Industrial solution for real time integration of process and enterprise domains

Posc Caesar Member Meeting
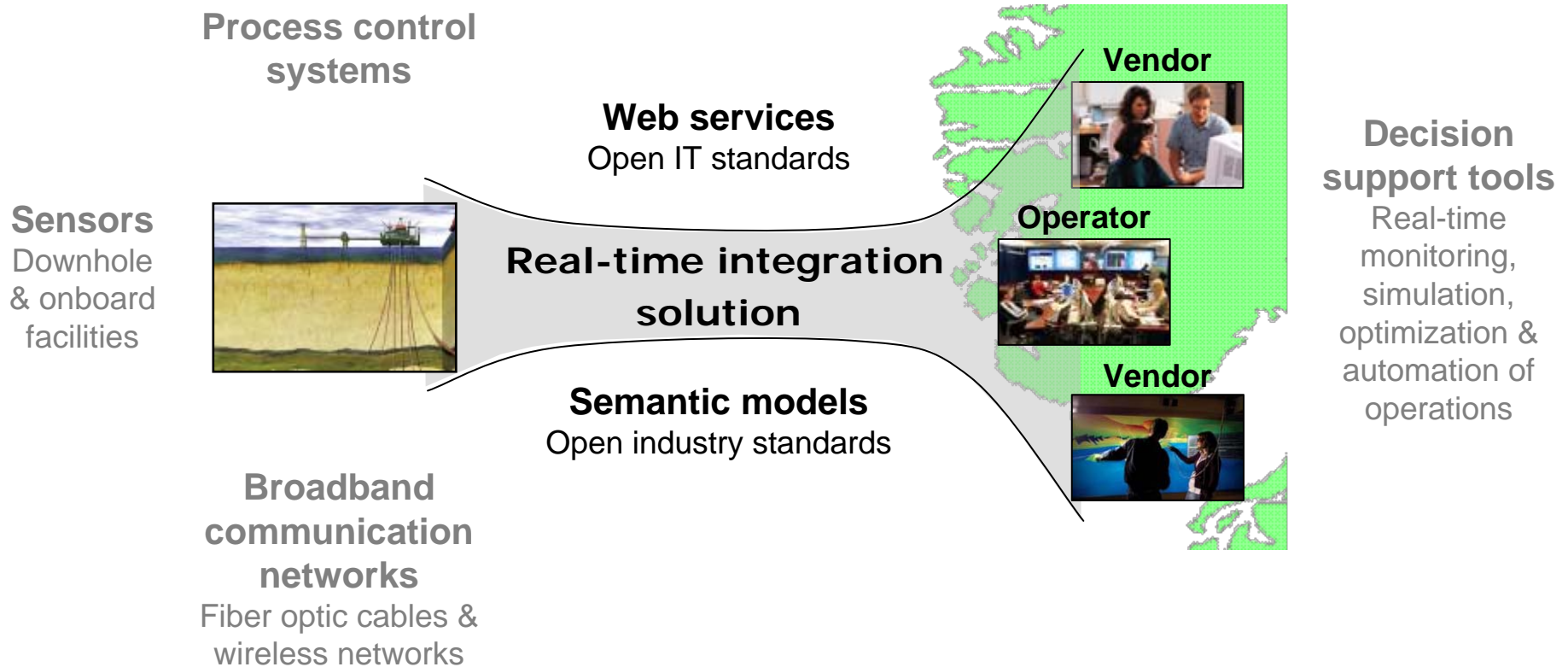**Houston February 20, 2009**

Kaare Finbak, IBM C&P
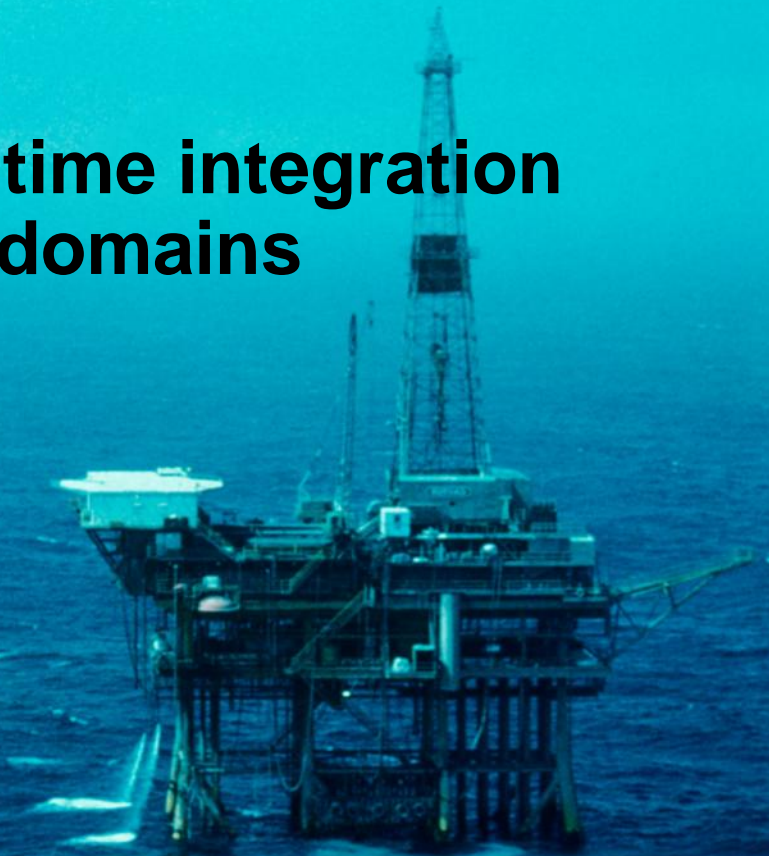
Introduction

- Technologies required to fully implement Integrated Operations
  - Real-time and "smarter"

