PCA and ISO15926 and Interoperability
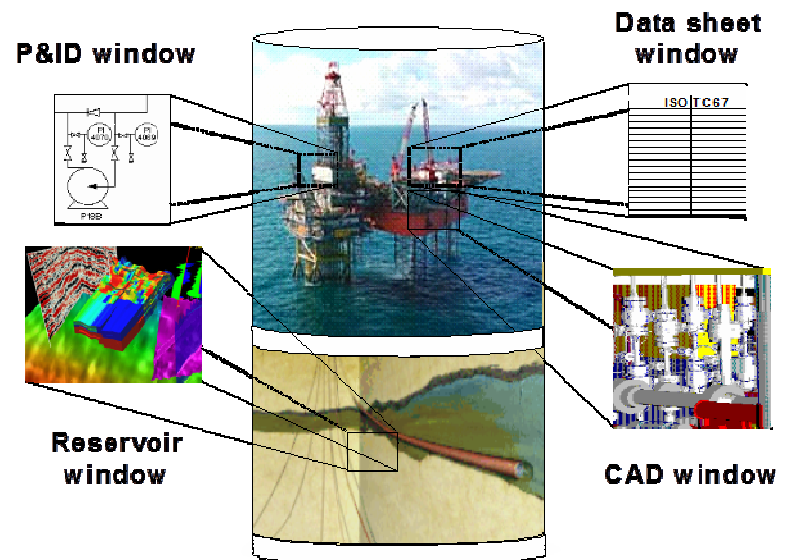## - Realizing Integrated Operation -

PCA FORUM 2010 AND MEMBERS MEETING

20-21 October 2010, Kuala Lumpur

Oskar Fredagsvik, Leading Advisor IO, Statoil

and

Chairman PCA

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

- 37 members in 12 countries on 4 continents

- PCA arranges forums and member meetings every year in:
  - **Asia/Australia**
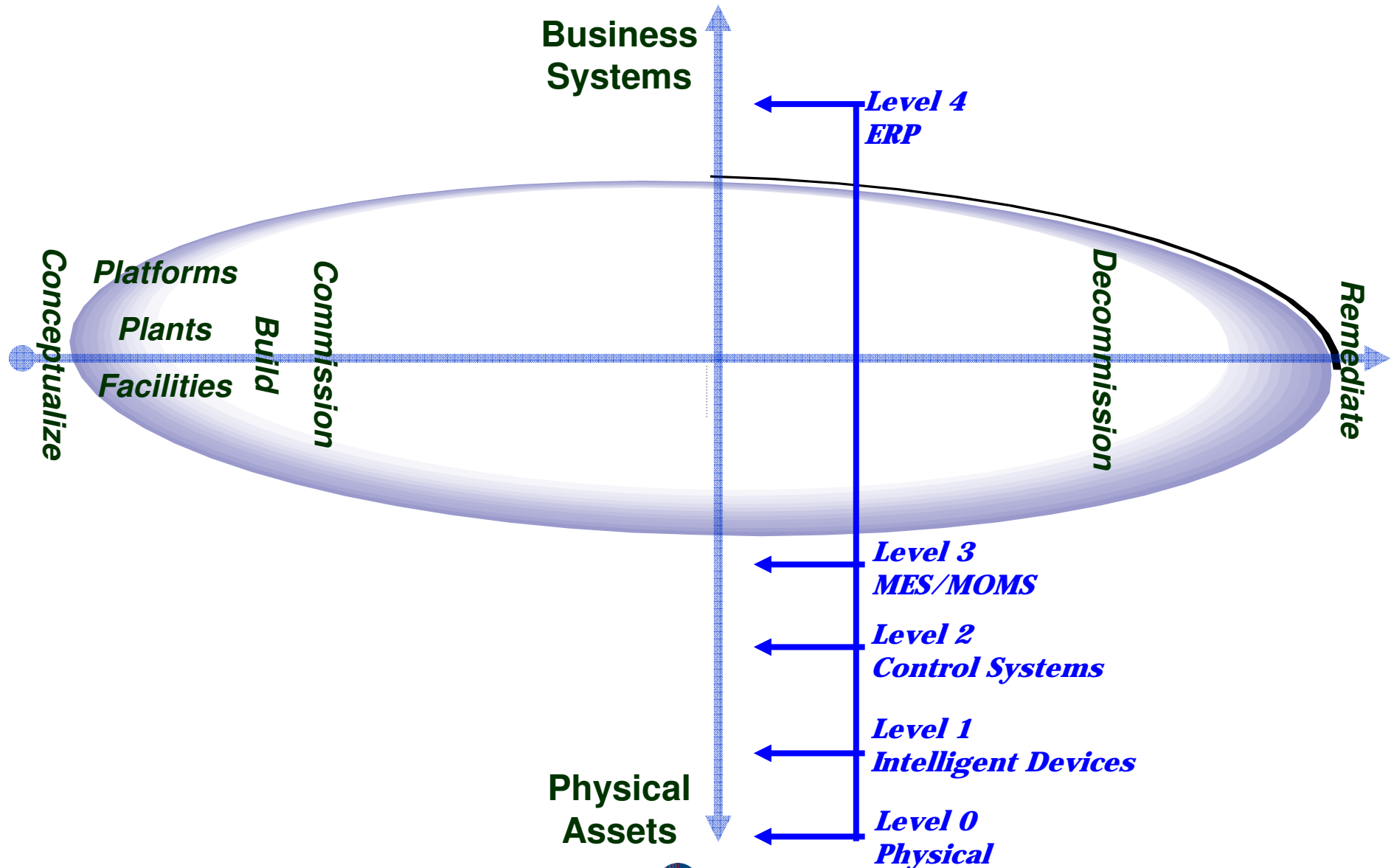 - **Europe/Africa**
  - **Americas**

The vision of ISO 15926 data interoperability and life cycle

Focus areas so far:
1. Documents for operations   (1993+)
2. Integrated operations   (2004+)
3. Operations and maintenance (2008+)

Life Cycle and Plant to Business (P2B) View

Integrated Operations (IO)

Generation 1 and 2

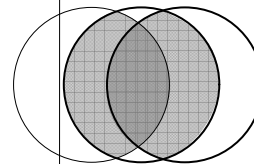IO is real time data onshore from offshore fields and new integrated work processes
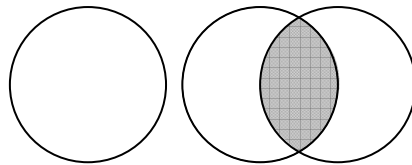
IO has a potential of USD 50 billions on the NCS

Potential

Integration across companies

Integration across onshore and offshore

Limited integration

Generation 2
- Integrated operation centers of operators and vendors
- Heavily automated processes
- 24/7 operation

Generation 1
- Integrated onshore and offshore centers
- Continuous onshore support
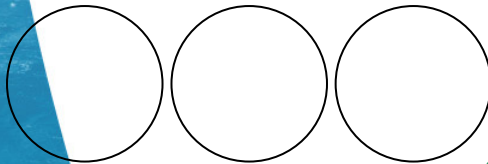
Traditional processes
- Self-sustainable fields
- Specialized onshore units
- Periodic onshore support

