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MIMOSA

IT Architecture SIG

Stavanger 2013-05-27

Frode Myren, DE, IBM

Tore Christiansen, Technical Advisor, POSC Caesar Association

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Agenda

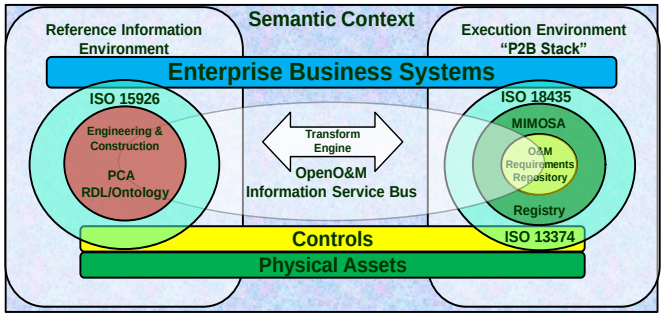
- **Background for the SIG**
- **The architecture**
  - framework
  - dimensions
  - reference models
  - application examples
- **Summary and next steps**

Background for the SIG

- Joint SIG between MIMOSA and POSC Caesar
- Key stakeholders:
- Alan Johnston, MIMOSA
- Cliff Pedersen, MIMOSA
- Nils Sandsmark, PCA
- Thore Langeland, PCA
- Aim to complete and issue a first version this year

Mandate Purpose

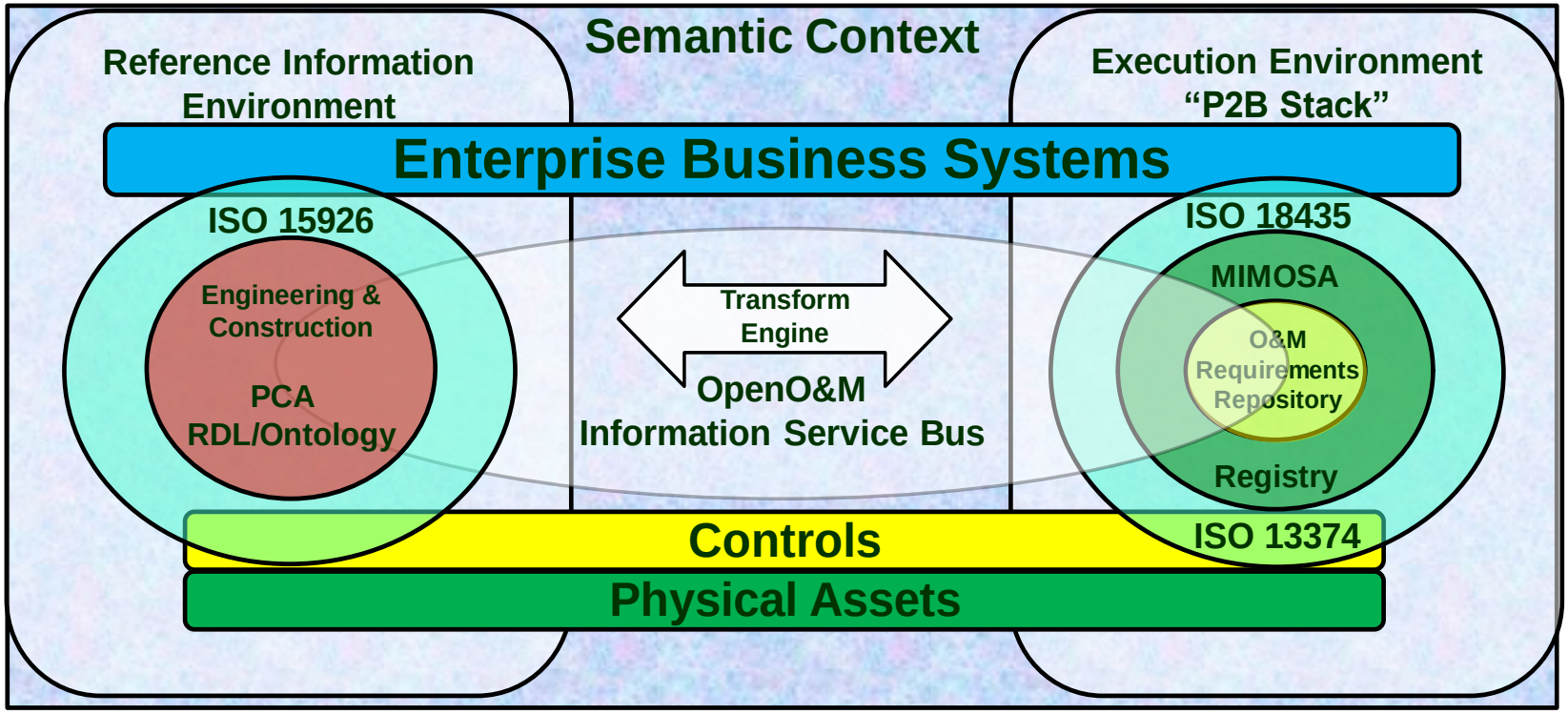
- **Harvest IT architecture**
  - At logical level, with examples of possible implementation architectures
  - Including information access
  - In alignment with jointly developed top-level architecture based on PERA
  - In collaboration with Joint O&M SIG and other appropriate parties



- **Communicate how PCA Ontology/PCA RDL, MIMOSA, OpenO&M and other standards are being used and interlinked**

- **Ensure industry relevance**

Context for Collaboration



ISO TC 184/WG 6

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Relationship to other SIGs and broader community

- **Operations and Maintenance SIG –**
  Chair: Markus Stumptner, Uni South Australia
- **Instrument and equipment SIG –**
  Chair: Ravindra Grampurohit, Emerson
- **MMT Models, Methods and Tools SIG –**
  Chair: Lillian Hella, PCA
- **Relevant best practice patterns in the broader community**

Deliverables

Link up to projects where more detailed work is done
Contribute based on shared interests

Past ITA patterns

Future ITA patterns

Statoil?

NWR?

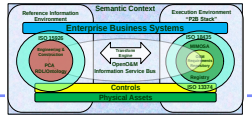
EPIM?

PCA SIGs?

OpenO&M SIGs?

Joint O&M SIG

Joint ITA SIG



time

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ARCHITECTURE

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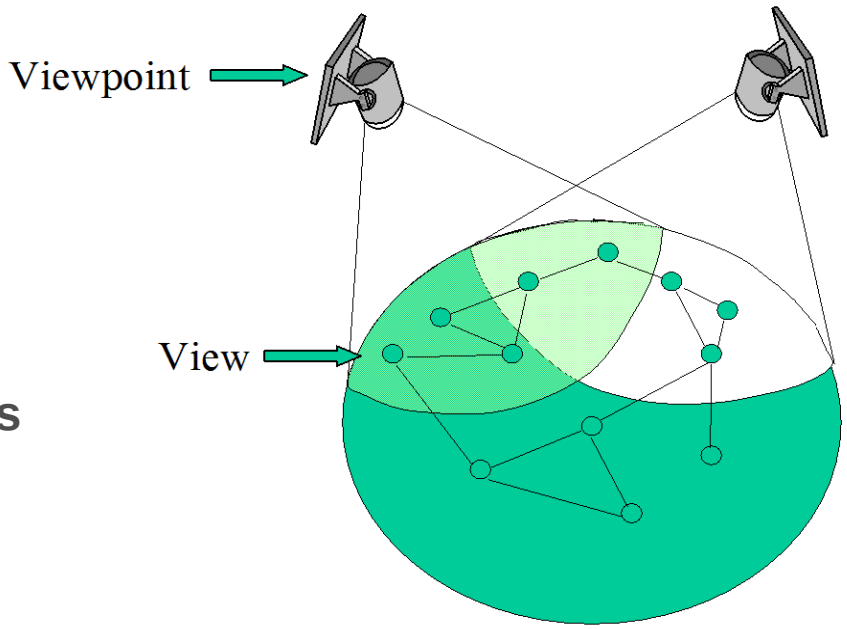
Architecture: The purpose and motivation

- Enterprise systems have to meet requirements of many different types
- The functionality needed from a business perspective
- The knowledge needed to deliver the functionality
- The technology needed to “operate the knowledge”
- and thus meet the business objective

- It is difficult to keep everything in focus, and too many system architectures are only about technology
- How can architecture help create systems that better meet their requirements throughout the entire system life-cycle?

The architecture framework

- Architecture Dimensions
- Defining the context, content and configuration
- Operational Environments
- Creating the various requirements
- Reference Models
- Describing the chosen solutions



