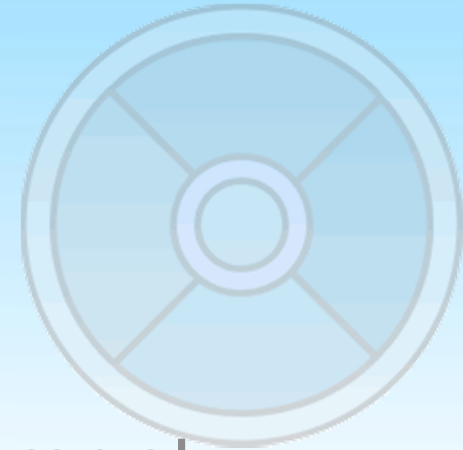


Collaborations To Achieve Open Standards-based Interoperability for Critical Infrastructure Management



Alan T. Johnston
MIMOSA President
OpenO&M Initiative Chair

- A new industry solutions business model where systems of systems interoperate based on open, supplier neutral standards
 - Shared, supplier neutral industry information models
 - Shared, supplier neutral industry utility services (SOA-2) driven by industry use cases, with the ability to be validated by 3rd parties
- Shared industry information models, all required industry and enterprise information (including all required O&M information) and shared industry utility services **delivered as part of the EPC process.**
- Cloud technology-based environment(s) for all required O&M and Life-cycle management services enabled by open standards based interoperability.
- Use Case-Driven Methodology
- Owner/Operator Leadership and Governance