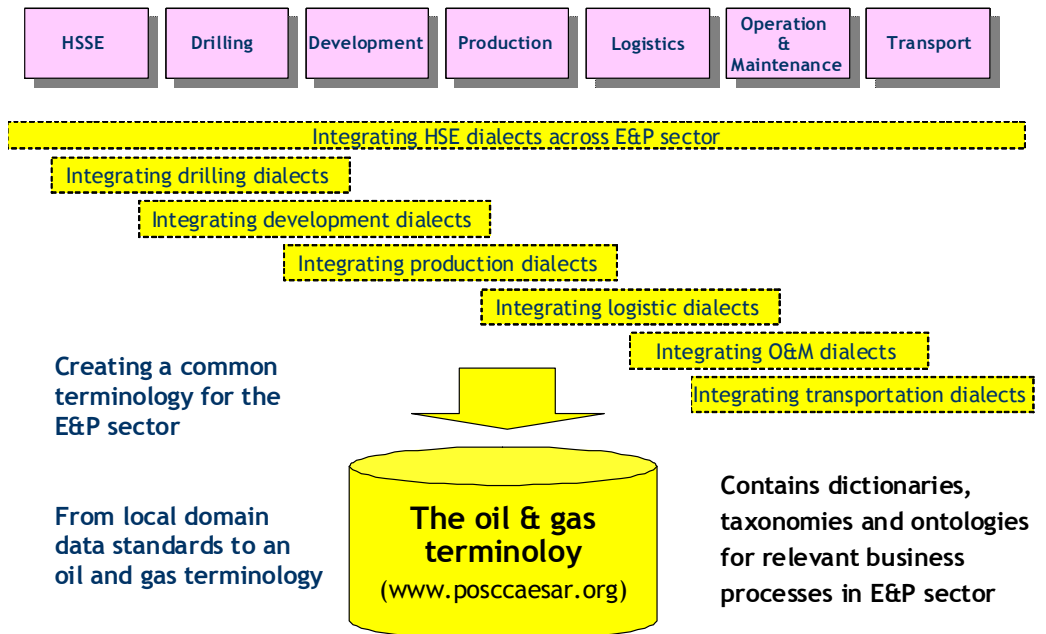**Time**

2005   2010   2015

olf

4

Information quality

- ➢ Information quality
  - ✓ A common dictionary
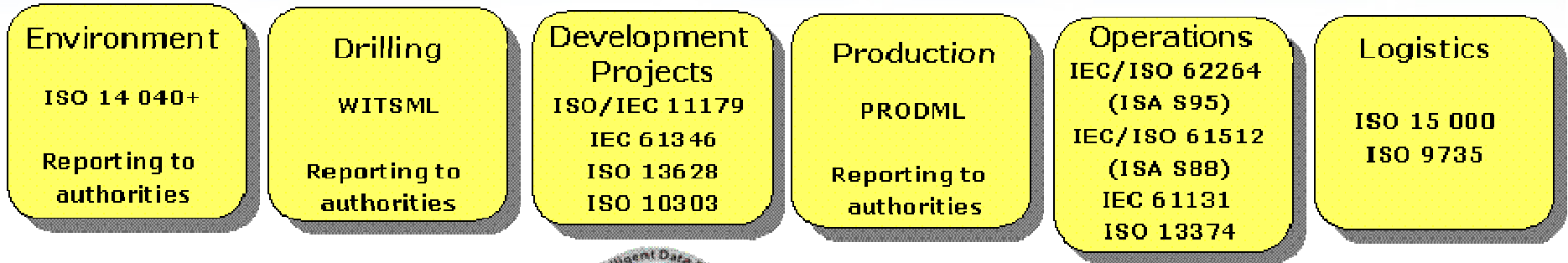   (HSE, drilling, development, production, logistics, operation and maintenance)

- ➢ Deployments
  - ✓ Daily Drilling Report
  - ✓ Daily Production Report
  - ✓ Monthly Production Report
  - ✓ Yearly Environmental Report
  - ✓ RFID deployment
    - • Personnel
    - • Container
    - • Drill string
    - • Equipment
  - ✓ EqHub – a common database for standard equipment

Harmonizing the E&P terminology

Integrating the terminology from the different business domains in E&P

| HSSE | Drilling | Development | Production | Logistics | Operation & Maintenance | Transport |

Integrating HSE dialects across E&P sector

Integrating drilling dialects

Integrating development dialects

Integrating production dialects

Integrating logistic dialects

Integrating O&M dialects

Integrating transportation dialects

Creating a common terminology for the E&P sector

From local domain data standards to an oil and gas terminology

The oil & gas terminoloy
(www.posccaesar.org)

Contains dictionaries, taxonomies and ontologies for relevant business processes in E&P sector

Statoil – GODI a new integration layer for plant information systems

Oskar Fredagsvik, Leading Advisor IO

Integrated operations: Collaboration across all boundaries

Statoil

Need for Integration

Value Creation

- Decisions & executions
- Mindset
- Organization
- Collaboration work arenas
- Information work spaces
- Information access
- Communication infrastructure
- Data capture

Integration

Criterion 7
Criterion 6
Criterion 5
Criterion 4
Criterion 3
Criterion 2
Criterion 1