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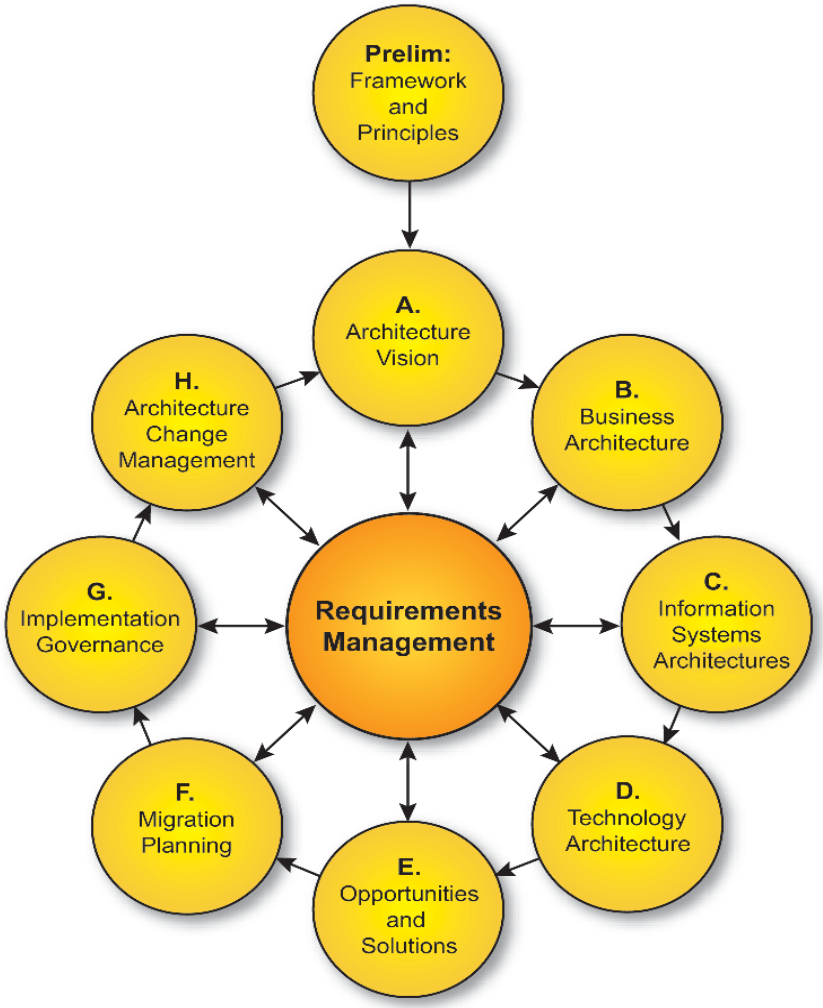
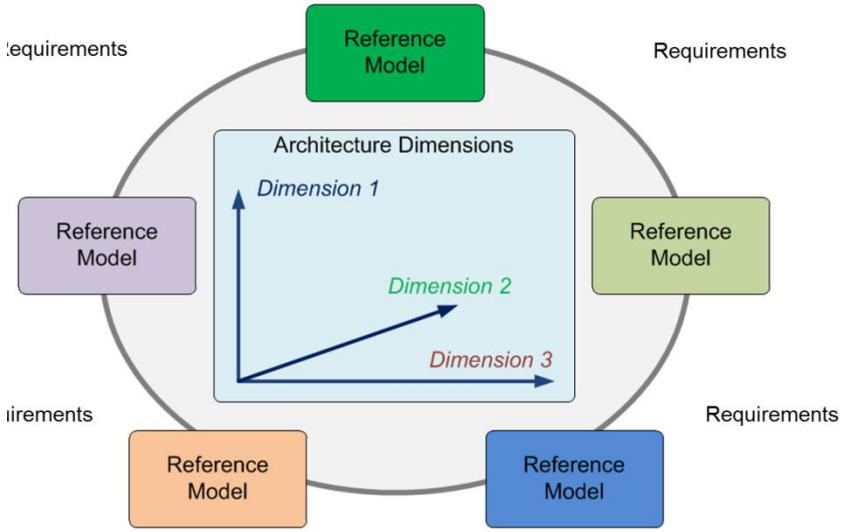
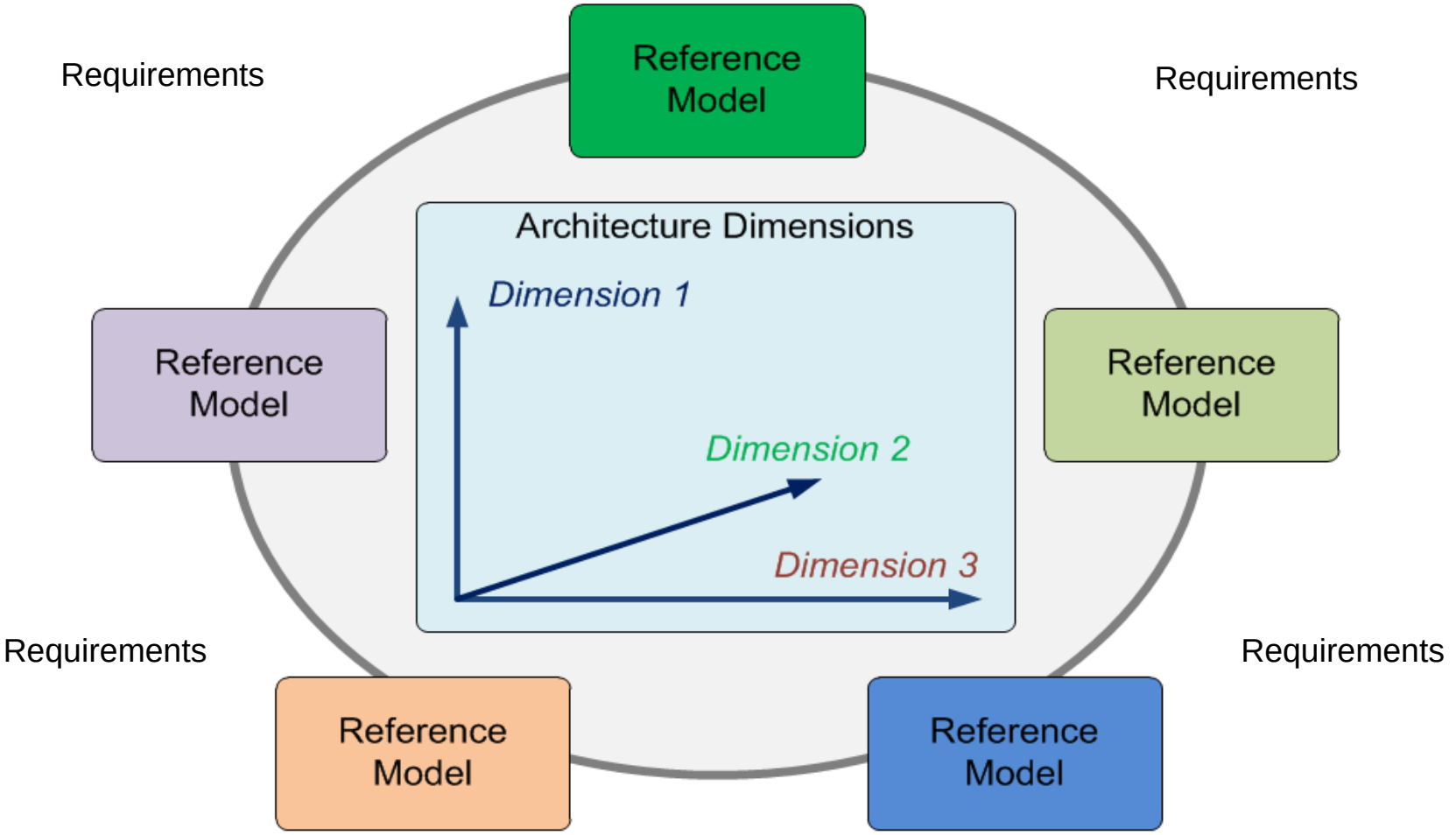
TOGAF Architecture Development Method



PCA-MIMOSA Architecture Framework

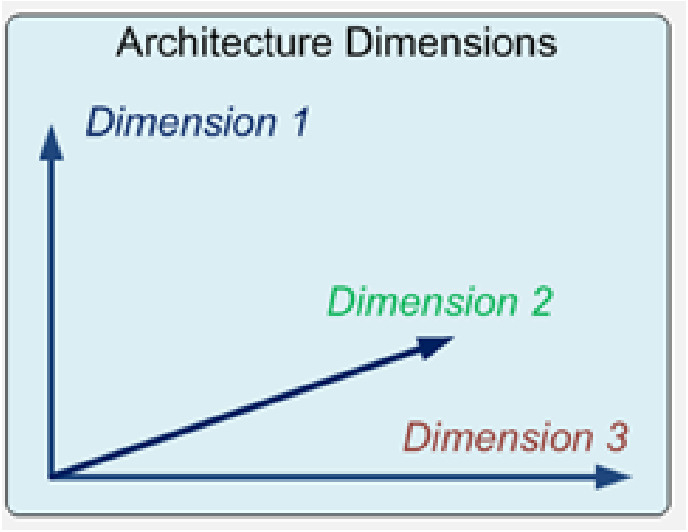


PCA-MIMOSA Architecture Framework



Architecture: The dimensions

- The Business Context Dimension
- The Technology Configuration Dimension
- The Knowledge Content Dimension



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Architecture: The Business Context Dimension

- "Why is the system there in the first place"
- A lifecycle view of system operation
- PISTEP lifecycle model
- Engineering and Process value chain
- Control and Procurement supply chain
- Scoping of information lifecycle management

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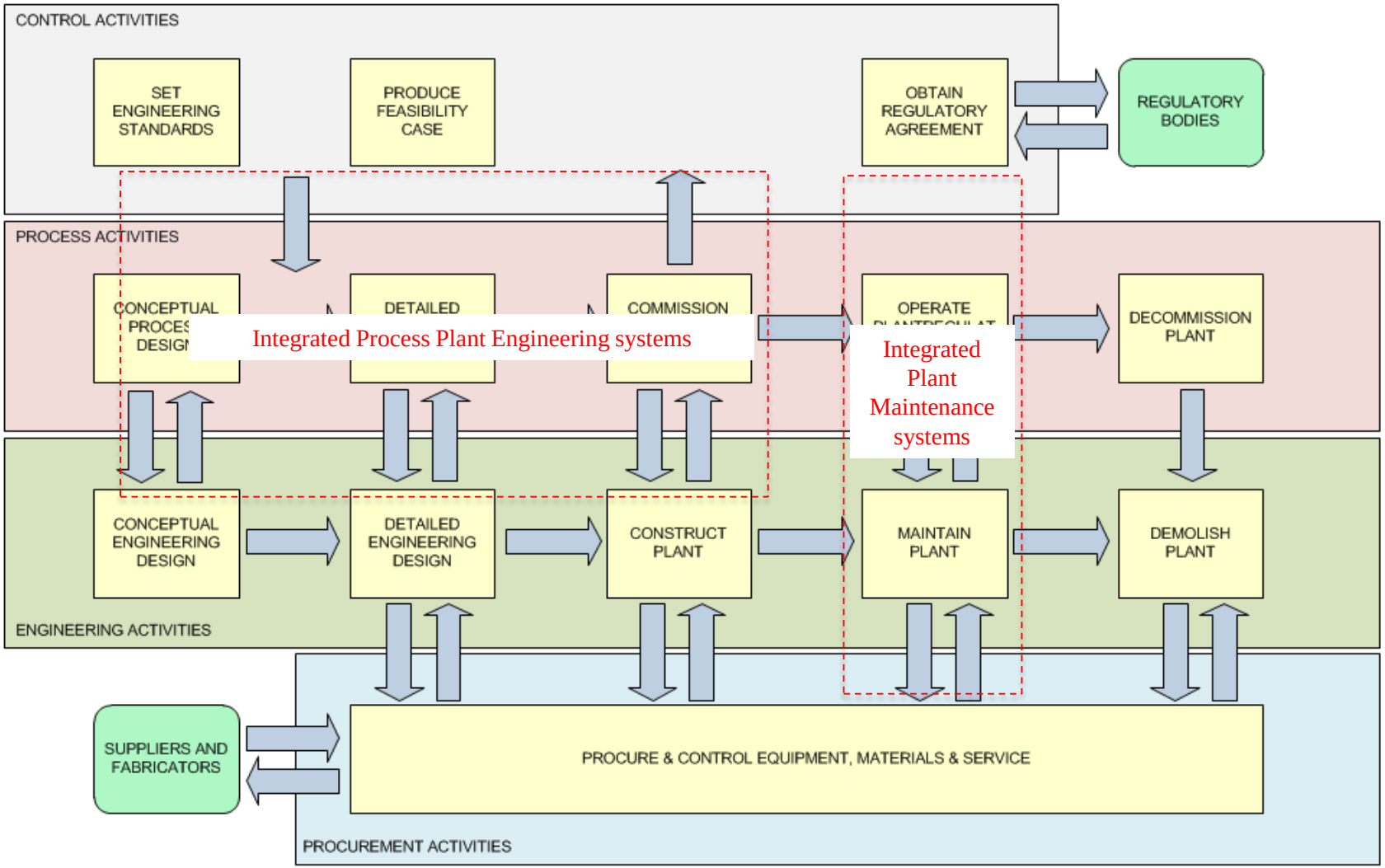
PCA-MIMOSA Business Context Dimension



