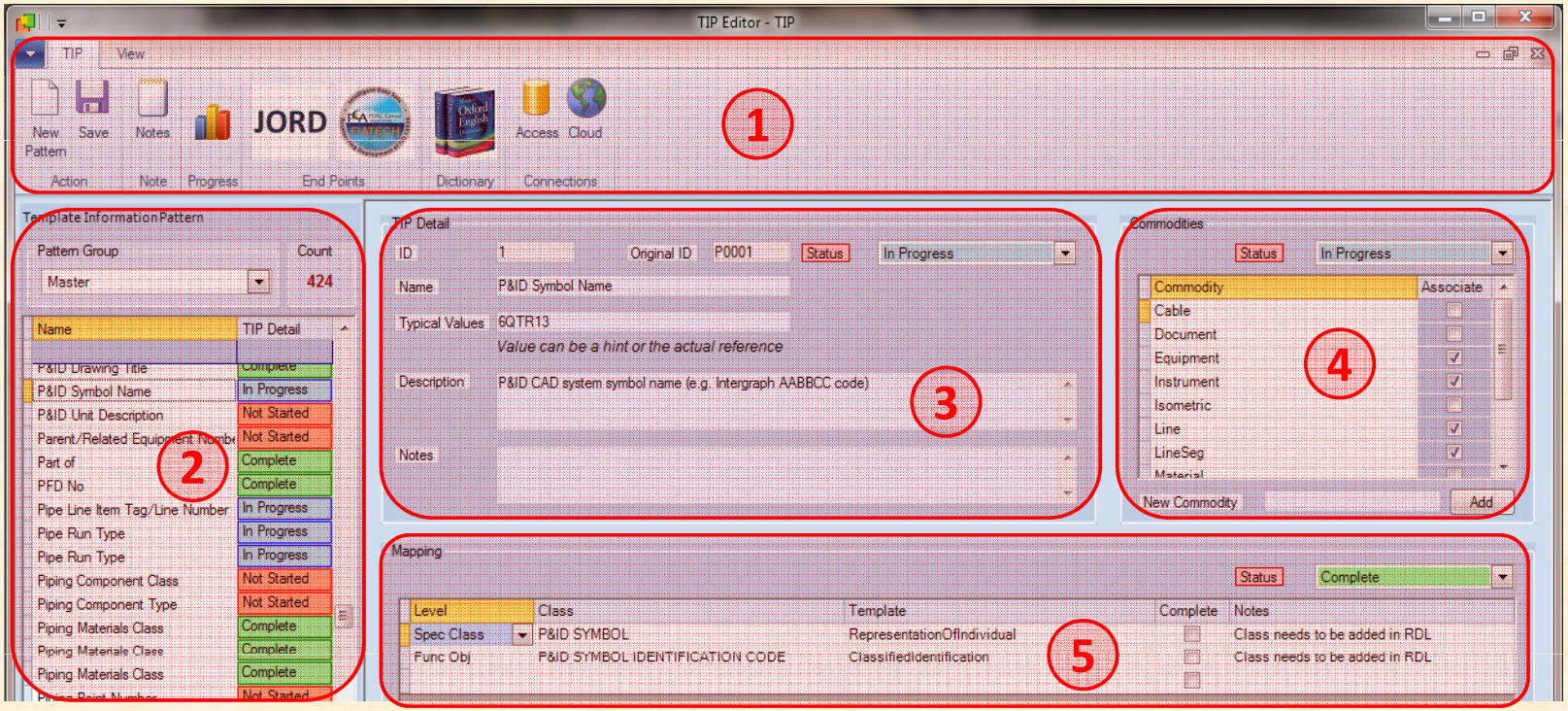
- Allow subject matter experts to define and use common terminology they require for information exchanges without becoming ISO 15926 experts
- TIP's use combinations, or patterns, of Part 4 Classes and Part 7 Templates to represent data and provide an easier entry point for SMEs and new adopters of the ISO 15926 standard



IIP Keynote Presentation, Rob Brawn, CH2M HILL and Hilbert Pretorius, Hatch 2012

Current TIP's interface



1. Toolbar
   - Progress
   - End Point Search
   - Dictionary
   - Connectivity
2. Navigation Bar
   - Pattern Group
   - No. Patterns
   - Filter
3. Detail View
   - Pattern Definition
4. Commodities
   - Object(s) in view
5. Mapping
   - Part 4 Classes
   - Part 7 Templates