lab



marketing



accounting



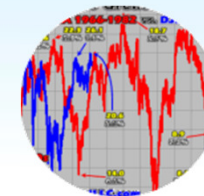
planning



reliability



good enough in the past



trading



maintenance

control



Supply & distribution



management

planners



outside operator



field workers



management

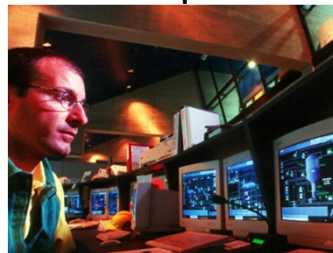


ADAPTIVE → IMPROVEMENT

maintenance

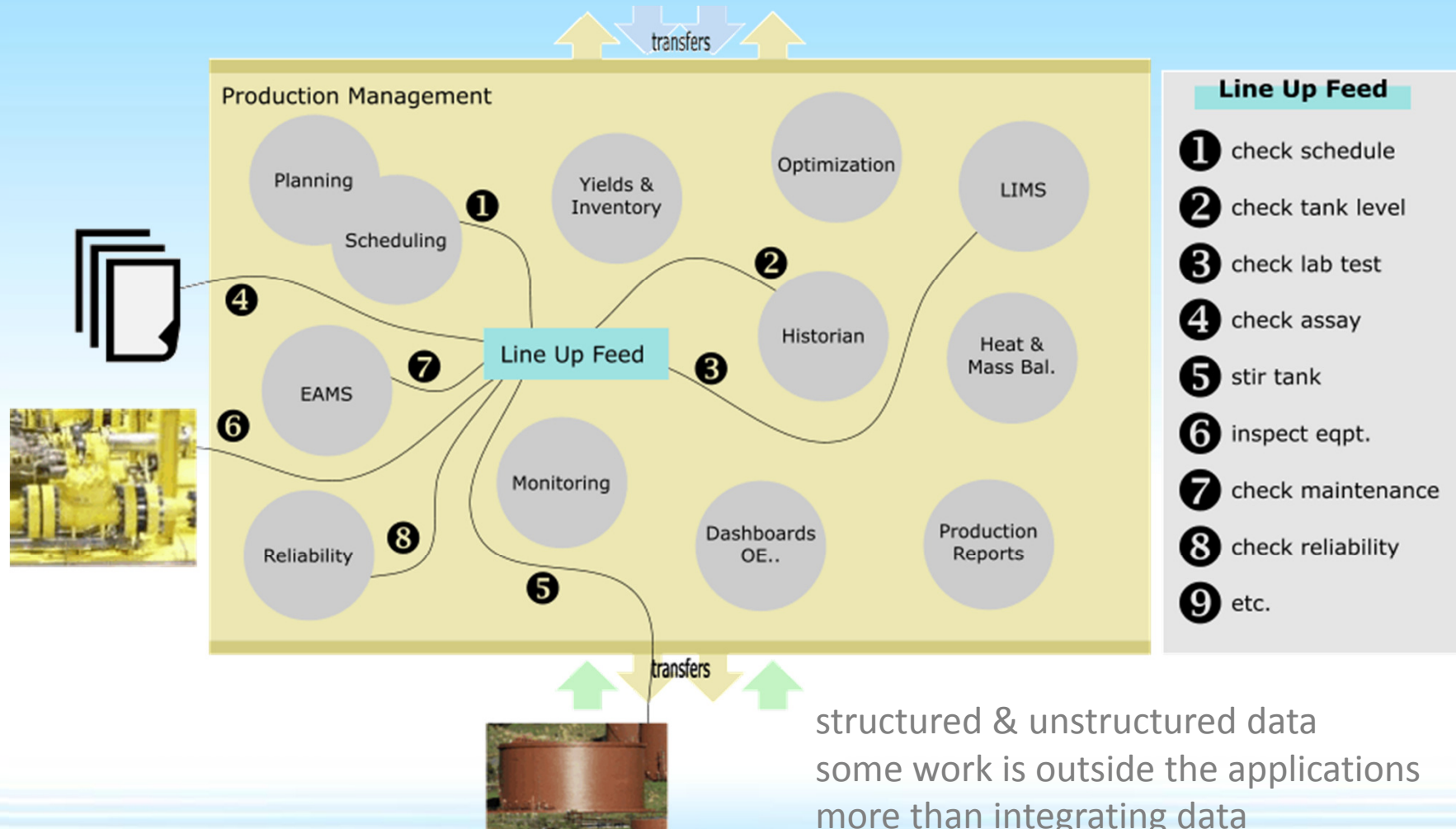


board operator

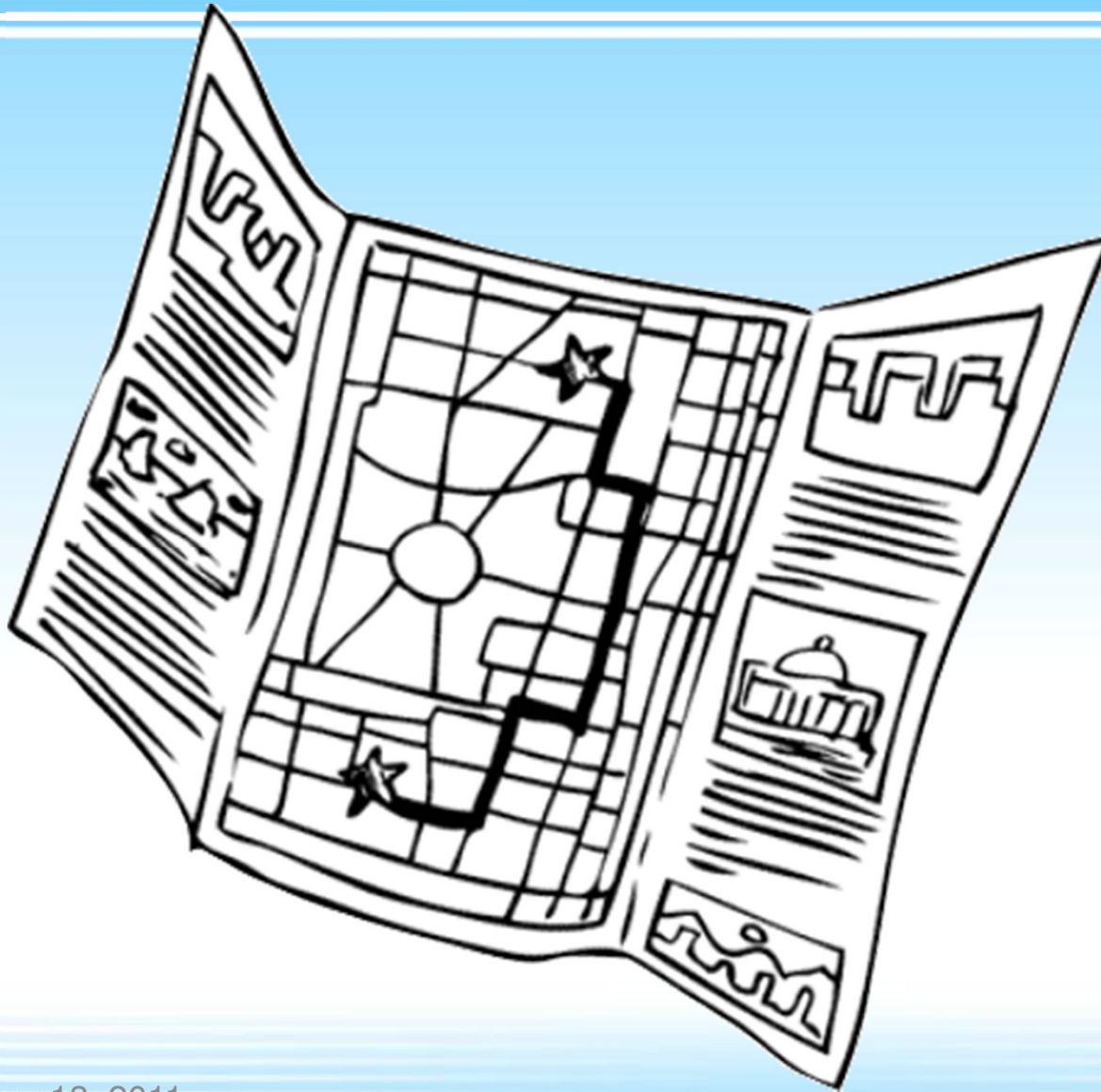


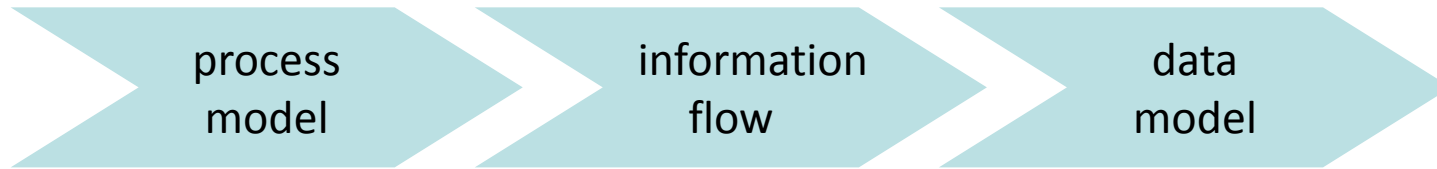
auditable

event-driven

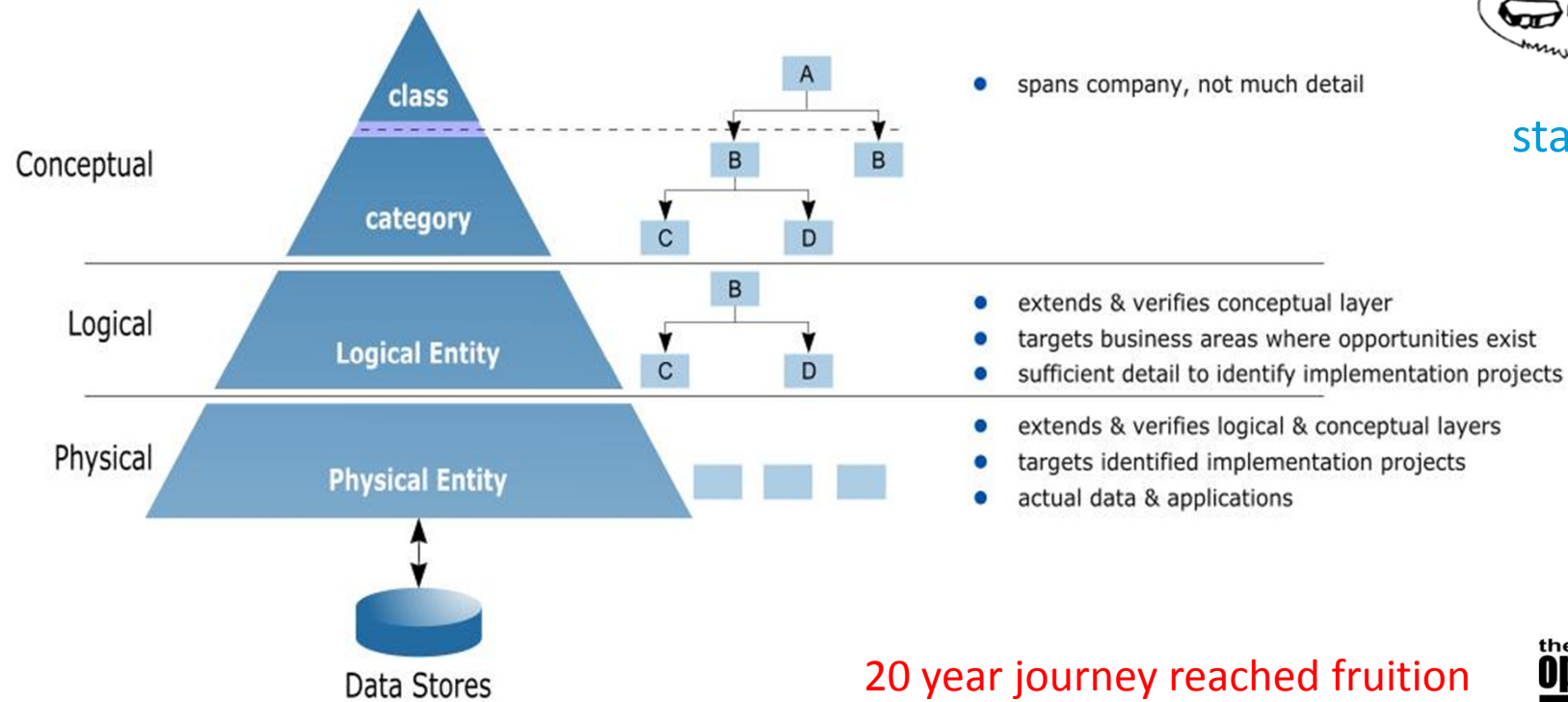


so how do you get there





standards



20 year journey reached fruition