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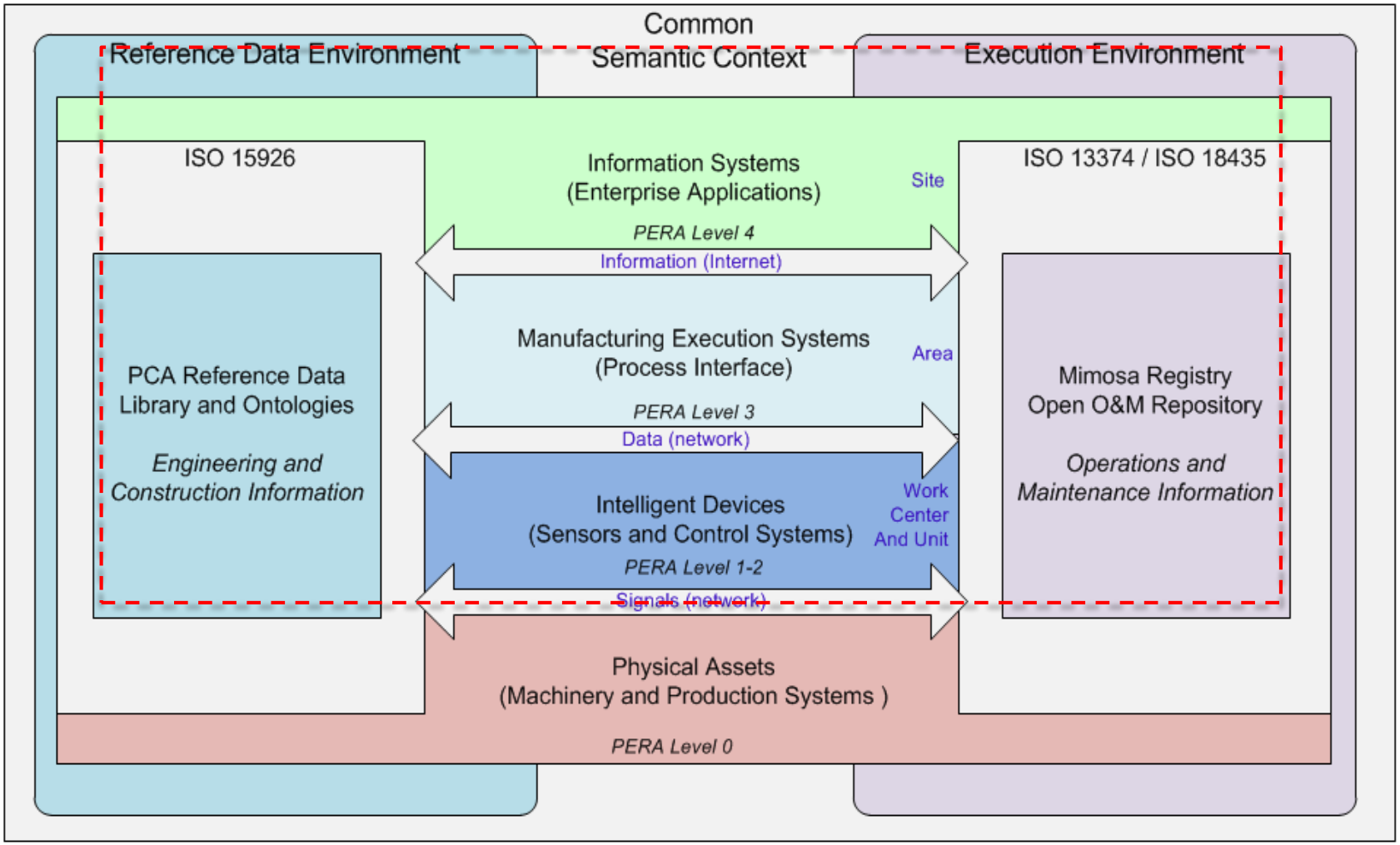
Architecture: The Technology Configuration Dimension

- "How is the system layered and populated"
- A topological view of system structure
- Purdue Enterprise Reference Architecture
- Physical environment and production system
- Intelligent devices, manufacturing control
- Enterprise applications

PCA-MIMOSA Technology Configuration Dimension



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Architecture: The Knowledge Content Dimension

- "What does the system know"
- A topical view of domain knowledge
- Application domain specific terms
- ISO 15926 Data Model
- PCA Reference Data Classes
- MIMOSA Reference Terms and Models

PCA-MIMOSA Knowledge Content Dimension

Domain Specific Nomenclatures

Health, Safety & Environment

Reference Data for Oil & Gas applications

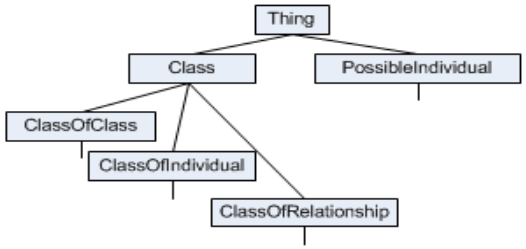
Drilling & Completion

Reservoir & Production

Operations & Maintenance

Logistics & Transportation

ISO 15926 Data Model

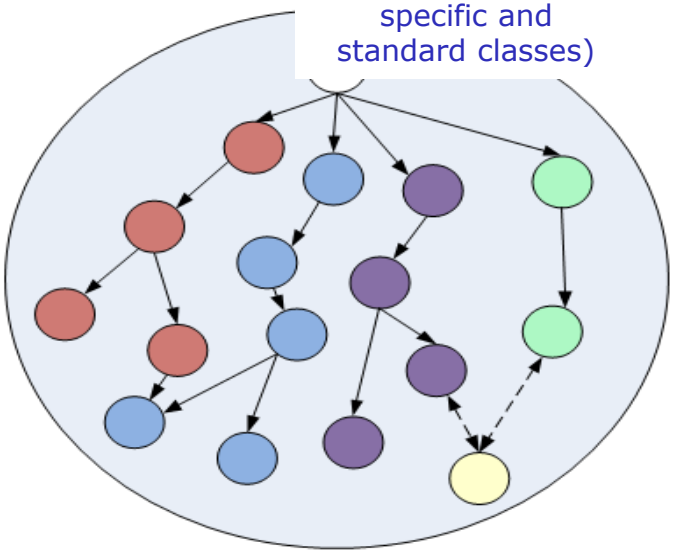


Structure and add to PCA Reference Data Library (RDL)

Determine entity type

PCA (Oil & Gas & Process Industry Ontologies and Refe

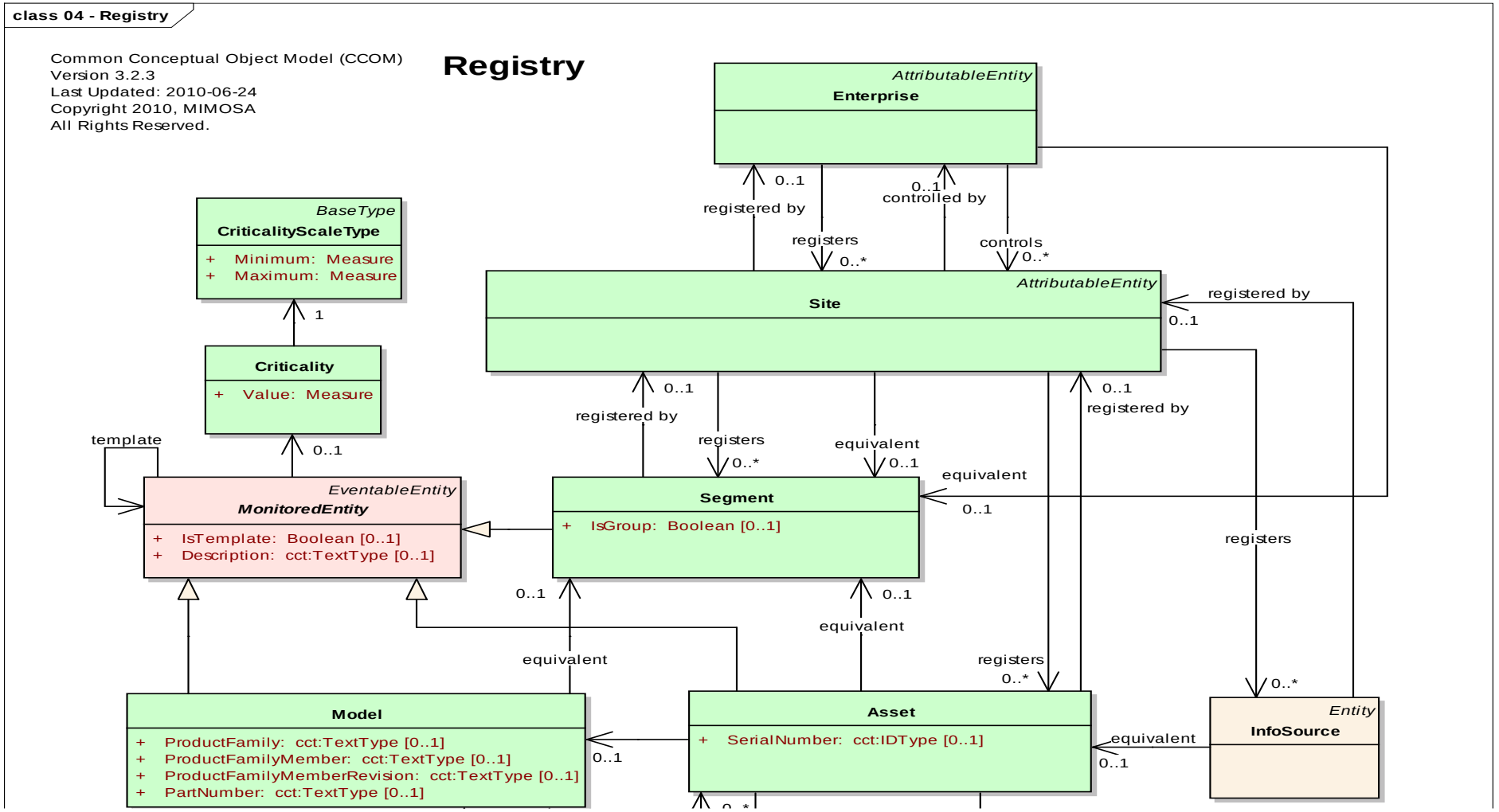
Production Control Ontology (relationships between domain specific and standard classes)



Determine specialization and other relationships

Need to interoperate and integrate with MIMOSA CCOM

MIMOSA Common Conceptual Object Model (CCOM)



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The reference models

- **Stakeholder Agreements**
  Business Model, revenue & cost, interests, behavior

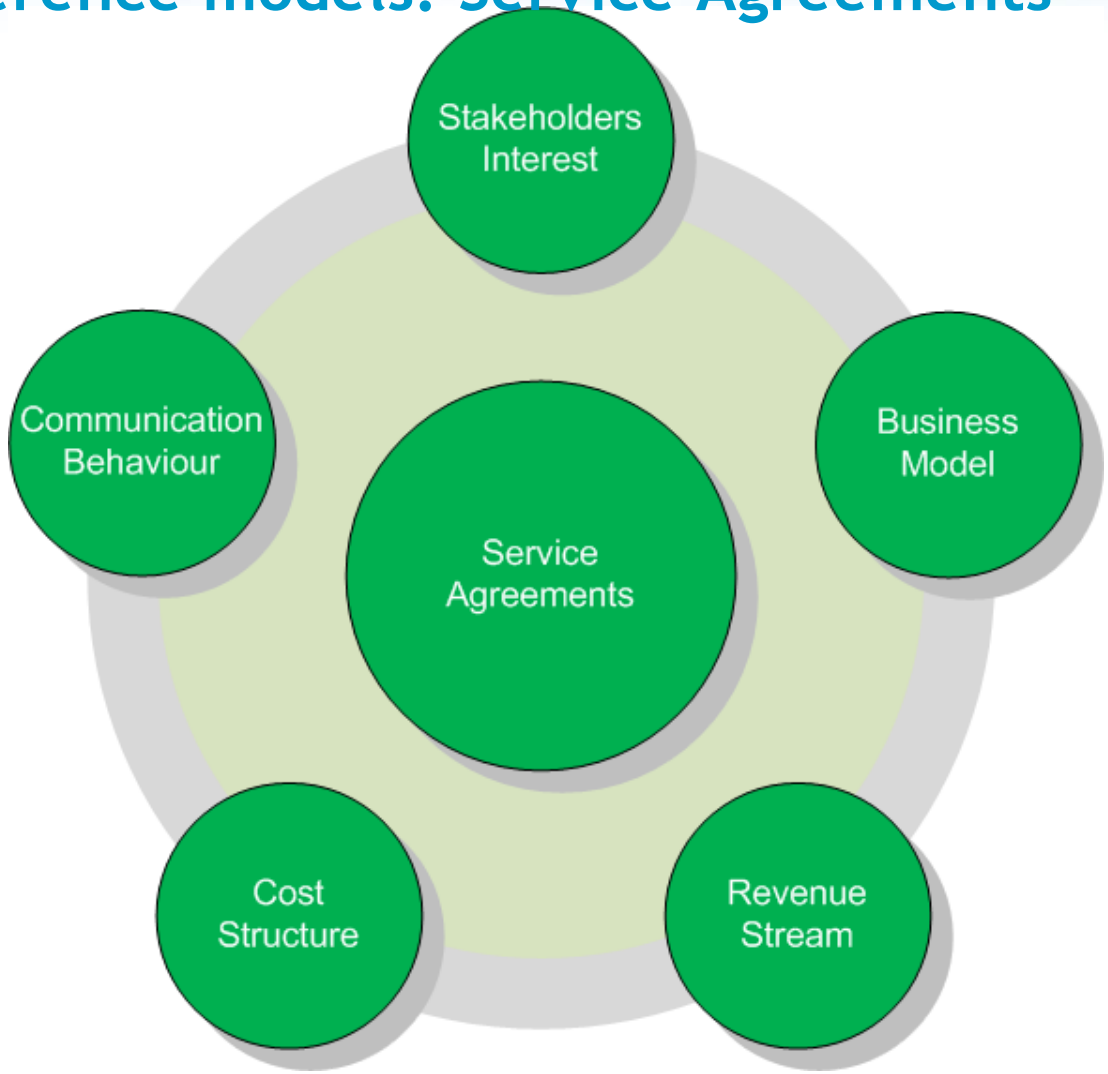
- **Systems Engineering**
  Control, manufacturing and information system configuration