Collaborating with a Neutral 3D Model: Objective

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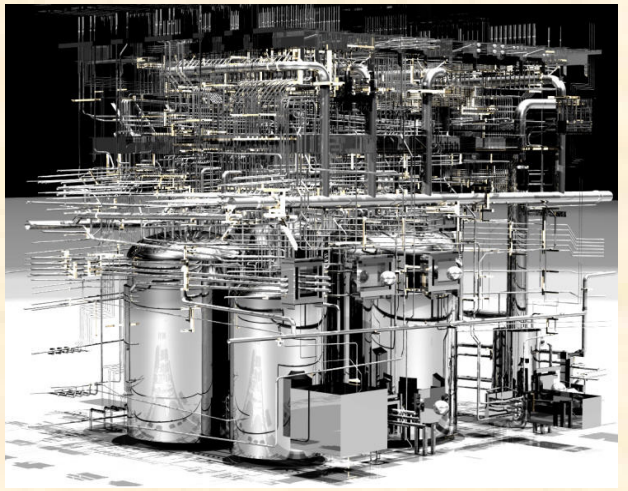
Developing the roadmap checklist and associated work-process in defining what is the minimum requirement for model exchanges (geometry as well as intelligent data) amongst the key stakeholders with different 3D modelling systems (SmartPlant, AutoPLANT, PDMS, etc,) to meet material management and construction deliverables



Glen Worrall, Bentley Systems

3D Format is secondary, Focus is on use cases and lifecycle models

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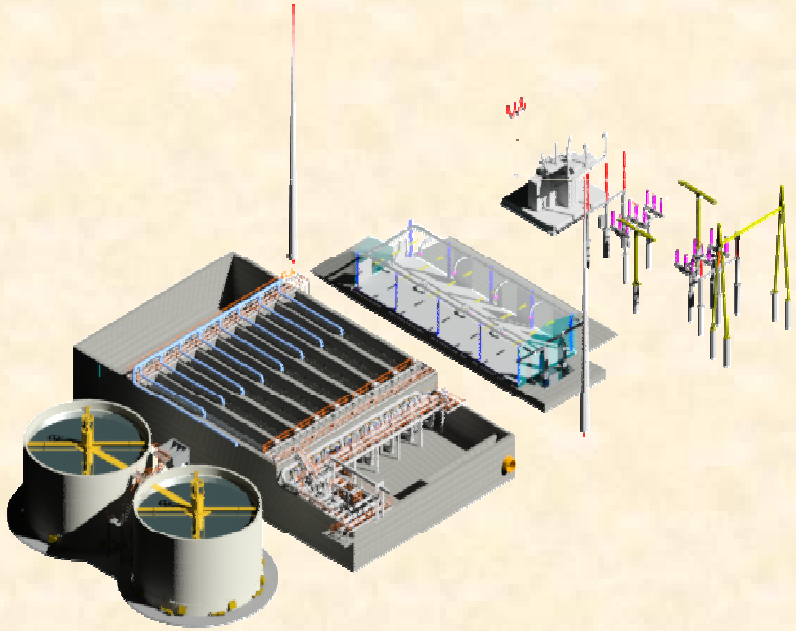
- Vendor Exchange Use Cases documented *(specifically vendor handover use case to be expanded)*
- Maintenance Use Cases documented
- *3D for Life presentation* from Dow: Non-engineering use of 3D data
- JT Open conference had many examples of 3D model collaboration



Neutral Formats: Siemens JT (ISO PAS 14306) and ISO 15926:3

Glen Worrall, Bentley Systems

Structural Steel Interoperability for the Building and Process Plant Industries (SSI)

Harmonization of ISO 15926 and ISO 16739-IFCs

- Better coordination across disciplines and supply chain
- Improved handoff to detailing/fabrication
- Enhanced inspection, sequencing and erection
- Reduced time and cost
- Streamline model creation (no need to recreate during detailing)
- Improved quality and material usage
- Stronger support by software companies to implement common standards

To integrate and streamline structural steel processes benefiting both the building and process plant industries

