POSC Caesar Association

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Short report on standards development and ongoing projects

PCA Member Meeting

Houston, 20 February 2009

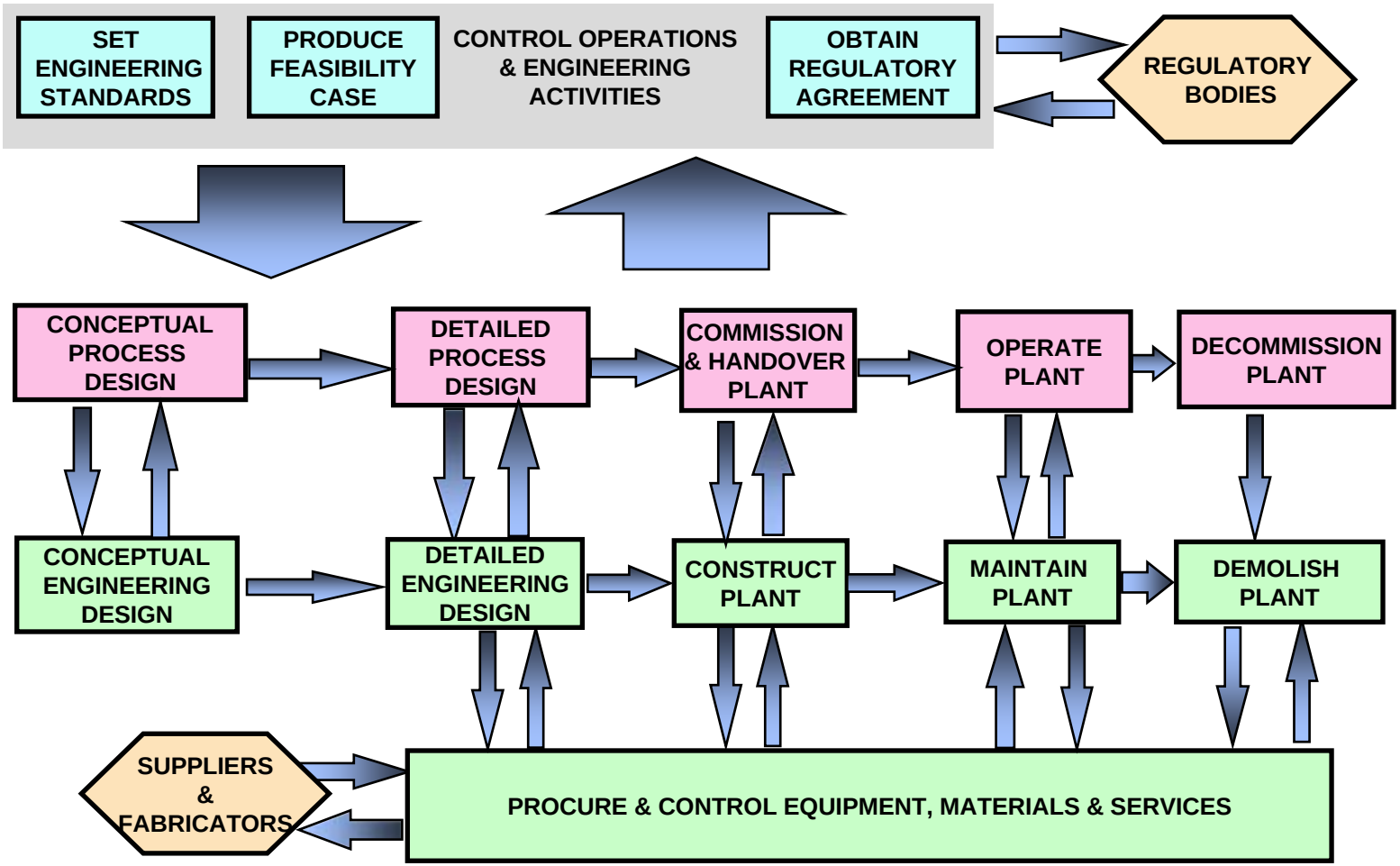
Nils Sandsmark

Contents

- ISO 15926 Scope, Status and Plans
- Integrated Operations in the High North (IOHN)
- (IDS)