The OpenO&M™ Initiative

Brings People Processes and Systems Together

Enterprise Business Systems

Enterprise Resource Planning (ERP), Enterprise Risk Management

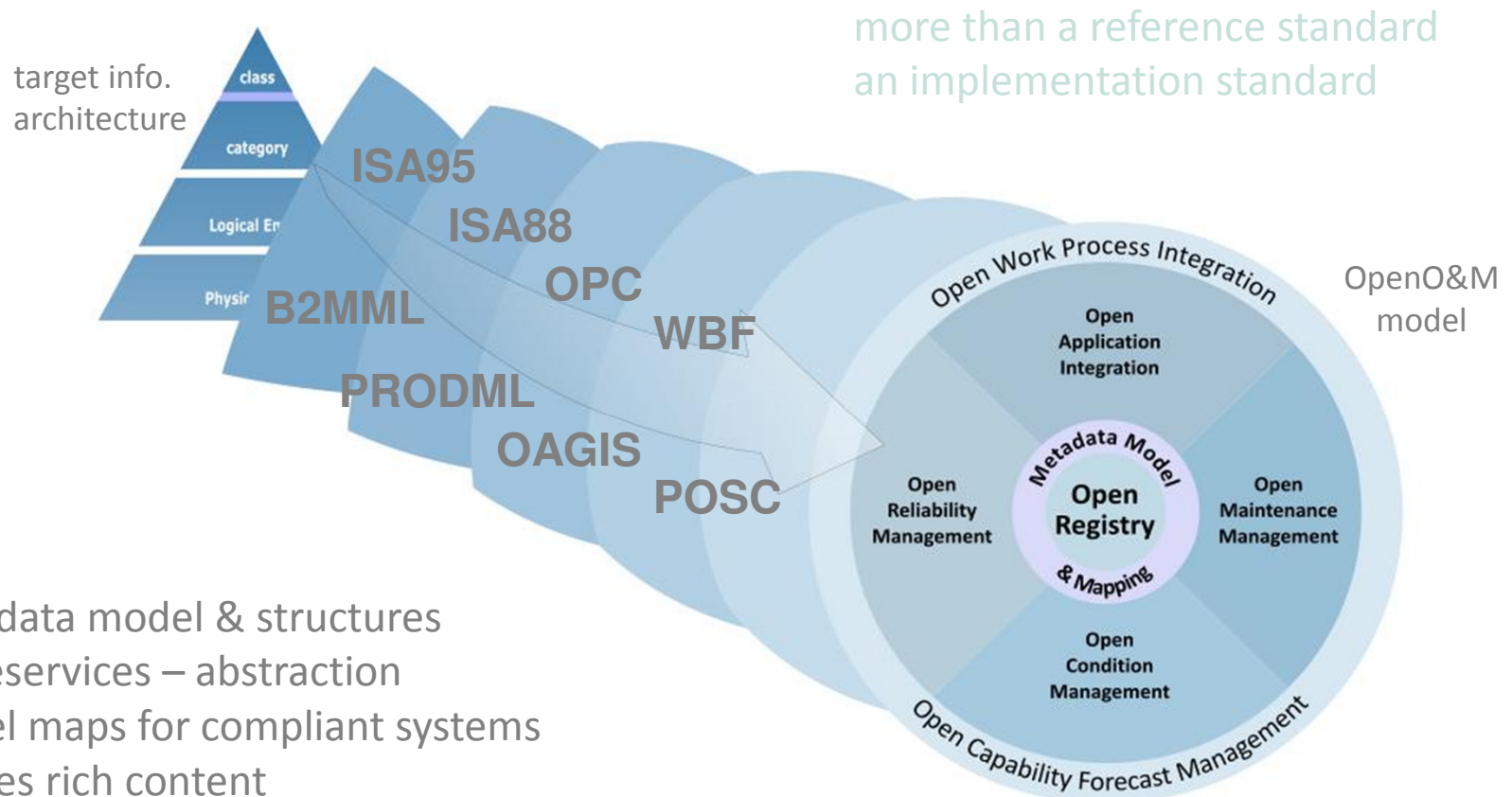
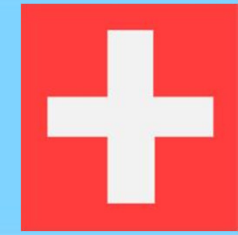
Operations

Maintenance

OpenO&M™



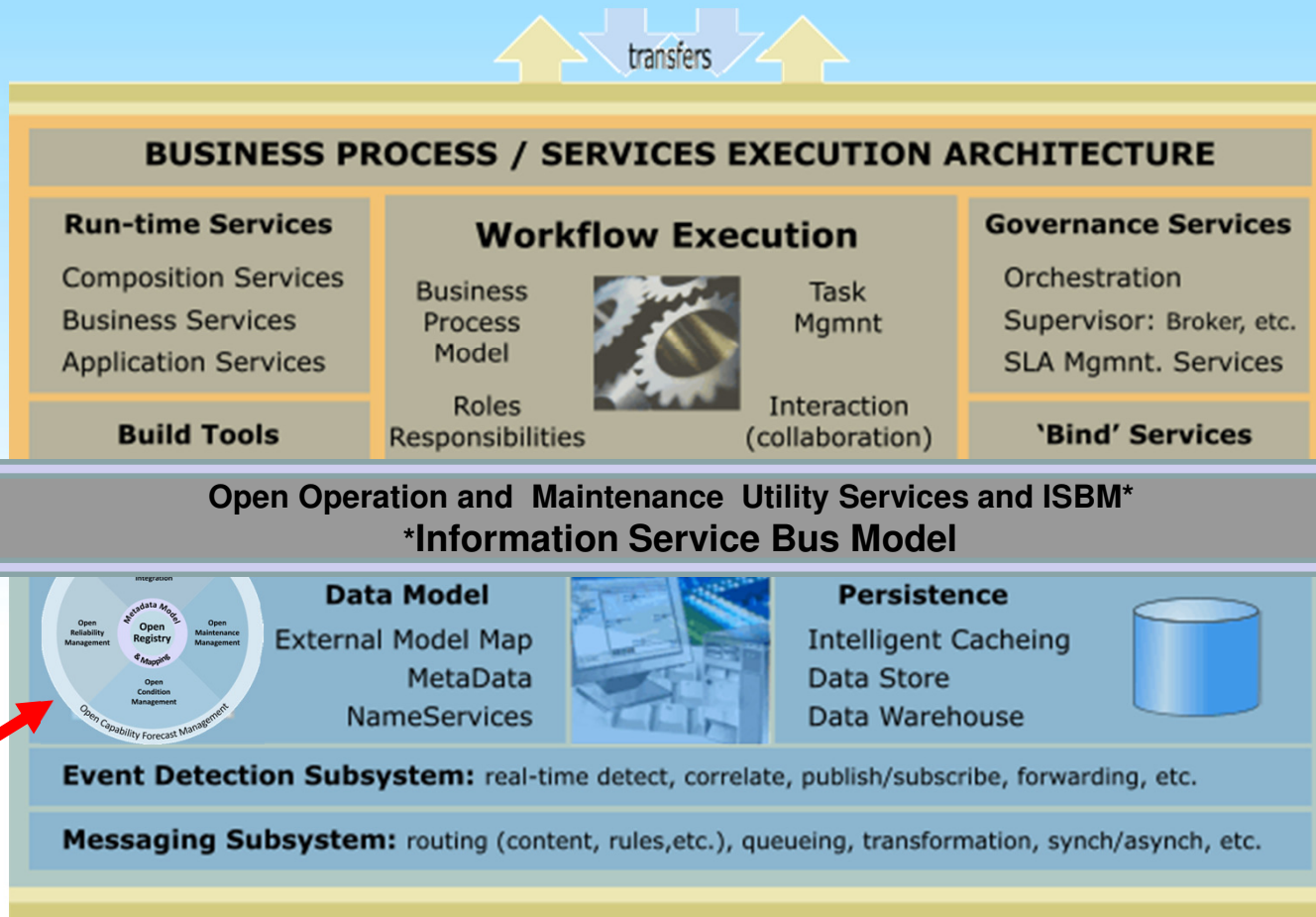
Physical Asset Control
Real-time Systems



more than a reference standard
 an implementation standard

- metadata model & structures
- nameservices – abstraction
- model maps for compliant systems
- defines rich content
- commoditize O&M data exchange
- non-proprietary interoperability

