

# ISO15926 Overview

**OpenO&M/MIMOSA and PCA Forum – Americas 2011**

February 22, 2010, Houston

Nils Sandsmark, General Manager PCA

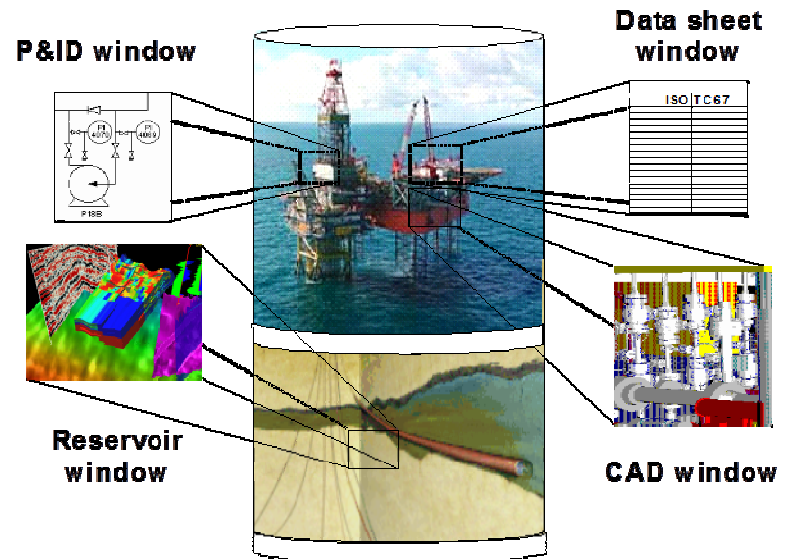
# Content

- POSC Caesar Association (PCA)
- ISO 15926 Business cases
- ISO 15926 Introduction and status
- Join Projects
- Special Interest Groups (SIGs)
- Summary

# POSC Caesar Association (PCA)

- PCA is a global, **not-for-profit**, independent **member organization** developing, enhancing, and promoting methodology, technology and solutions for **data interoperability** with special focus on **ISO 15926**
- 36 members in 12 countries on 4 continents
- PCA arranges forums and member meetings every year in:
  - Asia/Australia
  - Europe/Africa
  - America

## The vision of ISO 15926 data interoperability and life cycle

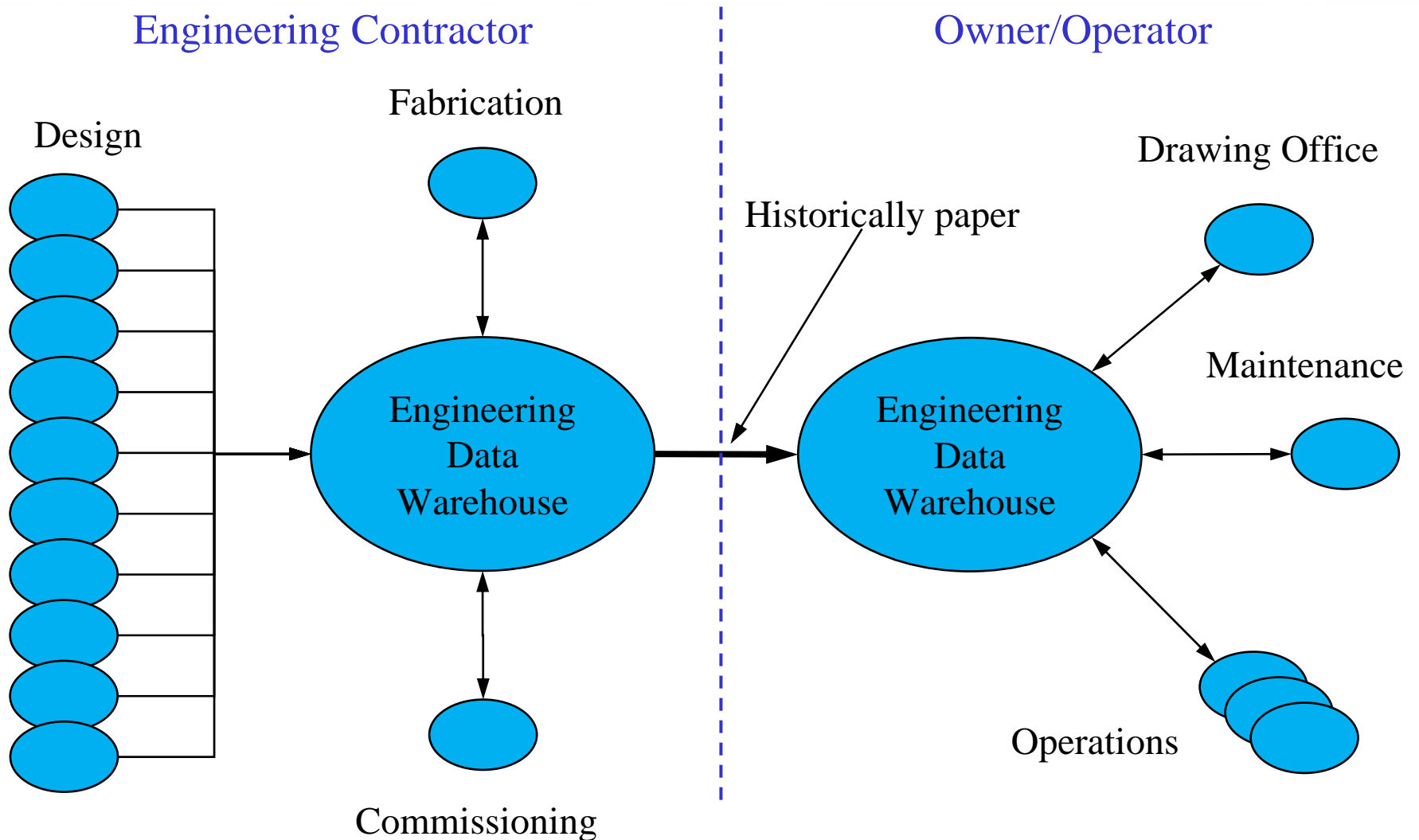


Focus areas so far:

1. Handover EPC - OO (1993+)
2. Integrated operations (2004+)
3. Operations & maintenance and integration between engineering and O & M (2008+)