- **Software Integration**
  Platform, programming paradigm, integration, storage

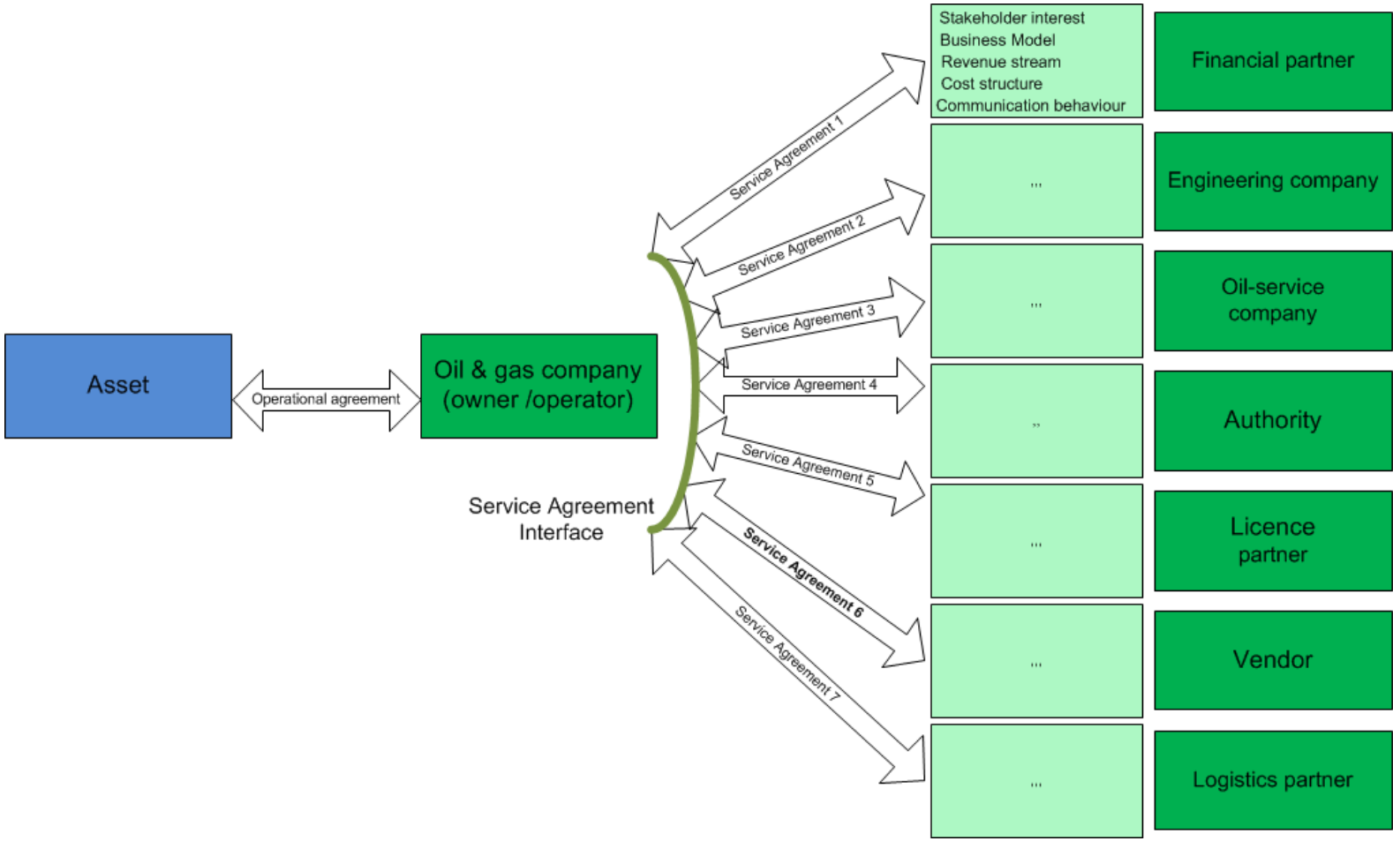
- **Semantic Ontology**
  Domain and scope, model paradigm and constructs

- **Standards Usage**
  Representation, meta-data, data quality and security, ref. data

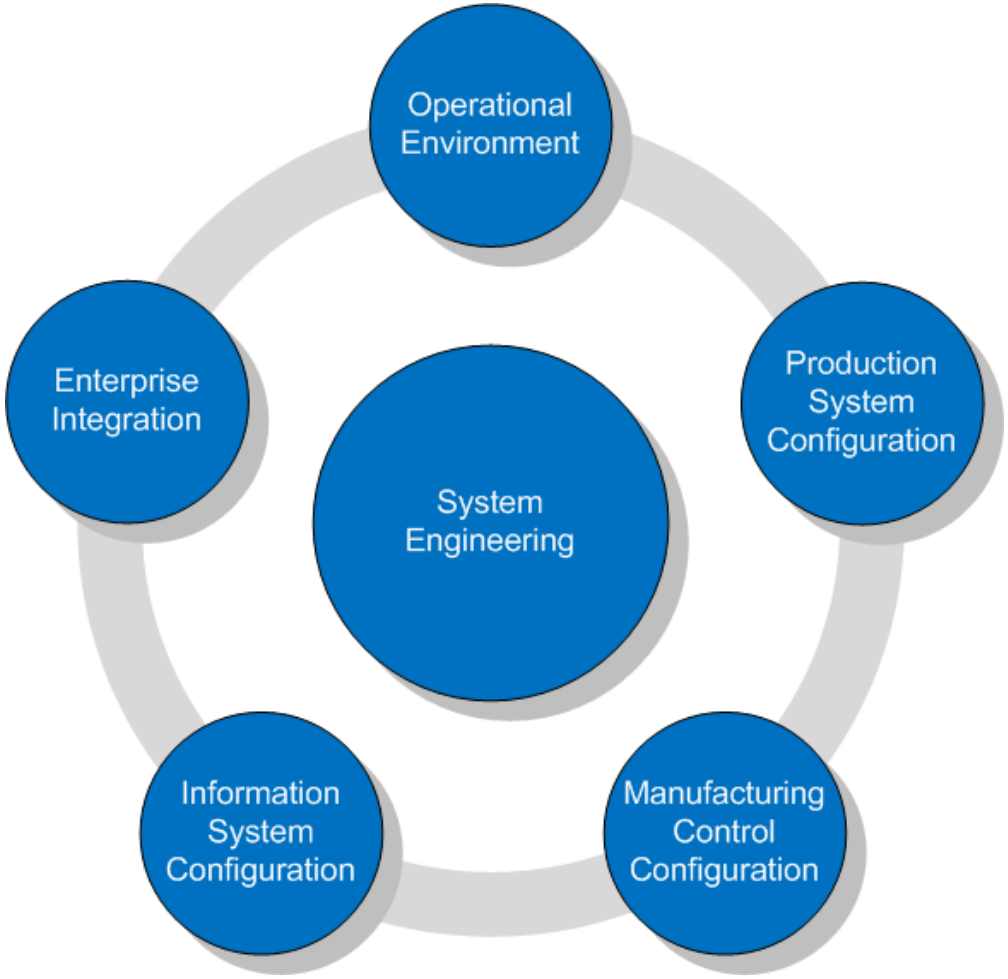
The reference models: Service Agreements



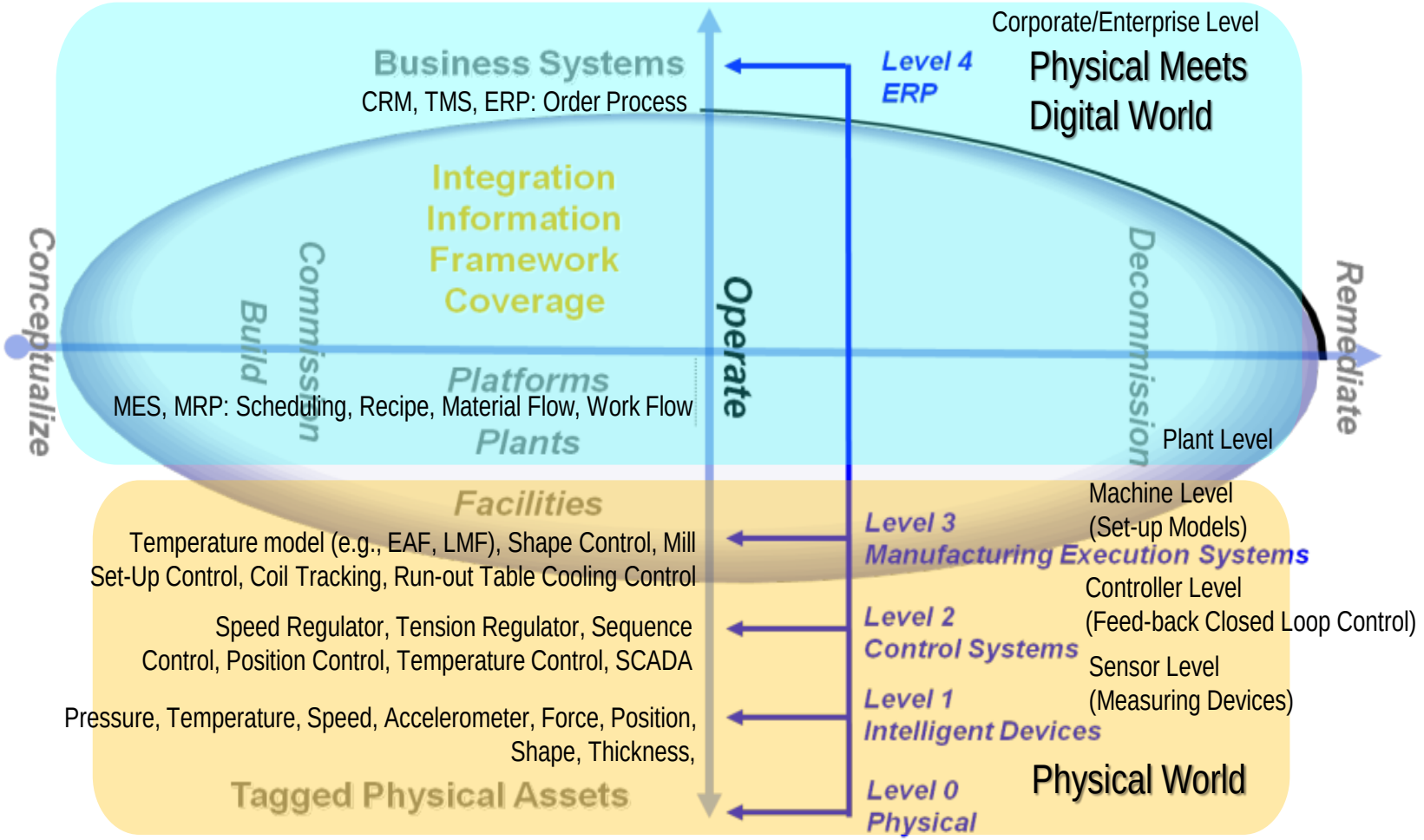
The reference models: Service Agreements – example