Rob Brawn, CH2M HILL 2012

Structural Steel Interoperability Deliverables

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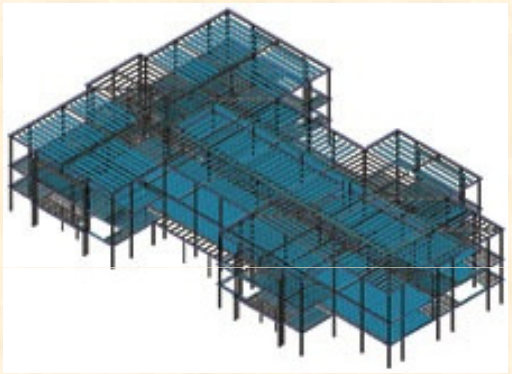
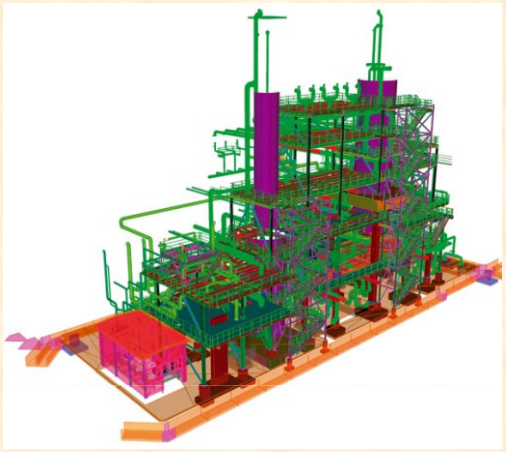
1) Review the current *Structural Steel Information Delivery Manual (IDM);* extend/develop the *Structural Steel IDM* by defining critical data exchanges in the process plant industries
2) Recommend business use cases to implement *Structural Steel IDM* (developed)
3) Define subsequent work for delivering industry guidelines for structural steel interoperability and define potential mappings to IFCs and ISO 15926
4) Vendor and user education





Rob Brawn, CH2M HILL 2012

Harmonizing Industry Standards to Exchange Equipment Data (HEED)

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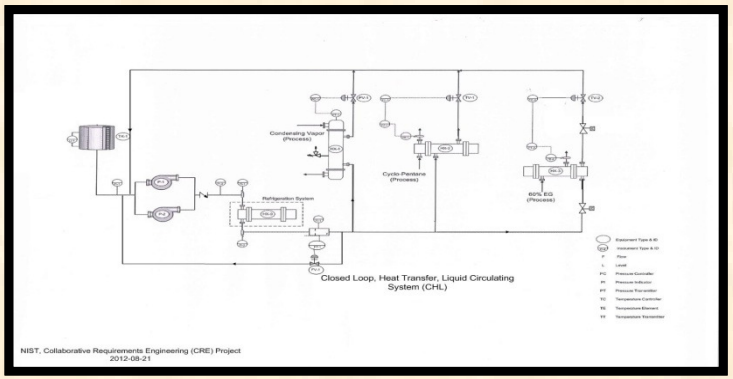
Objective: demonstrate use of Electronic Data Exchange (EDE) to integrate the processes and software applications used for performance and margin management of equipment

Scope: Closed loop, Heat transfer, Liquid circulating (CHL) systems

Focus: pumps, valves, and limited examination of heat exchangers



Use data models and data dictionaries:

- Hydraulic Institute's EDE 50.7 standard
- AEX cfiXML
- ISO 15926

Mark Palmer, NIST, 2012

HEED Project Drivers

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- **Leverage the successes of:**
  - HI 50.7 and the use of domain data dictionaries
  - cross-industry collaboration
    - process and power industries; equipment suppliers; s/w suppliers
  - recognition of handover and O&M data challenges and opportunities
  - performance simulation, predictive maintenance, failure management
- **Collaborate with other projects,** e.g., EPRI PIM, HI, IIP, JORD
- Starting with **system requirements** and **life cycle**
- **Focus on viable increments for broad deployment**

Mark Palmer, NIST, 2012

HI EDE "Endorsements"

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Heat Exchangers

Pumping Equipment

Compressors

Hydraulic Institute

HI 50.7: Electronic Data Exchange for Pumps and Pump Packages

energy API

ANSI

PIP

API 610, 11th edition / ISO 13709: Standard for Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries

ASME/ANSI B73.1-2010: Specification for Horizontal End Suction Centrifugal Pumps for Chemical Process

ASME/ANSI B73.2-2010: Specification for Vertical In-Line Centrifugal Pumps for Chemical Process

Process Industry Practices (PIP)

HEED Phase 1 Deliverables

Del. #1: Methods for using multiple data dictionaries for margin management data exchange

- *Proposed set of data fields commonly used in margin, performance and reliability management of mechanical equipment*
- *Description of software tools and the data flows among these tools commonly used in these processes*