RTV
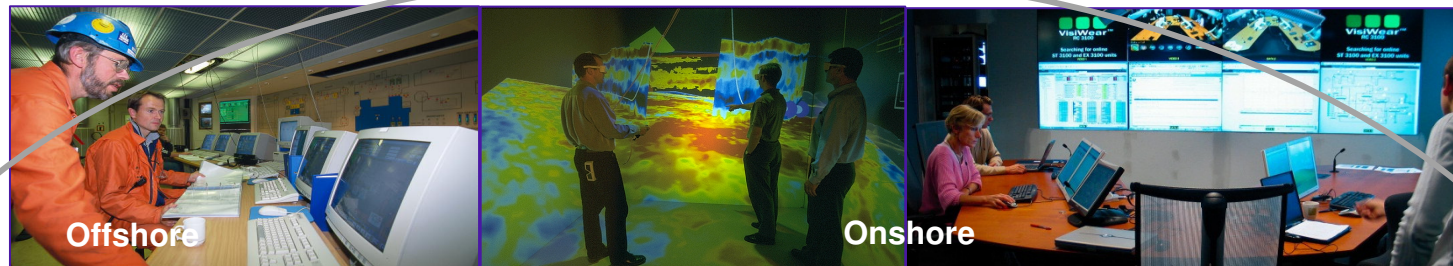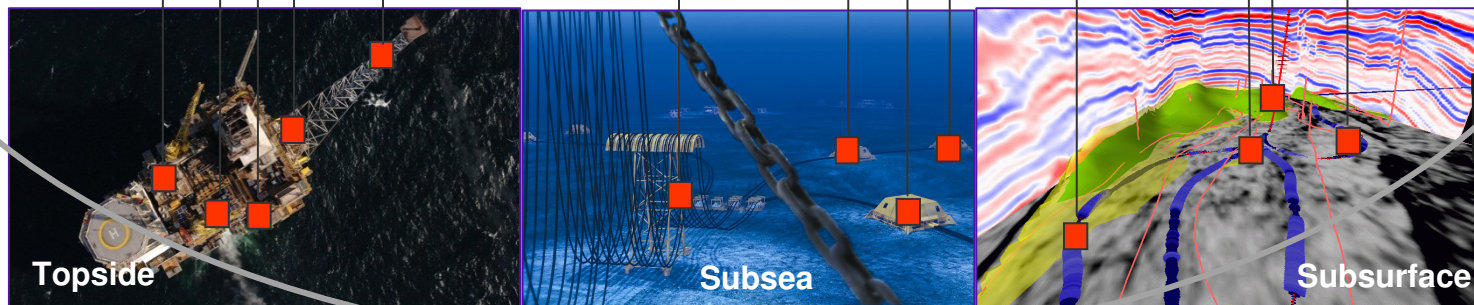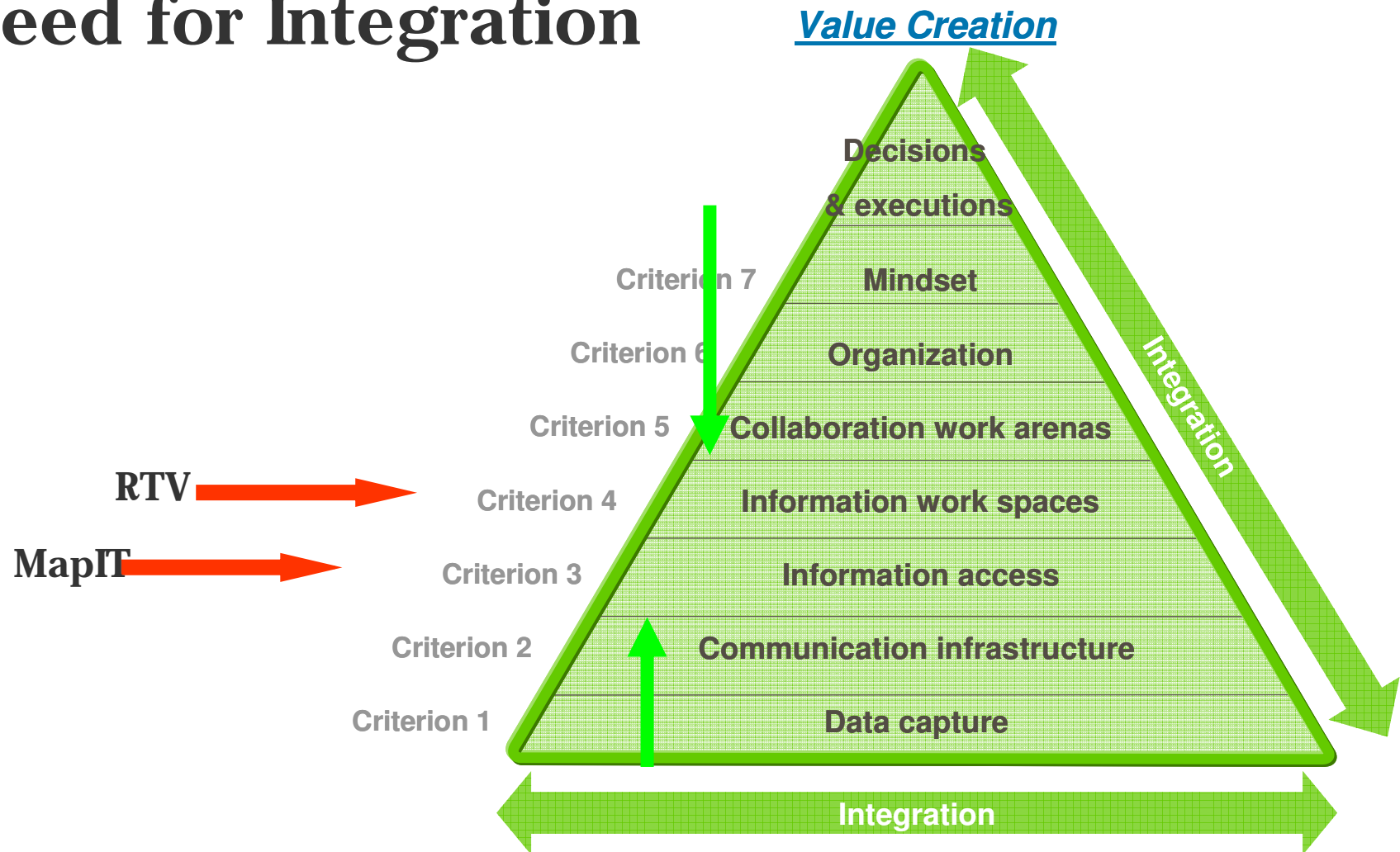
MapIT

Statoil, approx 40 plans connected to an infrastructure of fiberoptic cables
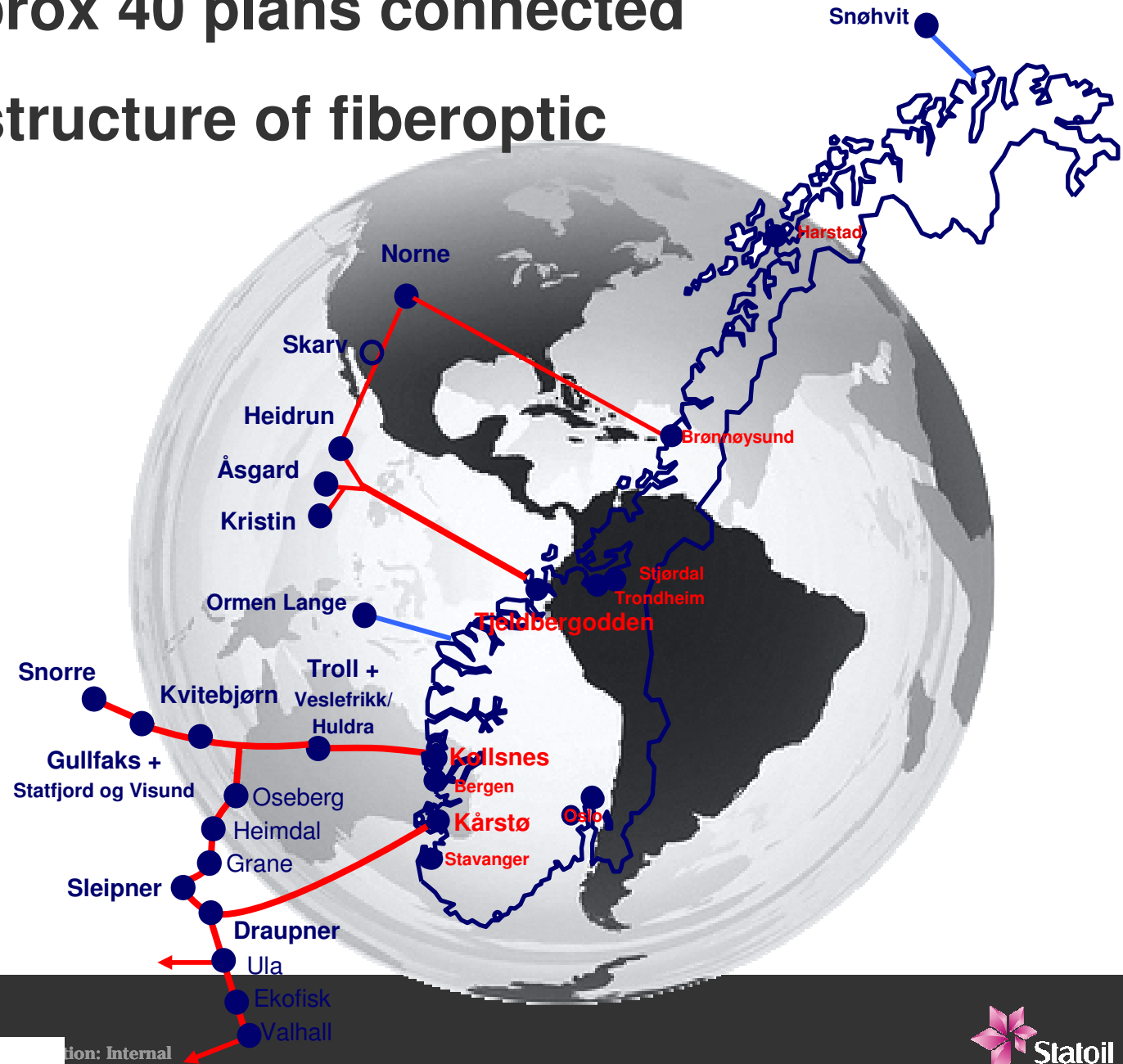
We need to
support
business needs
globally