The reference models: Systems Engineering



The reference models: Systems Engineering - example



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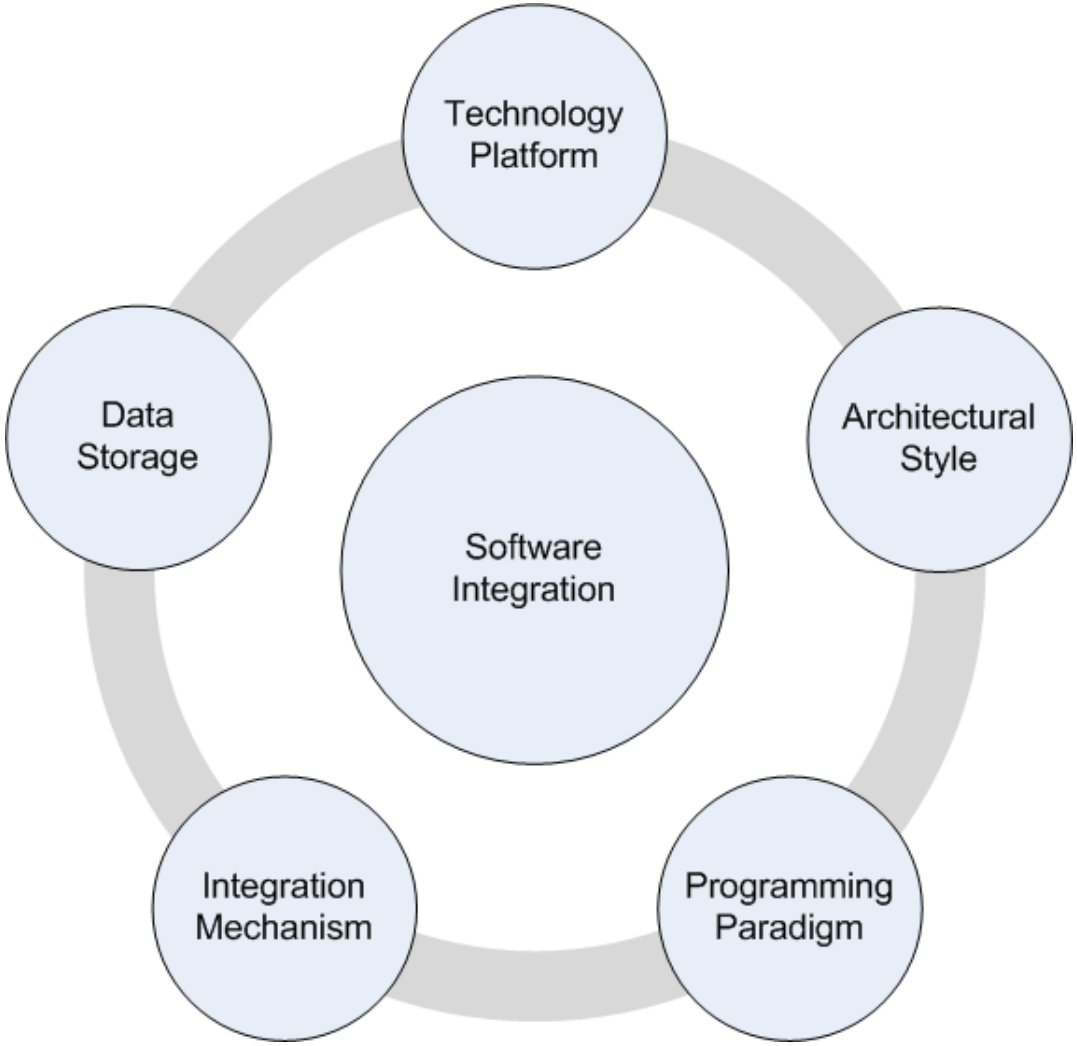
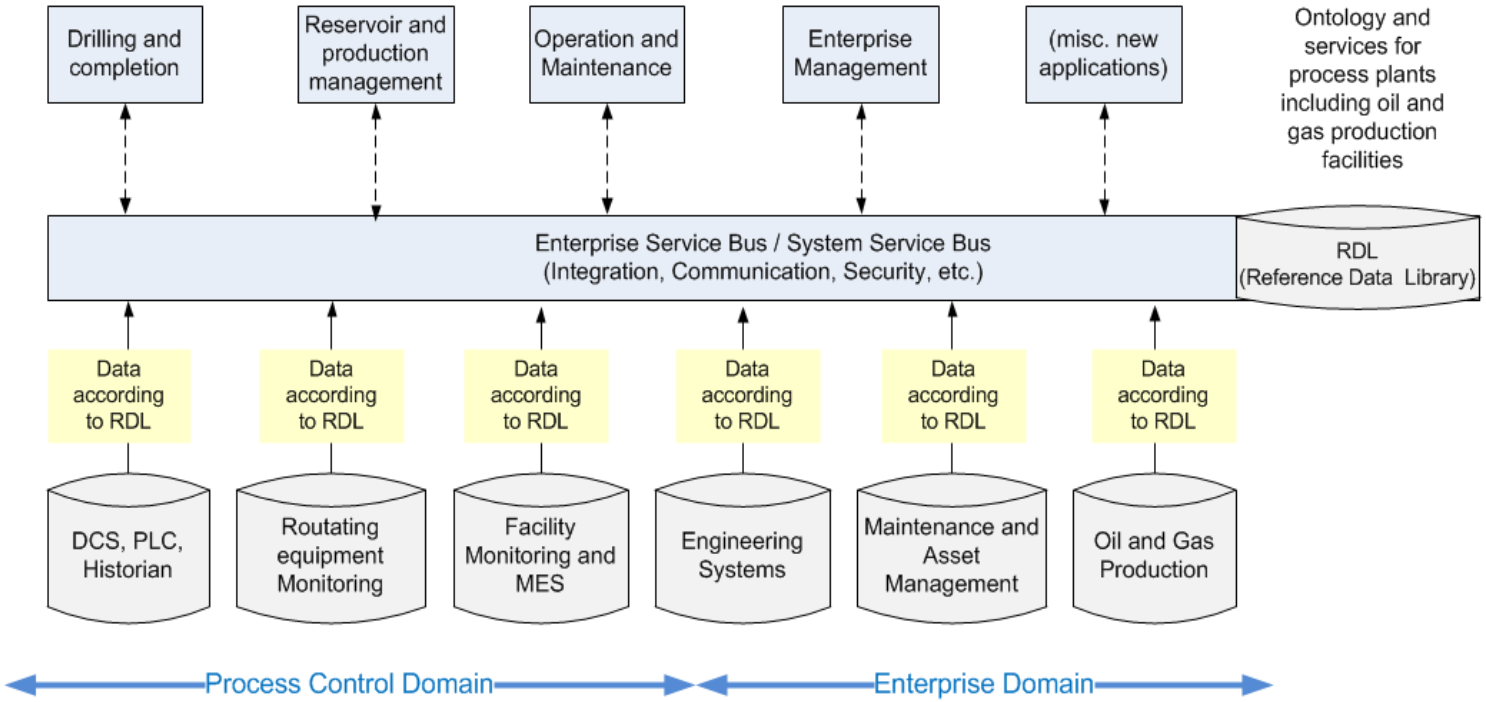
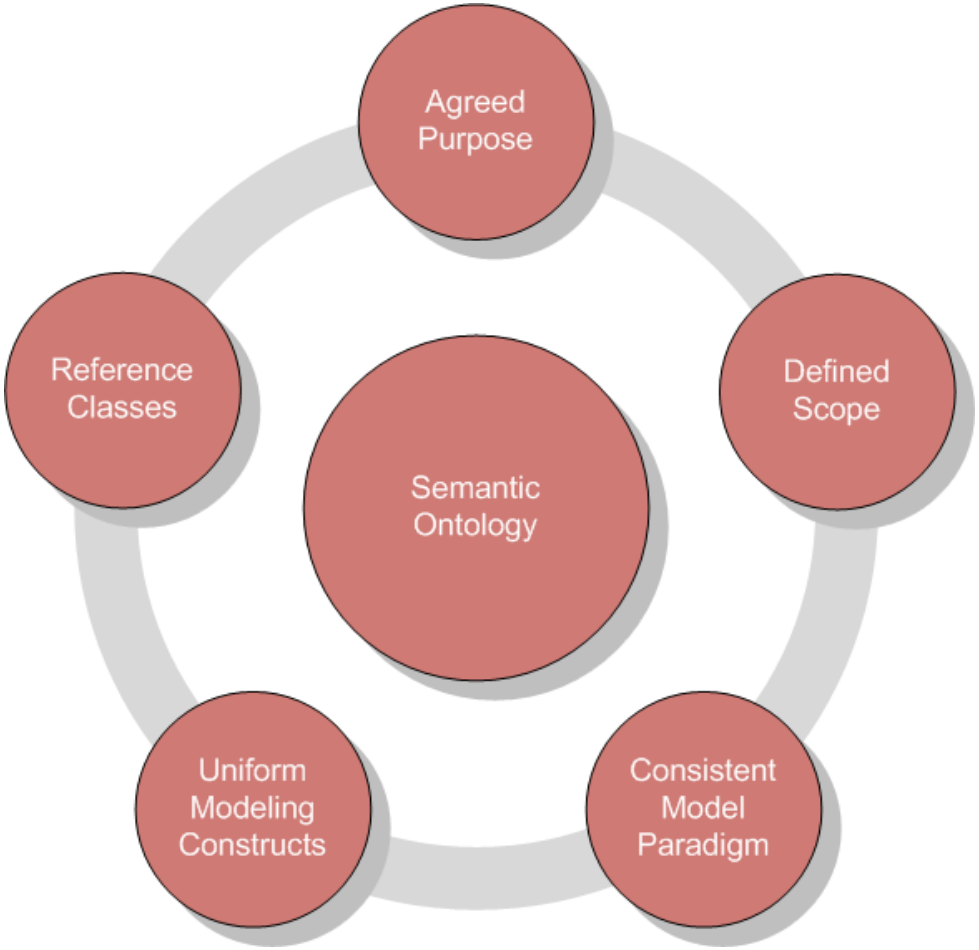
The reference models: Software Integration