- The Reference Semantic Model (RSM)
  - Purpose & scope
  - Contributing associations & companies
  - Extension of ISO 15926

- The Information Integration Framework (IIF)
  - Main functionality

- Examples of challenges solved by the RSM and the IIF

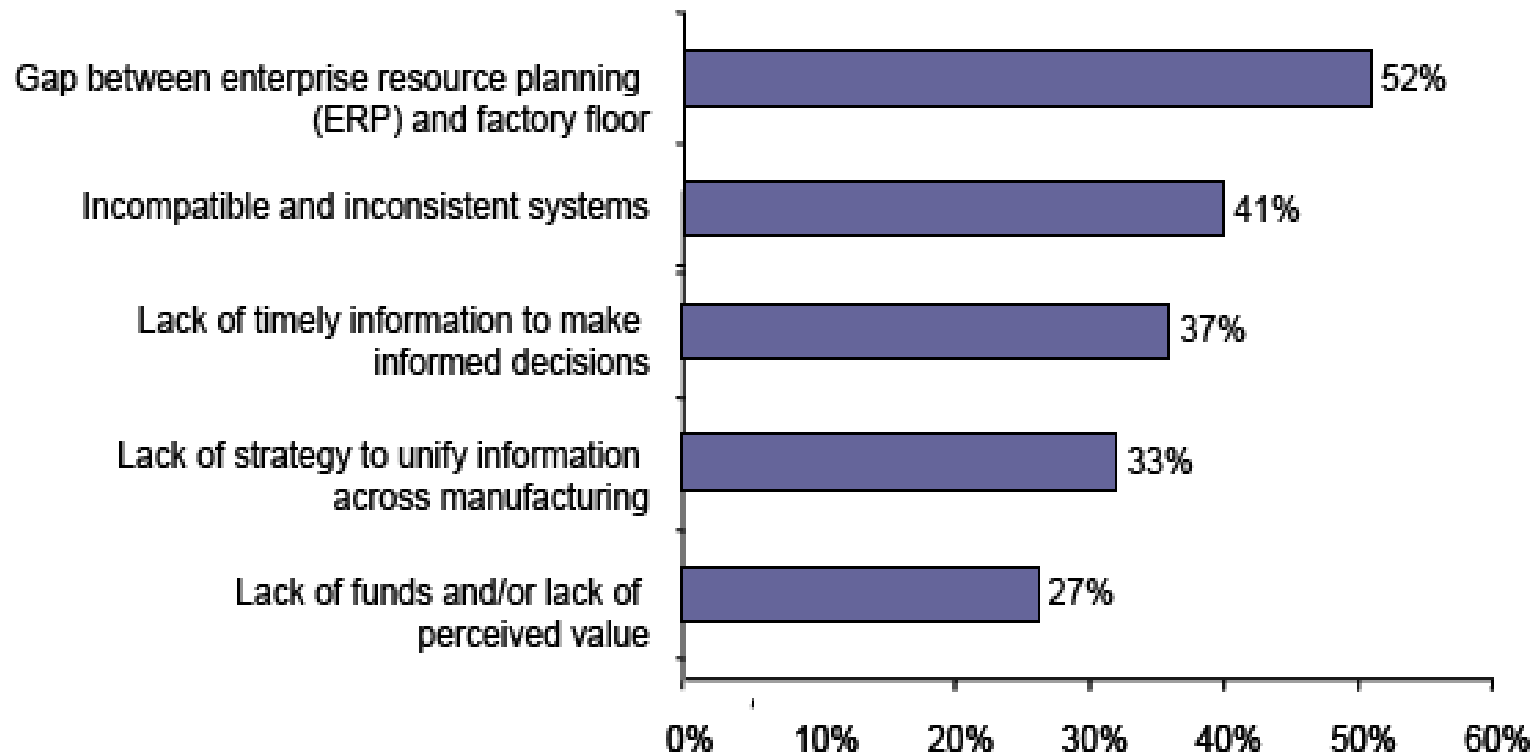- Real-life examples of application of the RSM and the IIF

Practical Innovation. True Integration. Connected Operations.