Snøhvit

Norne

Skarv

Heidrun

Åsgard

Kristin

Harstad

Brønnøysund

Stjørdal
Trondheim

Tjeldbergodden

Ormen Lange

Snorre

Kvitebjørn

Troll +
Veslefrikk/
Huldra

Gullfaks +
Statfjord og Visund

Oseberg

Heimdal

Grane

Sleipner

Draupner

Ula

Ekofisk

Valhall

Kollsnes

Bergen

Kårstø

Stavanger

Oslo

Statoil

MapIT

GODI: BUSINESS DRIVERS

Statoil

Business Drivers RTV - MapIT

- The MapIT project will deliver standardised <u>data access</u> independent of data source technology to any data subscriber
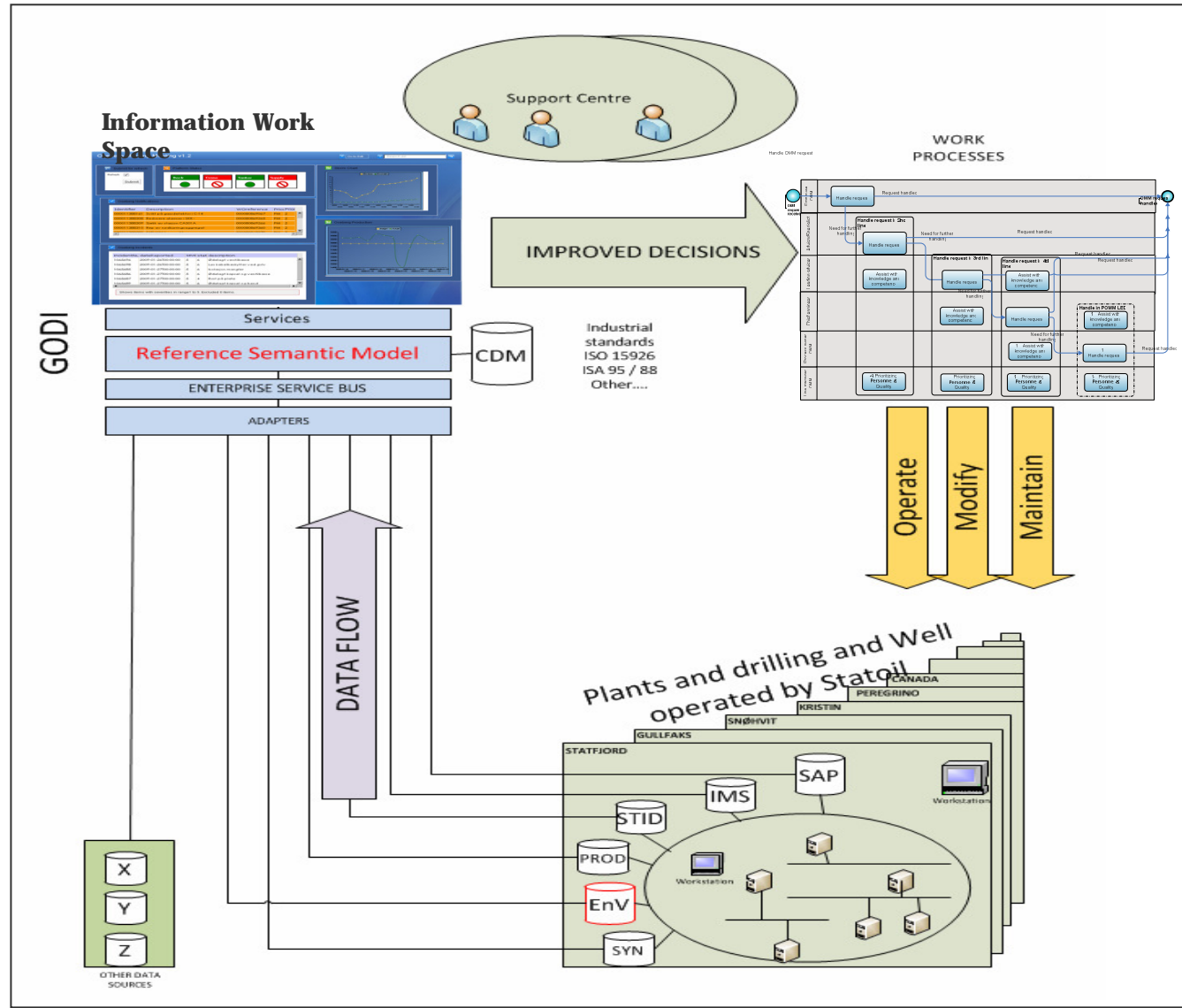
- The RTV project will deliver <u>information work spaces</u> for data visualisation and collaboration to Petec and OMM domains

- The two projects will deliver:
  – Standardised information to support safer, better and faster decisions for work processes

  – Standard visualisation and collaboration across assets

  – A platform to enable continuous change

  – Support tools for to new operating model

  – Enablers for creative and innovative Industrial IT tools

MapIT   RTV

GODI

IMS
TI
SAP
DBR
IMS

DATA   INFORMATION
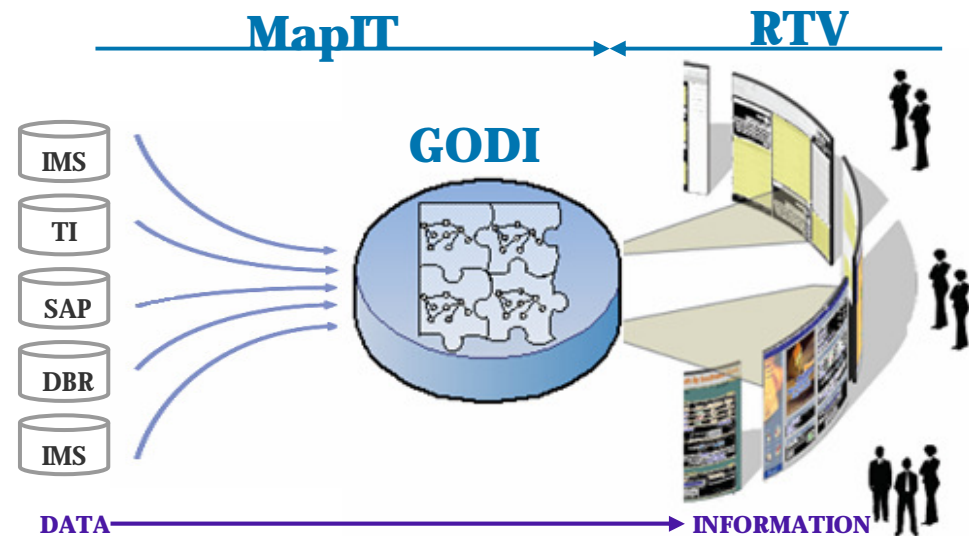
GODI - Global Operation Data Integration
RTV   - Real Time Visualisation
MapIT- Master project IT