ISO 15926 Original Scope

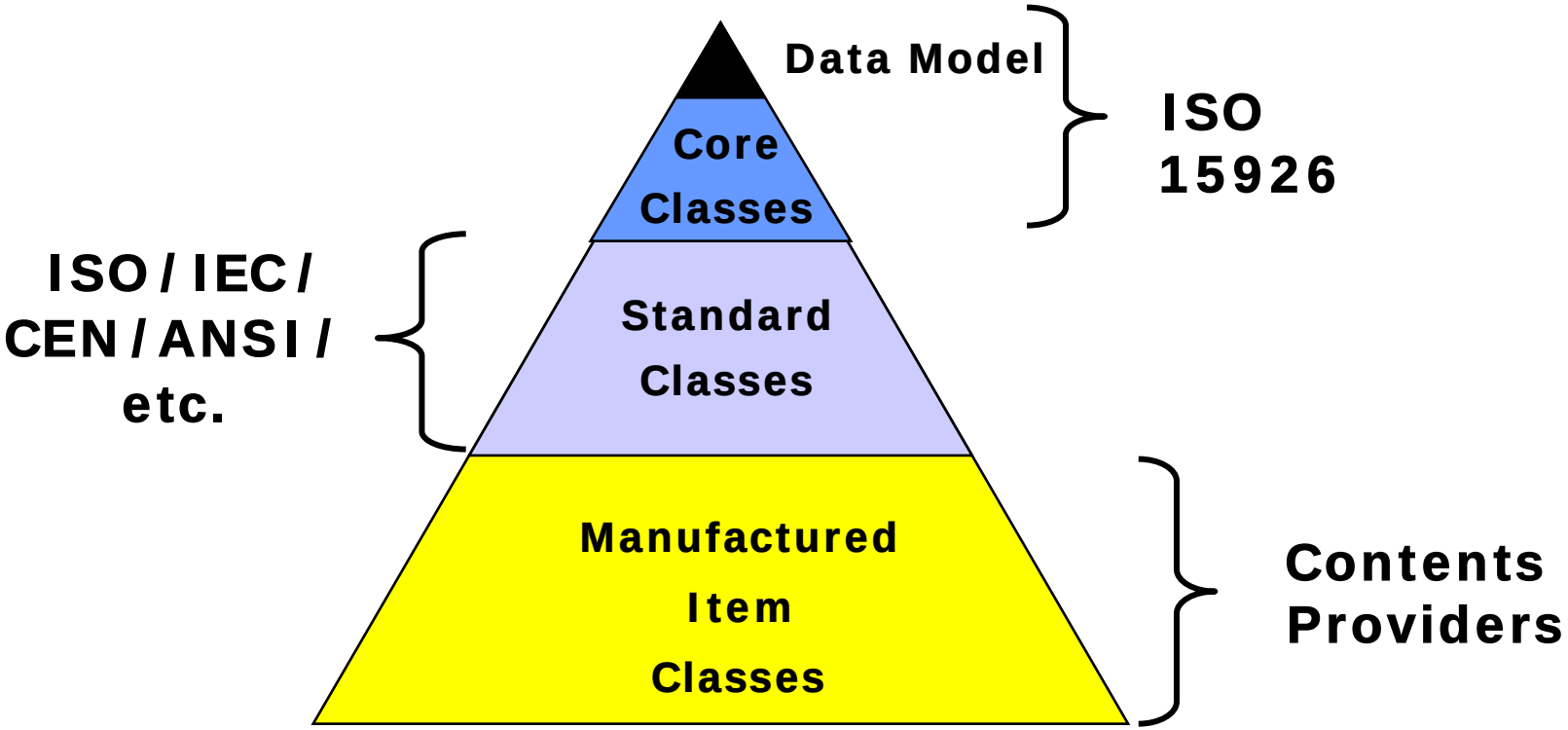
The PISTEP Model for Life Cycle Activities



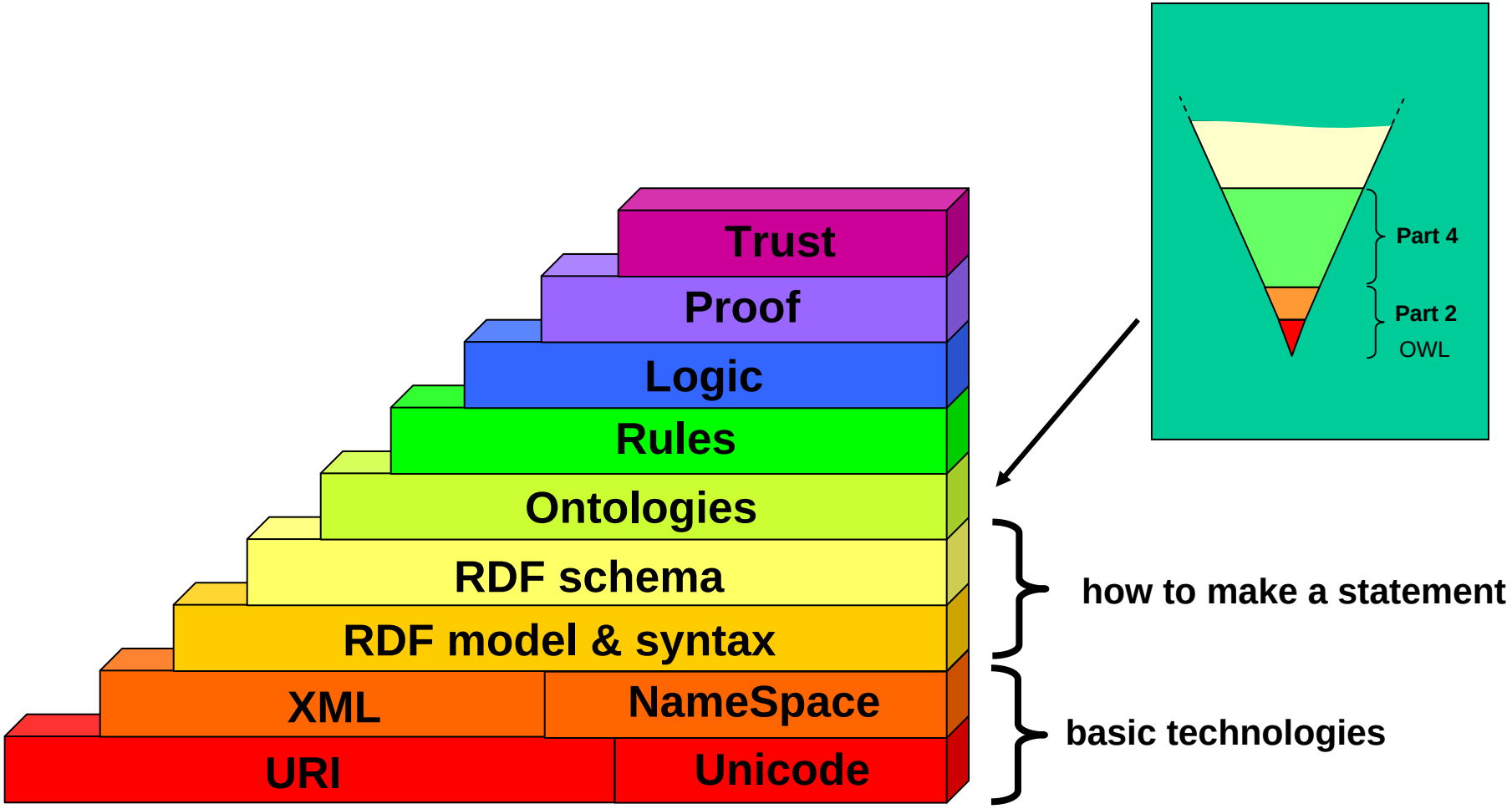
ISO 15926 Information Model

- Conceptual Model (ANSI SPARC)
  - Universal context
- Based on logic and formal ontology
  - Good and consistent theoretical foundation
- Consists of:
  - Generic entity model
  - Reference data
  - Templates