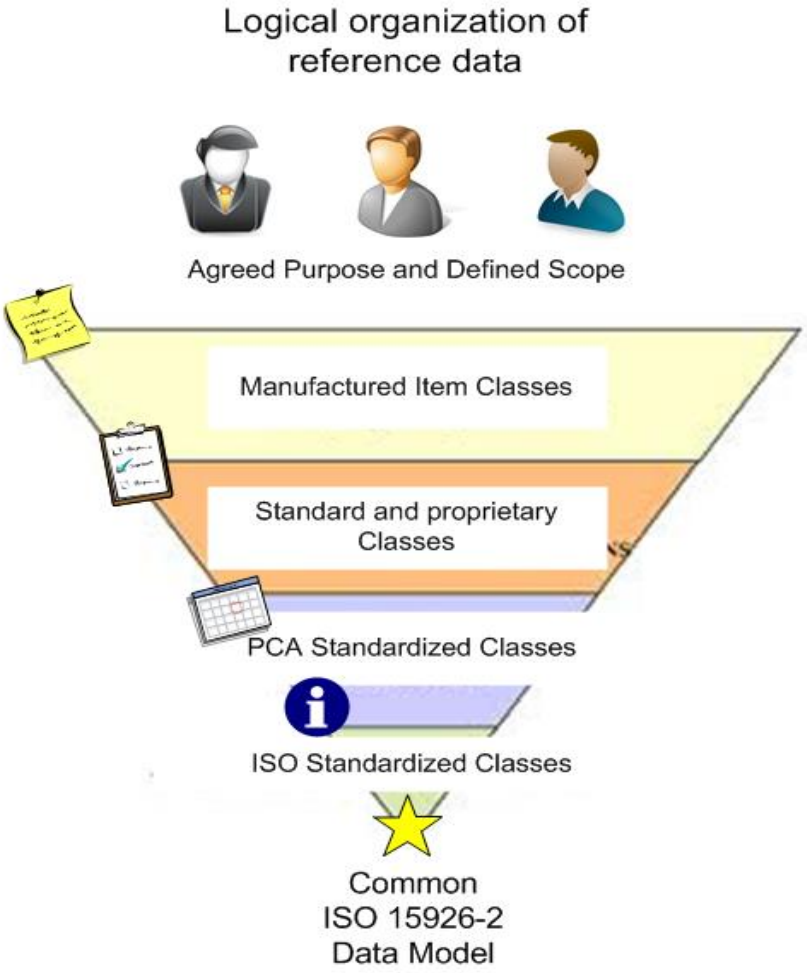
The reference models: Software Integration -example

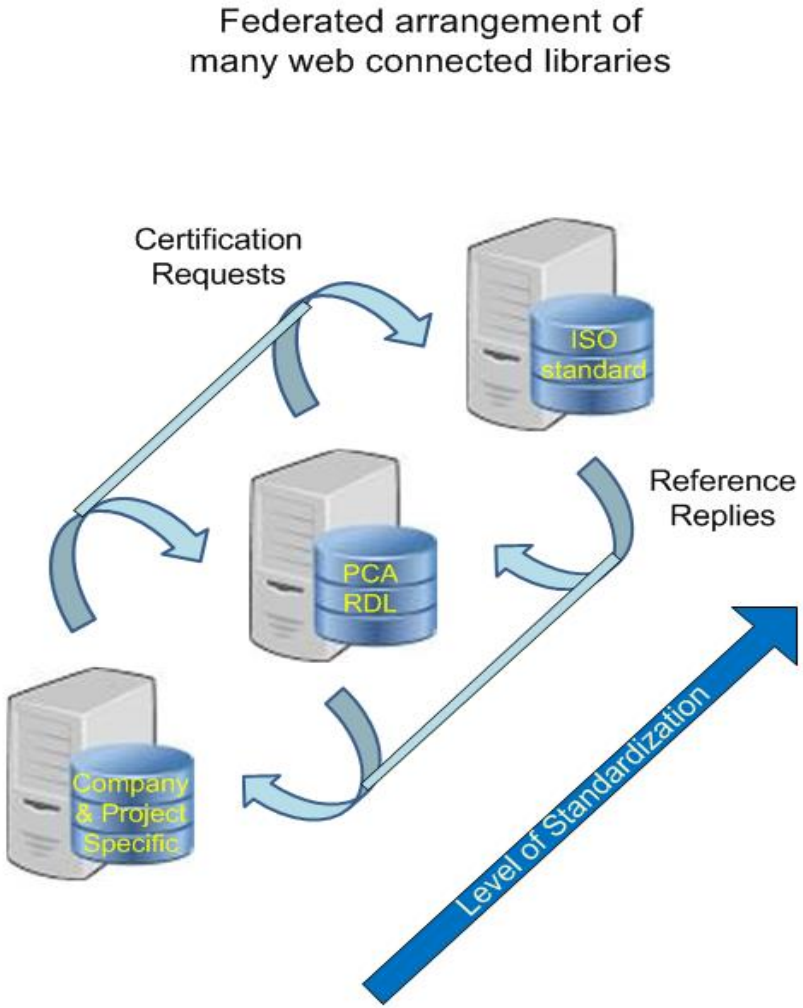


The reference models: Semantic Ontology



The reference models: Semantic Ontology - example





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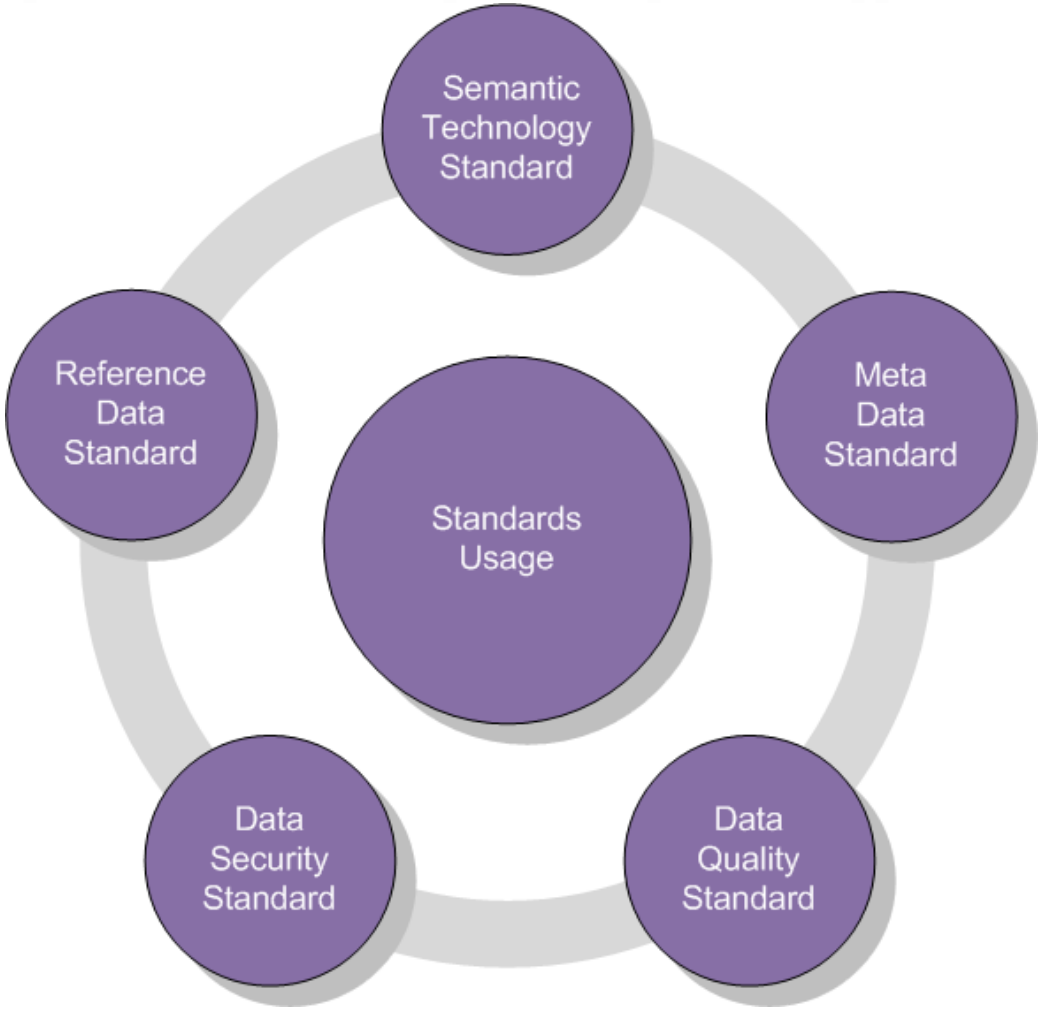
The reference models: Standards Usage



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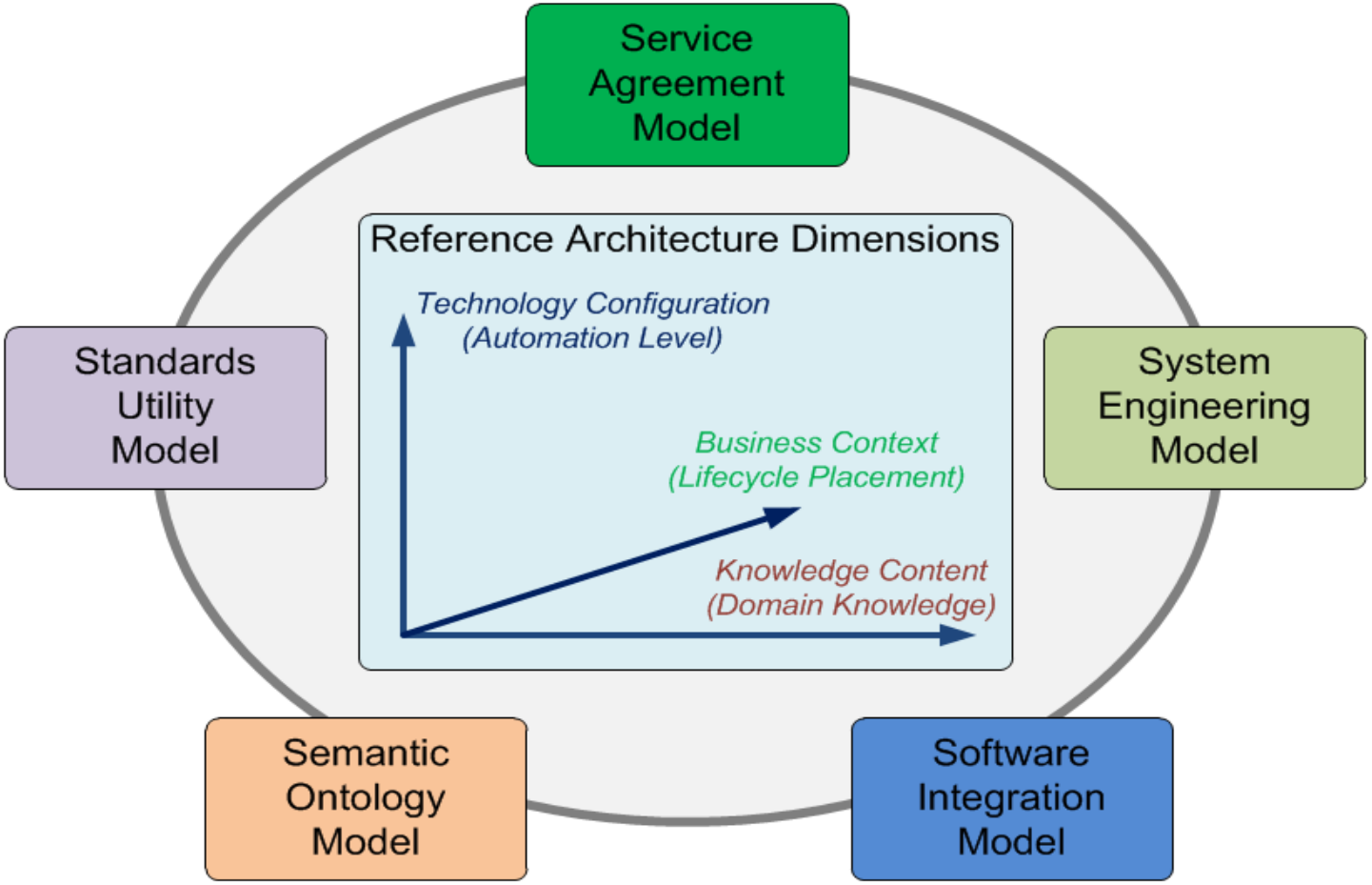
PCA-MIMOSA Reference Architecture Framework