Statoil

AS- IS

TO- BE

ENTERPRISE LEVEL

DAILY OPERATIONS

All Plants/operated by Statoil

Information Work Space

Support Centre

WORK PROCESSES

IMPROVED DECISIONS

GODI

Services

Reference Semantic Model

CDM

ENTERPRISE SERVICE BUS

ADAPTERS

Industrial standards
ISO 15926
ISA 95 / 88
Other....

Operate

Modify

Maintain

DATA FLOW

Plants and drilling and Well operated by Statoil

CANADA
PEREGRINO
SNØHVIT
KRISTIN
GULLFAKS
STATFJORD

SAP
IMS
STID
PROD
EnV
SYN

Workstation

X
Y
Z

OTHER DATA SOURCES

STATFJORD
SAP
IMS

Workstation

SYN

Statoil

Benefits

- Quantified
    - Avoided cost Data management and data integration
    - Time efficiency and better and faster decisions
    - Reduced opex IT systems that are being discontinued
    - Studies internally in Statoil and in the oil industry have shown improvements in production based on collaboration.
- Not Quantified
    - MapIT and RTV are delivering system support for integrated operations by refining data into information
    - Easier to harmonize work process, rapid deployment of processes and tools
    - Reduce personnel dependencies
    - Move the problem not the person
    - RTV and GODI are prime examples of enterprise solutions that will contribute to the standardisation of work processes across assets, and as such create a foundation to establish multi asset support centres
    - Improved time to market for new business functionality

Statoil

MapIT

PROJECT MAPIT
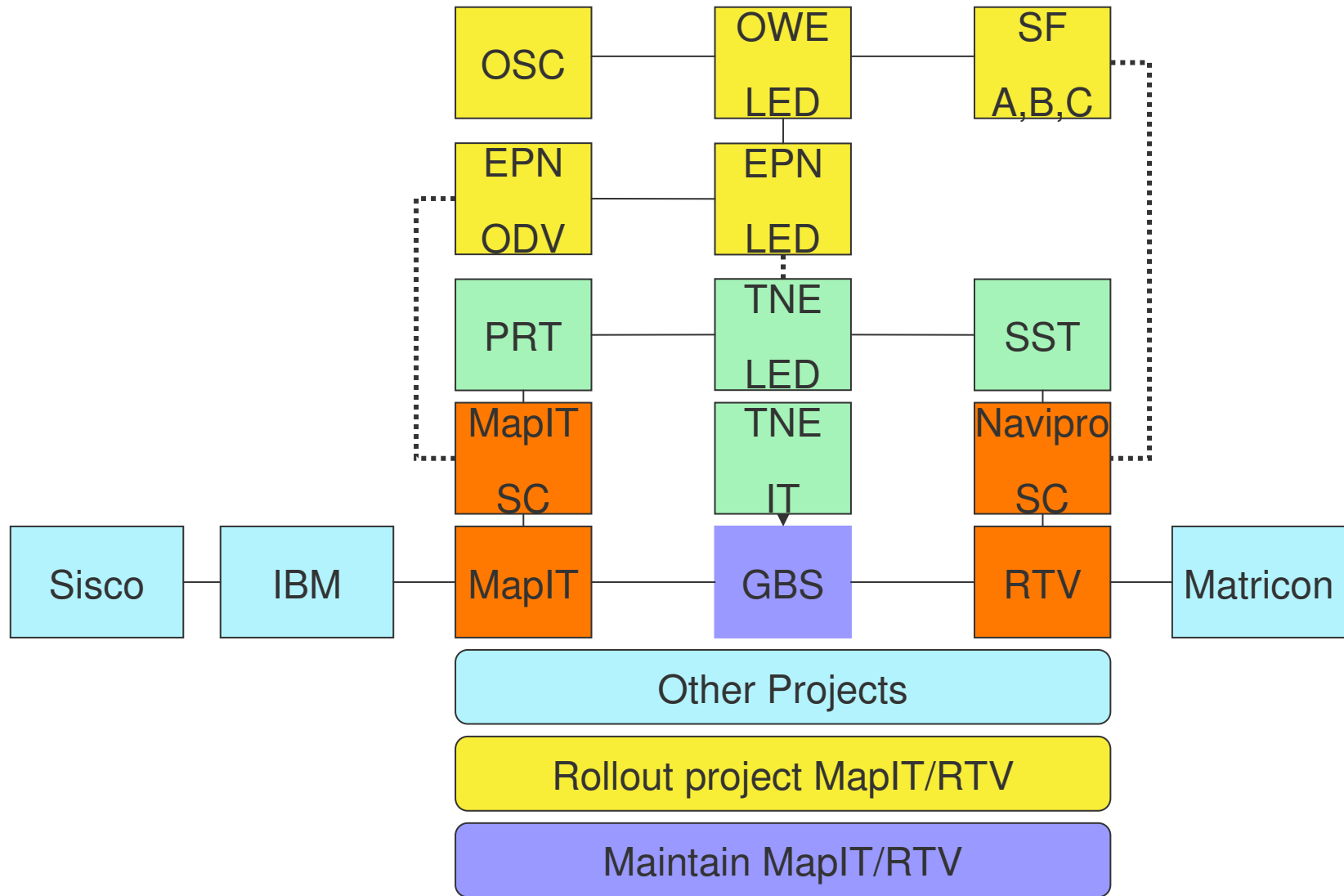
Statoil

The GODI Vision

- Provide enterprise-wide access to plant and equipment related data, through standardised information models combining data from different sources, to end-user applications.