ISO 15926 Architecture



The layers of the Semantic Web



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

- **ISO 15926 - 1 Overview and fundamental principles (Published IS in 2004)**
- **ISO 15926 - 2 Data model (Published IS in 2003)**
- **ISO 15926 - 3 Ontology for geometry and topology (Approved TS)**
- **ISO 15926 - 4 Initial reference data (Published IS in 2007)**
- ISO 15926 - 5 Procedures for registration and maintenance of reference data (Replaced by ISO/IEC procedure)
- **ISO 15926 - 6 Scope and methodology for developing additional reference data (NWI/CD proposal to be submitted to ISO Q2 2009)**
- **ISO 15926 – 7: Template Methodology (NWI/CD proposal to be submitted to ISO Q2 2009)**
- **ISO 15926 – 8: OWL Representation**
- **ISO 15926 – 9: Implementation methods for the integration of distributed systems – Façade implementation**
- **ISO 15926 – 10: Abstract Test Methods**

Integrated Operations in the High North

Integrated Operations in the High North – Joint Industry Project

IOHN

Project Outline

December 2008

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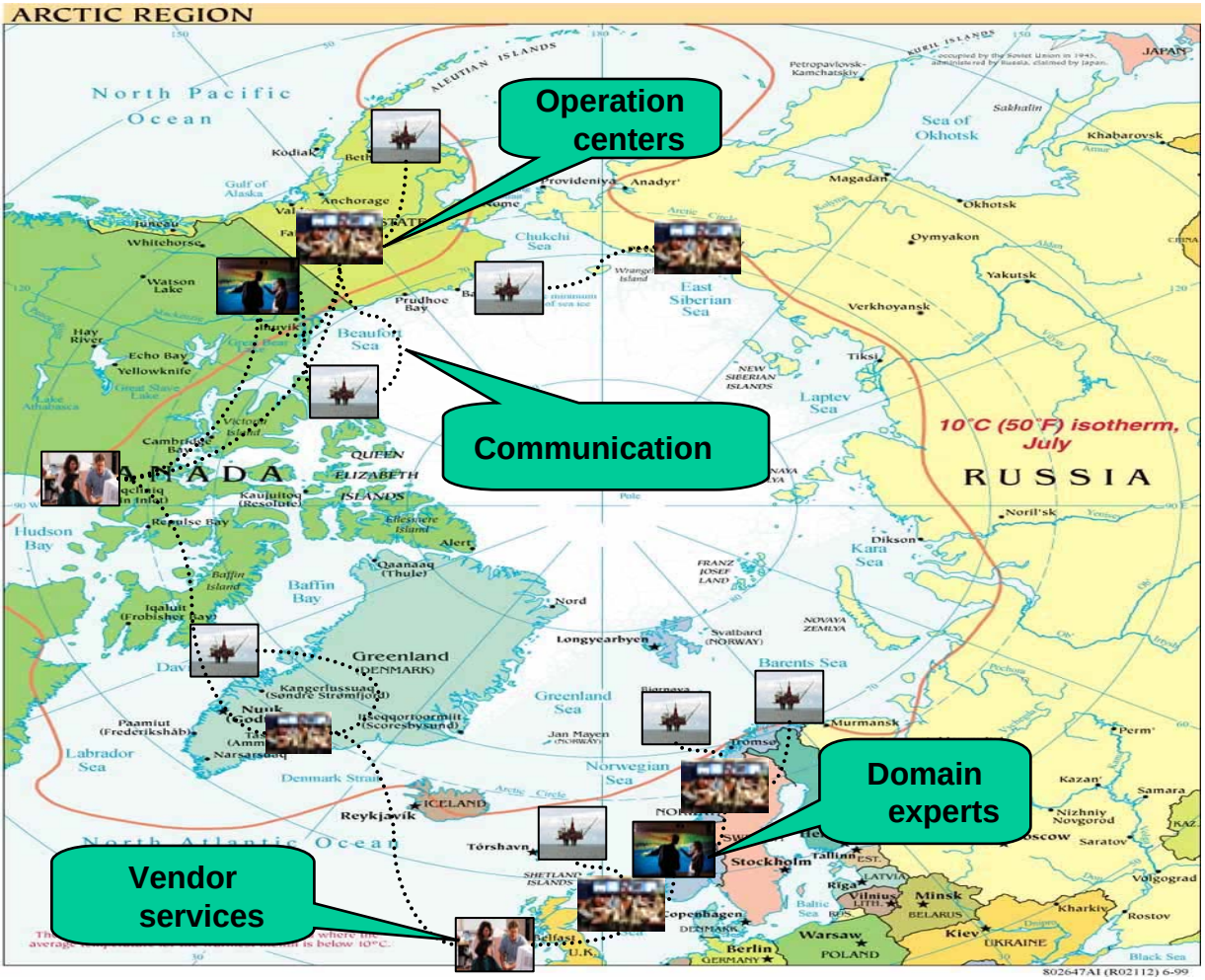
High North Challenges (1)