To fully implement Integrated Operations new technologies and solutions are required

Process control systems

Vendor

Web services
Open IT standards

Decision support tools
Real-time monitoring, simulation, optimization & automation of operations

Sensors
Downhole & onboard facilities

Real-time integration solution

Operator

Semantic models
Open industry standards

Vendor

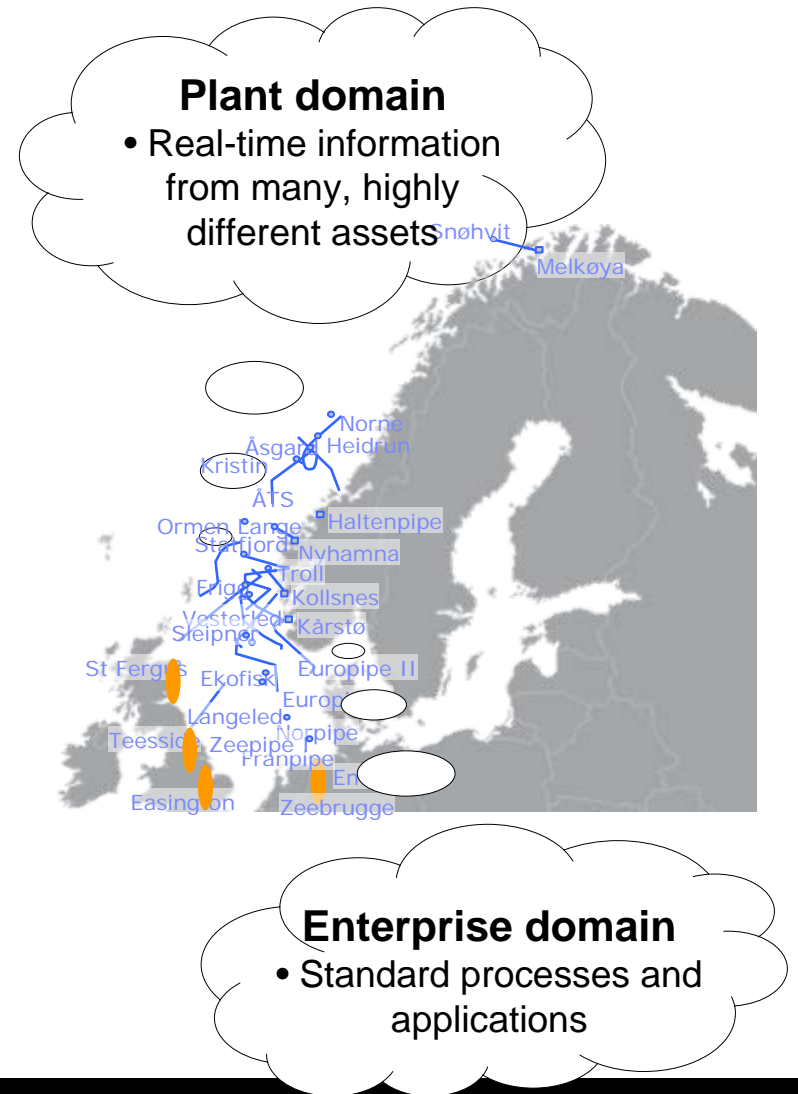**Broadband communication networks**
Fiber optic cables & wireless networks

This understanding is confirmed by international studies

Figure 2. Internal Challenges (all performance categories)

Challenge	Percentage
Gap between enterprise resource planning (ERP) and factory floor	52%
Incompatible and inconsistent systems	41%
Lack of timely information to make informed decisions	37%
Lack of strategy to unify information across manufacturing	33%
Lack of funds and/or lack of perceived value	27%

IBM invests significantly in new, open solutions for the oil industry

- A common reference semantic model (RSM) based on open industry standards

  - Developed by a committee with the industry's main standardization associations as participants

  - Is currently being aligned with ISO 15926 through the IOHN project

- A solution – Information Integration Framework (IIF) – for transferal of real-time information between the process and enterprise domains

  - Model-based solution incorporating the RSM

  - Tested and proven in co-operation with amongst others StatoilHydro and ABB

Plant domain
- Real-time information from many, highly different assets

Enterprise domain
- Standard processes and applications

Reference semantic model
Purpose & scope

- Develop an implementable reference semantic model that can be used by processing & manufacturing companies to connect

  – Real-time measurements

  – Planning & scheduling information

  – Life cycle information

- Should provide a single enterprise hierarchy that models process equipment, measurements and documents connectivity