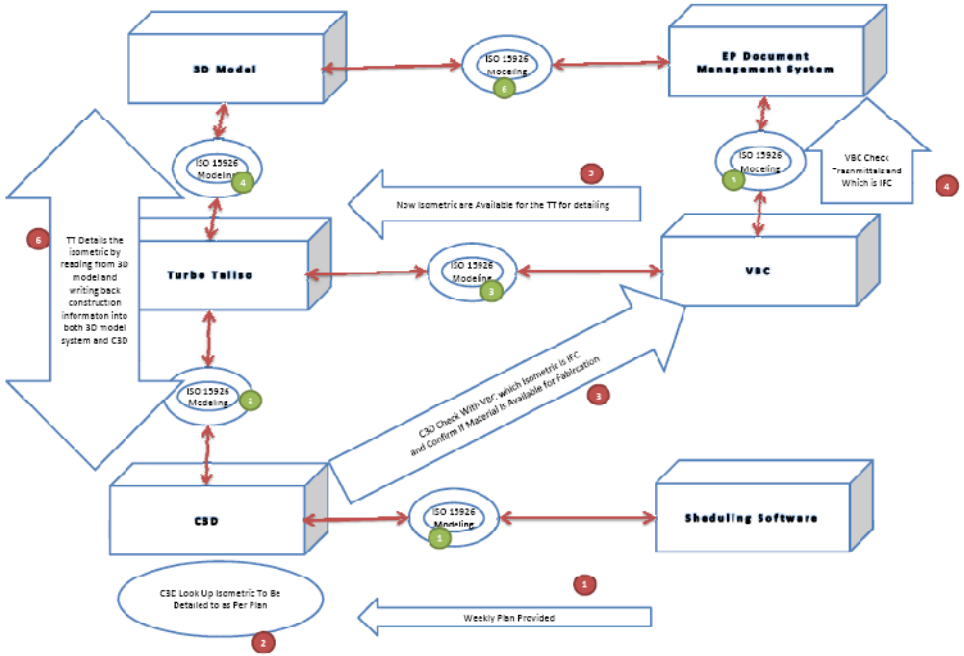
Del. #2: Methods for mapping proposed dataset to ISO 15926 RDL

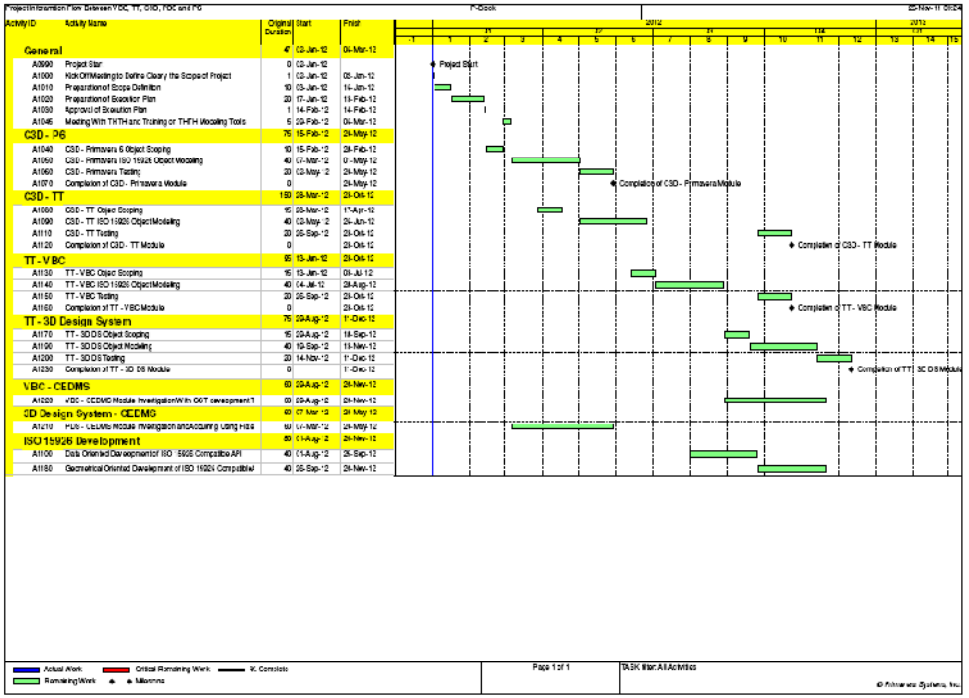
- *Database of proposed data sets, templates, and mappings*
- *Report on data fields or concepts that could not be represented (or particularly difficult to be represented) in the RDL and recommendations for improvements*

Mark Palmer, NIST, 2012

ISO 15926 Project Information Flow (PIF)

- Testing of current ISO15926 Tools and the production of used case studies
- Define typical major project information flows, select pilots, and try to solve them using ISO 15926 tools and approximate the savings achieved.