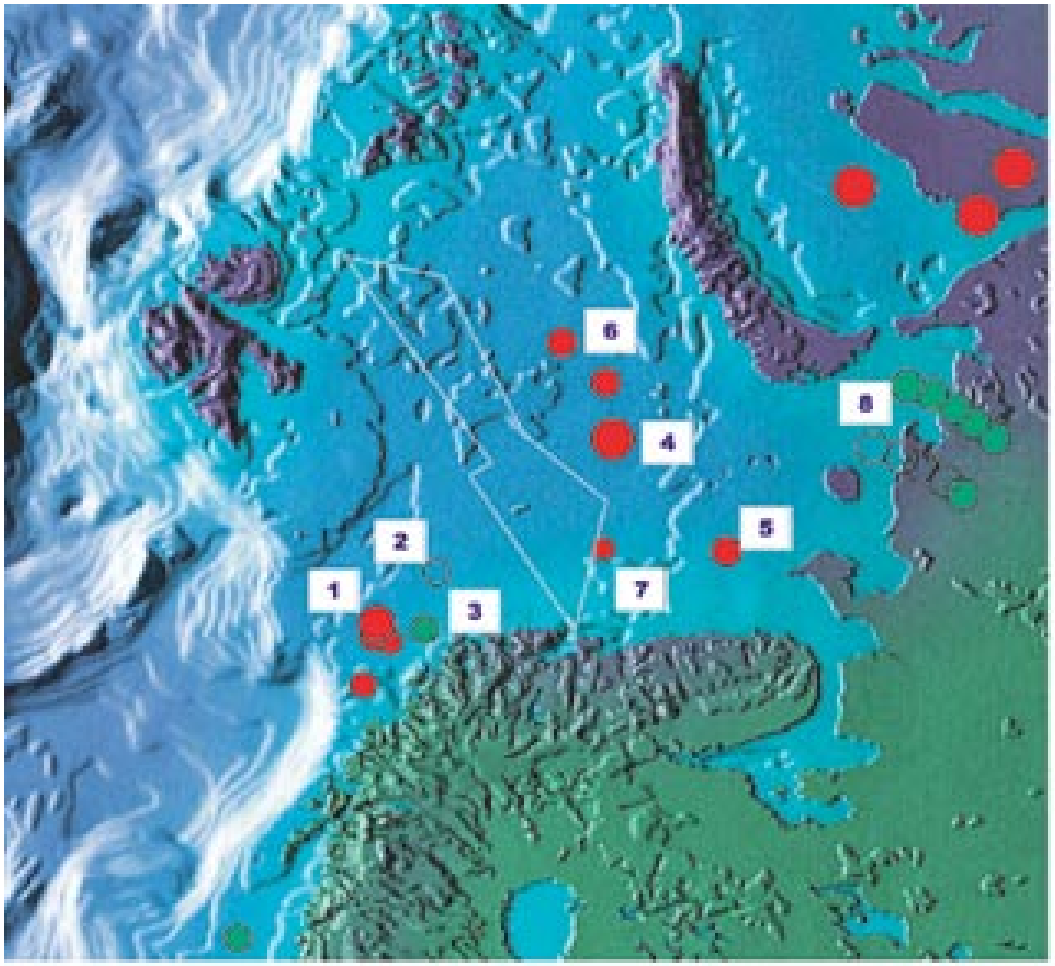
Integrated Operations in the High North – Joint Industry Project



- Remoteness
  - Huge area - Long distances (Norway responsible for an area 6 times the mainland)
  - Insufficient infrastructure (Technical and ”social”)
- Weather
  - Ice on sea, equipment, etc.
  - Storms
- Environment
  - “Zero footprint” solutions
- Satellite communication can be difficult
  - Geostationary – may be unreliable
  - Low orbit – small bandwidth
  - High polar orbit – not available

High North Challenges (2)

Integrated Operations in the High North – Joint Industry Project



- Dual use military – civil
  - Start with surveillance
- Challenges - Summary
  - Capture
  - Transfer
  - Integrate
  - Distribute
  - Manage risk incl. information security

Gass

Olje

Gass og olje

1: Snøhvit, Albatross, Askeladden
2: Dumbo
3: Goliath
4: Shtokmanovskoye
5: Murmanskoye
6: Ludlovskaya
7: Kildinskoye
8: Prirasiomnoje, Medinskaya, Dolginskaya...

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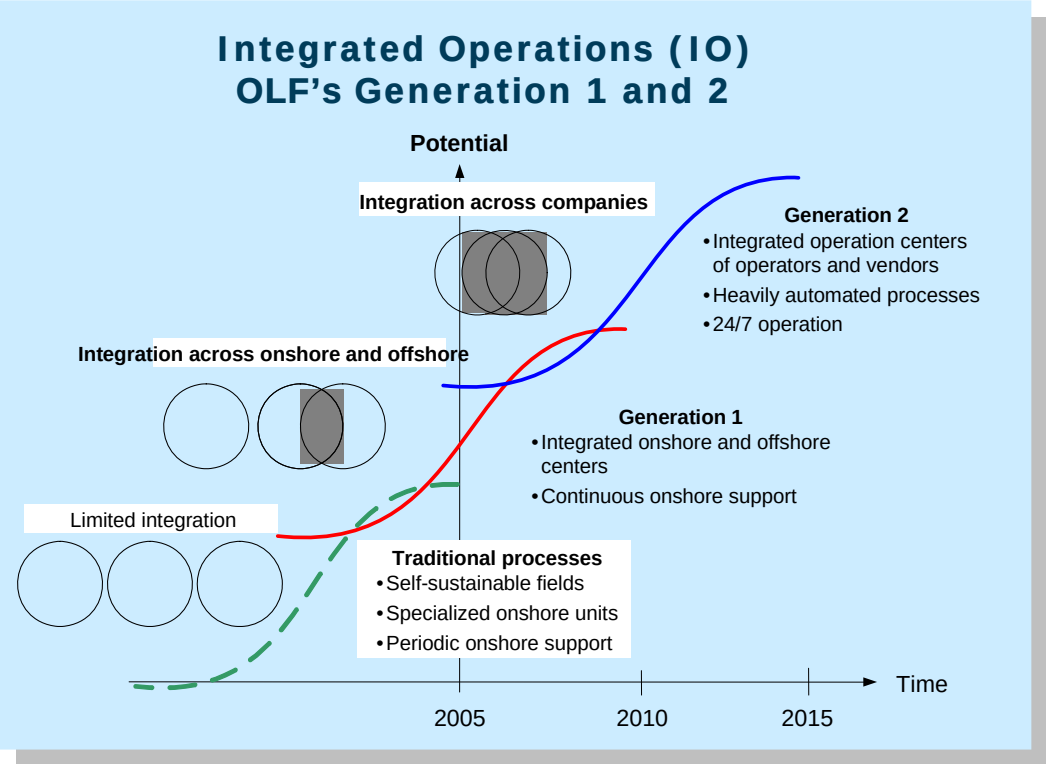
Integrated Operations (IO)

- **IO is more information in real time offshore and onshore**
- **IO is safer, faster and better decisions**
- **IO has a potential of NOK 300 billions on the NCS**