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THE ARCHITECTURE APPLICATION EXAMPLES

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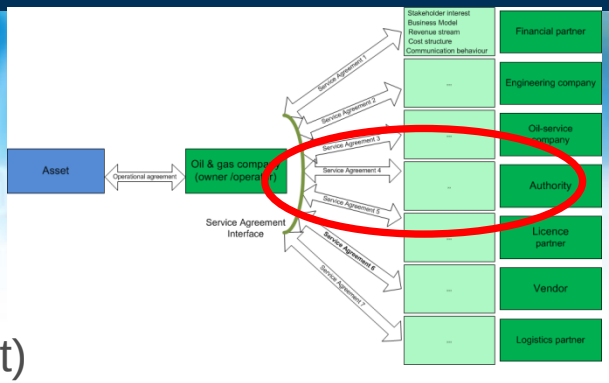
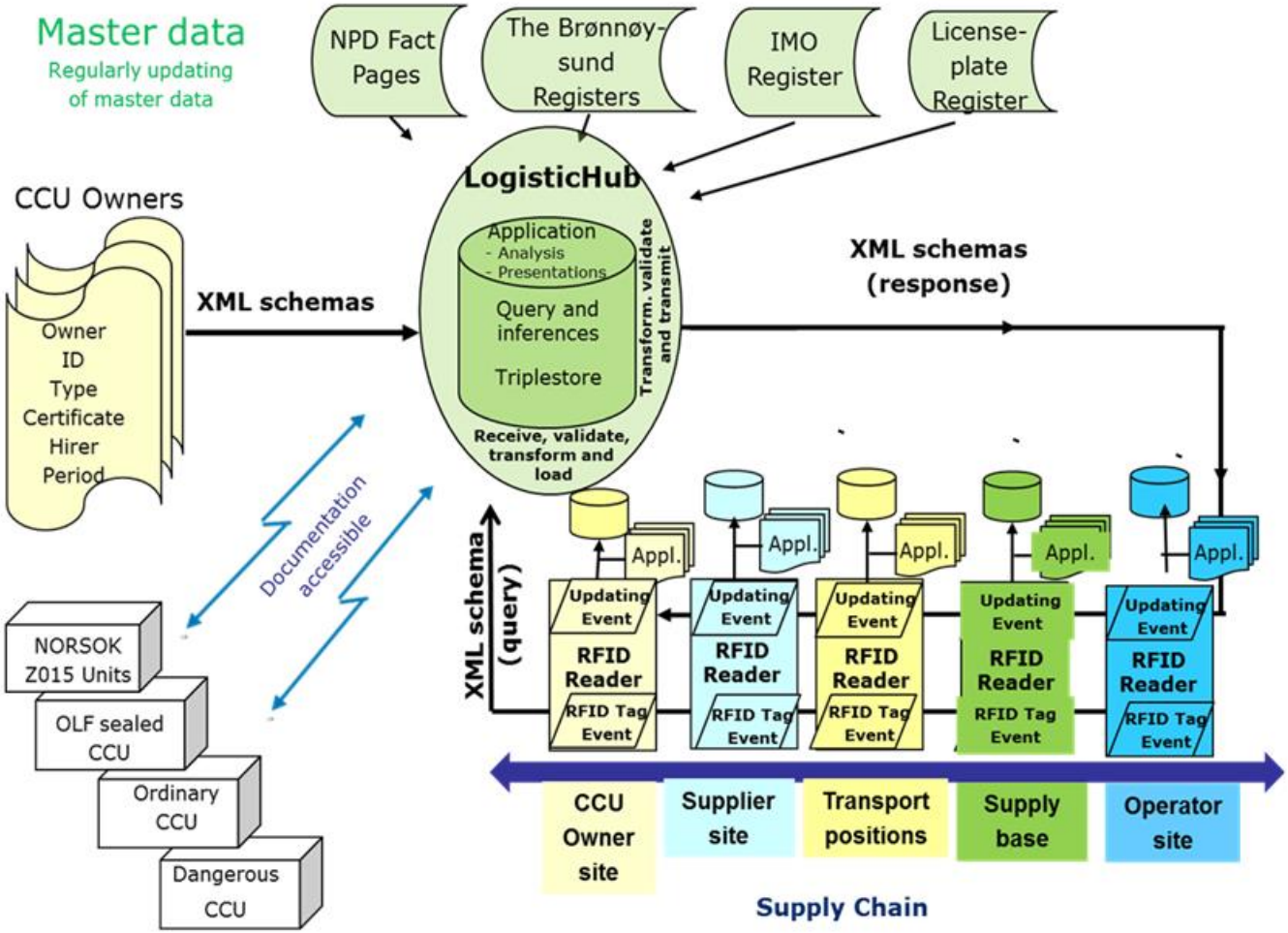
Application example: LogisticsHub



- EPIM (Exploration & Production Information Management)
- EPIM managed hub for tracking information about Cargo Carrying Units for the Norwegian offshore oil & gas industry
- Content and structure of terminology/ontology according to ISO 15926
- Transportation event model with defined activities aligned with (a subset of) EPC Global GS1
- Based on Semantic technology, ISO standards and W3C recommendations
- Database is an RDF triplestore with management and queries operations based on SPARQL
- Simple GUI for administration, analysis and reporting

EPIM Logistics Tracking

Application example



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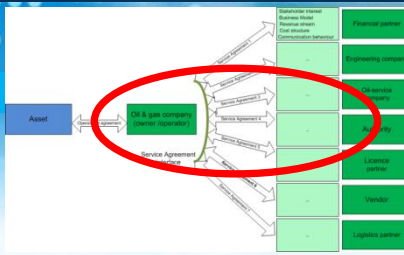
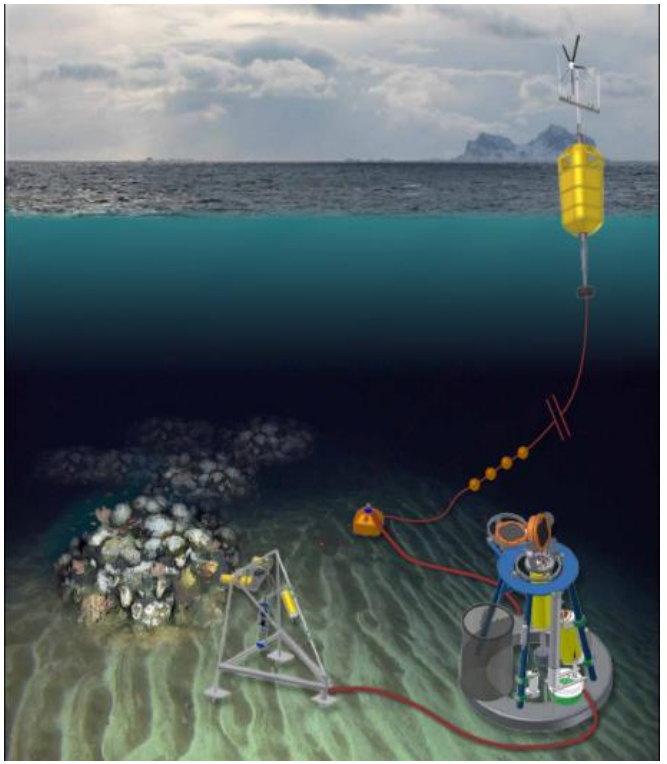


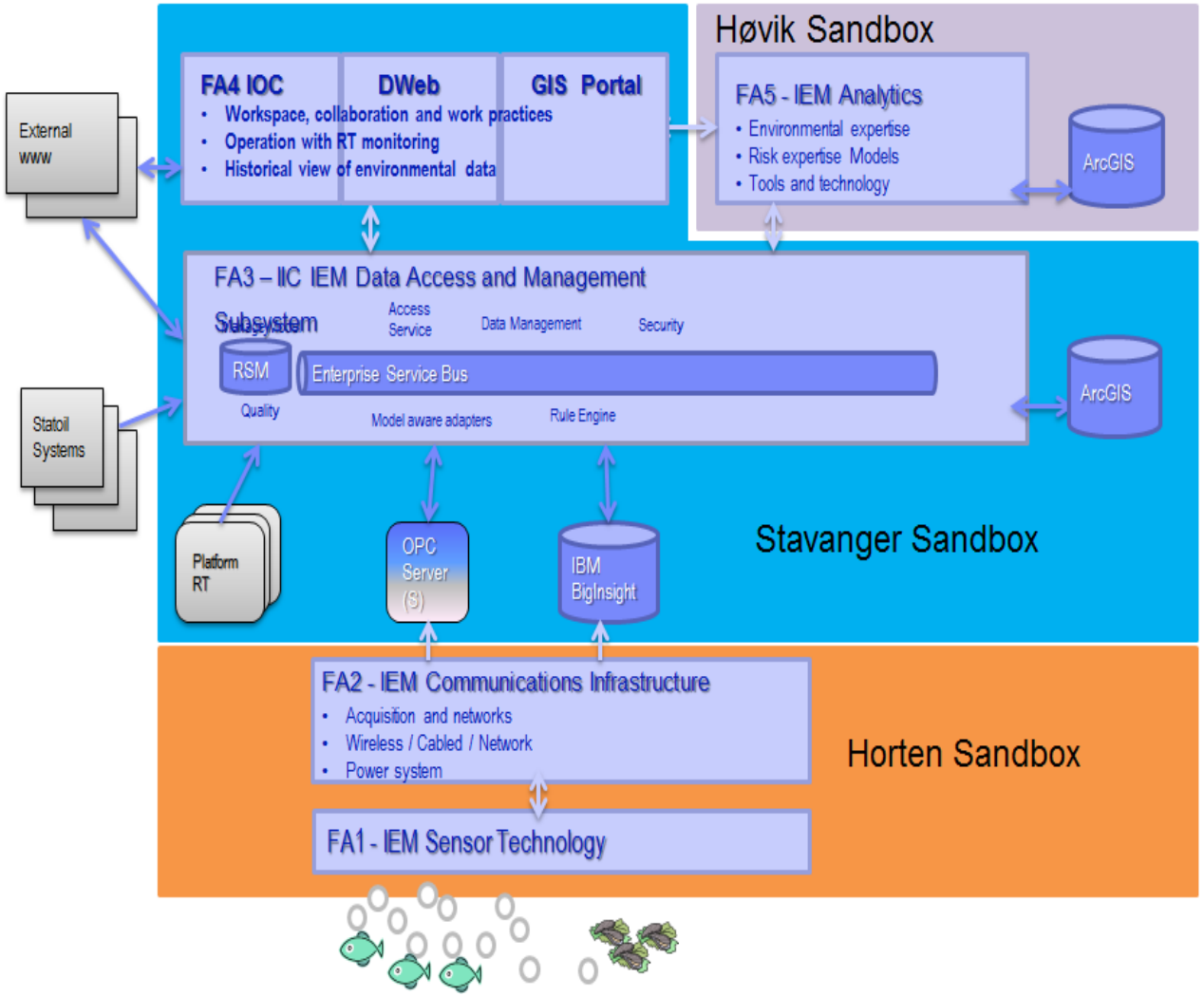
Application example: Integrated Environmental Monitoring

- Statoil: Prudent operations in fragile environments
- Consortium: Kongsberg, DNV, IBM
- An environmental monitoring system
- 1) Subsea monitoring system for measurement of key environmental data
- 2) Decision support system for analysis and visualization, monitoring and controlling
  - a) Discharges to the sea
  - b) Natural resources ,
  - c) Combinations of the two