Reference semantic model
Participating associations and companies

MIMOSA

OAGi

WBF

Energistics

ISA 88
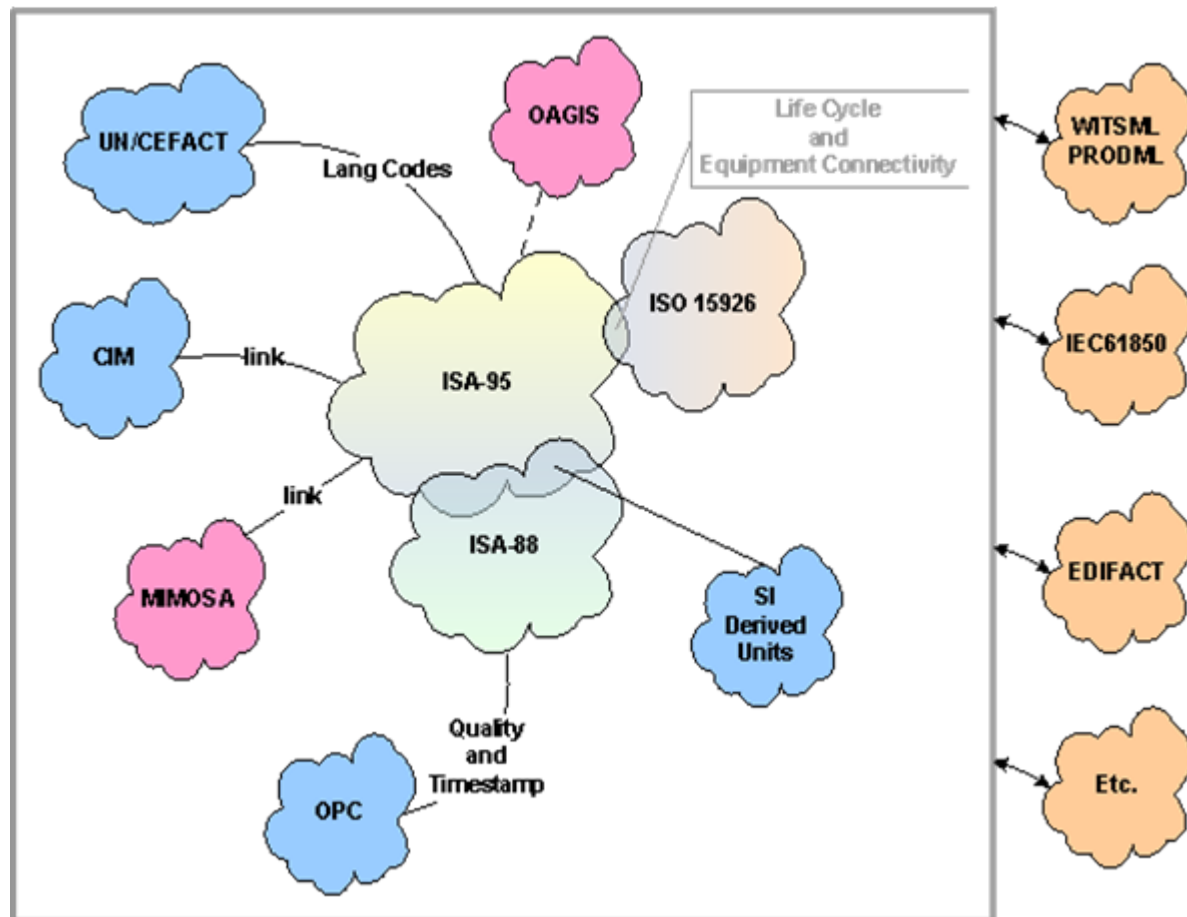
ISA 95

POSC Caesar
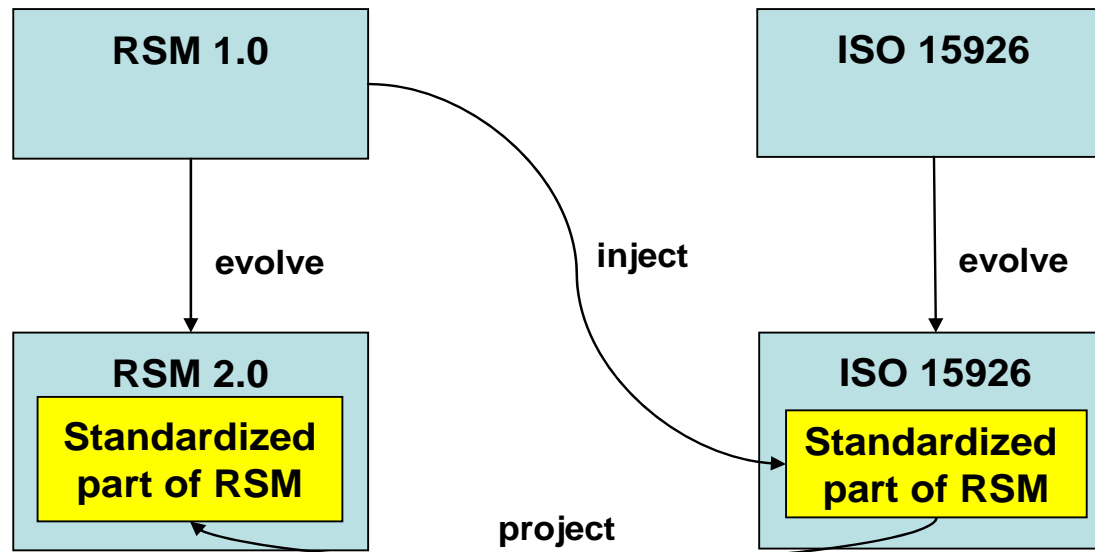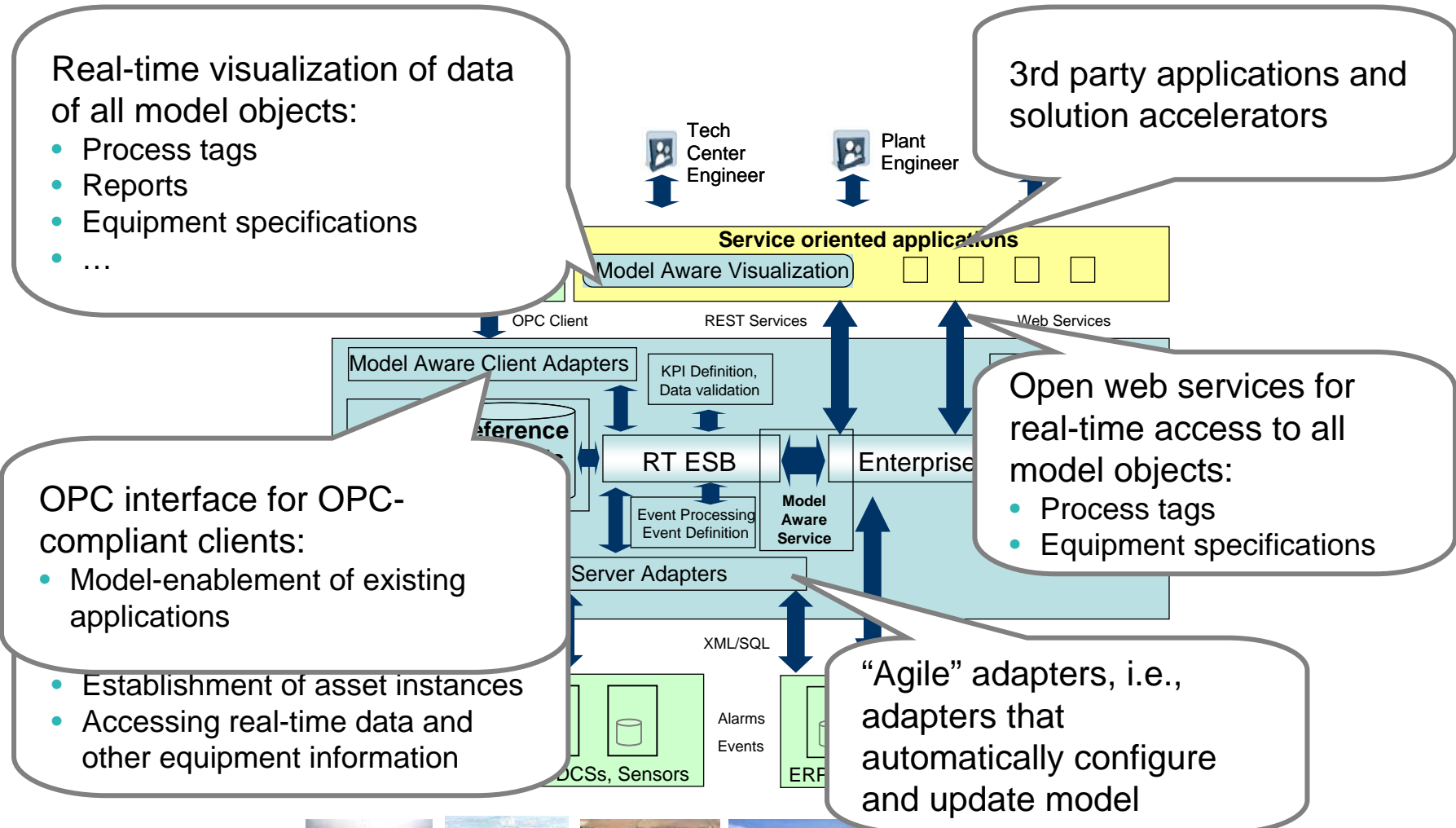
OPC

OSIsoft

DNV

DOW

SISCO

IBM

Reference Semantic Model
Process for alignment of RSM with ISO 15926

- The R&D project IO High North has as a target to extend ISO 15926 in the drilling, reservoir & production, and operation & maintenance domains

- IBM contributes with resources required to align the RSM with ISO 15926, and to define and test use case demonstrating the feasibility of the ISO 15926 extensions

Information Integration Framework (IIF)

Real-time visualization of data of all model objects:
- Process tags
- Reports
- Equipment specifications
- …

3rd party applications and solution accelerators

Tech Center Engineer

Plant Engineer

Service oriented applications

Model Aware Visualization

OPC Client

REST Services

Web Services

Model Aware Client Adapters

KPI Definition, Data validation

Open web services for real-time access to all model objects:
- Process tags
- Equipment specifications

eference

RT ESB

Enterprise

OPC interface for OPC-compliant clients:
- Model-enablement of existing applications
- Establishment of asset instances
- Accessing real-time data and other equipment information