OLF's Information Management Strategy

An efficient pipeline for real-time data transferal and analysis

Field data

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

Smarter solutions

Web portals
Web services

Common XML schemas

Vendor

Operator

Vendor

Semantic Web

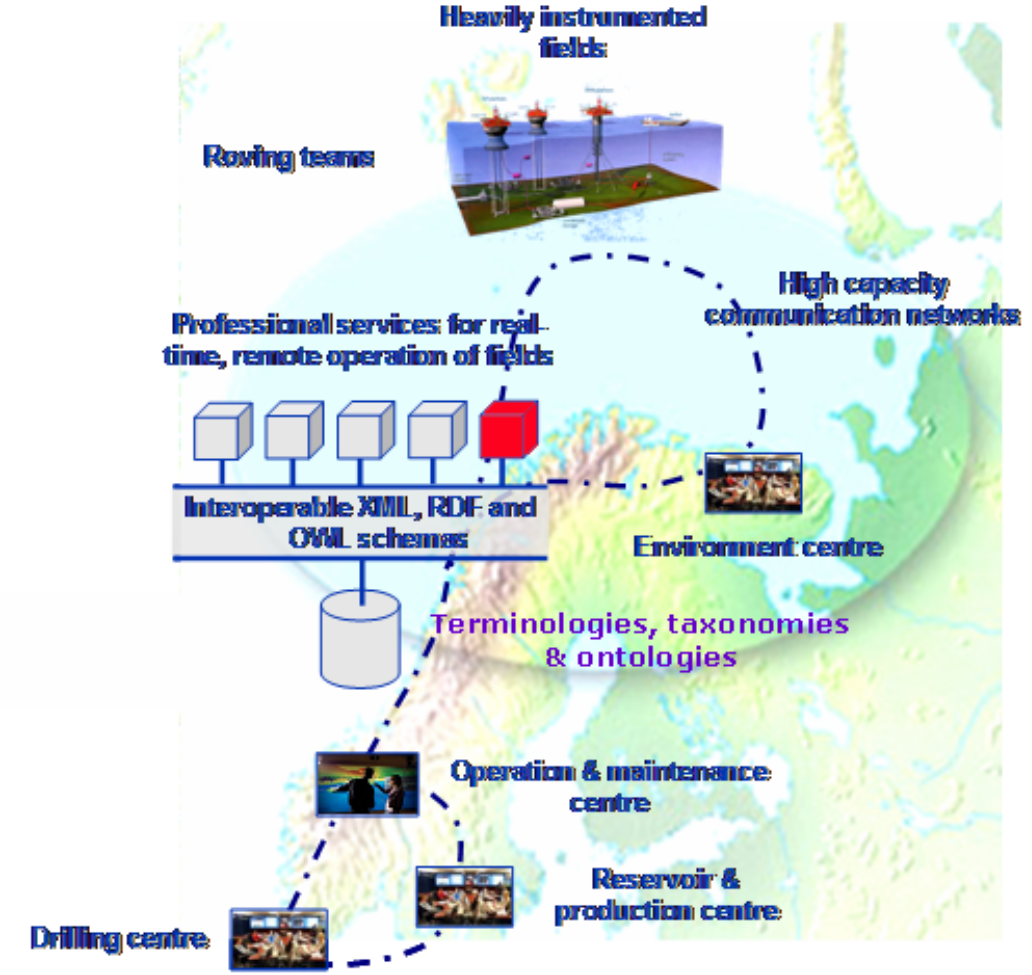
- Infrastructure for web services
- Oil & Gas Ontology

Smarter data

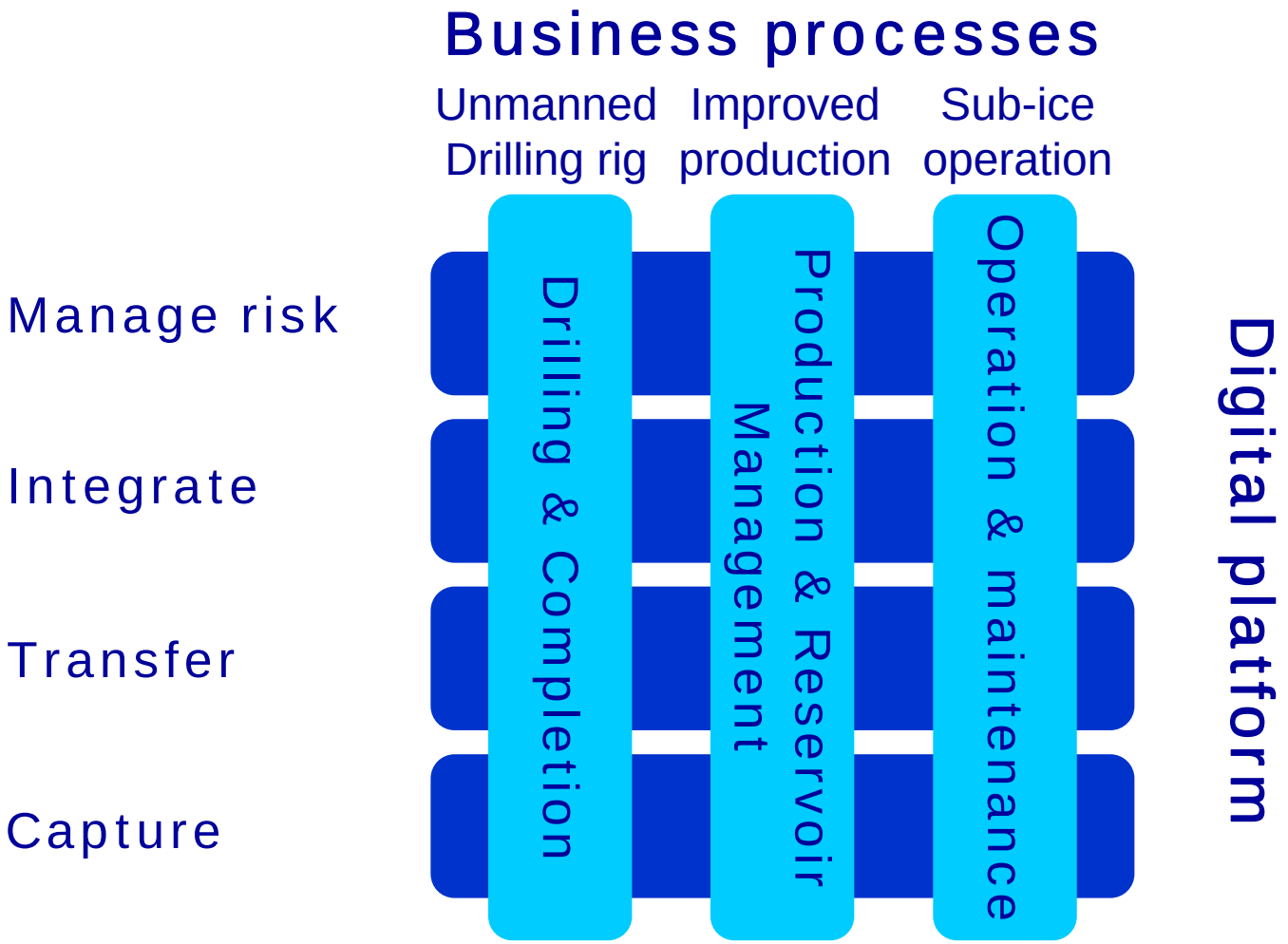
*Ontology = A hierarchical data structure containing concepts, relationships, properties and rules for a specific domain