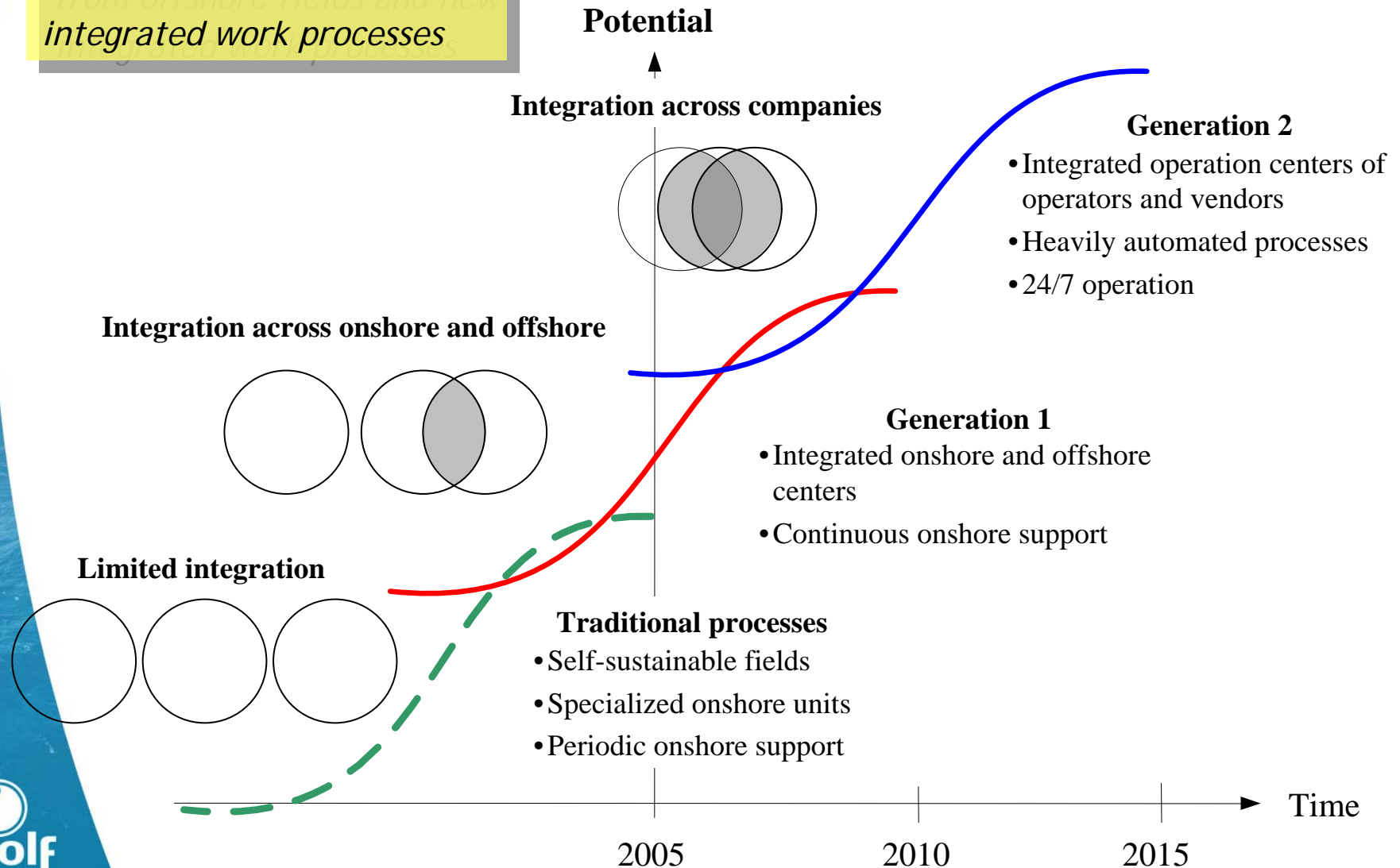
# ISO 15926 Business cases

# The Start - Data Handover

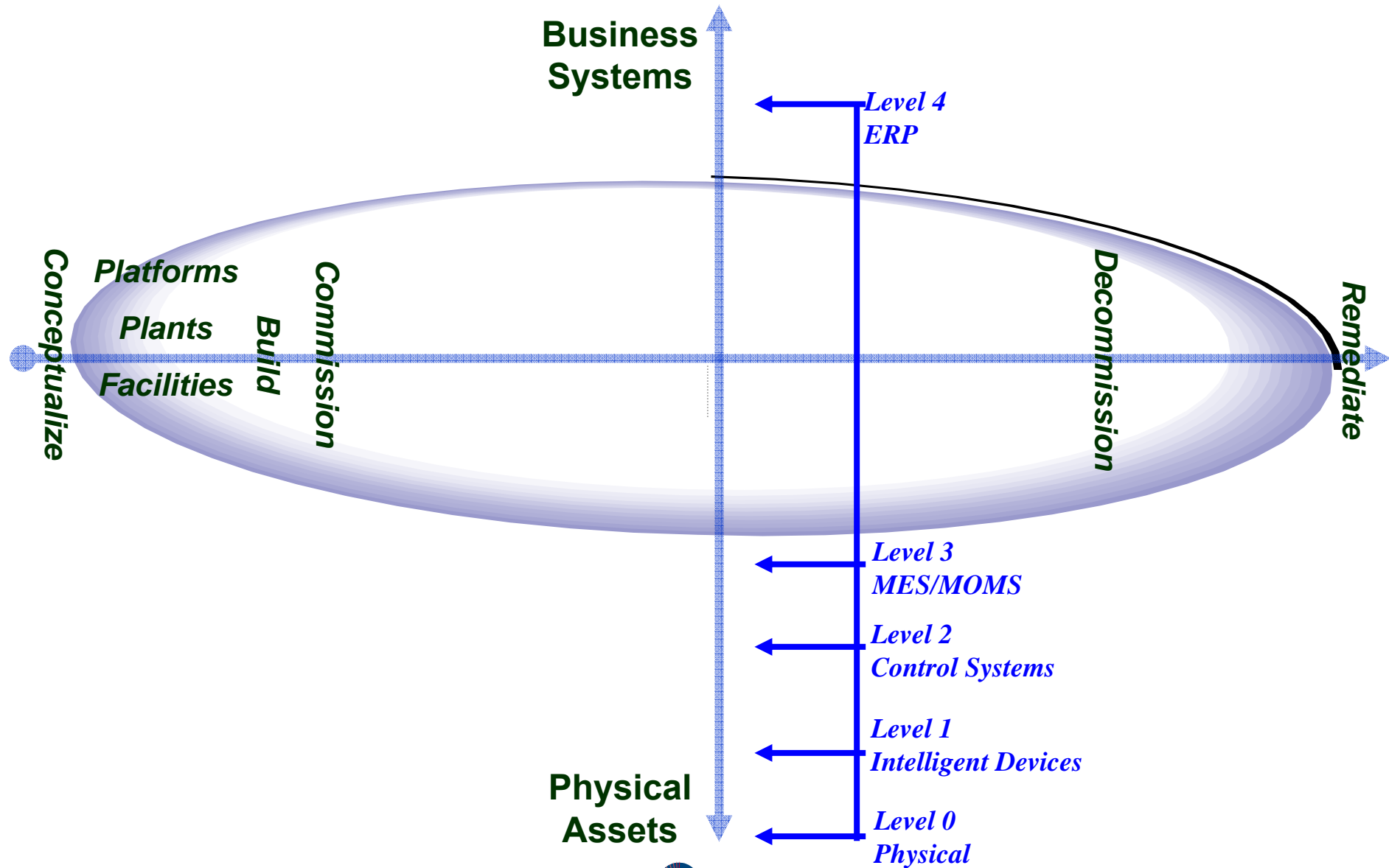


# Integrated Operations (IO)

Generation 1 and 2  
IO is real time data onshore  
from offshore fields and new  
integrated work processes



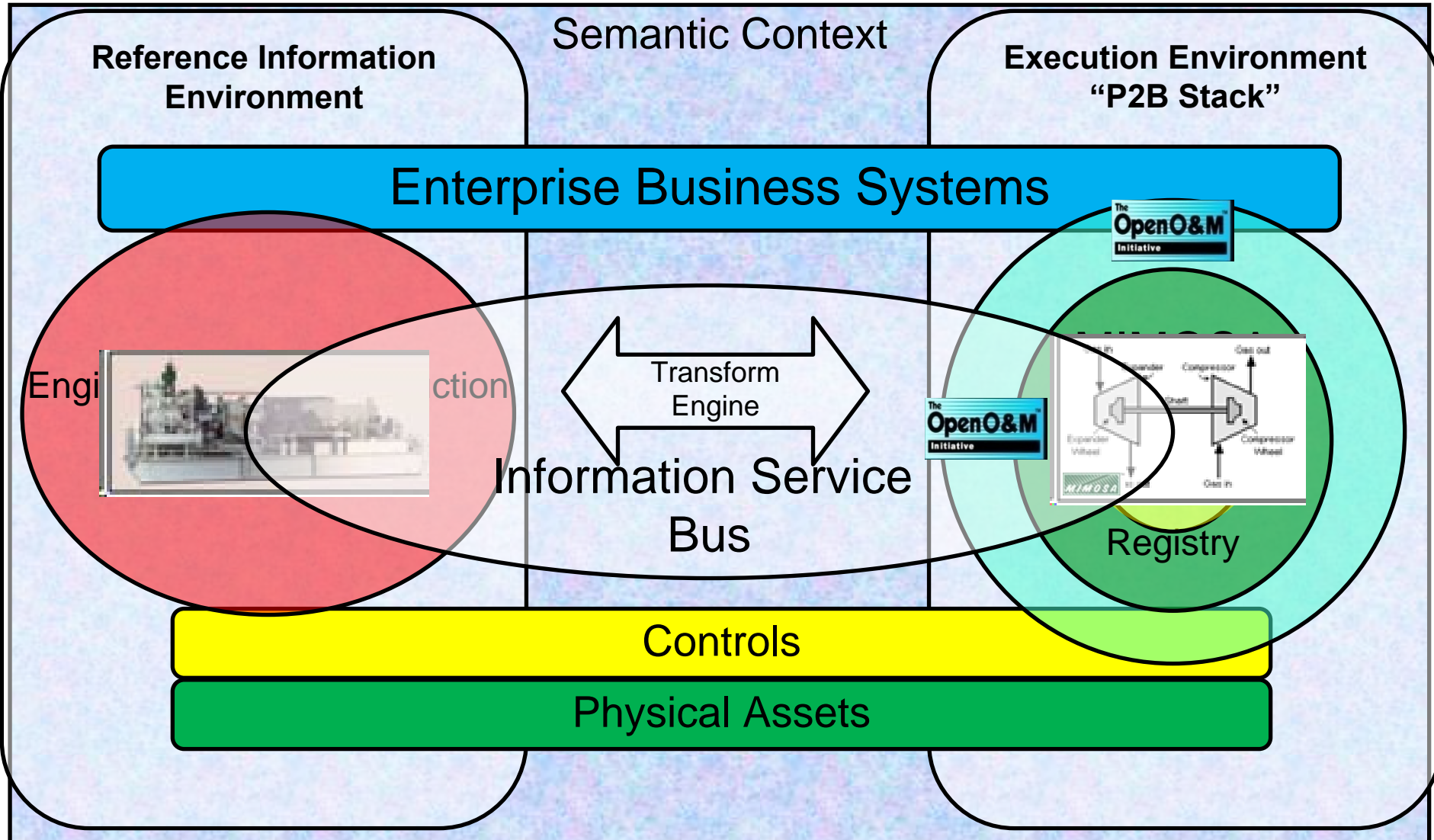
# Life Cycle and Plant to Business (P2B) View





# Context for Collaboration

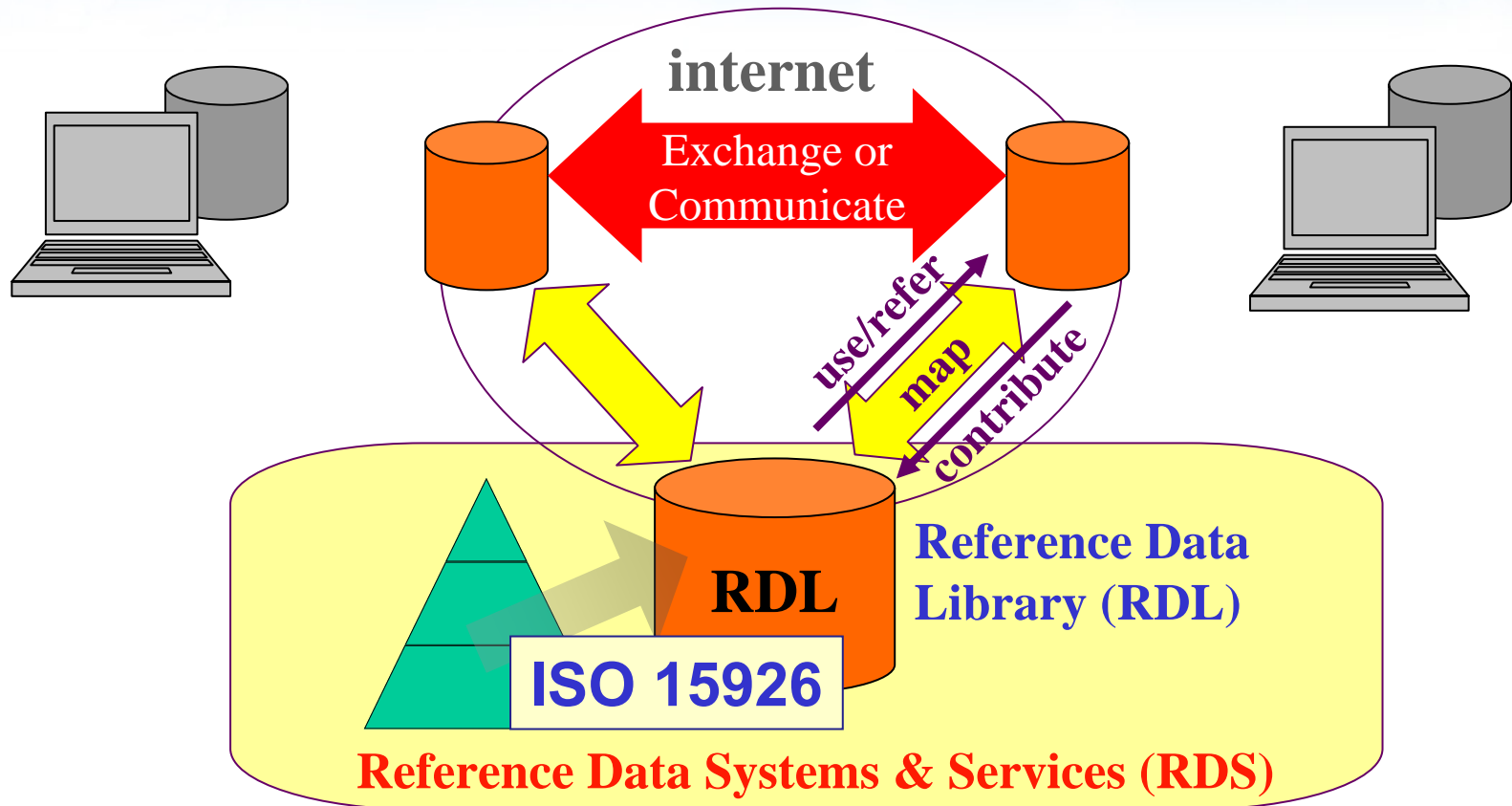
The Safe Technology Roadmap™ for Interoperability





# ISO 15926 Introduction and status

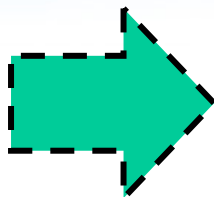
# ISO15926 interoperability at its simplest