Statoil

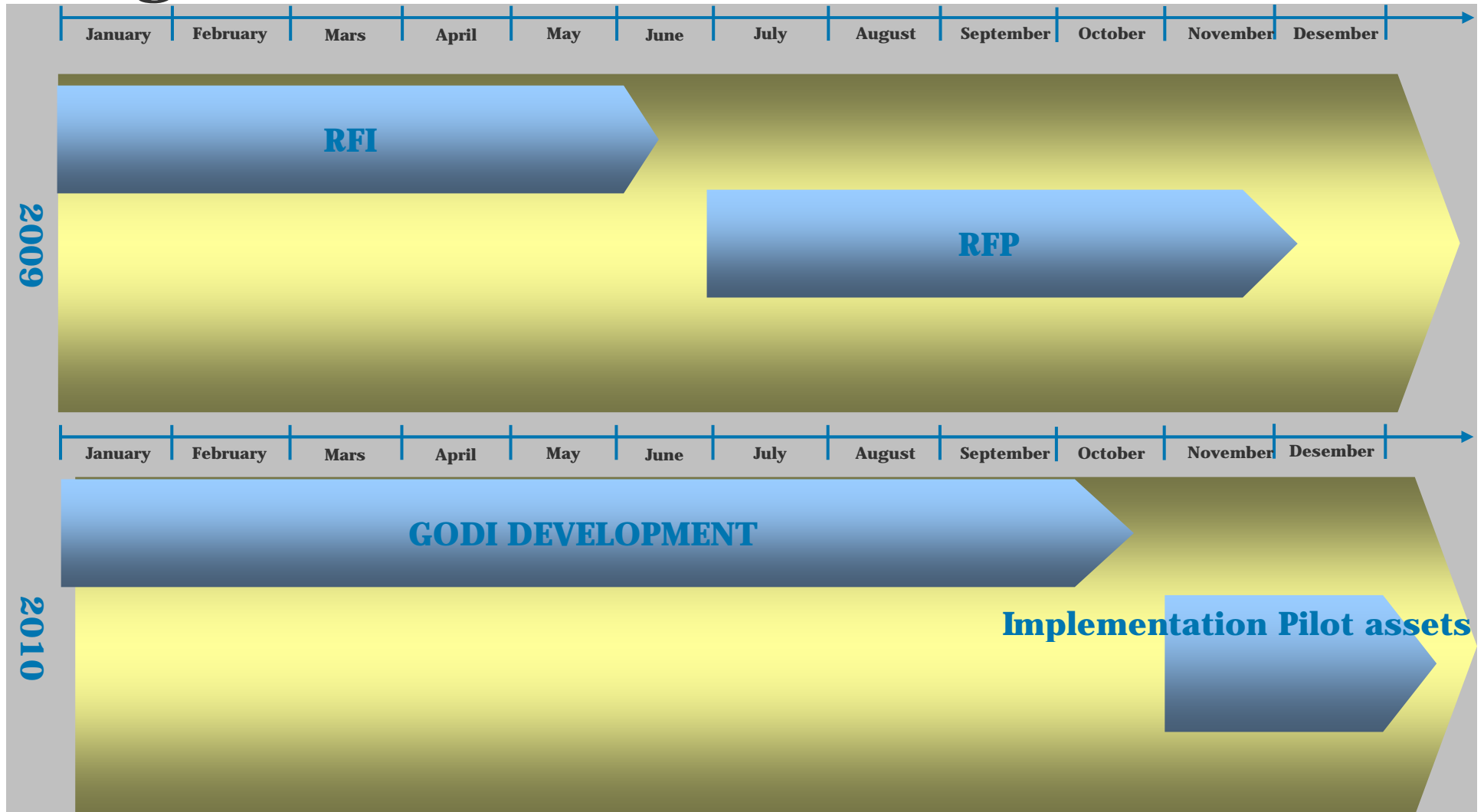# GODI interfaces with end user applications
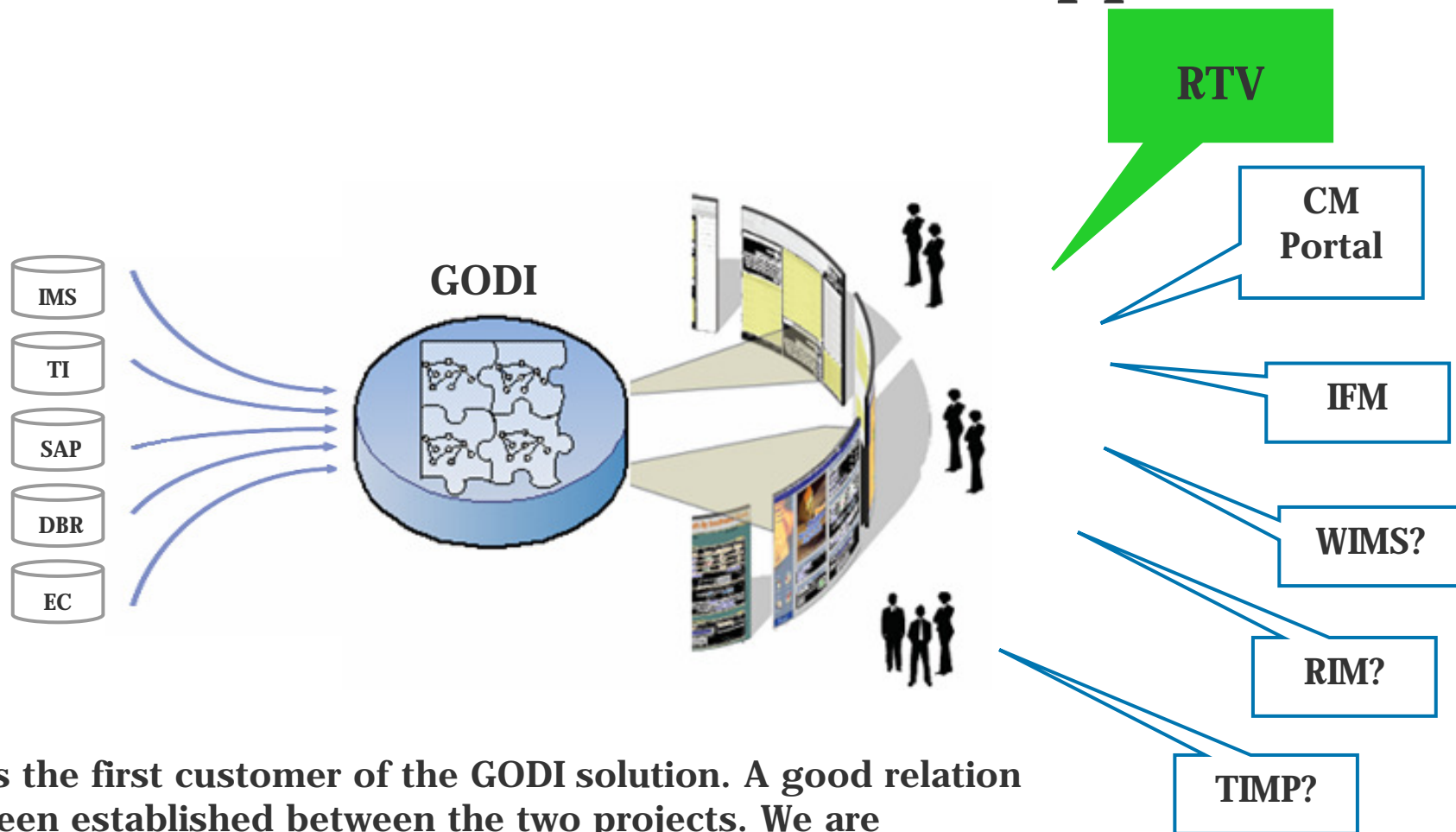
RTV is the first customer of the GODI solution. A good relation has been established between the two projects. We are collaborating on all common deliveries.