Main Objectives

- The primary objective of the project is to develop:
  - A demonstrated reliable digital platform for Integrated Operation Generation 2 (IO G2) in the High North
  - IO G2 pilots within drilling, R&P, O&M in the High North
  - Decision Support for drilling, R&P, O&M
- IO G2 for the High North shall facilitate operations in remote and hazardous conditions, the use of limited operational personnel and “zero footprint” solutions



Project Architecture – Business View



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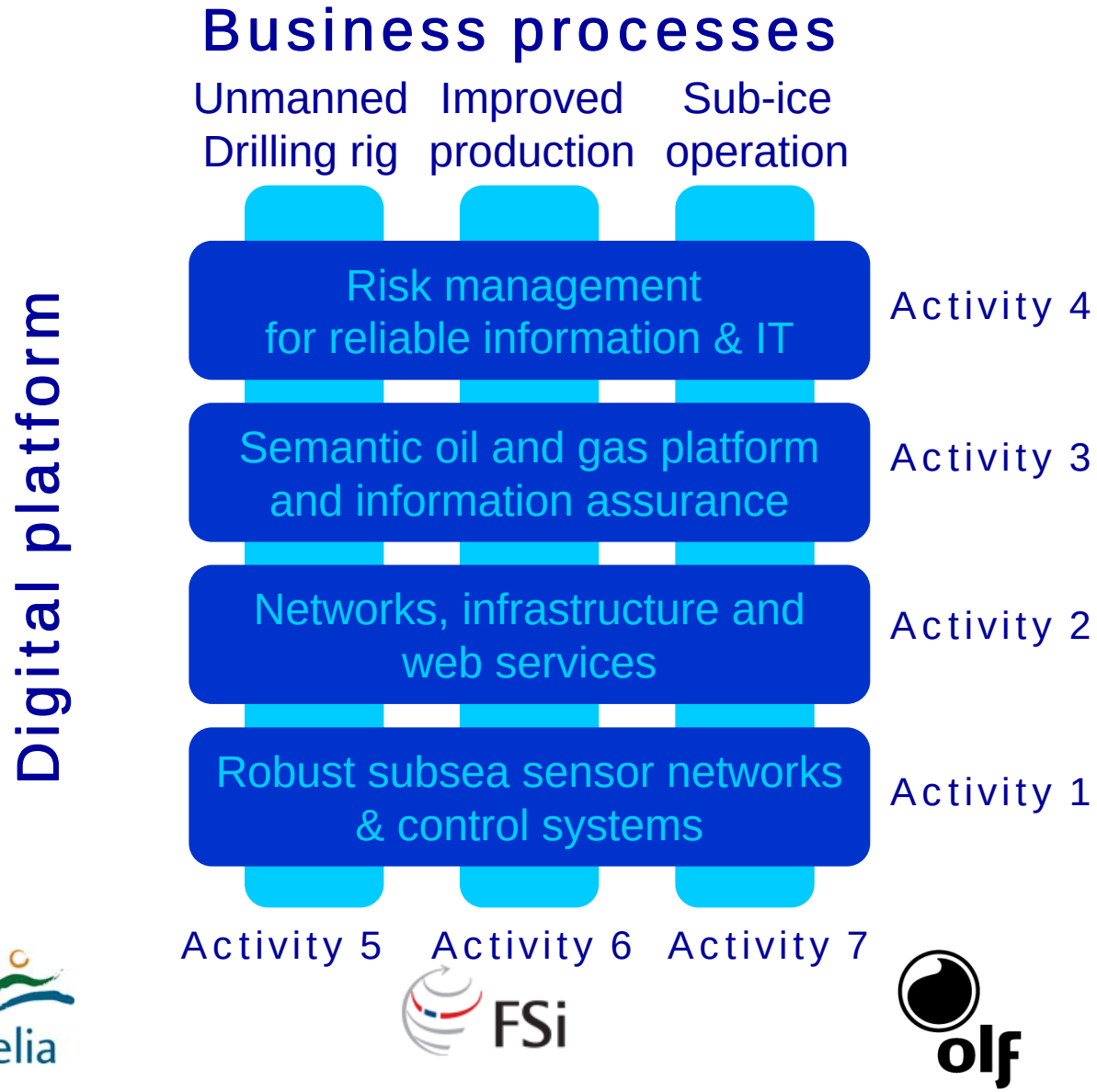
Objectives - Pilots:

- **Drilling pilot:** Demonstrate an automatically controlled tripping sequence, performed by a drilling control system which is highly integrated with smart software agents and a dynamic well model for predictive control in real-time
- **Production pilot:** Develop modular and flexible decision support system to maintain the highest degree of regularity for a remotely operated field in the High North
- **Operation and maintenance pilot:** Develop solutions and demonstrate that it is possible to operate and maintain oil and gas production facilities in sub-ice conditions