Event Processing Event Definition

Model Aware Service

Server Adapters

XML/SQL

"Agile" adapters, i.e., adapters that automatically configure and update model

Alarms

Events

DCSs, Sensors

ERP

Examples of challenges solved by the RSM and the IIF

- Access to information about the same object(s) even if the information is dispersed across many facilities and many applications
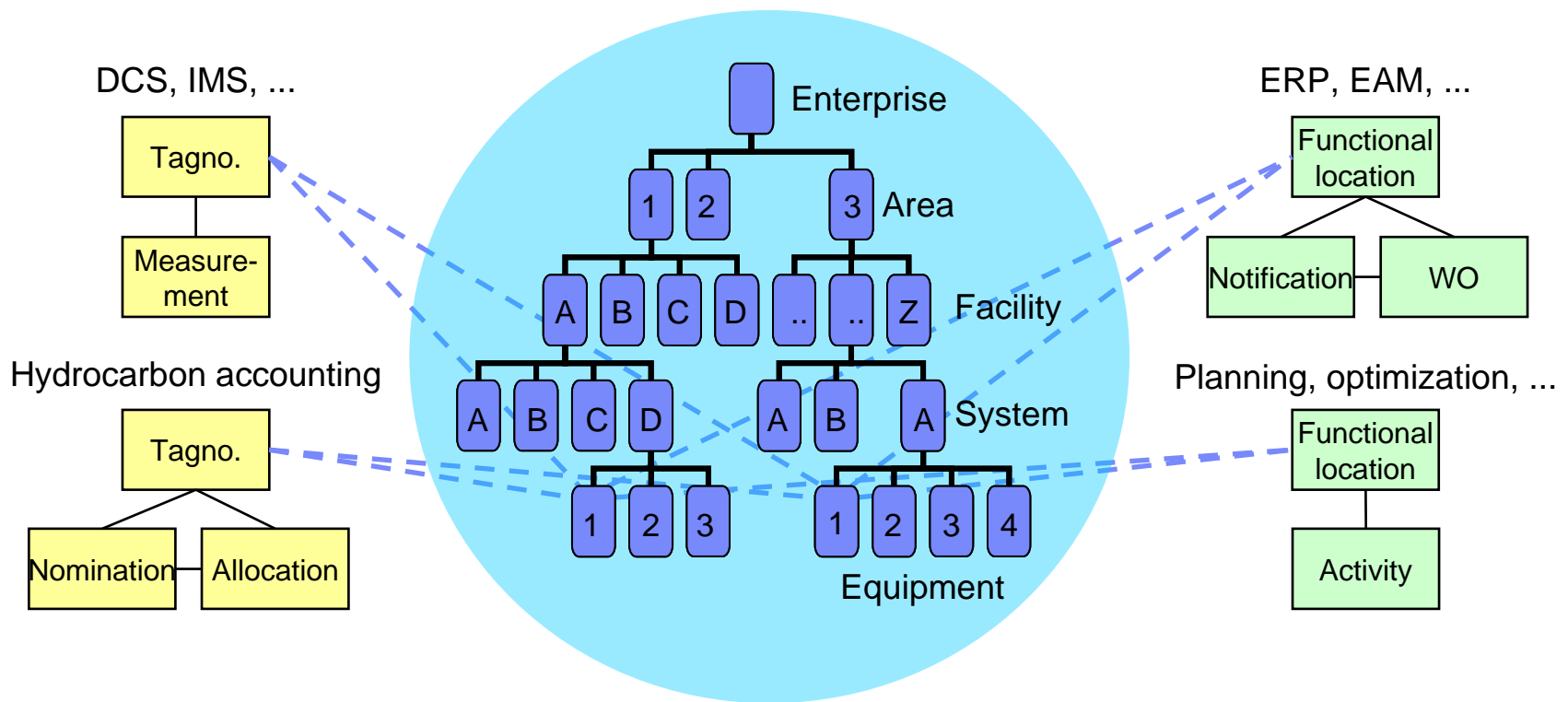
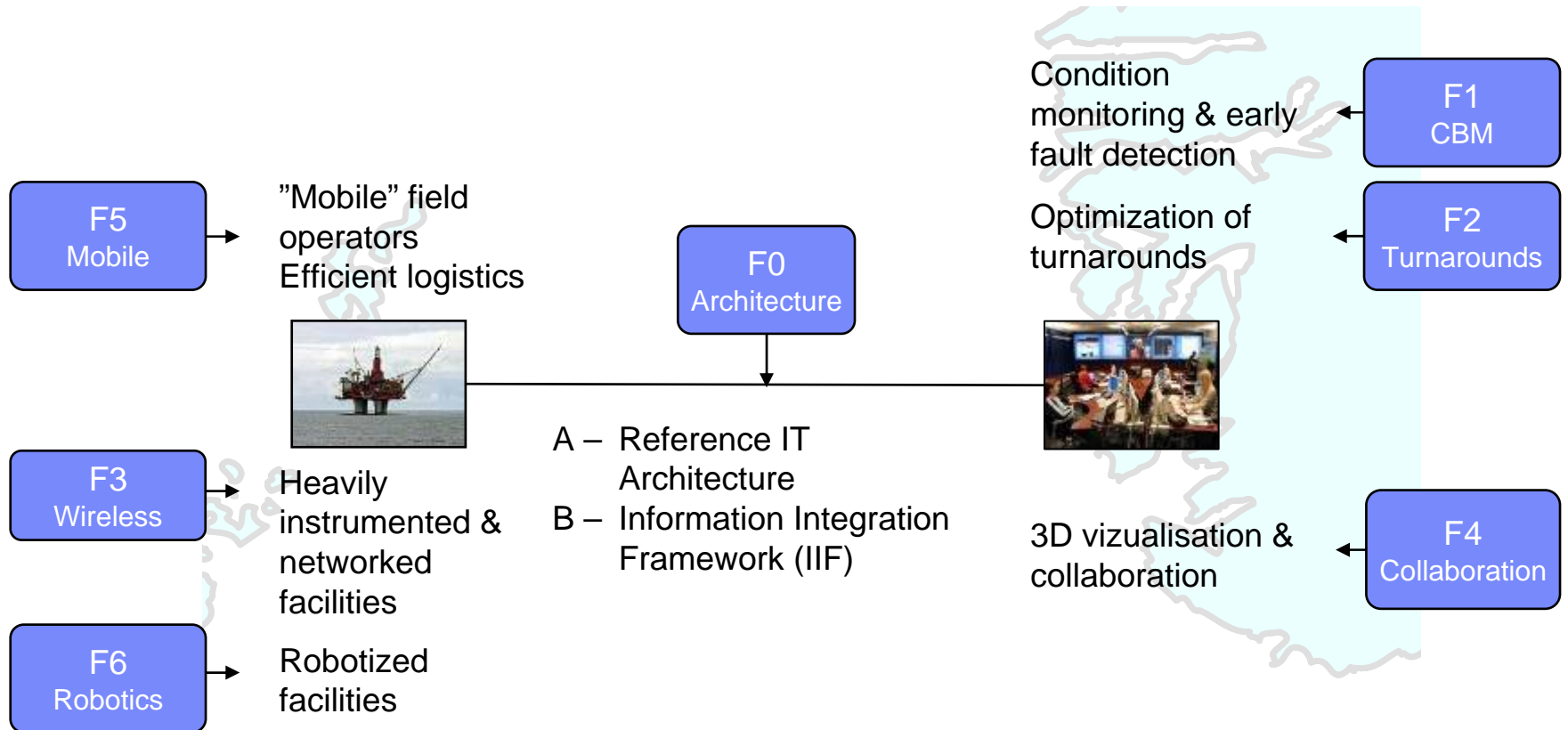# Examples of challenges solved by the RSM and the IIF