Map of contibutors

High Level Plan

January	February	Mars	April	May	June	July	August	September	October	November	Desember

2009

RFI

RFP

January	February	Mars	April	May	June	July	August	September	October	November	Desember

2010

GODI DEVELOPMENT

Implementation Pilot assets

Statoil

MapIT

ARCHITECTURE

GODI – Approved Concept Architecture

GODI Model Management Team

5 **Enterprise Statoil** — *Years, Mnths, Weeks*	
4 **Business Area (EPN Operation N)** — *Mnths, Weeks, Days*	
3 **Asset (Norne) Daily Operations** — *(Days, Shifts, hrs, min, sec)*	
2 **Process Control** — Days, Shifts, hrs, min sec	
1 **Process Control** — Days, Shifts, hrs, min sec	
0 **Process Control**	

FFO

Expert centres

Partners Service Providers

All Plants operated by Statoil
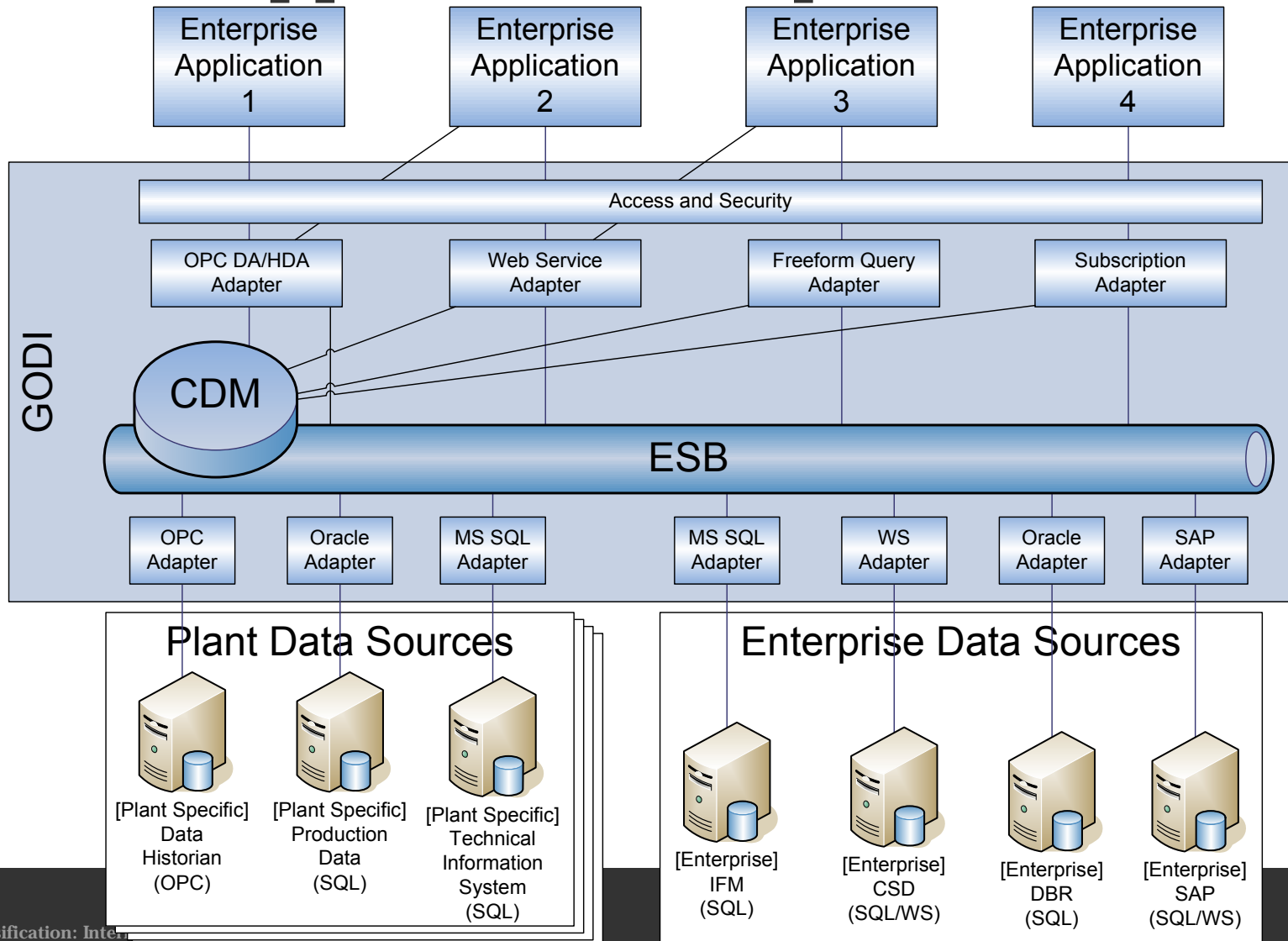
GODI Model Management Team (GBS and TNE)
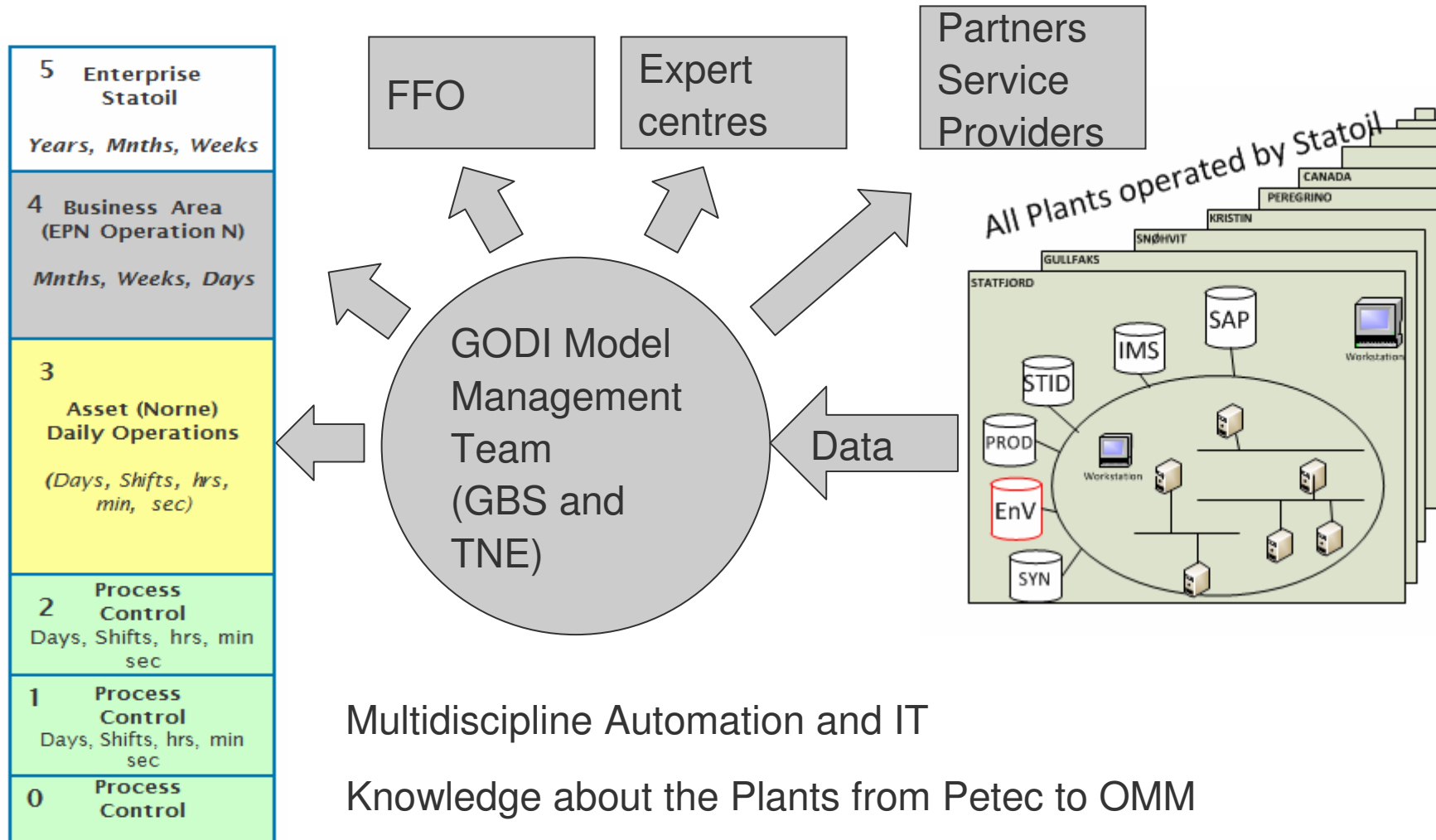
Data