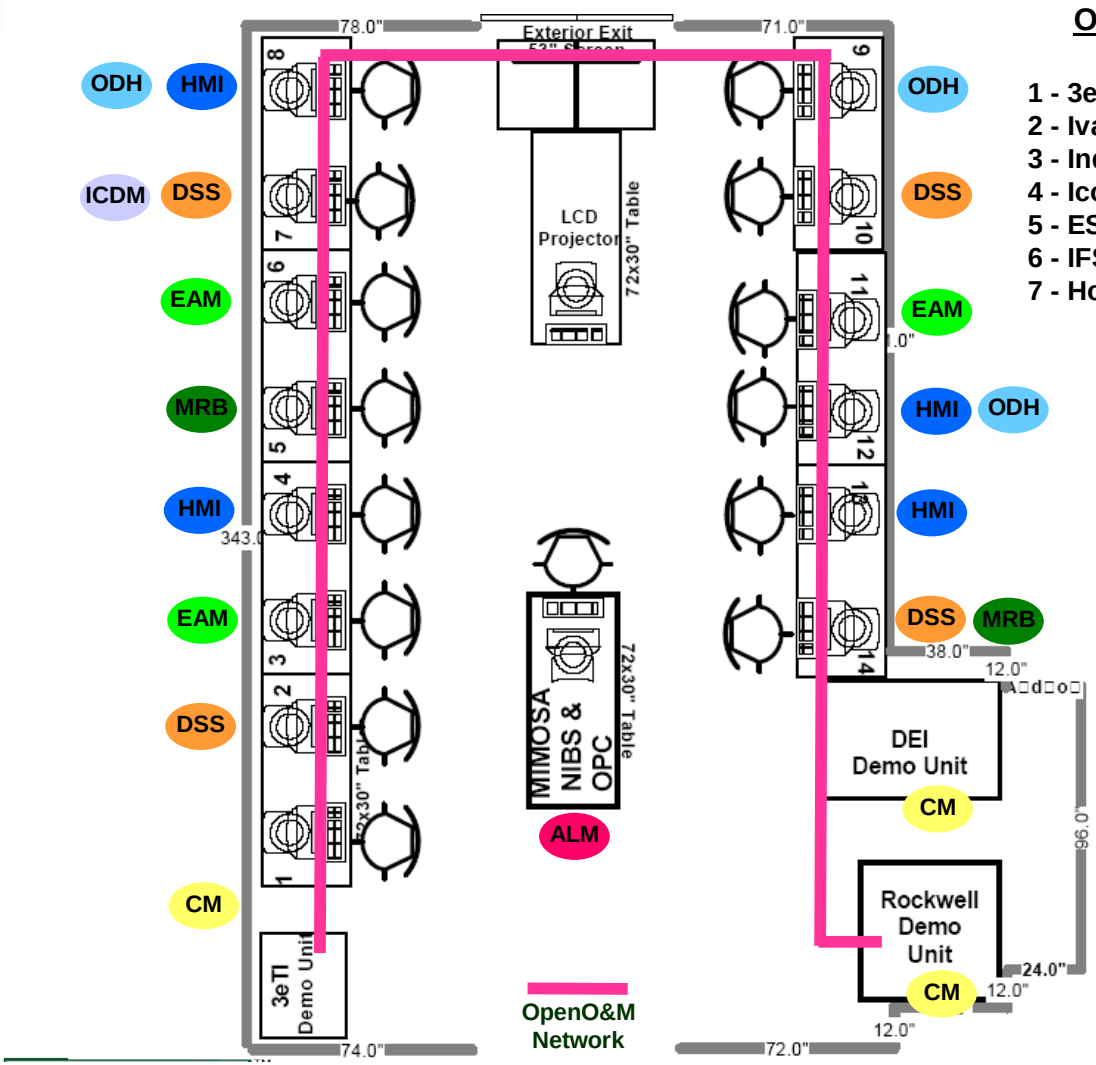


Application examples: Integrated Environmental Monitoring

Integration services based on semantic technology and W3C recommendations



Int. Maintenance Conference IO&M Interoperability Demo



Organization Legend

1 - 3eTI
2 - Ivara
3 - Indus
4 - Iconics
5 - ESRG
6 - IFS
7 - Honeywell
8 - AspenTech
9 - Matrikon
10 - PdMA
11 - Synergen
12 - Yokogawa
13 - Rockwell
14 - DEI

Function Legend

- ALM — Asset Lifecycle Mgmt & Universal ID
- CM — Condition Monitoring
- ODH — Operational Data Historian
- HMI — Human-Machine Interface
- ICDM — Instrumentation & Control Device Management
- DSS — Decision Support System
- EAM — Enterprise Asset Management / CMMS
- MRB — Maintenance & Reliability Browser

December 2004

OSA-CBM Dual Use Technology Program - Office of Naval Research

MIMOSA Information Network (MIN)

June 21, 2000

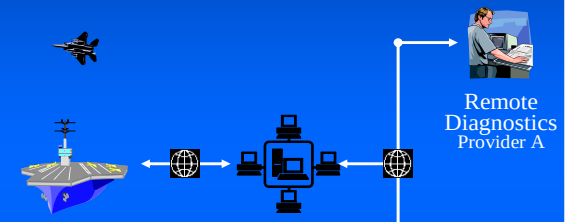
MIN-Viewer

OSA-CBM Presentation

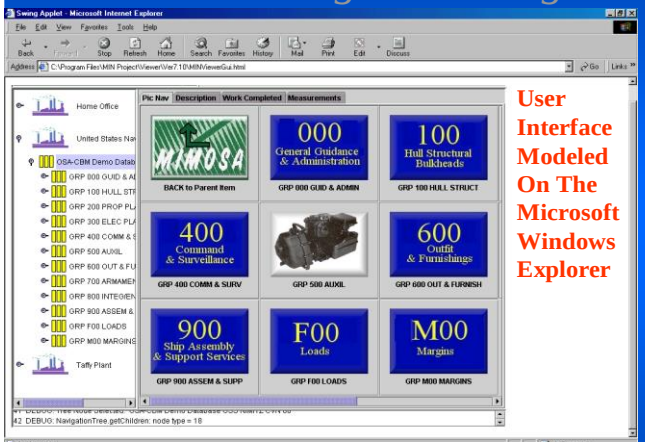
Alan T. Johnston

MIN Project Director

The OSA-CBM MIN Demonstration Concept



MIN-Viewer Segment Navigation 1



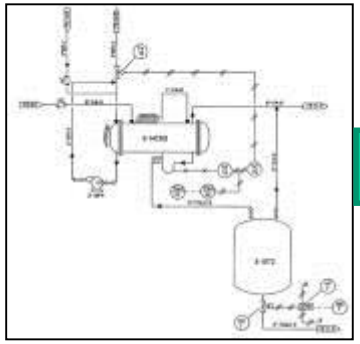
User Interface Modeled On The Microsoft Windows Explorer

OGI Pilot examples: Continuous Handover and Automated Systems Provisioning Use Cases

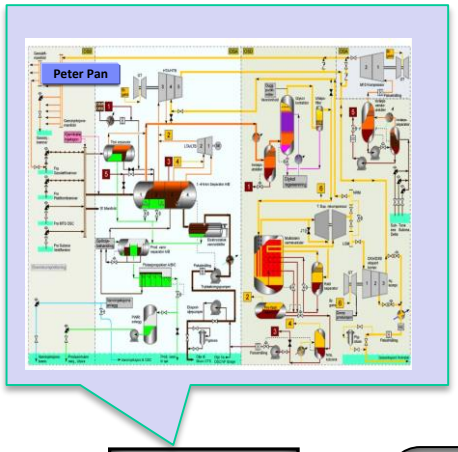
- Continuous Handover– A use case for exchanging engineering, systems, equipment and asset information between the EPC firms, Capital Equipment Suppliers and the Owner/Operator of an asset or facility on a continuous and opportunistic basis throughout the Capital Project.

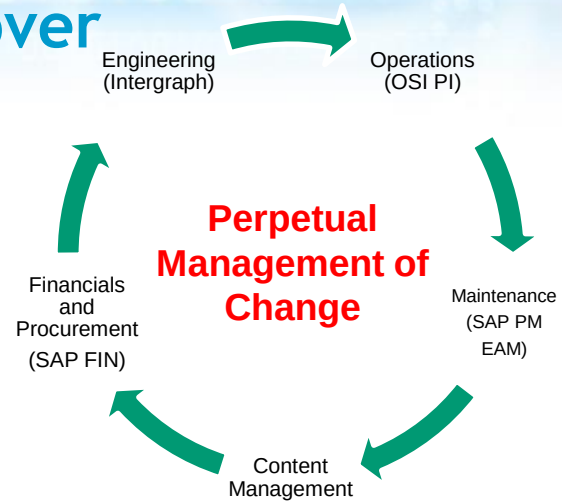
- Automated Systems Provisioning- A use case for automatically provisioning O&M systems based on the information handed over from an EPC, - synchronize the physical and digital asset

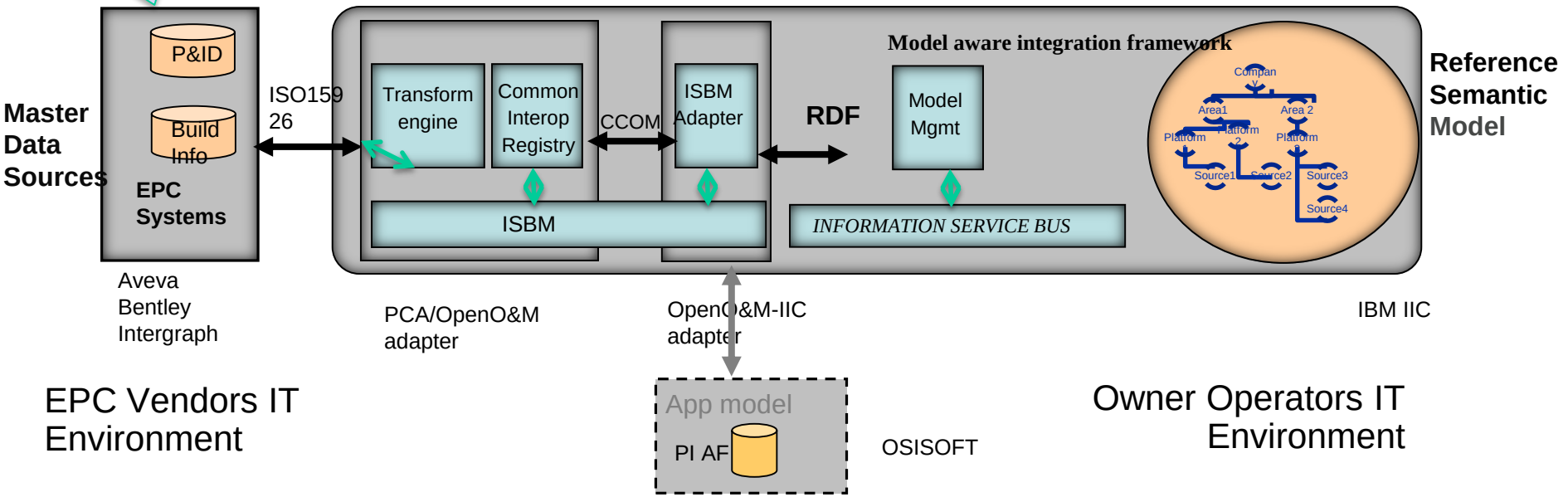
- In conjunction with and supported by MIMOSA/PCA Joint SIGs



Application example: Digital Handover







Summary and next steps

- Complete the description of architecture and systems in an ITA SIG report
- Balance the architecture description language complexity with ease of reading to gain a sufficiently wide audience
- Harmonize terms between MIMOSA and PCA (integrate and interoperate between CCOM and PCA RDL)
- *For more information please contact:*
  - tore.christiansen@posccaesar.org
  - myren@no.ibm.com
  - atjohn@comcast.net

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QUESTIONS AND COMMENTS?