- Non-intrusive integration of the many existing applications in both the plant & enterprise domains

- Fast deployment of new, innovative work processes across domains and facilities
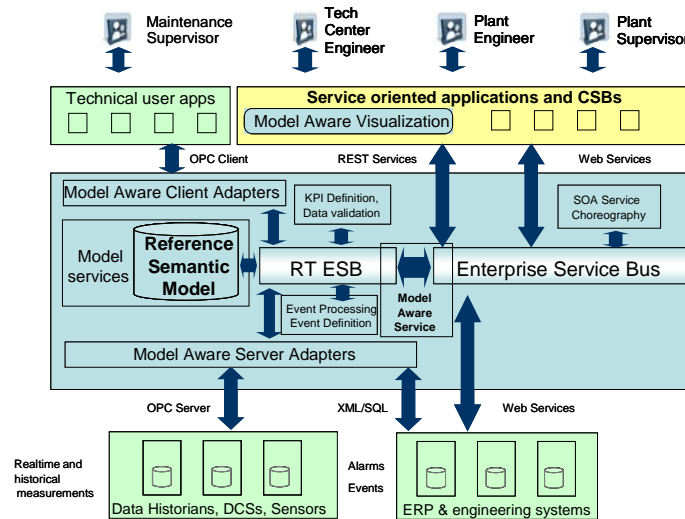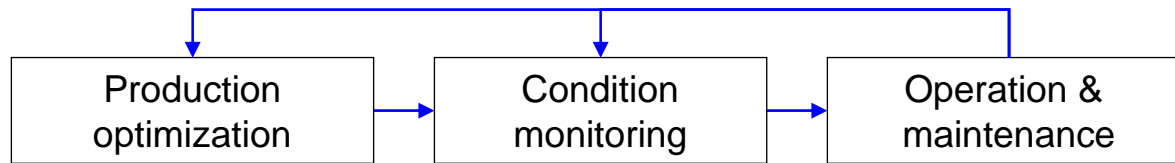
Real-life examples of application of the RSM and the IIF

The R&D program Tail IO
Contribute to increase of production with 5%, reduction of operation costs with 30% and improvement of HSE

F5 — Mobile	"Mobile" field operators. Efficient logistics
F3 — Wireless	Heavily instrumented & networked facilities
F6 — Robotics	Robotized facilities
F0 — Architecture	A – Reference IT Architecture B – Information Integration Framework (IIF)
F1 — CBM	Condition monitoring & early fault detection
F2 — Turnarounds	Optimization of turnarounds
F4 — Collaboration	3D vizualisation & collaboration

Real-life examples of application of the RSM and the IIF

The Tail IO F0B IIF project
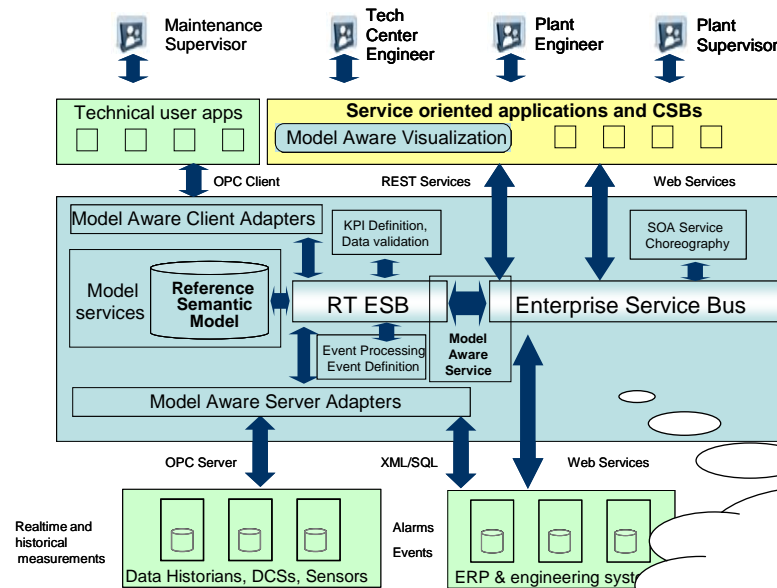
Demonstrate & verify flexibility and business value
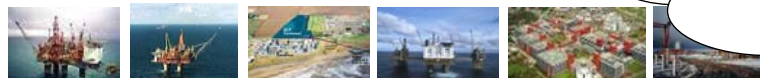
Condition monitoring	Operation & production	Production optimization