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PIF Year 1 Piping ISO 15926 Modeling for Construction – Defining Data Flow

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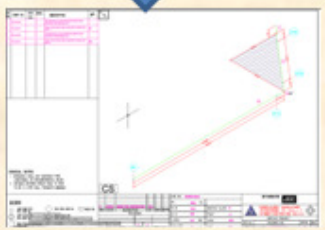
3D Model

Material Specs

Erection Isometric

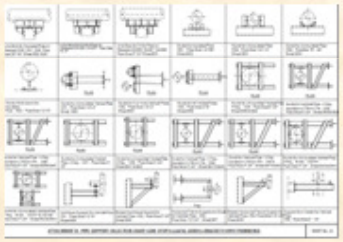
Isometric (Issued For Construction)

Transmittal



Fabrication Isometric

ERP System



Line List

Support Standard

Chehade Kassouf, CCT

PIF Year 2 Piping ISO 15926 Modeling for Construction: Scope and Deliverables

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- The scope of this project to define the requirements of piping data required in construction
  - Piping Specification
  - Geometry Standard
  - Material Standard
  - Drafting Rules and Symbol

Proposed Year 2 PIF, Chehade Kassouf, CCT

PIF Year 2 Piping ISO 15926 Modeling for Construction: Business Value and Implementation

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- Simplifying the whole process of implementing ISO 15926 in a firm
- Allow a standard data transfer between and from Fabrication to all other Phases
- Have potential to encompass the other industry piping fabrication(MEP, …)
- Allows Designer to share all their data without worrying about internal intellectual property

Proposed Year 2 PIF, Chehade Kassouf, CCT

Capturing Equipment Data Requirements Using ISO 15926 and Assessing Compliance: *Scope*

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- Collaboration with MIMOSA and PCA on their Oil and Gas Interoperability (OGI) Pilot
  - Focus on small subset scope that is common with OGI Pilot and HEED projects and consistent with IIP
  - Initial scope limited to few Equipment Classes and Parameters expanding to a small P&ID fragment
- ISO 15926 released documentation supplemented by JORD Phase 1 deliverables will be used
  - Engage and provide feedback to PCA/JORD and ISO 15926 T25 Core Team

Proposed 2013 project : Alan Johnston, MIMOSA; Mark Palmer, NIST; and Manoj Dharwadkar, Bentley Systems

Capturing Equipment Data Requirements Using ISO 15926 and Assessing Compliance: *Proposed Deliverables*

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- Examples of Validated Equipment Data Requirements
- Procedures for assessing compliance and examples of expected compliant datasets
- Compliance assessment reports for datasets created by various implementations
- Demonstration of Validation and Assessment tools used in the project

Proposed 2013 project : Alan Johnston, MIMOSA; Mark Palmer, NIST; and Manoj Dharwadkar, Bentley Systems

PCA & Fiatech Unify Industry Interoperability Activities Under the iRING Name

- iRING name represents the Solution Architecture and best practices for achieving global information interoperability based on ISO 15926
- Fiatech is supporting PCA to advance deployment of ISO 15926 with a single Joint Operational Reference Data (JORD) and supporting PCA building a stable, scalable and commercially-viable operation

JORD

POSC Caesar Association & Fiatech™

iRING TODAY
Interoperability News for the Capital Facilities Industry

"iRING embodies the efforts of a number of organizations across the industry collaborating on a vision of information interoperability that will deliver and operate the plants of tomorrow. For years, we've been a key participant in the development of iRING and the support of JORD to achieve this vision. With the ongoing shift to the cloud and the increasing importance of big data, we recognize that iRING is essential for the future of our business, and we encourage others to act in support." Peter Blake, Hatch