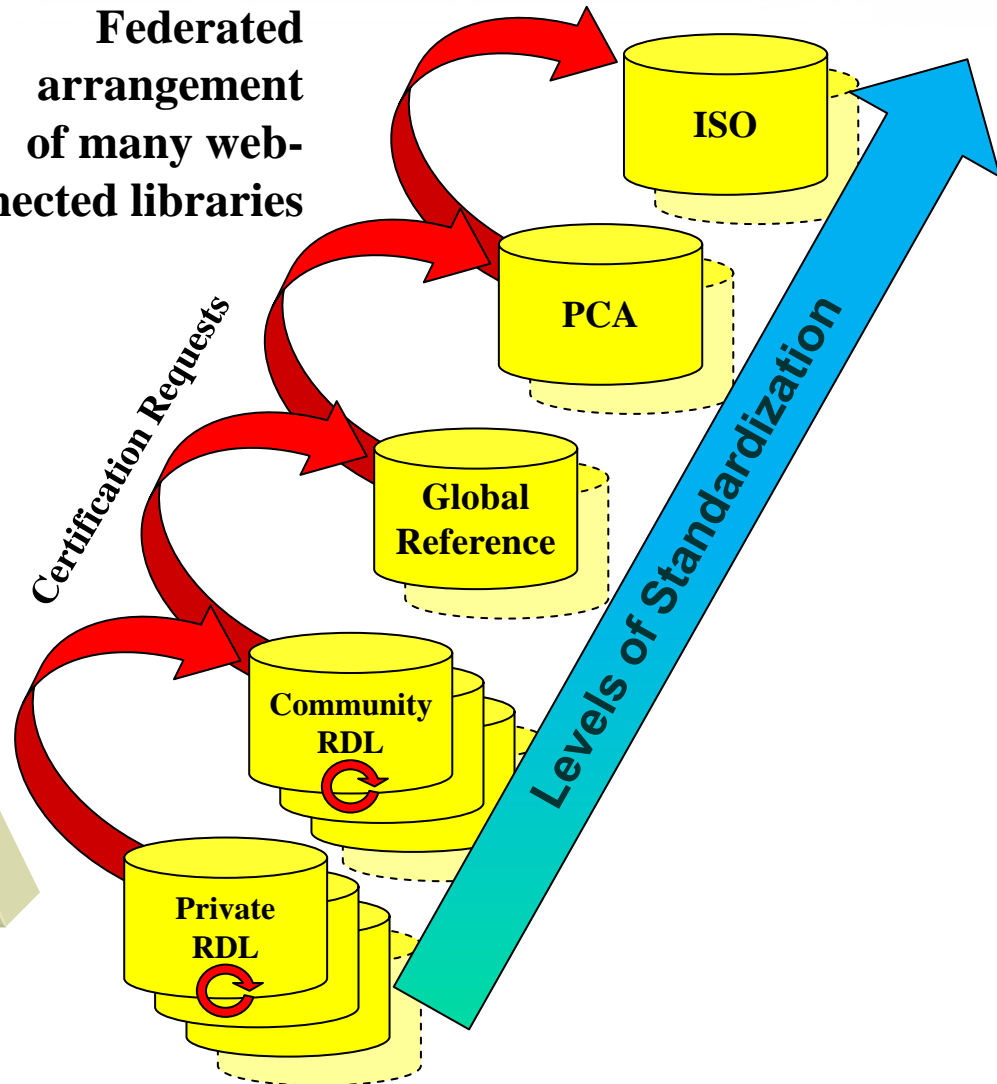
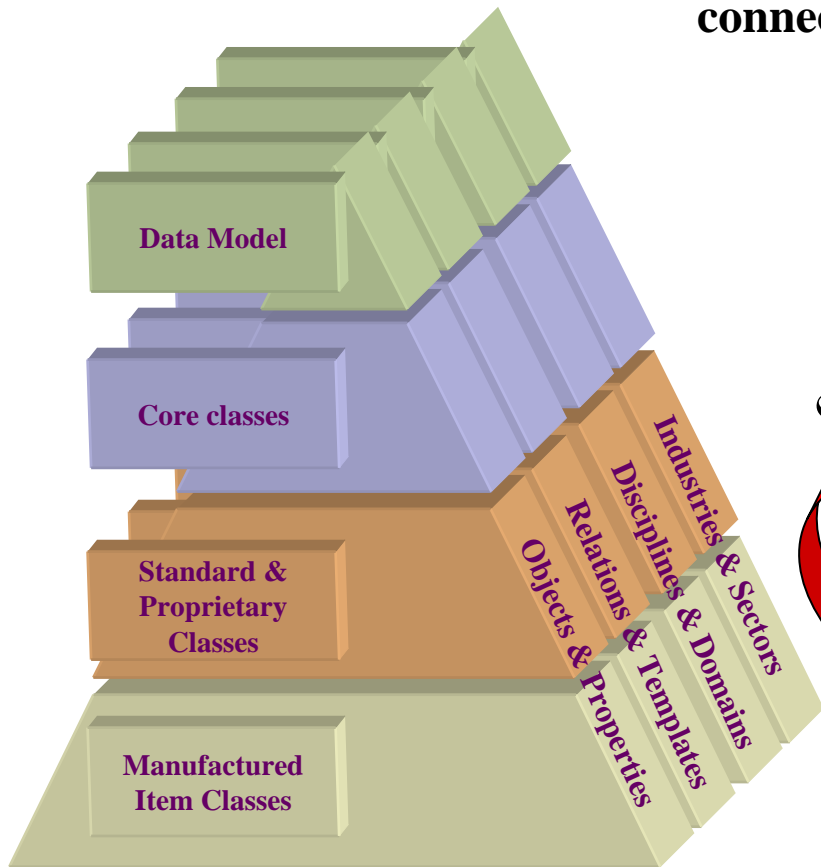
Using shared references & sharing references used,  
reduces business ambiguity & reduces mapping overheads.  
**Makes interoperability easier and reduces risk & cost**

# Reference data architecture

Logical organization of reference data



Federated arrangement of many web-connected libraries



# Axis of Reference Data

- ISO 15926-1:2004 **reference data**
  - Process plant life-cycle data that represents information about classes or individuals which are common to many process plants or of interest to many users
  - and are instances of ISO 15926-2 (Data Model)
- “ISO 15926 RD” are instances of ISO 15926-2 (Data Model)
  - But this does not necessarily make it “Standard Reference Data”
- “Standard Reference Data” is standardised in ISO 15926-4 (or subsequent parts)
- PCA Reference Data is ISO 15926 RD, but it is not “Standard Reference Data”
  - It will be progressed to become so in due course, but is not so by default
  - It is, when standardised by PCA “Industry Standard Reference Data”
- Domain Reference Data can become PCA or ISO 15926-4 RD by being subject to the appropriate level of standardisation
- Company specific RD is not standard in any way unless it has been progressed through some levels of standardisation
- Work in-progress (WIP) RD is new RD Items being processed.

# Reference Data Complexity

Decrease of ambiguity

- **Dictionary**
  - Terms and definitions
- **Taxonomy**
  - Classes in sub-/superclass hierarchy
- **Ontology**
  - Constraints
  - Connections

# Ontology

- **An ontology is an artefact consisting of a:**
  - **Vocabulary** used to describe a particular view of some domain
  - Set of **explicit assumptions** regarding the intended meaning of the vocabulary.
    - Usually includes **classification** based information
  - Constraints capturing **background knowledge** about the domain
- **Thus, an ontology describes a formal specification of a certain domain:**
  - Shared understanding of a domain of interest
  - Formal and machine manipulable model of a domain of interest



# ID's & Triples / Relationships & Mappings

- ID's (URI's) are fundamental to the Reference Data architecture and
- Fundamentally all mappings and all relationships are *Triples*.

ID#1 (URI)	Relationship ID (URI)	ID#2 (URI)
<MyObject> (URI) <b>"MyPump101"</b>	<b>&lt;is a&gt;</b> ( <i>Classification</i> relationship URI)	<RDL Class> (RDL Class URI) <b>Centrifugal Pump</b>
<My String or Symbol> (URI) <b>" Центробежный насос" (?)</b>	<b>&lt;is a name for&gt;</b> ( <i>Identification</i> relationship URI)	<RDL Class> (RDL Class URI) <b>Centrifugal Pump</b>
<MyClass> (URI) <b>"MyCatalogueXYZPumpType"</b>	<b>&lt;is a subClass of&gt;</b> ( <i>Specialization</i> relationship URI)	<RDL Class> (RDL Class URI) <b>Centrifugal Pump</b>

*These are indicative only. In practice these are "proto-templates" in Part 7 terms (one for each Part 2 relationship entity). Everything else is built from these.*

# Electrical pressure transmitter

RDL Explorer 1.6.2 - Magne Valen Sendstad (editor) : ELECTRICAL PRESSURE TRANSMITTER

Address <http://193.212.132.108/rds/> Log out Magne Valen Sendstad

Search  Search

Advanced search

Result(2)

Search result - 1 Hits

RDL Designation	Entity type
ELECTRICAL PRESSU...	CLASS_OF_INANIMA...

**CLASS OF INANIMATE PHYSICAL OBJECT**

**RDL Designation :** ELECTRICAL PRESSURE TRANSMITTER

**PCA ID :** RDS5769585

**Creation Date :** 2006.06.08

**Creator :** u20683

**Registration status :** Qualified

**RDL Definition :** A pressure transmitter measuring pressure and generating a standardized electrical output signal representing the detected pressure.