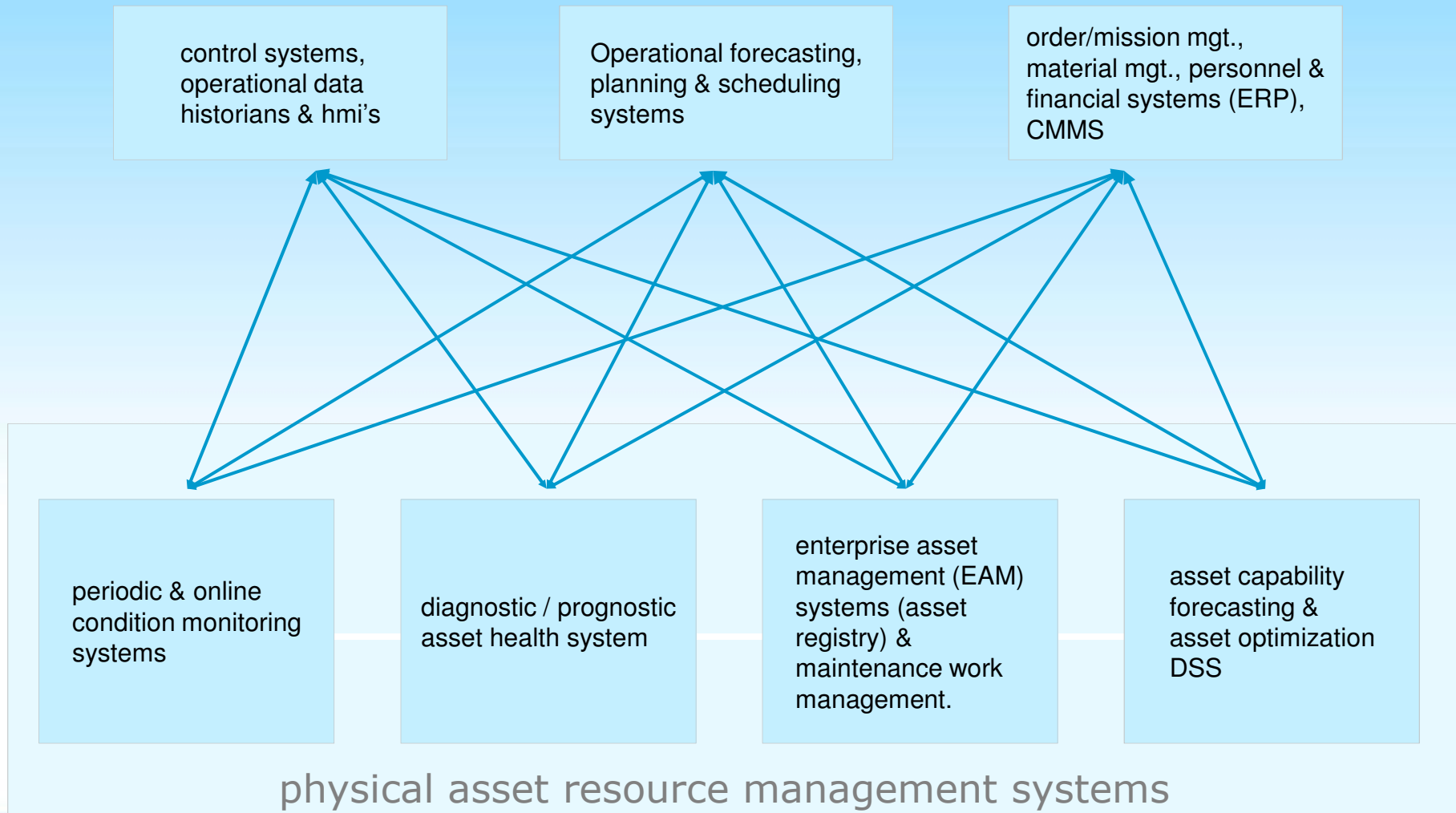
OpenO&M harmonizes the standards

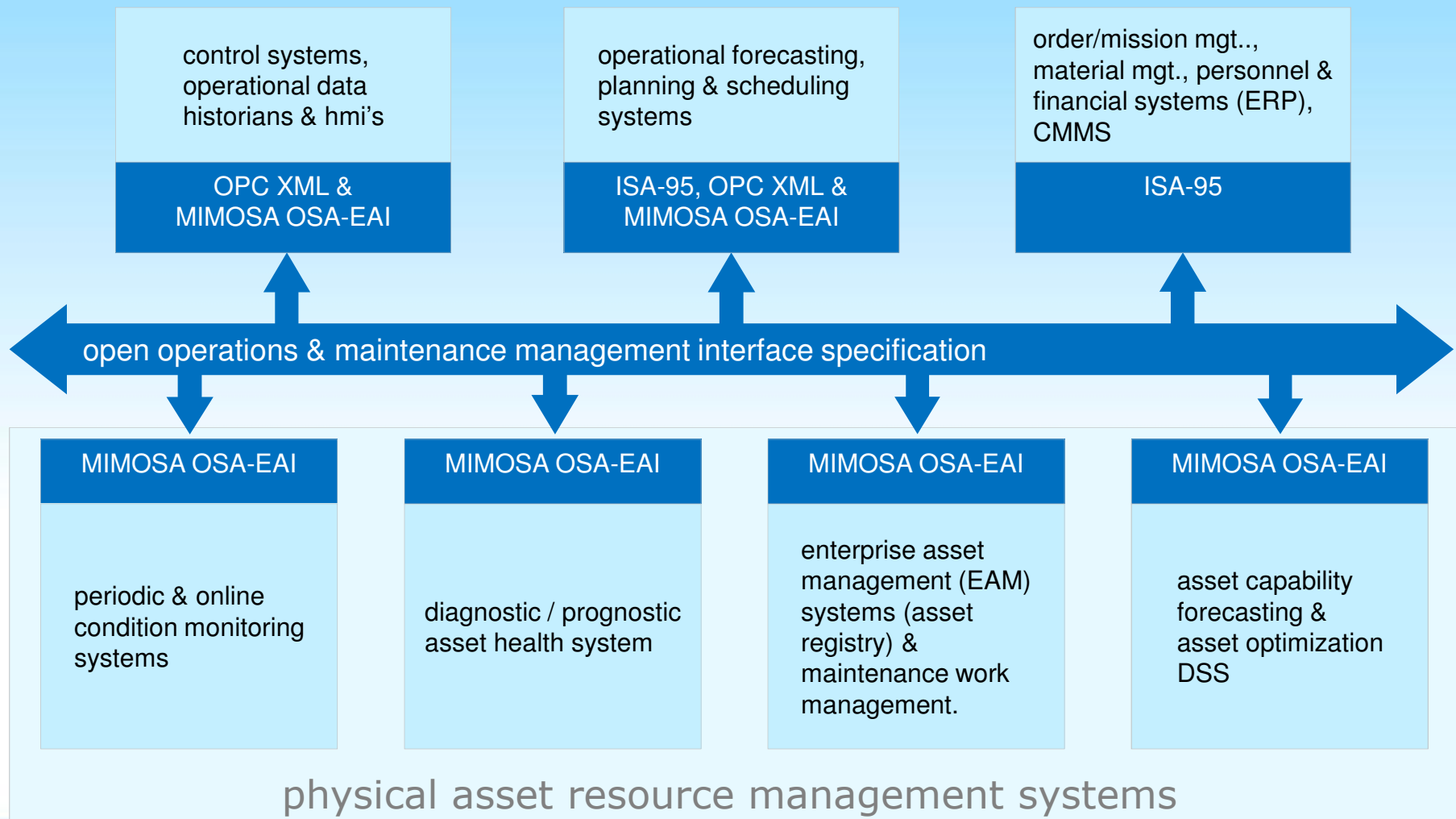


2

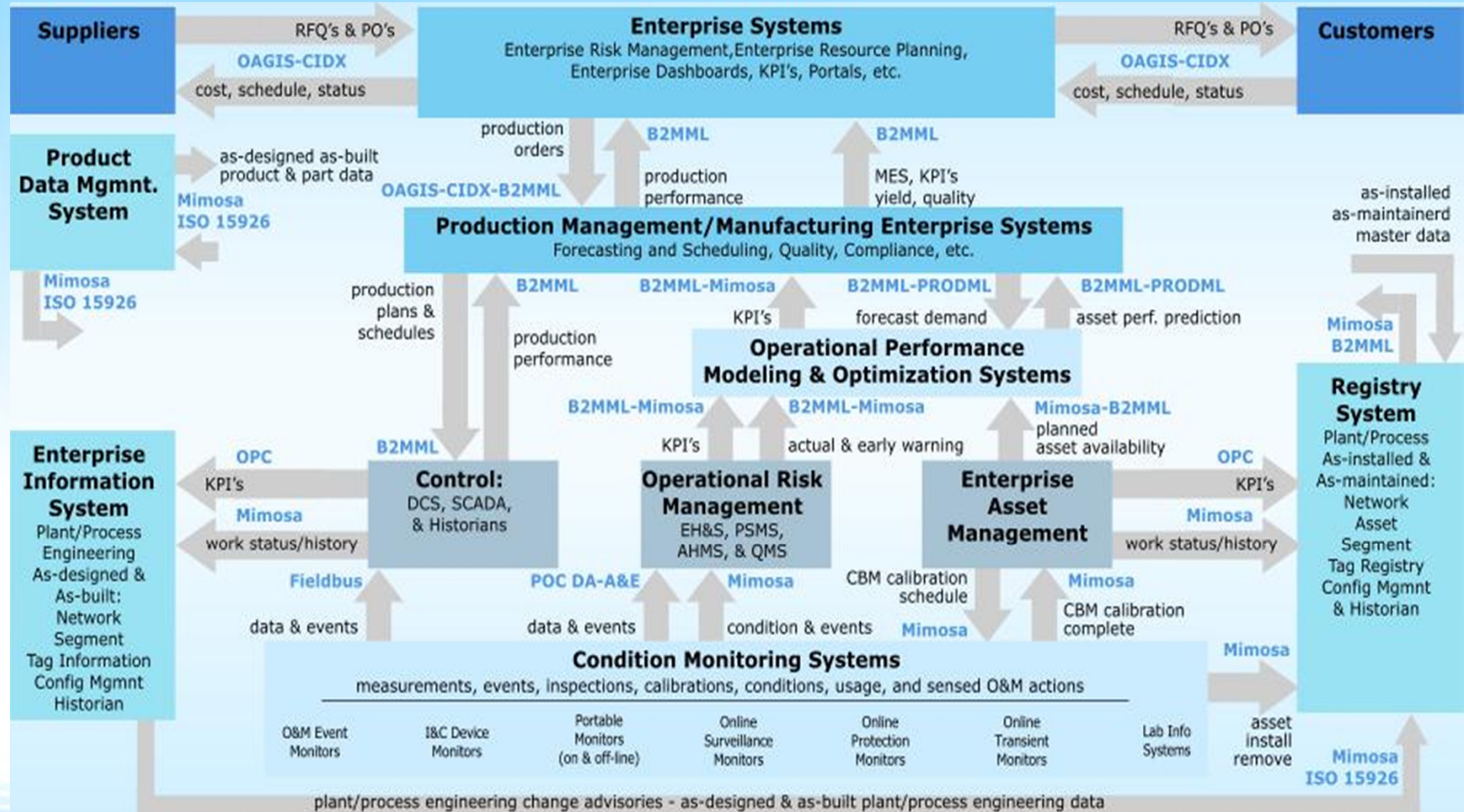
1

OpenO&M



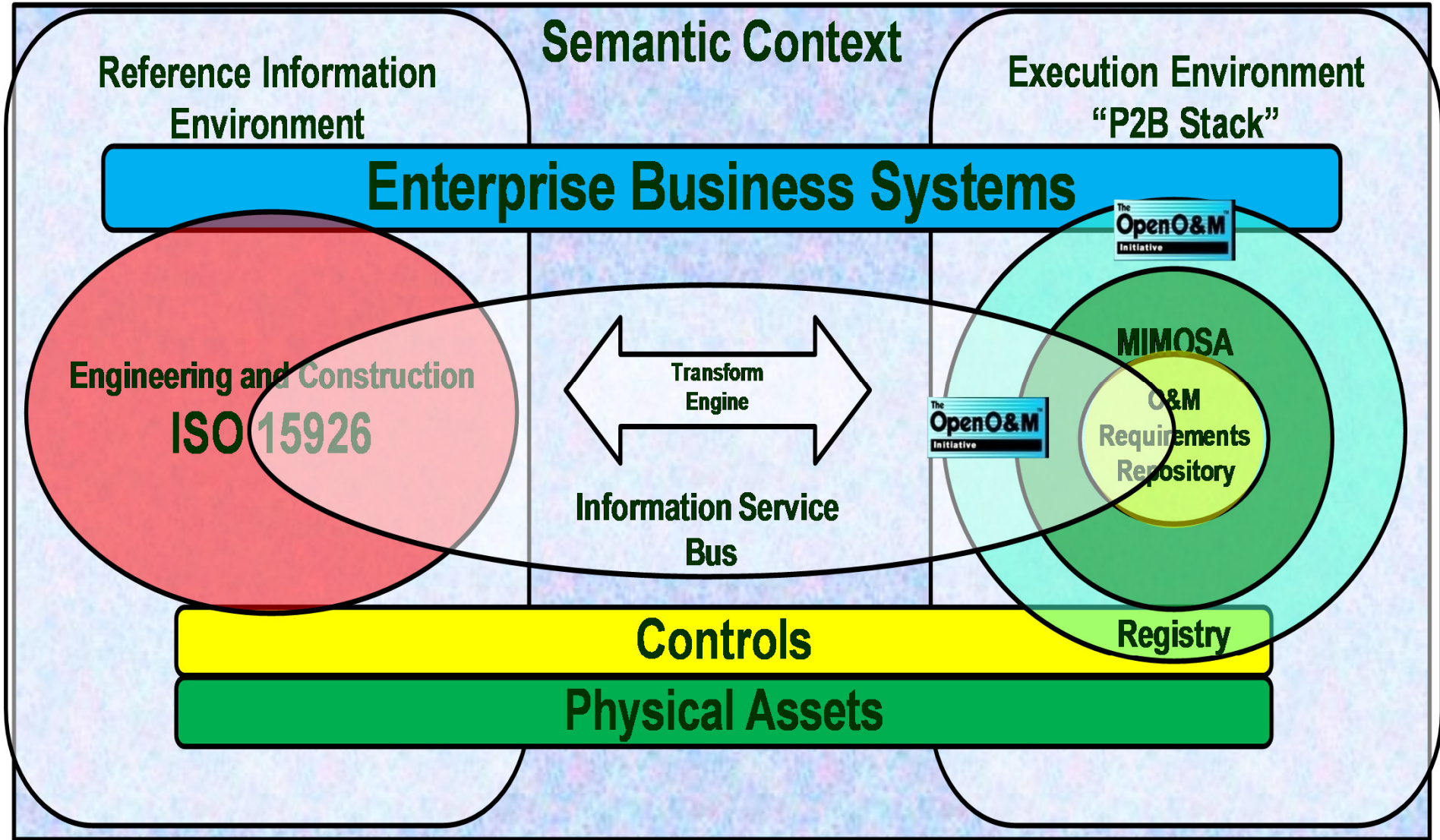


1. “handover” as-designed/built information from engineering, procurement, construction phase to O&M phase
2. recurring updates - send engineering upgrades to O&M systems
3. field engineering changes sent to engineering (bottom up)
4. on-line product data library updated with engineering reference information (asset based data)
5. operations & maintenance configuration changes (e.g. remove/replace transmitter)
6. preventive maintenance (PM) triggering
7. condition-based maintenance (CBM) triggering
8. early warning notification
9. incident management – actual & near-miss information captured and escalated along the lines of accountability
10. O&M systems information provisioning