Maintenance Supervisor | Tech Center Engineer | Plant Engineer | Plant Supervisor

Non-functional Requirements

Technical user apps

Service oriented applications and CSBs

Model Aware Visualization

Model Management

OPC Client | REST Services | Web Services

Model Aware Client Adapters

KPI Definition, Data validation

SOA Service Choreography

Model services

Reference Semantic Model

RT ESB

Enterprise Service Bus

Model Aware Service

Event Processing Event Definition

Model Aware Server Adapters

OPC Server | XML/SQL | Web Services

Realtime and historical measurements

Alarms Events

Data Historians, DCSs, Sensors

ERP & engineering syst

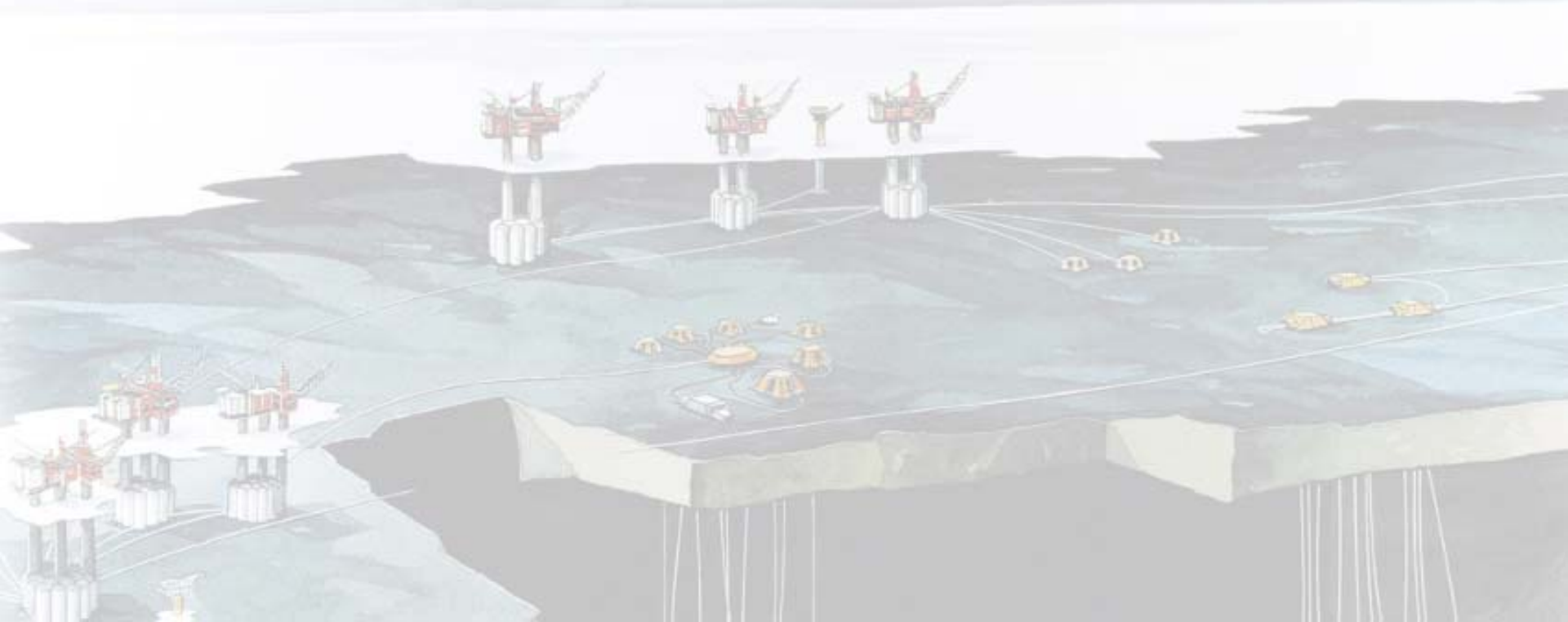Demonstrate & verify scalability and maintainability

Conclusions

- We believe that the RSM and the IIF solves many of the challenges that the industry is facing

  - Standardizes access to data across all assets, and protects existing investments

  - Facilitates fast and efficient deployment of new & innovative processes across domains and assets

- IBM will continue its support of open industry standards, and implement the standards in own solutions

  - Implement extensions to the ISO 15926 standard as they are developed

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Thank you for the attention!