**First relation**

- ELECTRICAL PRESSURE TRANSMITTER (2)
  - CLASSIFICATION.classified (4)
    - ISO TS 15926-4 (2007) INSTRUMENT CLASS (0)
    - NORSOK I-001 REV3 P01 PRESSURE/DIFF.PRESSURE INSTRUMENT
    - NORSOK Z-CR-002 EQUIPMENT CLASS (0)
    - STATOIL SAP CLASS (0)
    - SPECIALIZATION.subclass (2)
      - ELECTRICAL APPARATUS (1)
        - ARTEFACT (1)
          - ISO 15926-4 INANIMATE PHYSICAL OBJECT (1)
            - ISO 15926-4 ARRANGED INDIVIDUAL (1)
            - ISO 15926-4 POSSIBLE INDIVIDUAL (1)
            - ISO 15926-4 THING (0)
          - PRESSURE TRANSMITTER (1)
            - TRANSMITTER (1)
              - DETECTING INSTRUMENT (2)
                - MEASURING DEVICE (1)
                  - DEVICE (1)
                    - ISO 15926-4 FUNCTIONAL OBJECT (1)
                      - ISO 15926-4 ARRANGED INDIVIDUAL (1)
                      - ISO 15926-4 POSSIBLE INDIVIDUAL (1)
                      - ISO 15926-4 THING (0)
                    - PROCESS INSTRUMENT (1)
                      - ARTEFACT (1)
                        - ISO 15926-4 INANIMATE PHYSICAL OBJECT (1)
                          - ISO 15926-4 ARRANGED INDIVIDUAL (1)
                          - ISO 15926-4 POSSIBLE INDIVIDUAL (1)
                          - ISO 15926-4 THING (0)

**Second relation**

- ELECTRICAL PRESSURE TRANSMITTER (3)
  - CLASS\_OF\_ASSEMBLY\_OF\_INDIVIDUAL.class\_of\_whole (1)
    - PRESSURE TRANSMITTER ELECTRONIC MODULE (0)
  - CLASS\_OF\_IDENTIFICATION.represented (1)
    - Transmitter, Pressure, Electric (0)
  - SPECIALIZATION.superclass (2)
    - NORSOK I-001 REV3 P01 ELECTRICAL PRESSURE TRANSMITTER (0)
    - ROSEMOUNT 3051 (3)
      - ROSEMOUNT 3051C (3)
        - ROSEMOUNT 3051CA (0)
        - ROSEMOUNT 3051CD (0)
        - ROSEMOUNT 3051CG (1)
          - ROSEMOUNT 3051CG5A22A1KB4I1L4M6Q4 (0)
      - ROSEMOUNT 3051L (0)
      - ROSEMOUNT 3051T (2)
        - ROSEMOUNT 3051TA (0)
        - ROSEMOUNT 3051TG (1)
          - ROSEMOUNT 3051TG 5A2B31KB4I1M6Q4 (0)

Search in Entity types Columns

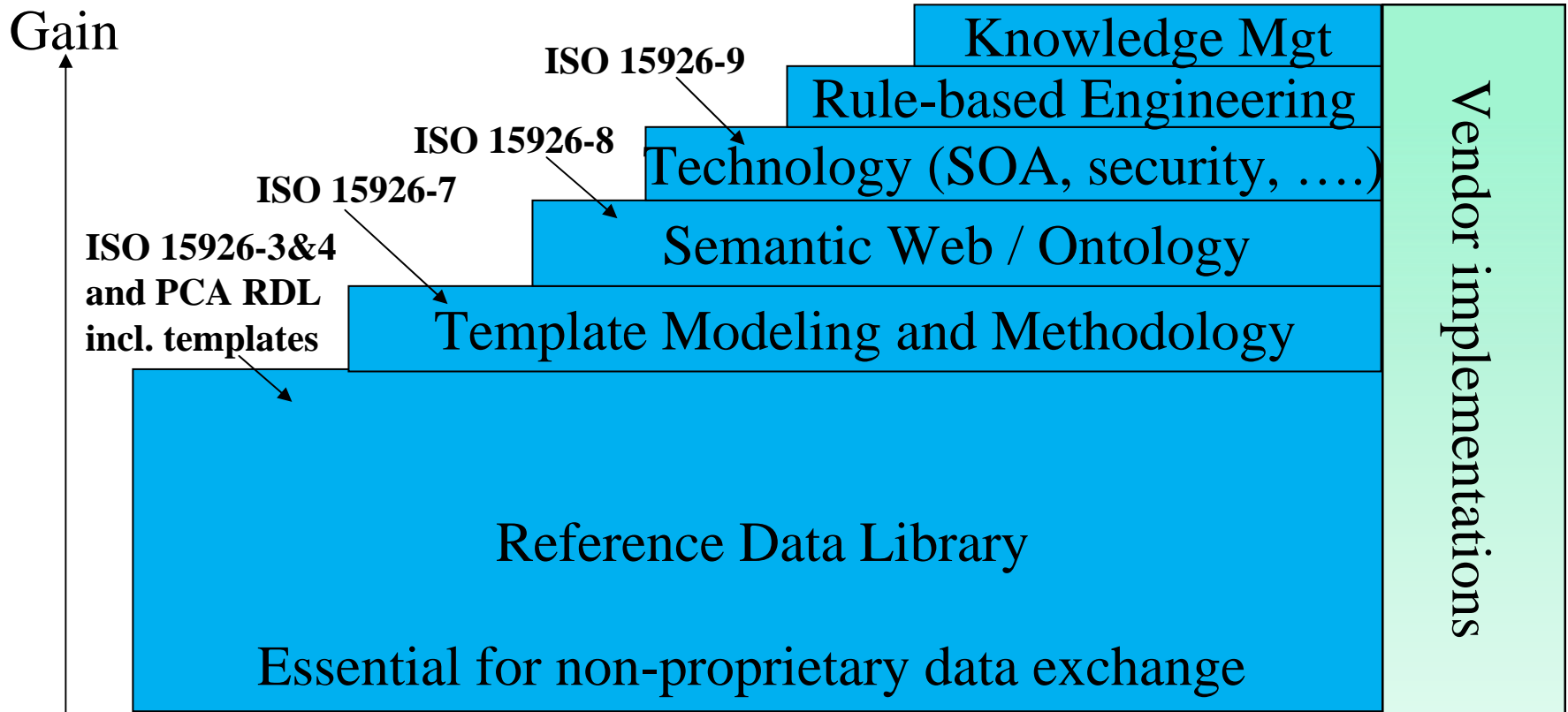
| Column  |
|---|
| <input checked="" type="checkbox"/> RDL Designation |
| <input type="checkbox"/> PCA ID                     |
| <input type="checkbox"/> Creation Date              |
| <input type="checkbox"/> Creator                    |
| <input type="checkbox"/> Deleted                    |

RDL Explorer 1.6.2 Memory (Available/Total) 230,72 Mb / 260,18 Mb

start

15:25

# ISO 15926 stack



## ISO 15926 Integration of life-cycle data for process plants including oil and gas production facilities

- **ISO 15926 – 1: *Overview and fundamental principles***. IS ed. 1 published in June 04
- **ISO 15926 – 2: *Data model***. IS ed. 1 published in December 03
- **ISO 15926 – 3: *Ontology for geometry and topology***. TS ed. 1 published in April 09
- **ISO 15926 – 4: *Initial reference data***. TS ed. 1 published in October 07
- **ISO 15926 – 6: *Scope and methodology for developing additional reference data***  
CD/TS proposal ready for ballot
- **ISO 15926 – 7: *Template Methodology***. TS sent to ISO for publication
- **ISO 15926 – 8: *OWL Representation***. TS sent to ISO for publication
- **ISO 15926 – 9: *Implementation methods for the integration of distributed systems – Façade implementation***. TS planned complete 2012
- **ISO 15926 – 10: *Abstract Test Methods***. TS planned complete 2012
- **ISO 15926 – 11: *Simplified Industrial Usage***. Under development, based on existing industrial usage. TS planned complete 2012
- **ISO 15926-5** has been replaced by an **annex to ISO TC184/SC4: *Procedure for development and maintenance of reference data in database format***

# Join Projects

# Integrated Operations in the High North (IOHN)



# High North - Typical operational concept



Integrated Operations in the High North – Joint Industry Project

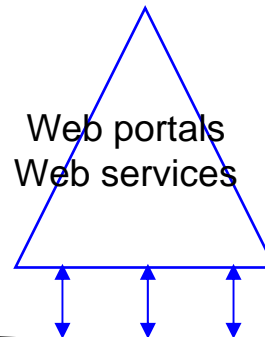


- Heavily instrumented facilities
  - Lean local organization
  - Extensive remote support organization
- ⇒ Robust and secure digital infrastructure required
- ⇒ Novel collaborative work processes required

# Information Strategy for IO

An efficient pipeline for real-time transfer and analysis of data

## Smarter solutions



**Vendor**



**Operator**



**Vendor**



## Field data

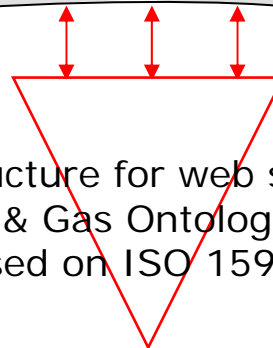
- Health, safety, environment
- Seismic
- Drilling & Completion
- Reservoir & production
- Operation & maintenance



**Standards based exchange**

Infrastructure for web services  
Oil & Gas Ontology<sup>1)</sup>  
Based on ISO 15926

## Smarter data



\*Ontology = A hierarchical data structure containing concepts, relationships, properties and rules for a specific domain

# Main Objective for IO in the High North

Integrated Operations in the High North – Joint Industry Project

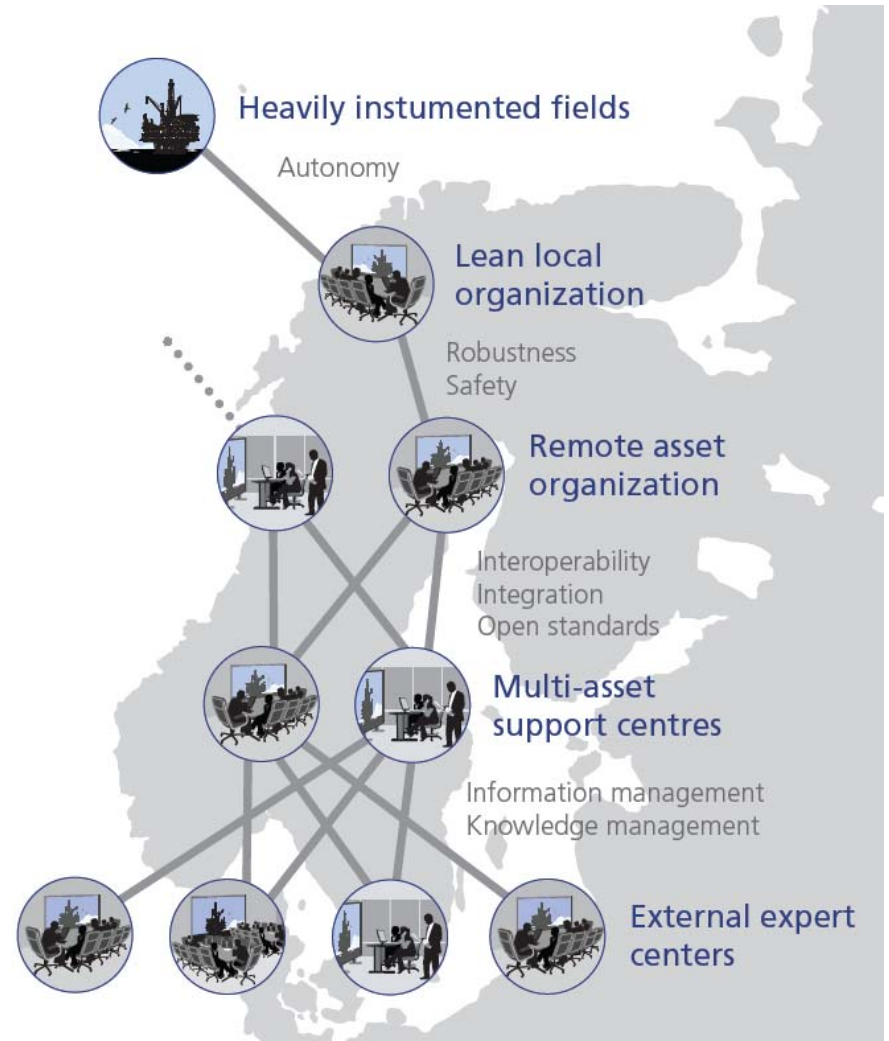


**Main objective:** Demonstrate a reliable digital platform for Integrated Operation Generation 2 (IO G2)

**Requirements:** Come from use cases within

- Drilling & Completion
- Production & Reservoir management
- Operation & Maintenance