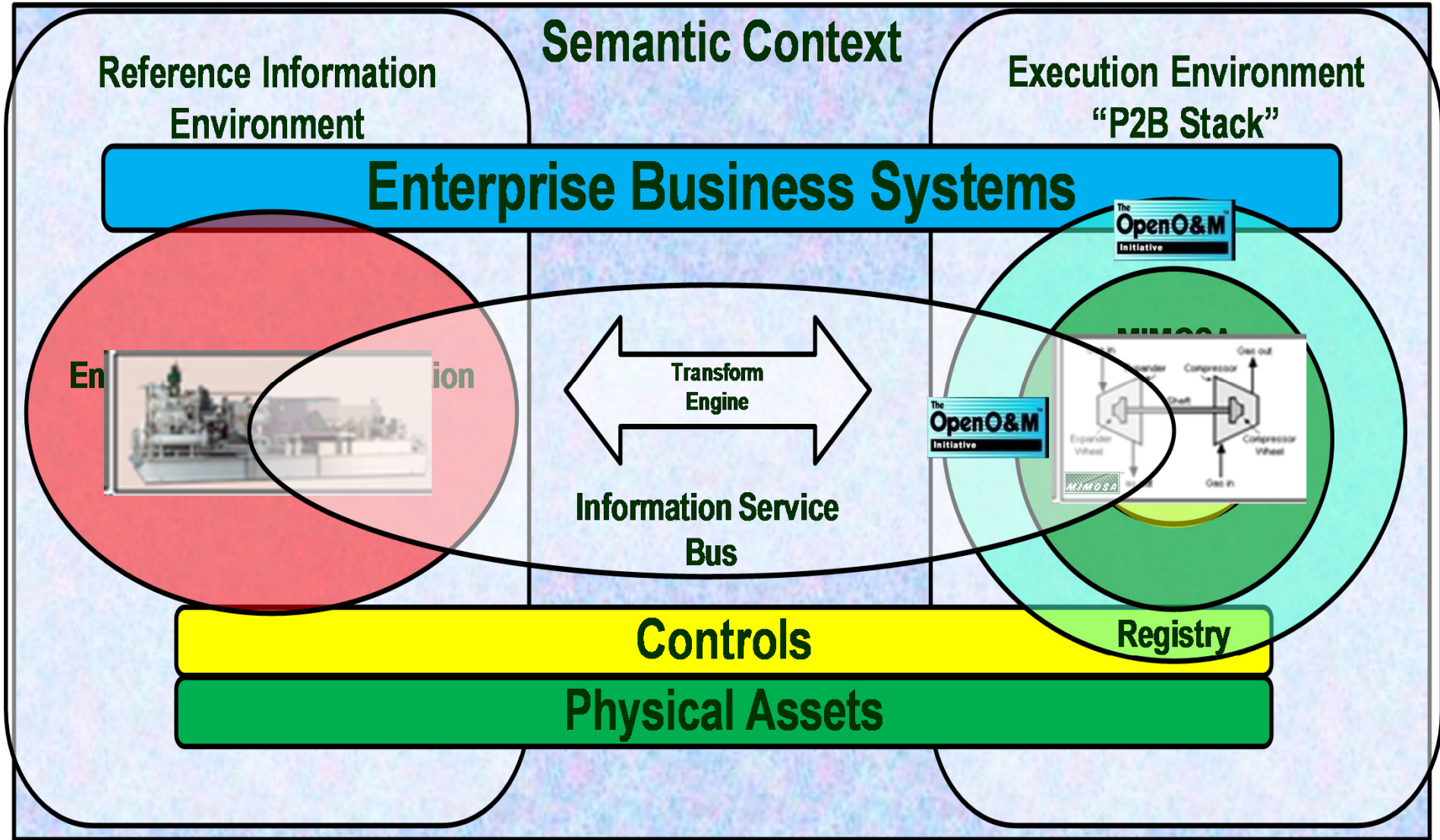
Context for Collaboration

The Safe Technology Roadmap™ for Interoperability

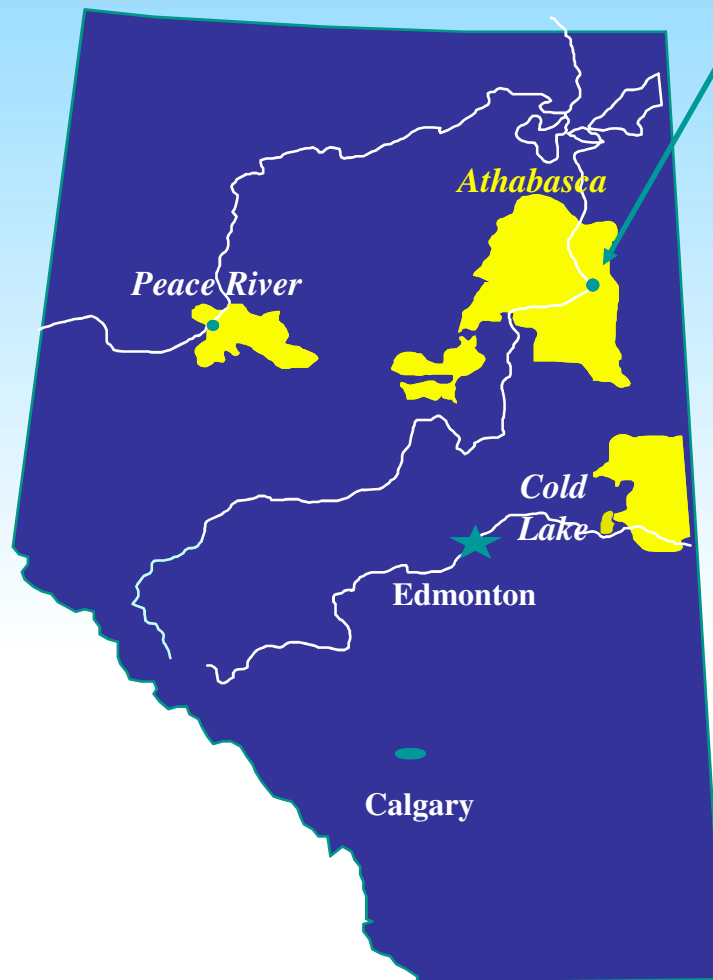


Context for Collaboration

The Safe Technology Roadmap™ for Interoperability



The New 'Black Gold' Alberta Oil Sands – A Vast Resource



Fort McMurray

Alberta area oil sands & heavy oil deposits contain **~2.5 Trillion** barrels of world's known petroleum reserves

Alberta deposits cover 77,000 sq km
(**~30,000 sq mi**)

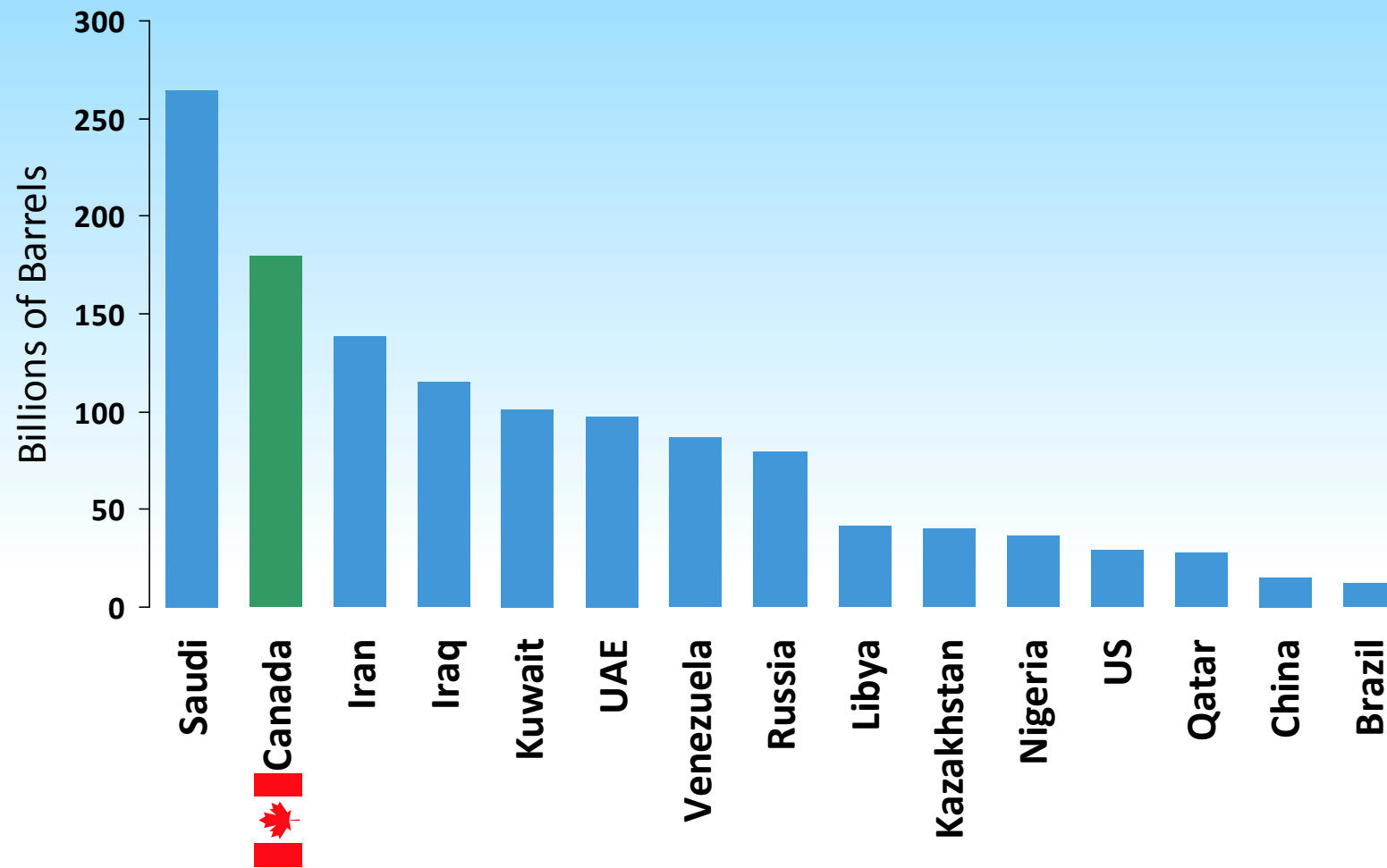
Athabasca Deposit

> 42,000 sq km

890 Billion barrels in place

20% within 250 ft. of surface

30 Bb Mineable; 142 Bb In-Situ

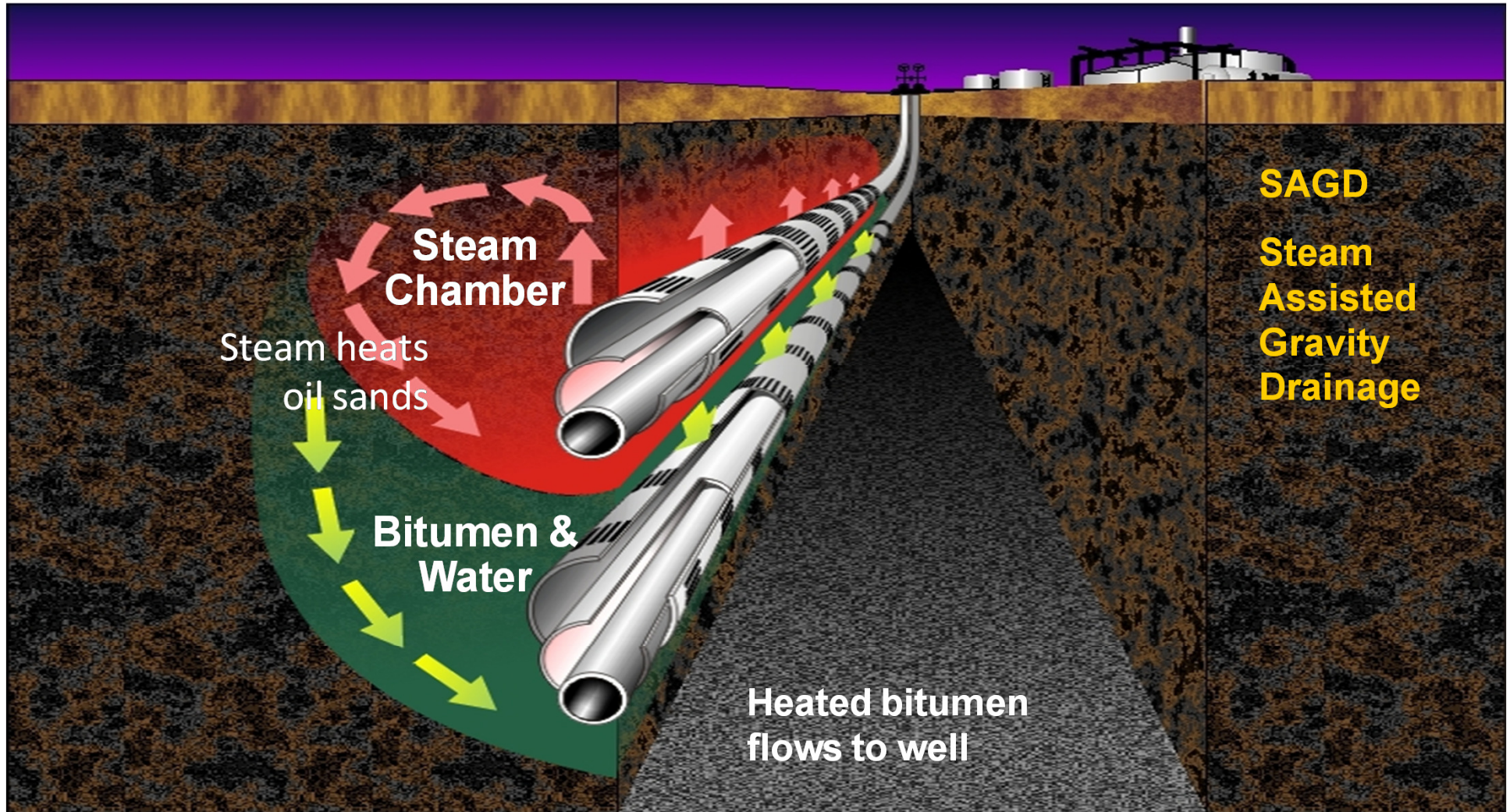


Source: BP Statistical Review of World Energy 2008

- ❑ **Thick, sticky mixture of**
 - **Sand,**
 - **Clay,**
 - **Water,**
 - **Bitumen: 8 – 9 °API**





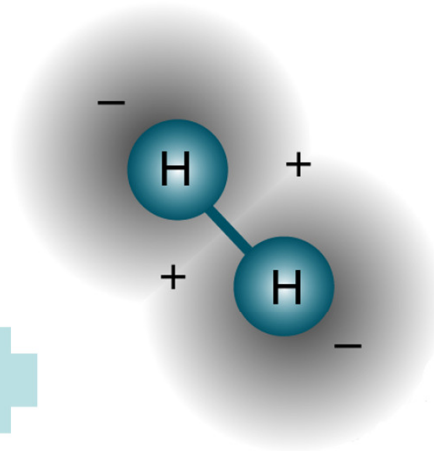


All Bitumen Needs Upgrading

Inputs



Bitumen



Hydrogen
(+ Heat)
(+ Pressure)