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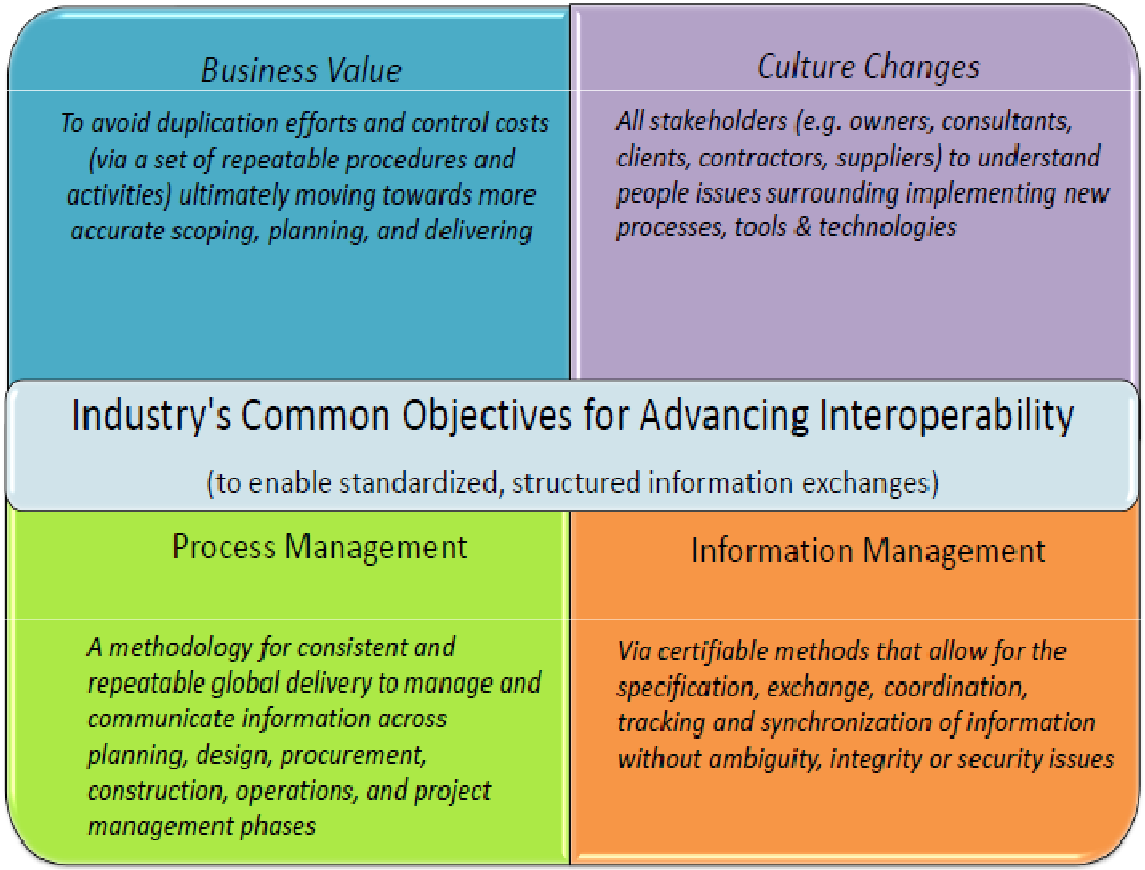
Four building blocks for advancing interoperability

via standardized, structured information exchanges

- *Business Value*
- *Culture Changes*
- *Process Management*
- *Information Management*



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Achieving Standards Based Integration

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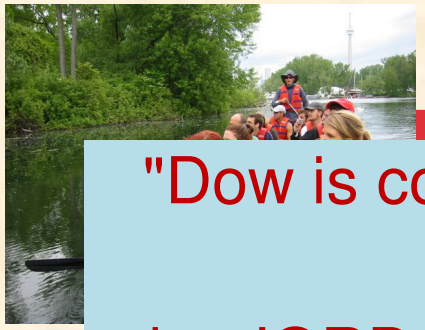
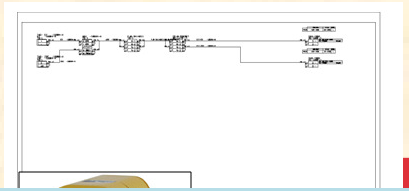
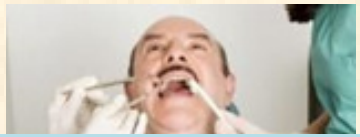




$500,000



"Dow is committed to pragmatic exploitation of ISO15926 for interoperability, and is a member of

the JORD project to create authoritative core Reference Data Services. Given the number of

Different initiatives taking place, Dow welcomes

the decision by Fiatech and PCA to bring coordination

Under the one iRING brand and iRINGToday as the business communication channel."

– **Barbara Migl, Dow Chemical, USA**

How to Achieve the Impossible – One Step at a Time,
Barbara Migl, Dow Chemical 2012

SUMMARY

Fiatech – Transforming the World's Infrastructure through Innovation and Technology

Fiatech working collaboratively with lead organizations throughout the capital projects industry driving forward a range of initiatives and projects to advance Interoperability for a step change improvement in project delivery and asset management.

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