**Key element:** Handling of real-time data across applications, disciplines, locations and organizations





# Drilling use cases

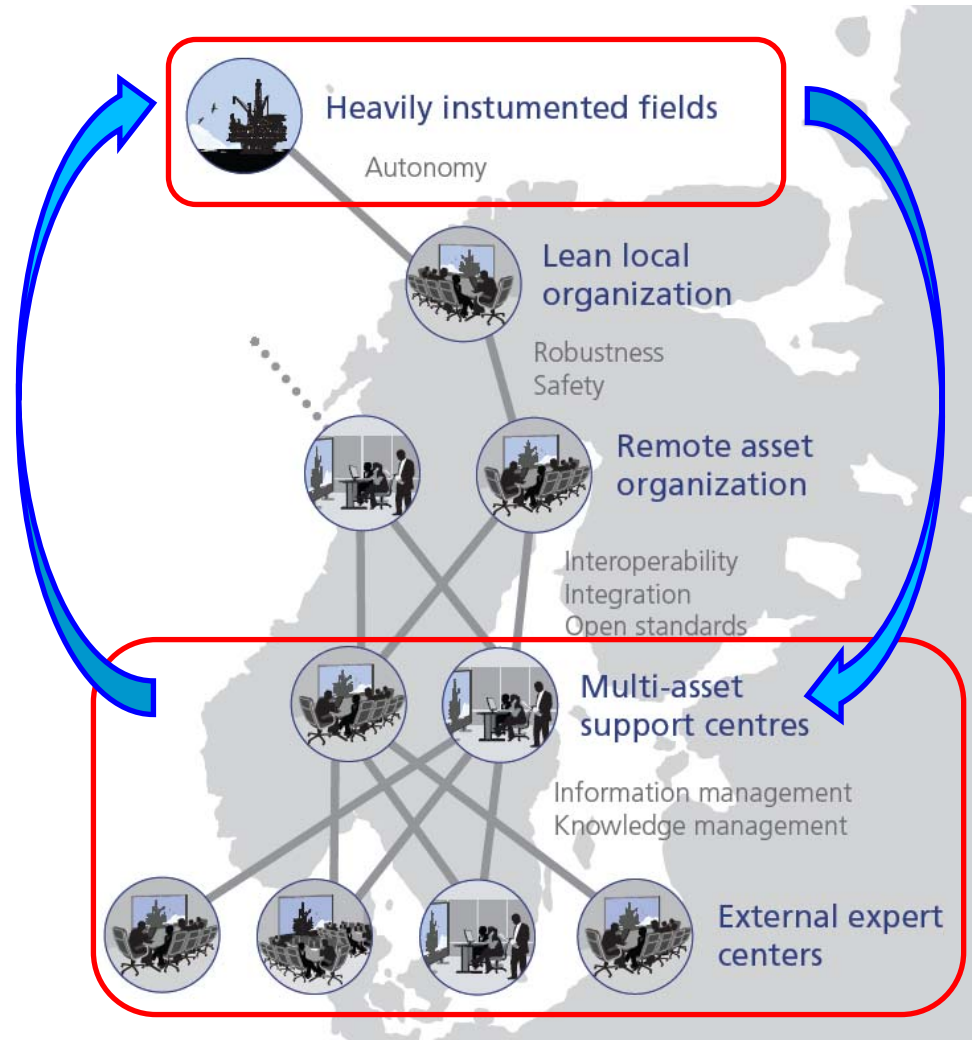
## Current situation:

- Gap between data/information and timely utilization in drilling operation

## How to close the loop?

### Solution:

1. Open standard for communication with drilling control system
2. Open standard and abstraction of data, information and knowledge in drilling domain
3. Framework and mechanisms for increased automation / autonomy

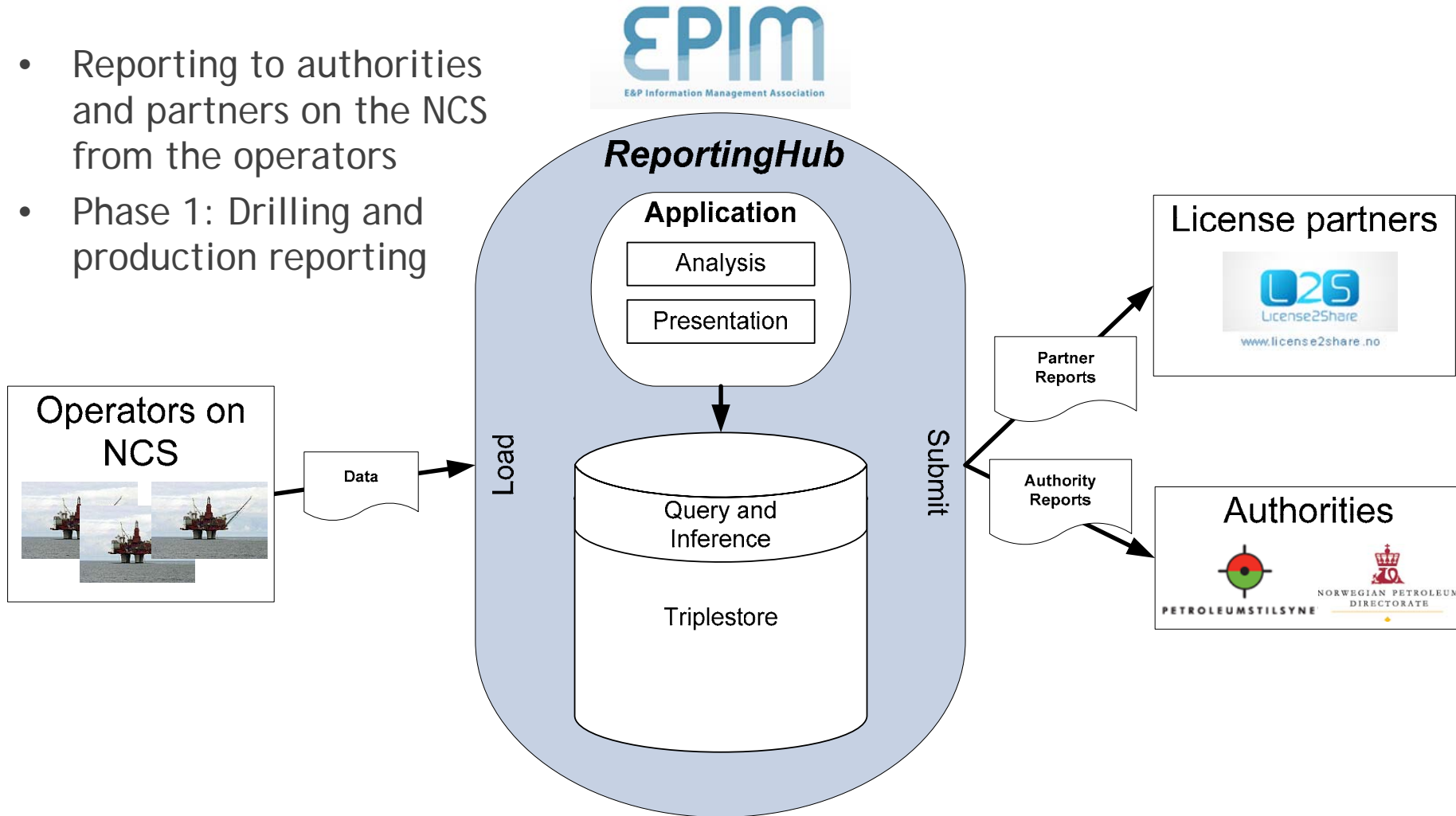


# EPIM-Reporting Forum

- EPIM-RUF (Oil&Gas Exploration & Production Information Management Association)
  - *Reporting Forum*
- Norwegian Continental-Shelf Oil&Gas *Drilling and Production reporting* from operators
  - to regulators & statutory authorities,
  - and to the their partners,
  - required as part of operating permits.
- Using *XML schemas annotated with ISO 15926 Reference Data*
- The XML schemas *are profiles of WITSML and PRODML* from Energistics

# ReportingHub - Main Objectives

- Reporting to authorities and partners on the NCS from the operators
- Phase 1: Drilling and production reporting