Outputs

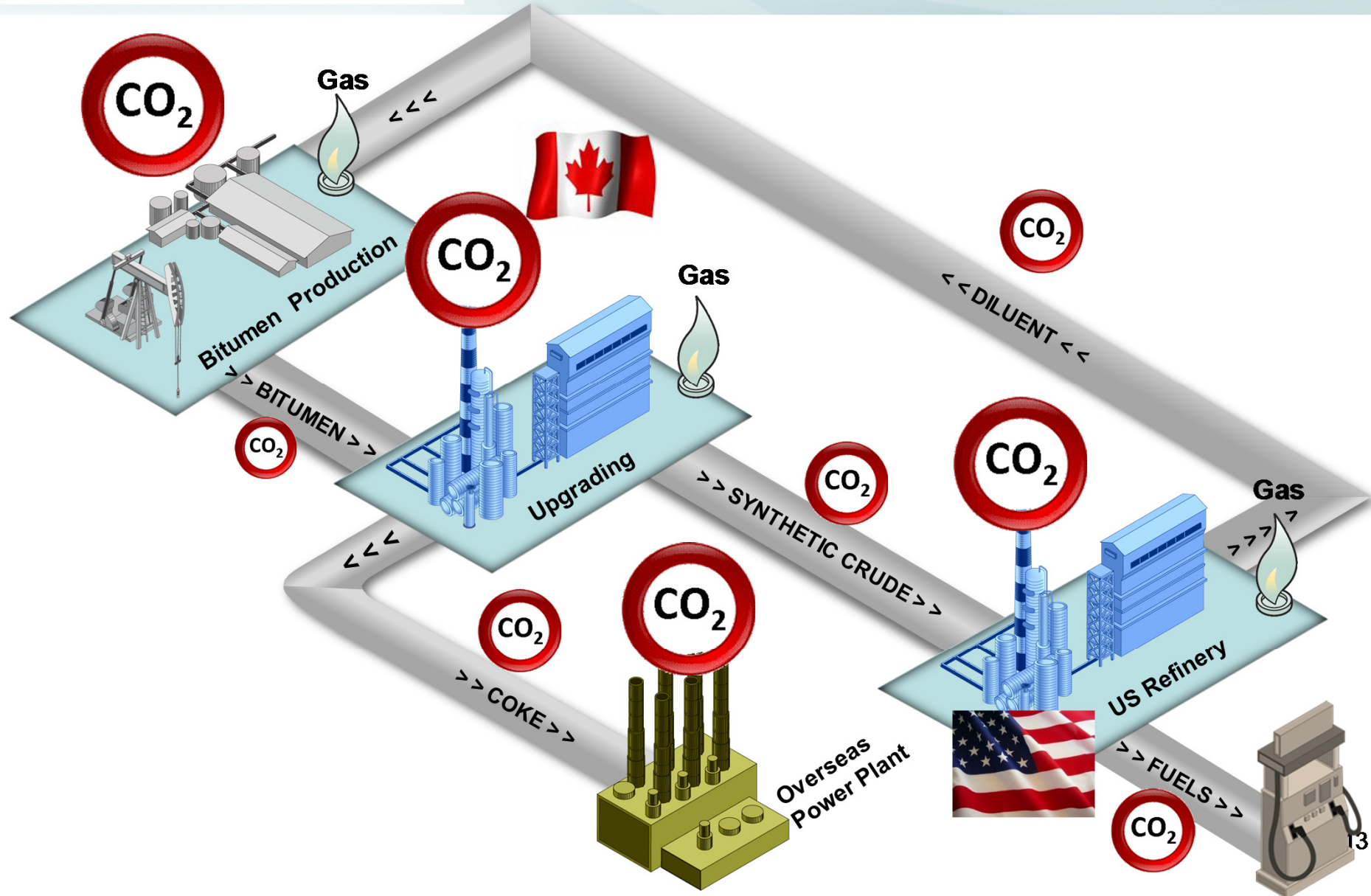


OR

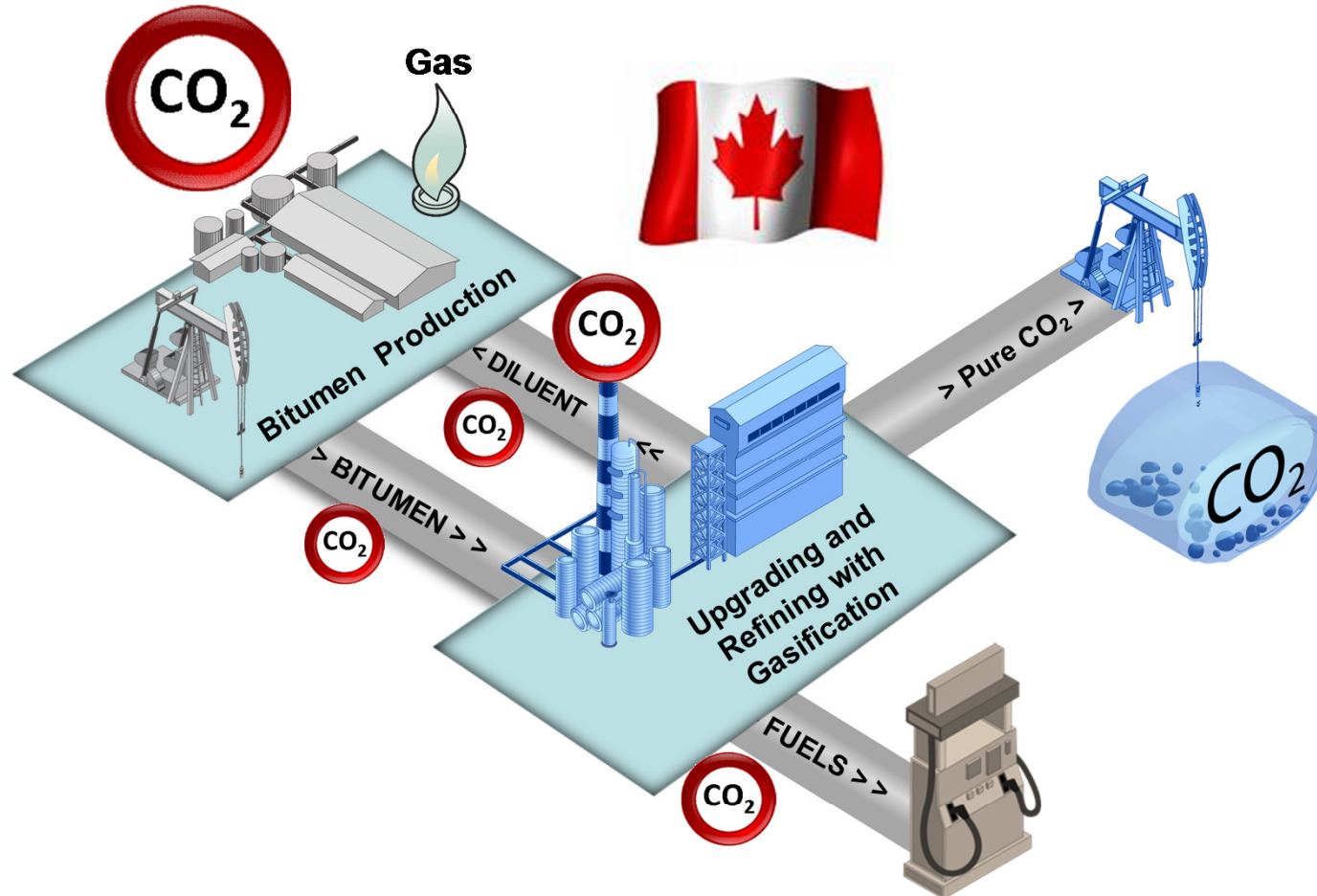


Fuels

Historical Process - Coking - Bitumen to Fuels



The Future: Bitumen to Fuels with CCS



One step conversion to fuels with gasification and CCS - Benefits for All Canadians

- Alberta's Bitumen Royalty In Kind (BRIK) programme**
 - secure source of feedstock
 - APPROVED – Feb.16, 2011
 - CNRL 50% Partner = North West Redwater Partnership (NWR)
- Financing**
- Project Sanction – November 2011***
- Implement a true Sensor-to-Boardroom **Industry Standard** Integrated/Interoperable system
 - ✓ via the Integrated Information Core (IIC)
- Begin Construction** – Spring 2012 (Early Works Fall 2011)
- Plant Start-Up** by Fall 2014 (Spring 2015?)

***The first Upgrader/Refinery in the world
With Integrated CO₂ Management***

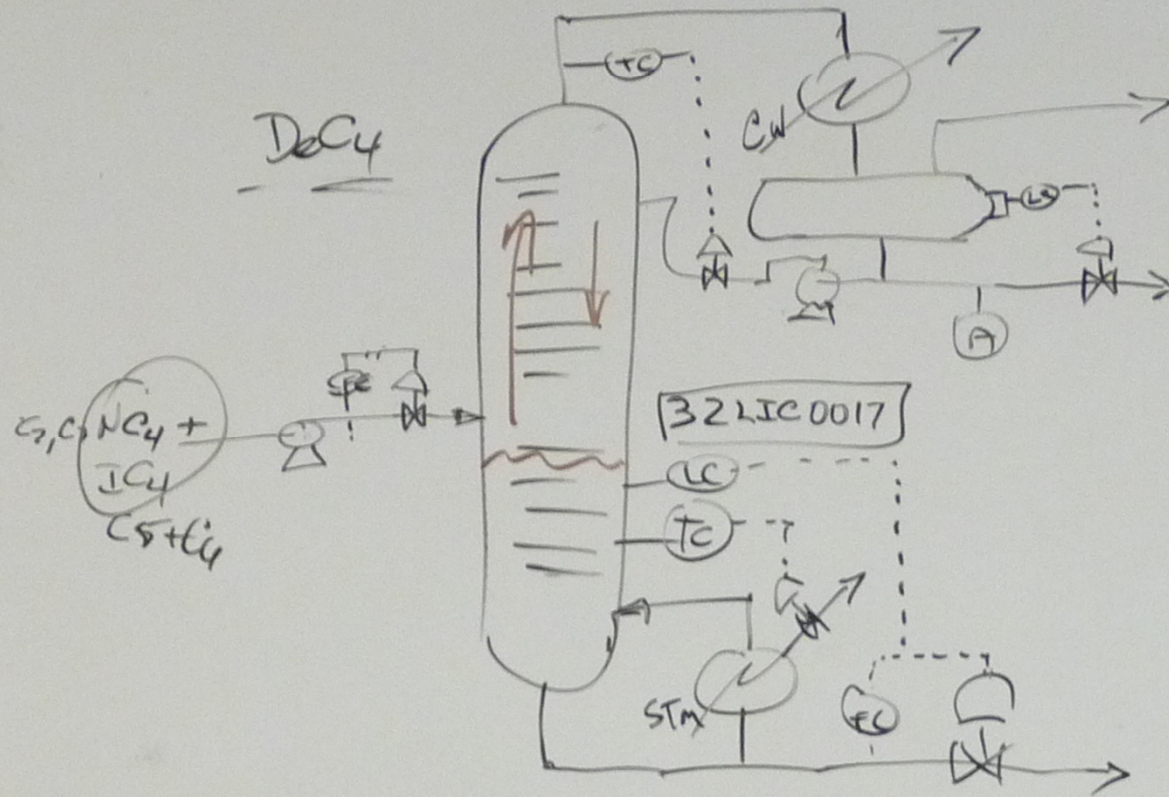
- ❑ Core Objective – Establish a **system of systems O&M interoperability** environment for NWR that:
 - Is **supplier neutral**
 - Is **sustainable** because suppliers build and support the required standards-based adaptors as licensed products
 - Uses **specified standards** (OpenO&M, MIMOSA, ISO 15926) supported by industry (owner/operators and suppliers) in a normative fashion
- ❑ Leverages an industry “**Foundation Architecture**”
 - Common industry information model
 - Common services defined by the OpenO&M Use Cases
- ❑ Engineering system remains **system of record** for engineering for full-project life-cycle
 - A skeletal extract is required to **bootstrap and provision O&M systems**
 - Post Handover, Operations and Maintenance departments will make **changes to the as operated and maintained information** that will **need to be captured and synchronized** with the engineering system of record