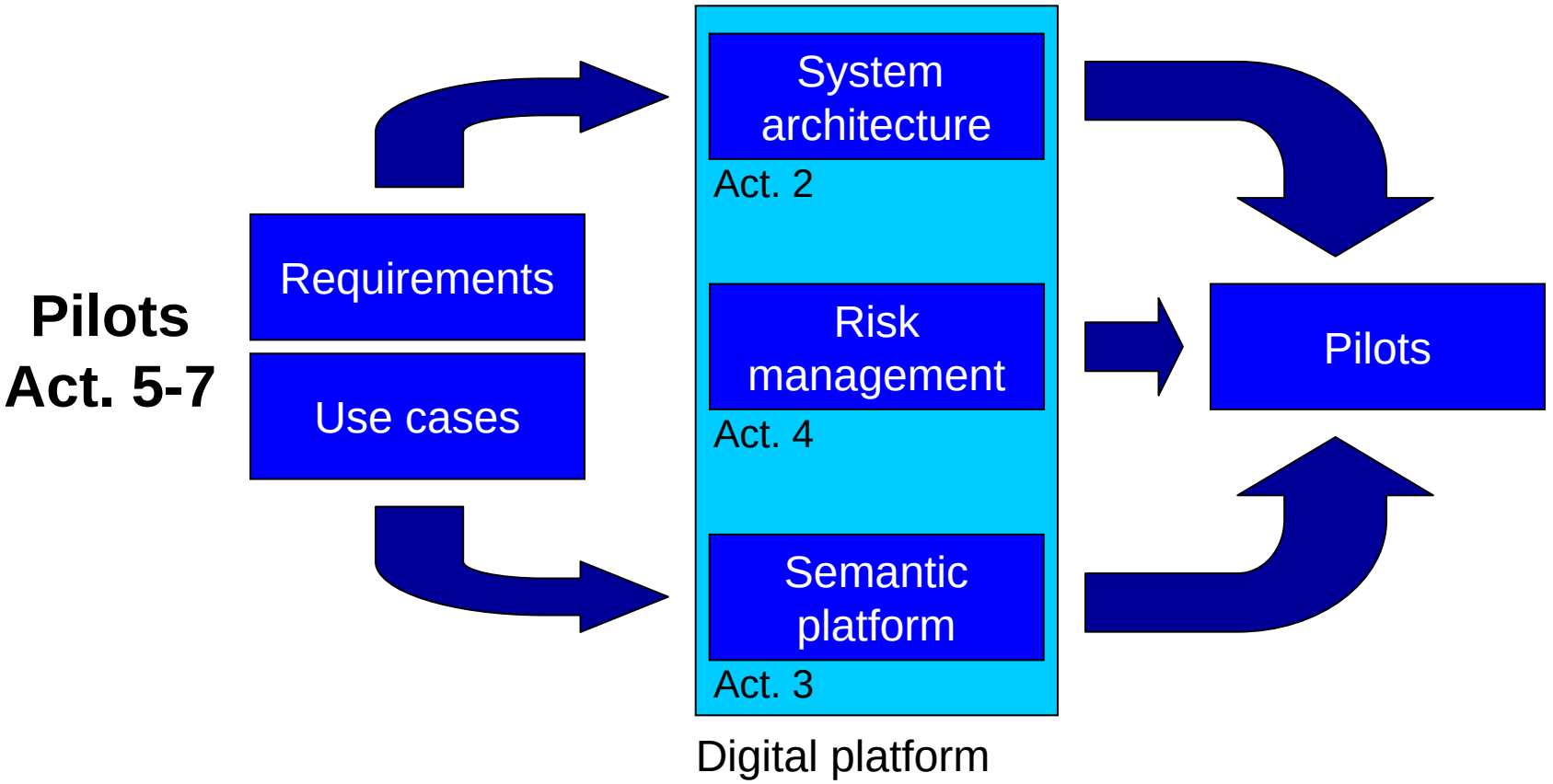
Project Architecture – Technical view (Detailed)



Objectives – Digital Platform:

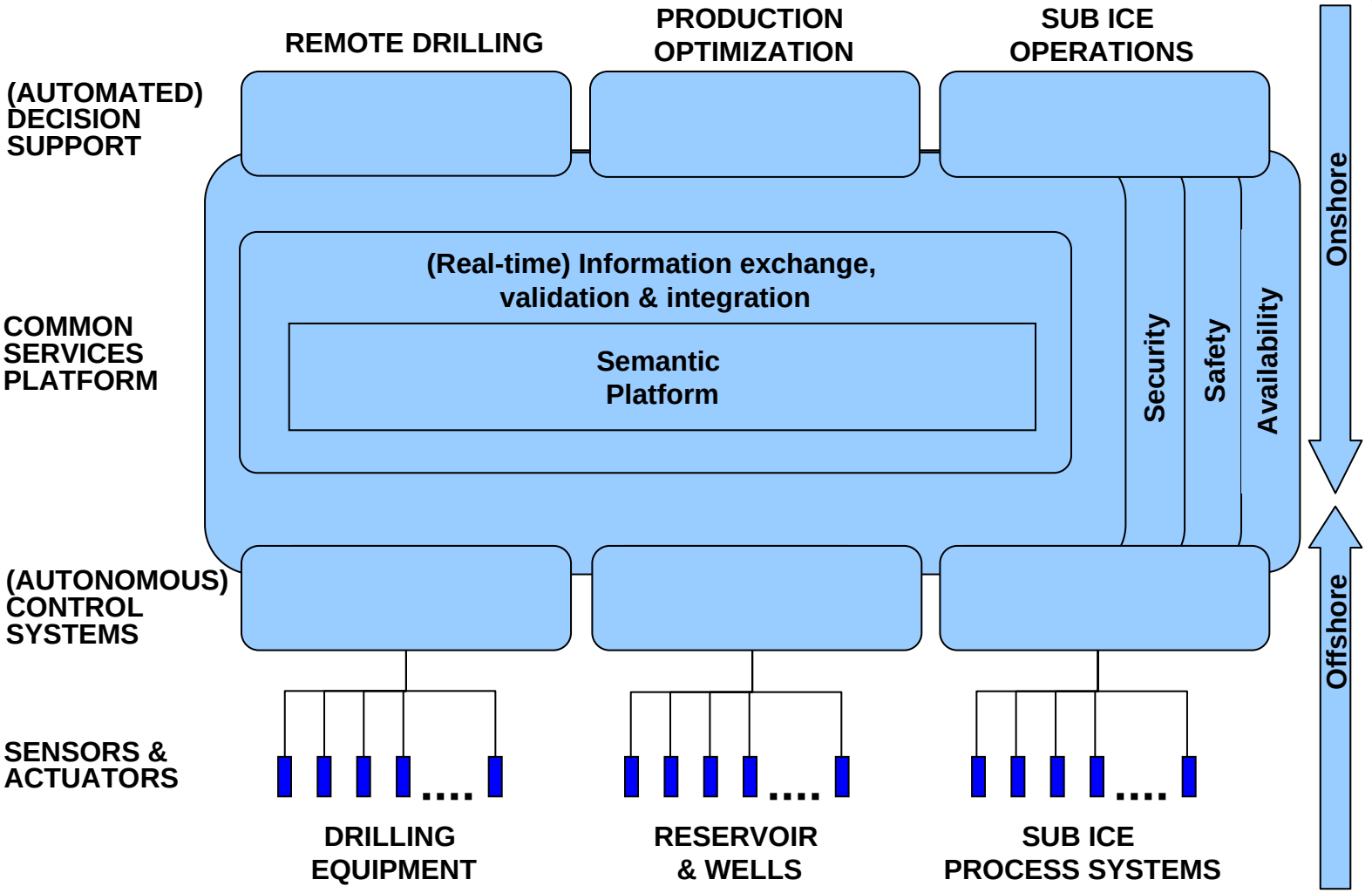
- **Manage risk:** Reduce the probability of production discontinuity and/or HSSE incidents due to unreliable information or IT systems, specifically intended for Integrated Operations
- **Semantic oil and gas platform:** Extend and improve the quality of the ISO 15926 based oil and gas ontology and develop a prototype information validation service
- **Networks, infrastructure and web services:** Investigate existing communication infrastructure for High North installations and prototype a web services platform supporting automatic monitoring, simulation and optimization
- **Robust sensor networks:** Bring forward new knowledge and technology for sensor based, robust control systems

Interaction digital platform and pilots



IO High North high level architecture

Integrated Operations in the High North – Joint Industry Project



Picture inspired by IO center / NTNU & OLF work

Roadmap

Integrated Operations in the High North – Joint Industry Project

IOHN

Year 1
Requirements and digital platform outline

- Business and system requirements
- System architecture and risk analysis
- Complete DPR, MPR and PRODML ontology
- Description of existing infrastructure in the High North

Year 2
Proof of concept for drilling, R&P, O&M

- Proof of concept for autonomous drilling control
- Proof of concept for autonomous QA of R&P data
- Proof of concept for condition based maintenance for sub-ice operations
- 1st increment of digital platform

Year 3
Consolidated digital platform

- Consolidated ontologies
- Dependable platform for shared data and services
- Gap analysis of IOG2 infrastructure for the High North
- Smart agent software for drilling control and production regularity
- IT Security and safety risk management guide

Year 4
IOG2 pilots for drilling, R&P, O&M

- Pilot of highly automated drilling rigs
- Pilot of production regularity system
- Pilot of highly integrated O&M processes for sub-ice conditions
- Recommended practices for IOG2
- Final report

Main deliverables:

1. ***Demonstrated reliable digital platform for IOG2 in the High North***
2. ***IOG2 pilots within drilling, R&P, O&M in the High North***
3. ***Decision Support for drilling, R&P, O&M***

Conceptualization → Industrialization / Take-up

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Participants and Funding

- **Participating organisations 2008-05-01:**
  - StatoilHydro, Norwegian Defence, IBM, DNV, National Oilwell Varco, Invenia, Computas, Epsis, Tieto, FMC, SAS Institute, Kongsberg, PSA, Centre of Integrated Operations, IRIS, NTNU, UiO, UiS, POSC Caesar, OLF, Abelia and FSi
  - Representing a total **committed funding** of **68.5 MNOK (10 MUSD)** (RCN 17 MNOK)
- **Six Letters of Intend or Statement of Interest received by 2008-12-31:**
  - Representing a total **funding** of **34 MNOK (5 MUSD)**
- **The project started as described May 1st with activity 2, 3, 4, 5, 6 and 7**
- **Activity 1 will start as soon as funding is secured**
- **Duration 4 years**

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IDS II

- **IDS II is a successor to the IDS project working on extending the ISO 15926/PCA RDL, and also using template methodology as defined by IDS to perform the mapping, and extend the RDL.**

- **The scope for first half of 2009 can be split in two:**
  - Part 1 is to map parts of the ConocoPhillips, bp and StatoilHydro “functional classes” to the RDL.
    - A table has been created by ConocoPhillips that holds proposed mappings across the company terminologies
    - Proposals for definitions for the Instrumentation domain are currently being prepared by ConocoPhillips
    - To be subject to review by PCA SIG’s for progression to PCA RDL, later ISO 15926 RDL
  - Part 2 is to map the SHAREcat terminology for a defined set of “classes and attributes” to the RDL
    - This is also coordinated with StatoilHydro, and indirectly also with ConocoPhillips and bp as all 3 companies are using SHAREcat
    - Same process as for Part 1

Participating Companies IDS II January 2009

- **Oil Companies**
  - ConocoPhillips Norway
  - BP Norway
  - StatoilHydro
- **EPC Contractors**
  - Aker Solutions ASA
  - Aibel
- **Suppliers**
  - ABB AS
  - Emerson Process Management AS
- **Solution Providers**
  - Tektonisk AS (SHAREcat)
  - Bentley
- Others
  - DNV
  - PCA (POSC Caesar Association)
  - Standard Norway
  - OLF