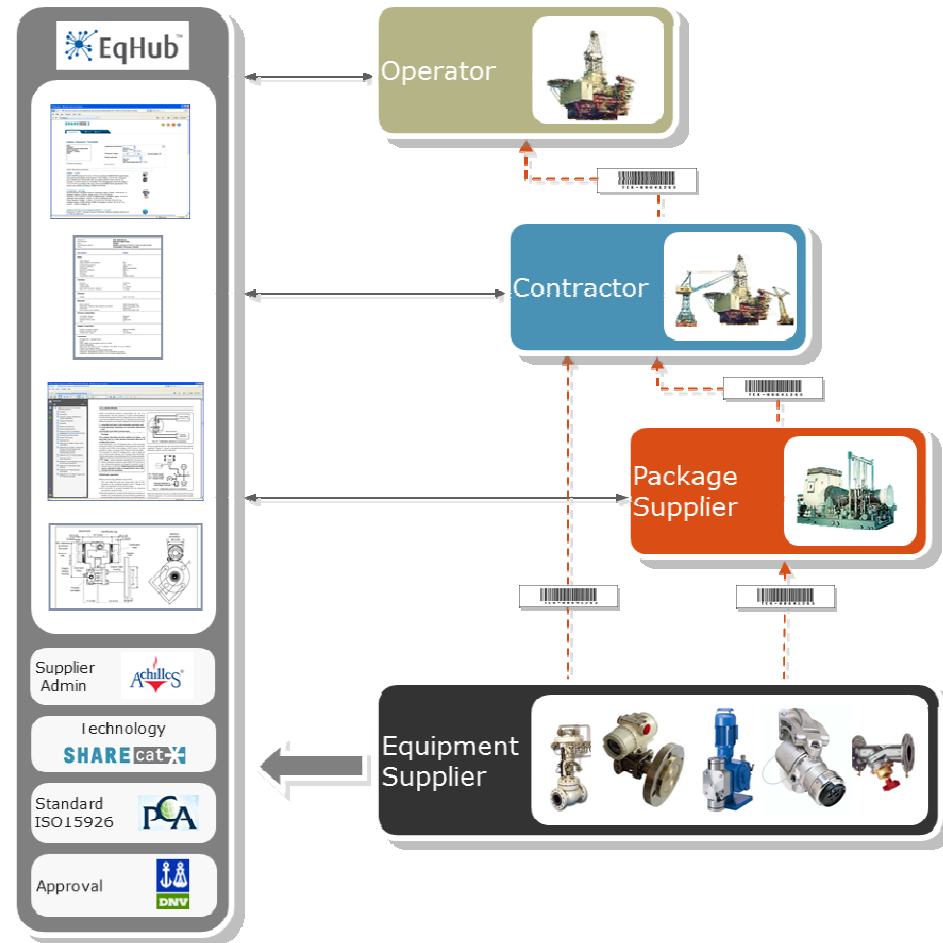


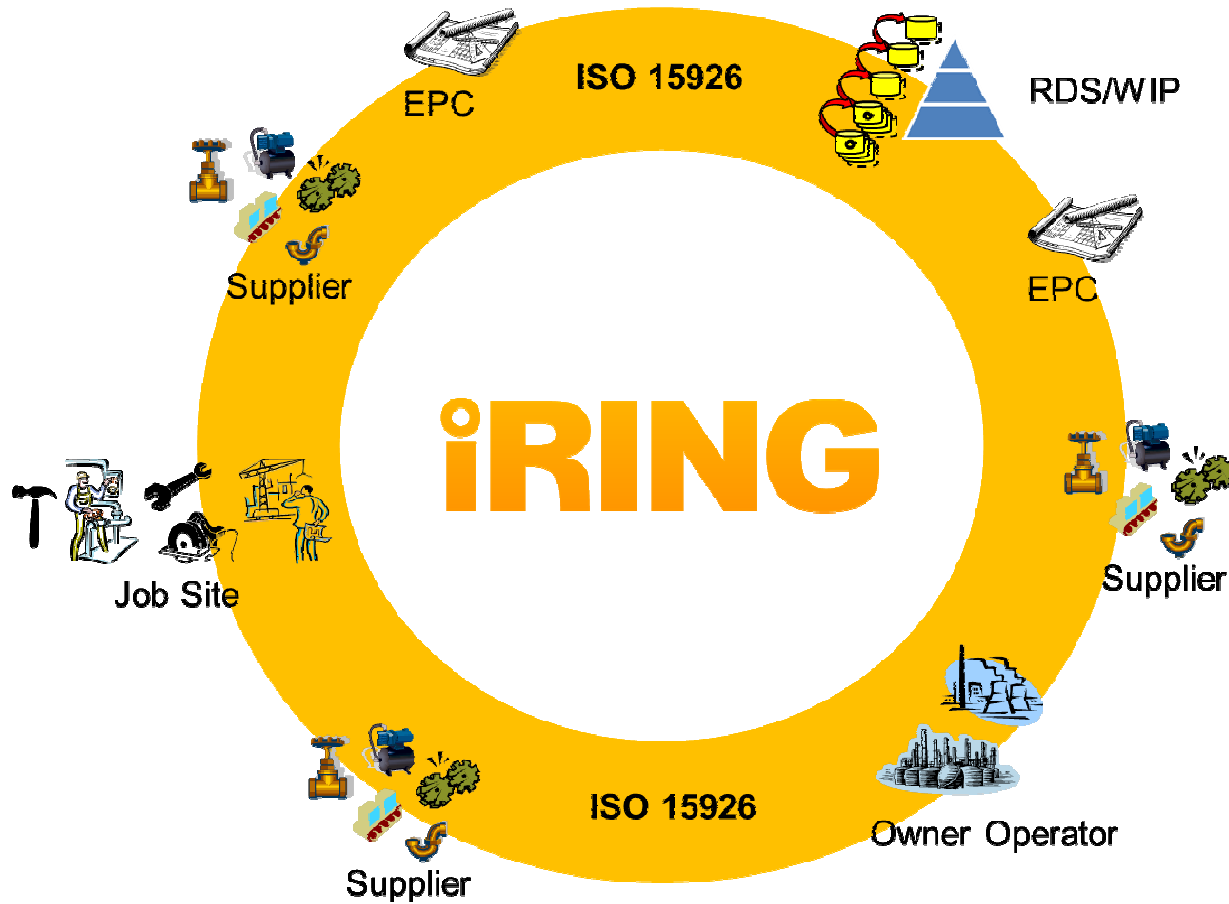


# EqHub - the concept

pre-qualified information delivered once and for all

- Operators contract specifications to reflect EqHub requirement
- Operators aligned with same information requirements
- Information requirements is based on ISO 15926
- EqHub certified information pre-approved by operators
- EqHub is owned and operated by EPIM
- EqHub will use a membership funding model (ref. Achilles)



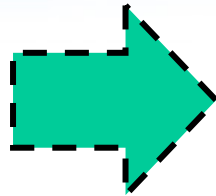


**ISO 15926 Realtime Interoperability Network Grid**

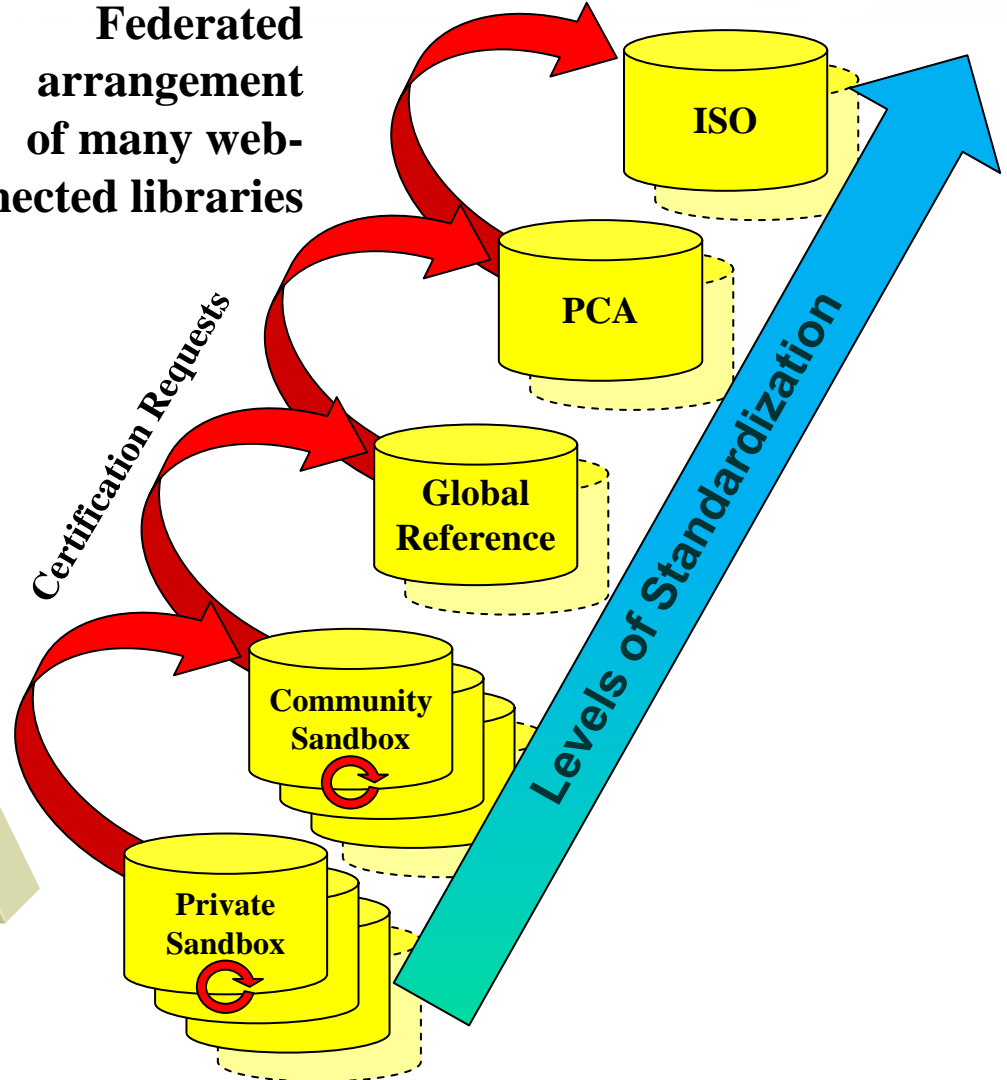
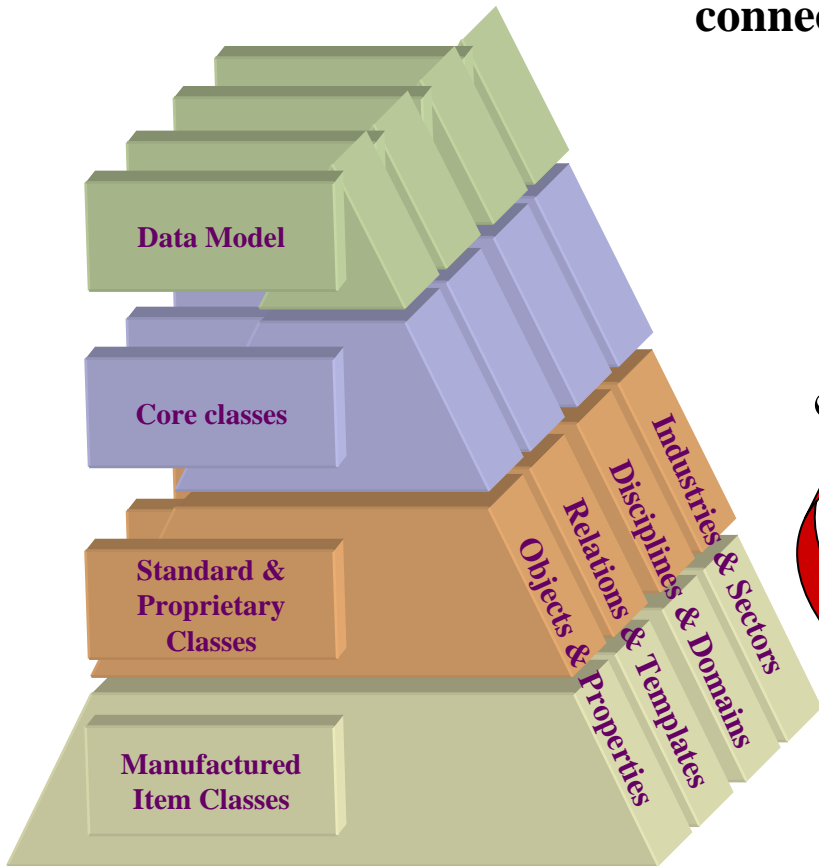
# Joint Operational Reference Data (JORD)