- O&M Environment Is **NOT Interoperable**
- Manual “handover”** from EPC to O&M
- O&M systems are **manually integrated**
- O&M systems are **manually provisioned** with common core data required for Start-up

- O&M Environment Is Interoperable
- Fully leverages OpenO&M Use Cases
- O&M systems **Interoperate** for defined Use Cases
- Digital “handover” from EPC to O&M
- O&M systems are **automatically provisioned** with common core data required for start-up

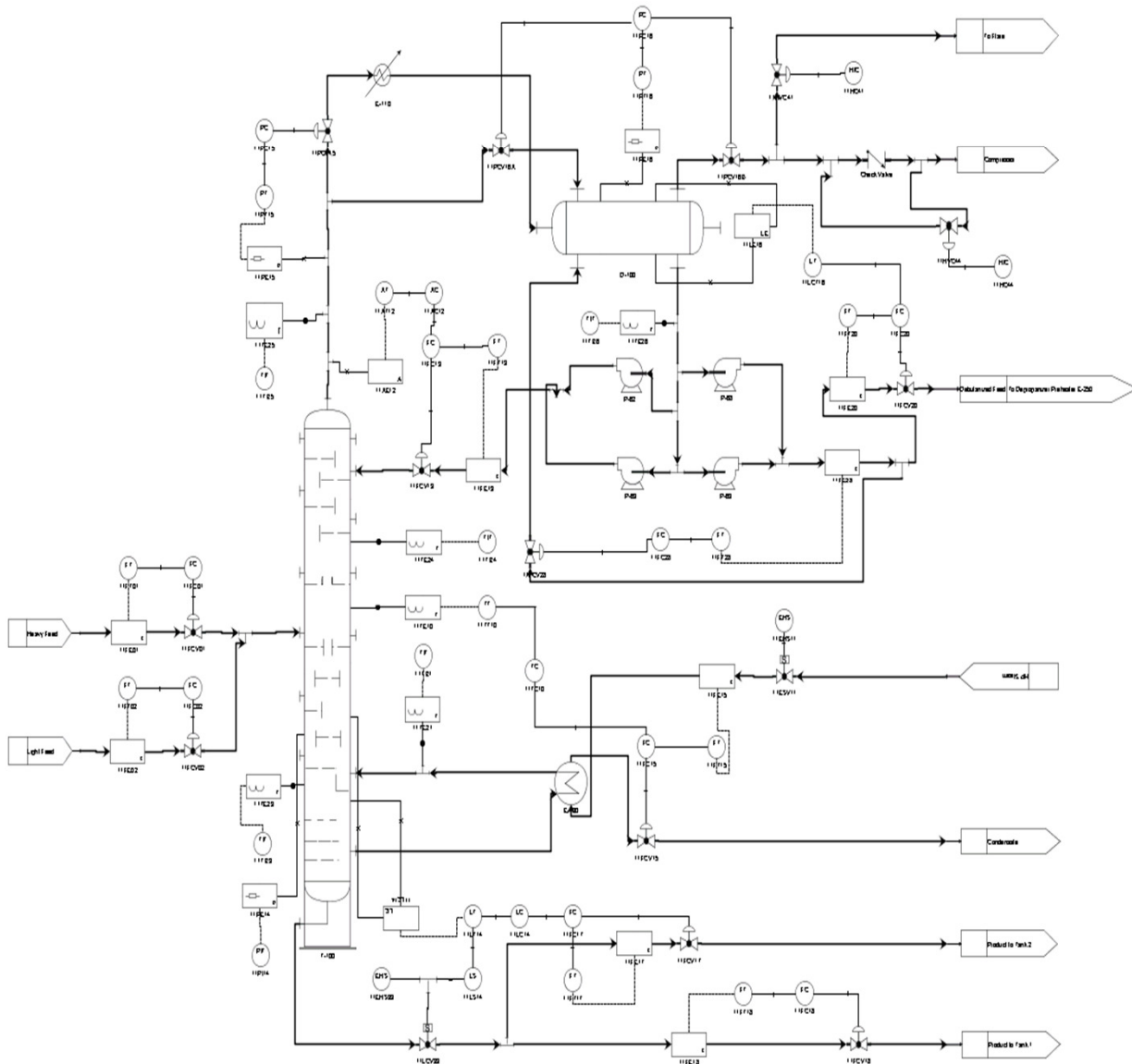
DeButanizer Fractionator

FlowSheet (PFD)



- Diagrams and Enterprises
 - My Diagrams
 - Published Diagrams
 - Enterprises
 - NWR
 - Alberta
 - ConnectivityFolder
 - ConnectivityDi
 - Sturgeon County
 - Condenser...
 - ConnectionTyp
 - Controller
 - Element
 - FlowMeter...
 - HeatExchange
 - Page... (more)
 - Pumps... (mon
 - Switches and F
 - Tank... (more)
 - Tower... (more)
 - Transmitters..
 - Valves... (mon

ConnectivityDiagram:NWR_Debutanizer

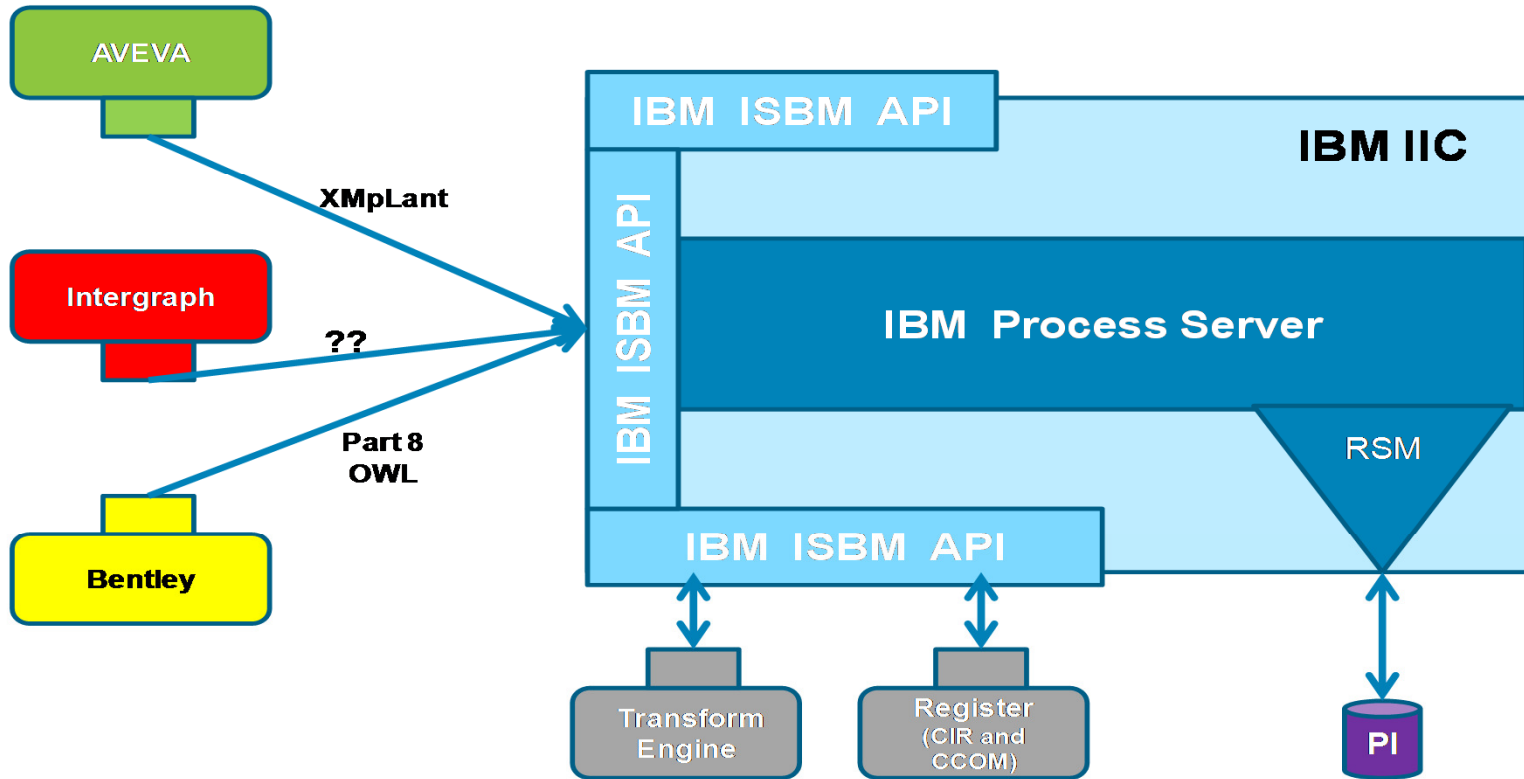


- Palettes
- Base
 - Connections
 - Connections
 - Capillary
 - Data
 - Electric
 - Mechanical
 - Low Voltage
 - Major Process
 - Minor Process
 - Signal
 - Monitor
 - Tee

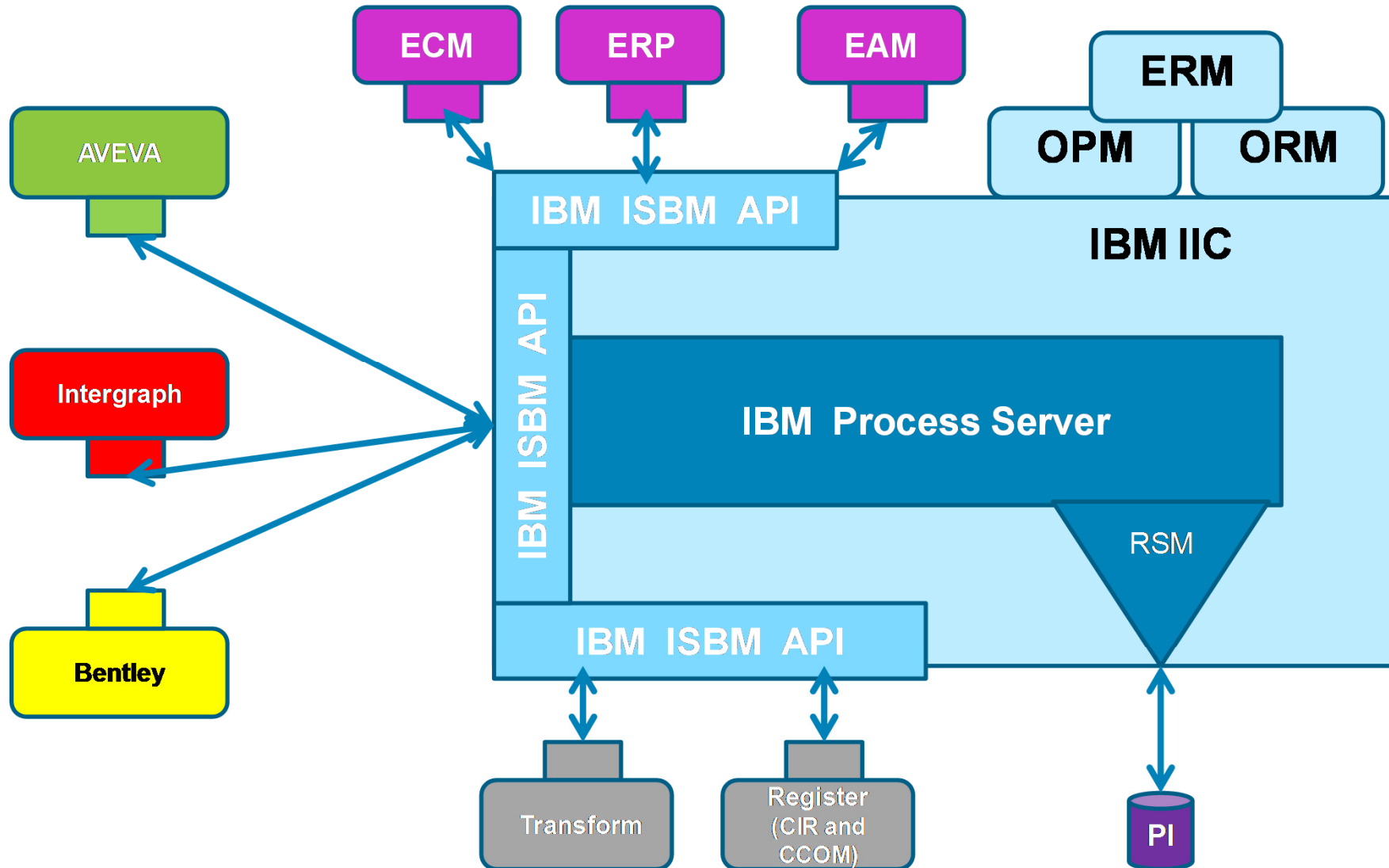
Properties Connections Measur

name	value
EquipmentN...	Connectivity...
ID	1313441998...
ParentID	DB65B1B0D...
EquipType	CONNECTIV...
WidgetType	
ResourceClass	

**Digital Plant 2011 Public Demo
Supporting OpenO&M Use Case 1 and 10**



NWR Future Phases Logical Architecture



ISO TC184 Manufacturing Asset Management Integration Task Force Total Asset Life-Cycle Summary



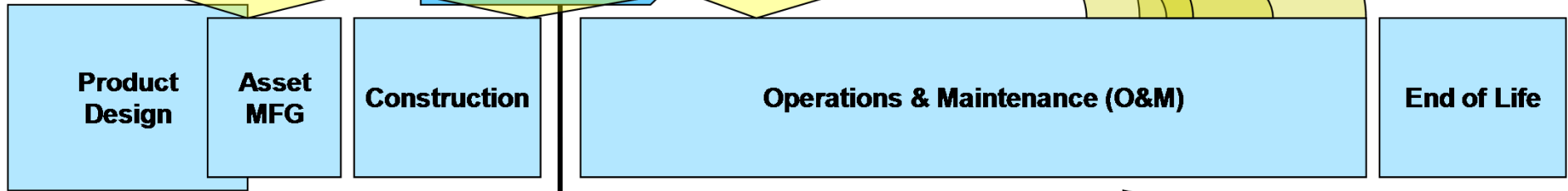
FIATECH

MIMOSA/OpenO&M™

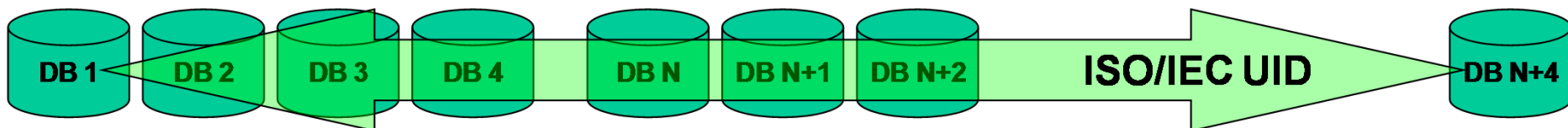
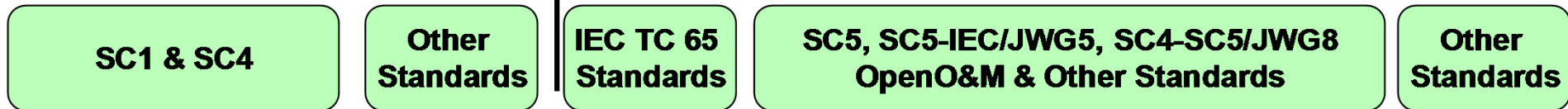
POSC CAESAR

Continuous Improvement
Feedback Loops

Commissioning



Product/Asset/Plant/Facility/Vehicle Life-Cycles



Services Oriented Architecture Using Standards-based Federated Data Model



ISO TC184

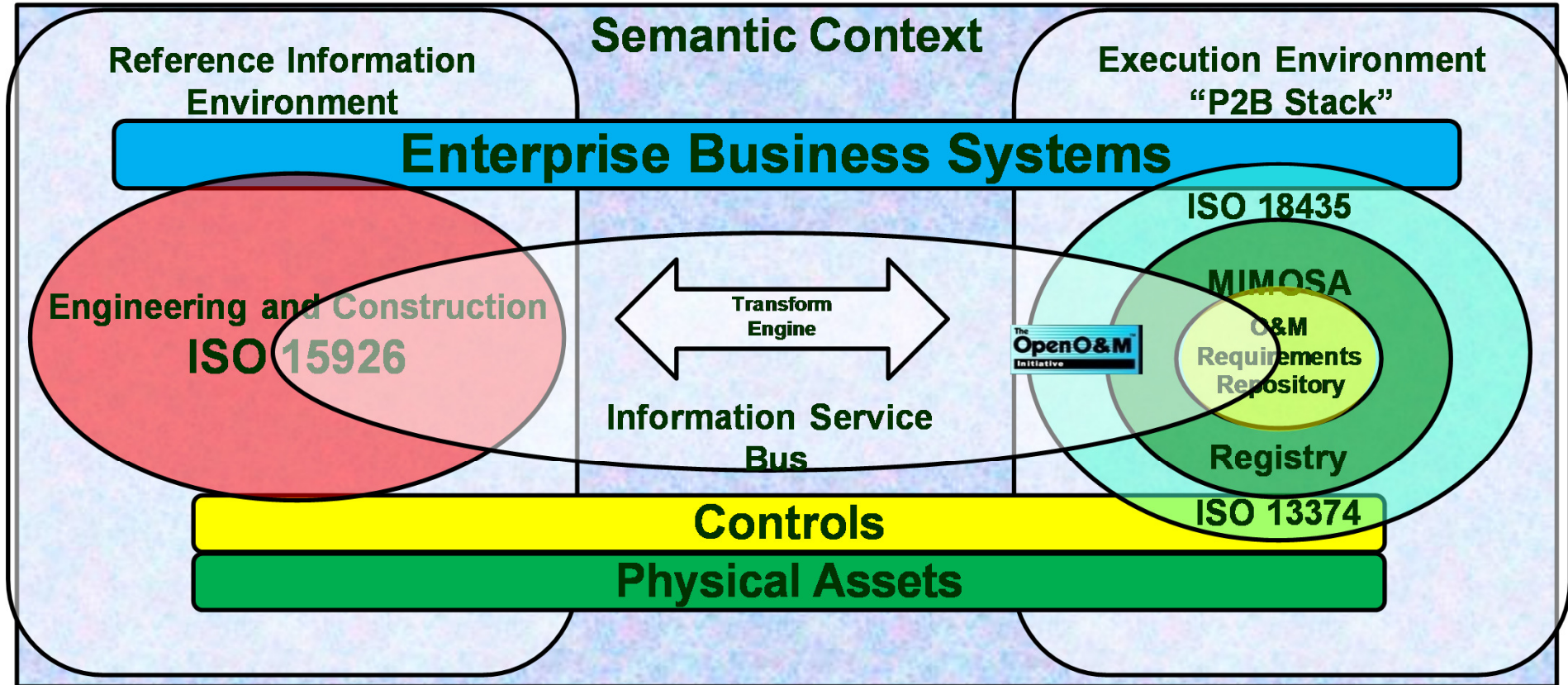
Oil and Gas asset management operations and maintenance Interoperability (OGI) Technical Specification Proposal

Nils Sandsmark and Alan T. Johnston
Co-Chairs

ISO TC 184 Plenary
May 4, 2010
Rosslyn, VA
ISO TC184



Context for Collaboration



ISO TC 184



Task Force Result Global Collaboration

- MIMOSA/OpenO&M
- FIATECH
- POSC Caesar
- Center for Integrated Engineering Asset Management (CIEAM)



On March 15, 2011 we received the official notification from the Japanese National Committee that they will become the 5th country officially participating in this project. This guarantees the project will proceed to produce the official ISO Oil and Gas interoperability solution .

ISO TC 184

- The shift from project-centric custom integration to productized standards-based interoperability is critical for sustainment of ever more complex systems in a system of systems model
- No single standards provides the required coverage
- The portfolio of standards including ISO 15926 and those related to the OpenO&M Initiative provide the core coverage that is required.
- Real owner/operator projects are starting to move forward in the Oil and Gas industry based on this approach.
- The ISO TC184 Oil and Gas Interoperability project will codify the collaborative approach in a Technical Specification