# Reference data architecture

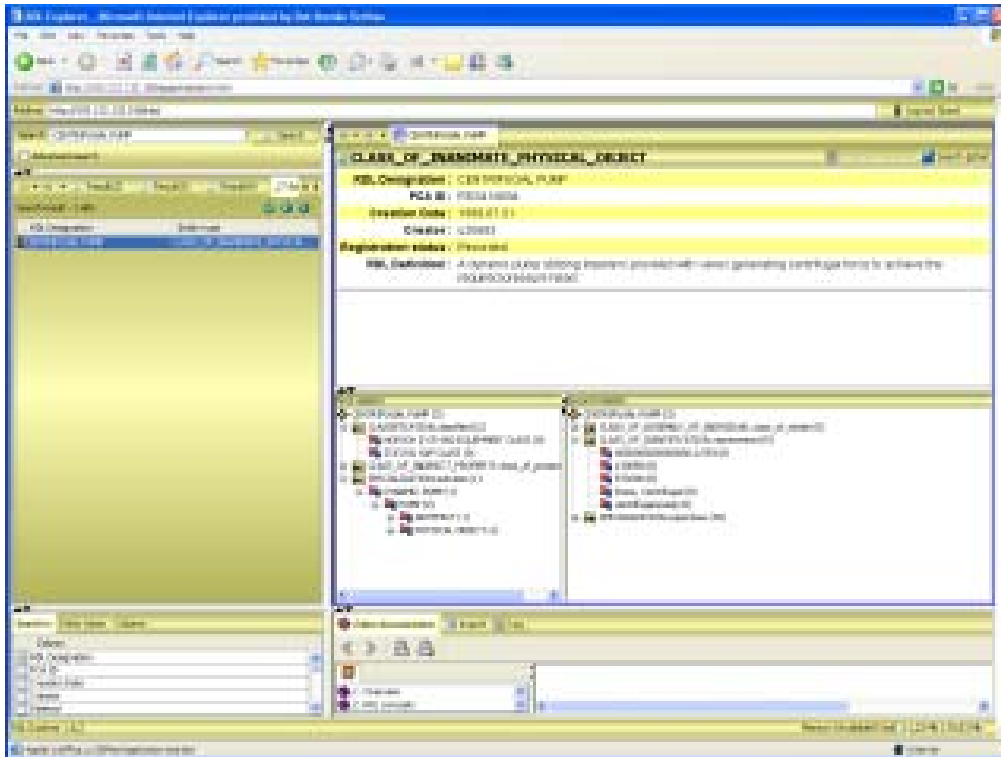
**Logical organization of reference data**



**Federated arrangement of many web-connected libraries**



# Reference Data Library Today



**100s of man-years of content**

**Technology and work  
 professes is not scaling**

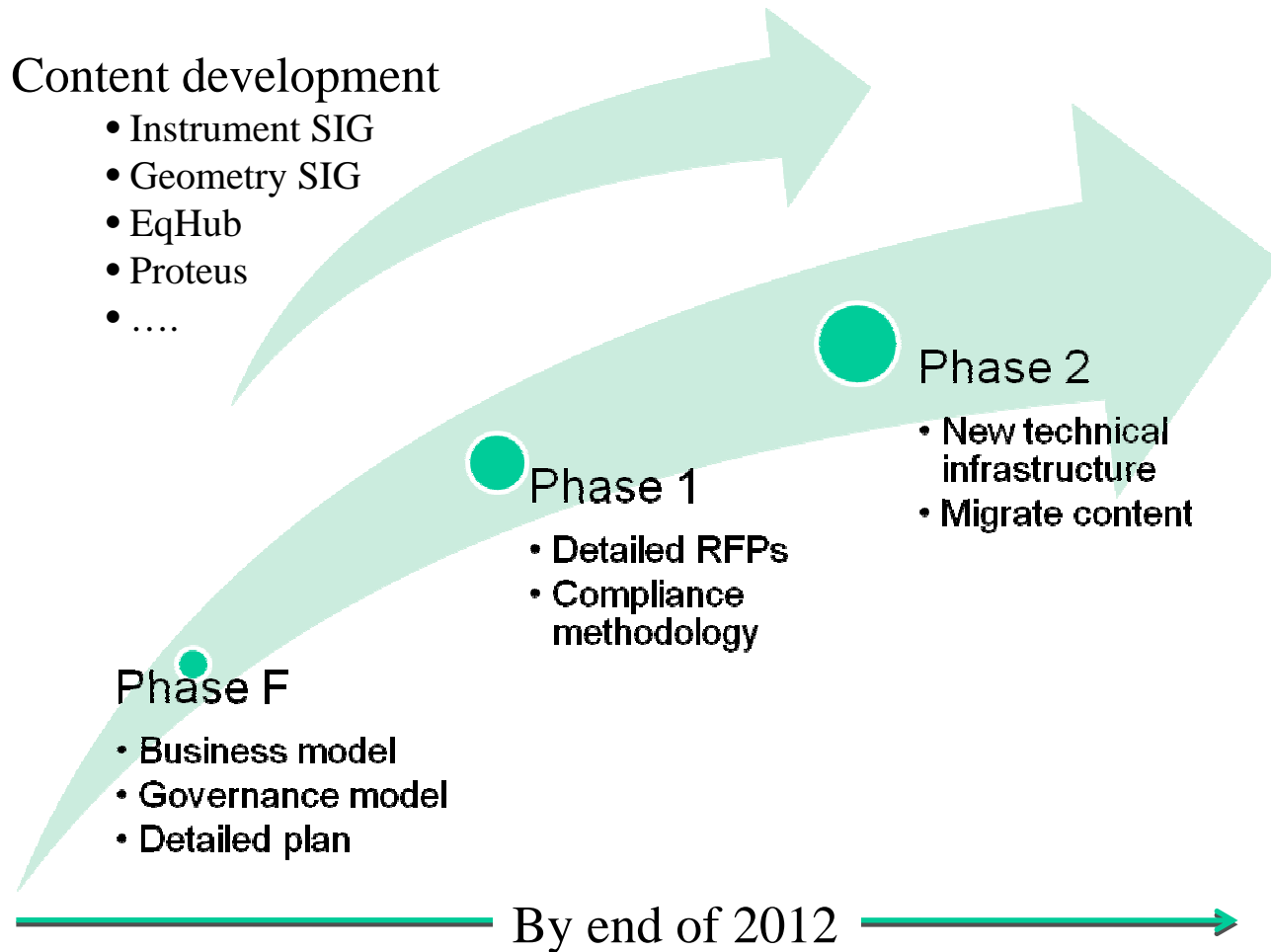
**Tools exist ... but only for  
 modelers**

# JORD Objectives

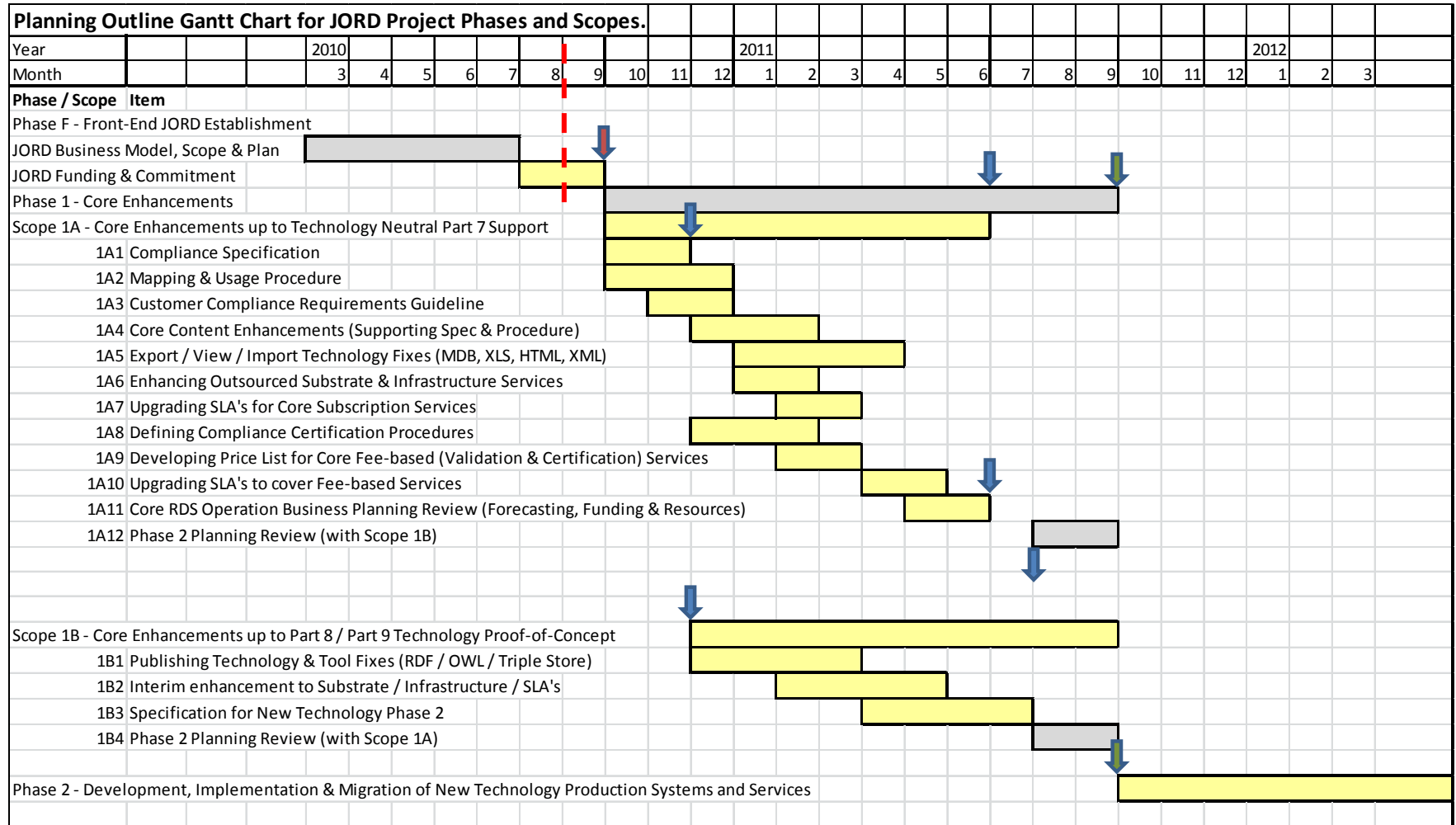
- **Scalable:**
  - Technical infrastructure for 24x7x365 operation, ever-increasing content
  - Critical path no longer dependent on a few specialists
- **Sustainable:**
  - Business model and funding for self-sustaining operation
  - Governance model for long-term viability
- **Validation:**
  - Content validated as consistent
  - Implementations validated as compliant
- **Adoption:**
  - An organization to enable broad uptake of ISO 15926



# JORD Deliverables



# JORD - Planning Schedule



Note - Phase 1 has two scopes 1A (technology-neutral) and 1B (Part 8/9 technology-specific) *in parallel*, for distinct resource and funding priorities.



# JORD Deliverable : Defined Services

| Core Services                       |   |  |
|-------------------------------------|---|--|
| Read / Export Content               | Free to anyone. (Funded by others, below.)            | Primary Service. All references resolvable to unique content, all readable, exportable (Supported formats include Browser UI, MDB, Excel, HTML, XML and RDF/OWL.) Copyright & licensing apply. |
| Core Content Mgmt & Validation      | Available to Subscribers & Sponsors                   | Maintenance and fixes of core content only and testing of proposed changes, etc. (for <i>new</i> domain content, see below).   |
| Support for Users, Projects & SIG's | Available to Subscribers & Sponsors                   | Maintenance of core procedures and support requests concerning use of core content and processes (For <i>new</i> content processing, see below.)   |
| Create / Read / Export new ID's     | Available to Subscribers & Sponsors who are Certified | Registered subscribers to the management services are free to generate new Global ID's for content in their locally managed Libraries / Sandboxes, etc.  |
| Content Write                       | Available to Subscribers & Sponsors who are Certified | Once subscribers achieve a level of certification, they will be able to write content directly (with appropriate meta-data controls on provenance & quality)                                   |
| New Content & Standardization       | Available for additional fees. (Per project / scope.) | Estimated cost per scope - Price list / rates development possible. Will arise from both Commercial Projects and Collaborative "SIG's".  |
| Certification of User Org's & Tools | Available for additional fees. (Per project / scope.) | Estimated cost per scope - Price list / rates development possible. Organized around Compliance Checklist. (Free & self-certifying components)   |
| Training & Related Consulting       | Available for additional fees. (Per project / scope.) | Estimated cost per scope - Price list / rates development possible.  |

Plus, operational support services, business and back-office functions. Other than core 15926 technical & coordination functions – all infrastructure and substrate technologies & services competitively outsourced.

Realizing Open Information Interoperability

# Why Participate?

- If you plan to use ISO 15926, you need a scalable and sustainable Reference Data Service
- You could wait for others to fund it and build it ....  
.... or you could help
- Once the Reference Data Service is in place, each of us gets 100% of the benefit ...  
... but none of us will have paid more than a fraction of the cost
- The broader we share the cost, the faster we each start to see benefits
- Let's capitalize on the momentum that has built

# Join projects open for new participants

- iRING
- Equipment Hub (EqHub)
- Joint Operational Reference Data (JORD)
- Oil and Gas asset management operations and maintenance Interoperability (OGI)

# PCA Special Interest Groups (SIGs)

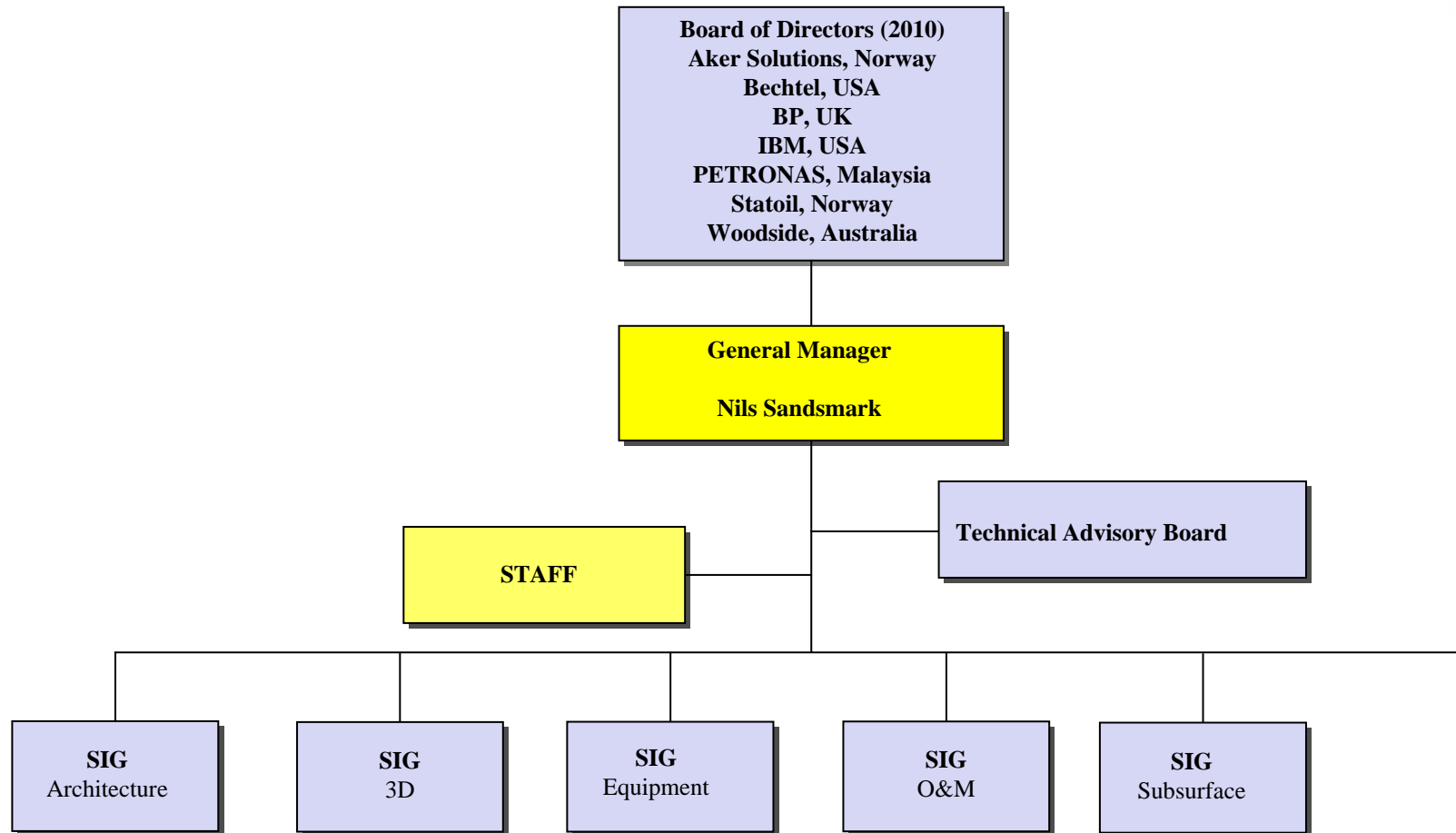


# Special Interest Groups (SIGs) - Mandate

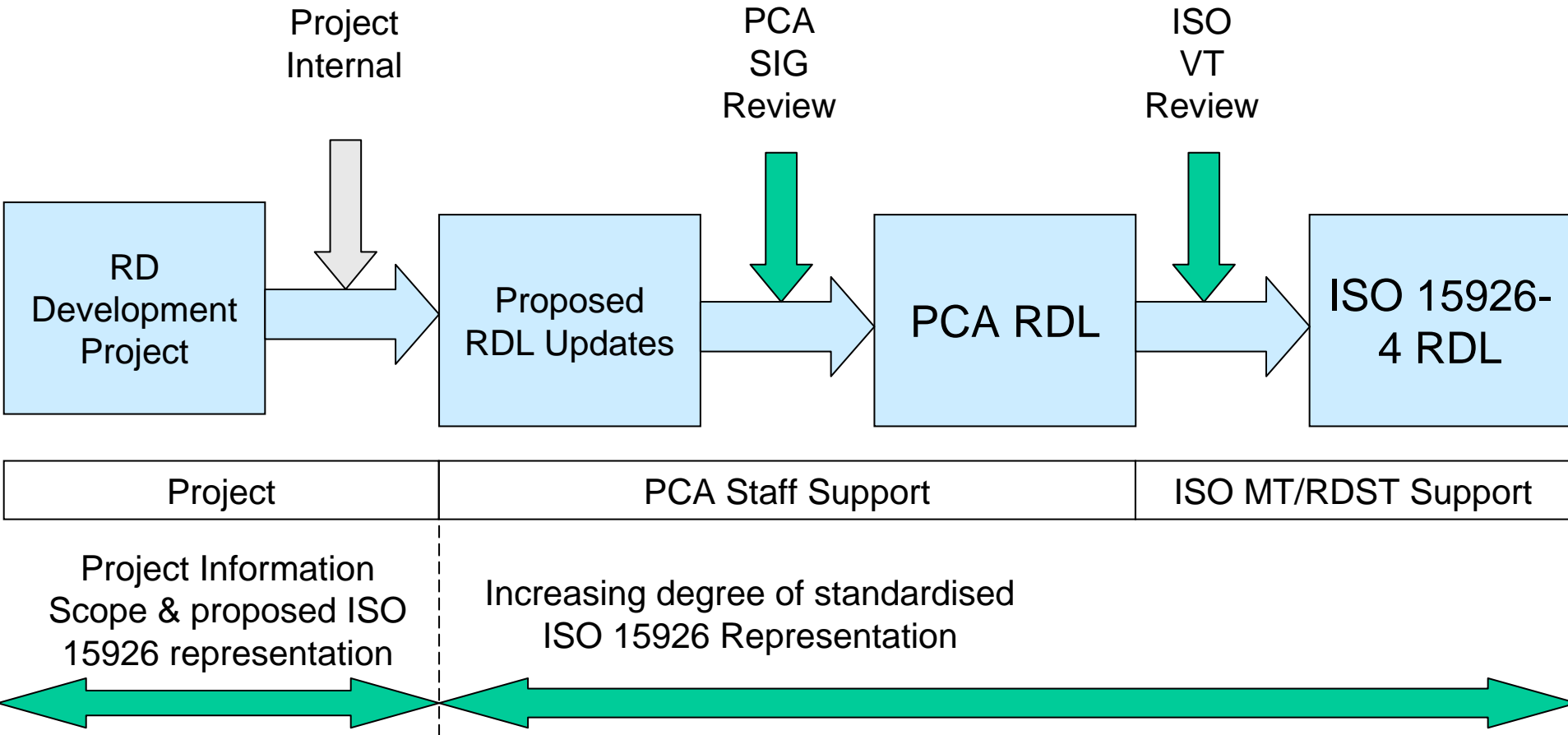
The SIG shall ensure that the industry gets access to reference data of very high quality by contributing to:

- Making recommendation for further enhancement of reference data within its domain
- Quality assurance and formal approval of all changes and enhancement of the RDL within its domain according to ISO procedures, ISO 15926 Parts and PCA's rules and procedures
- Developing and maintaining ISO 15926
- Establishing good dialogue arenas with all interested parties in the industry, in research and educational institutions and the authorities, and to clearly communicate the industry's position on key issues in this field

# PCA's organization



# The Standardisation Process



# Special Interest Groups (SIGs)

Active special interest groups:

- Modeling, Methods, and Technology
  - In co-operation with iRING
- Drilling and Completion
  - In co-operation with EPIM RUF and IOHN
- Production and reservoir
  - In co-operation with EPIM RUF and IOHN
- Operation and Maintenance
  - In co-operation with OpenO&M and IOHN
- Instrument and Control
  - In co-operation with iRING
- Geometry
  - In co-operation with FIATECH and the iRING

More information: <https://www.posccaesar.org/wiki/Sig>

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# Special Interest Groups (SIGs)

Planned special interest groups:

- Standard equipment SIGs in addition to Instrument and Control
  - Rotating equipment
  - Electrical
  - Etc.
- IT architecture
- UIDs and RFID
- Environment
  
- PCA is open for co-operation



## Summary

- Industry recognition of the dependency on Reference Data is growing
- ISO 15926 is ready – All key parts are in place and tested
- The standard is implemented by a number of software vendor and have been use by many Owners/Operators, EPCs and Suppliers
- Co-operation is necessary in order to accelerate the work