Multidiscipline Automation and IT

Knowledge about the Plants from Petec to OMM

Statoil

Semantics = Meaning

- **Semantics is the study of meaning**

- **Semantic web - a Web of linked data**

- **Including corporate data!**

- **It is about common formats for integration and combination of data drawn from diverse sources.**

- **Standards, tools, techniques, best practices, community, trust, logic, reasoning …**

- **Tim Berners-Lee, James Hendler and Ora Lassila (May 17, 2001). "The Semantic Web". Scientific American Magazine.**
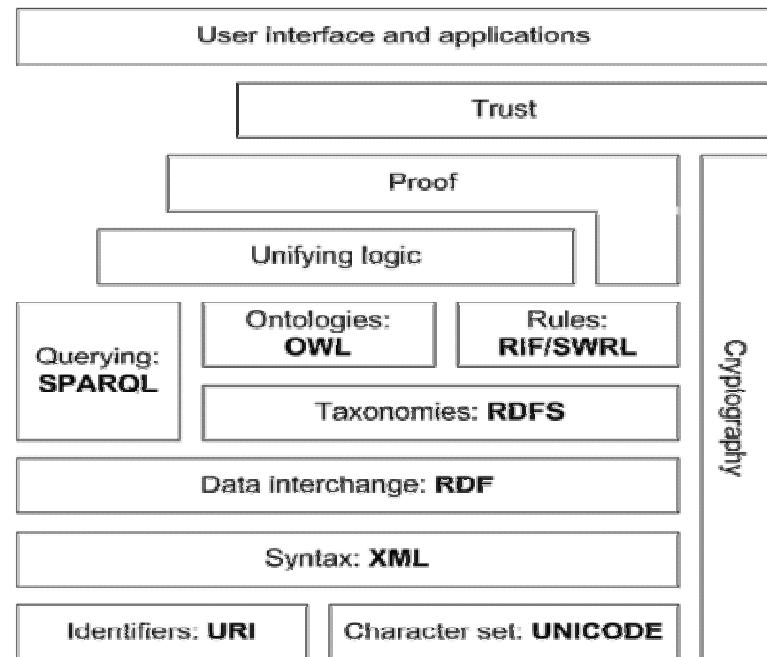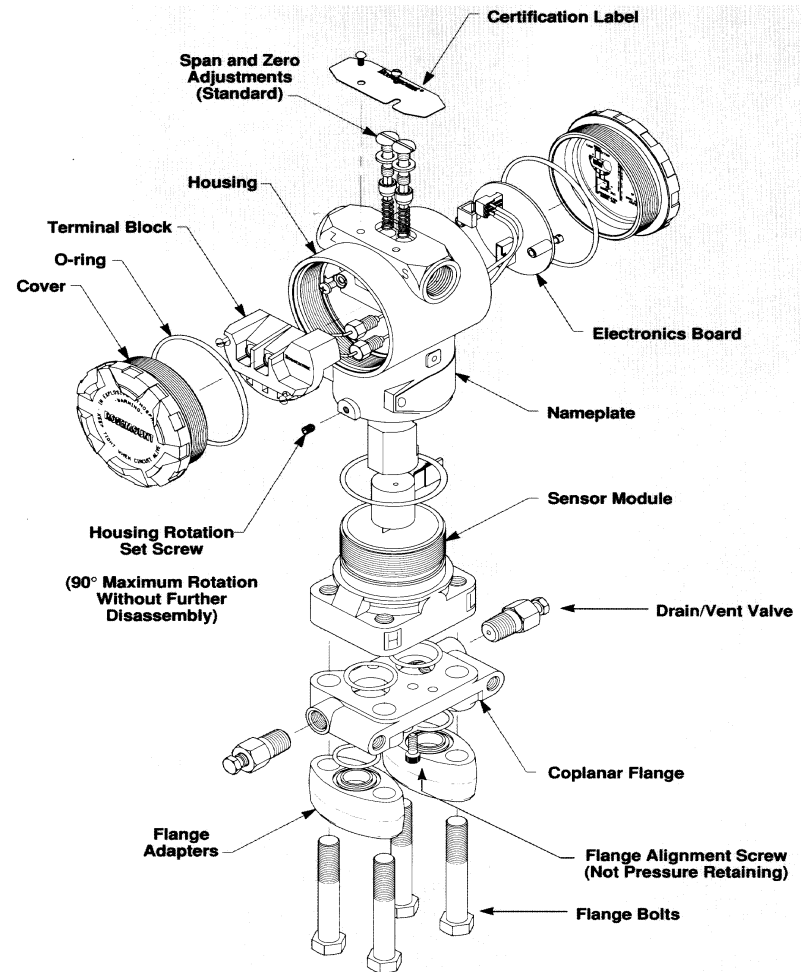

The Semantic Web Stack

What is an Ontology?

- A model of some aspect of the world

  – Introduces vocabulary

  – Specifies meaning (semantics) of terms

    • Pressure Transmitter is a Transmitter that is part of the subsea flow control module

  – Formalised using suitable logic

$$\forall x.[PressureTransmitter(x) \rightarrow Transmitter(x) \wedge \exists y.[isPartOf(x, y) \wedge SubseaControlModule(y)]]$$

E.g.

Data Sharing

- **2 main problems**
  - **Syntactic: can we talk?**
  - **Semantic: what do we talk about?**

- **Syntactic is easier to solve**
  - **Serialized objects: but you have to know the objects**
  - **JDBC/ODBC: but you have to know the database**
  - **XML: but what do the tags mean? (makes XML brittle to change)**

Statoil

Metadata

- Data "about" data
  - e.g. DDL in SQL
    - Meta data
  - Lots of data, little metadata

- Traditionally they are separated
  - Semantics encoded into individual applications
  - Semantics can become "lost"

- In RDF, metadata and data co exist *in the same form*

Statoil

Godi Model Management
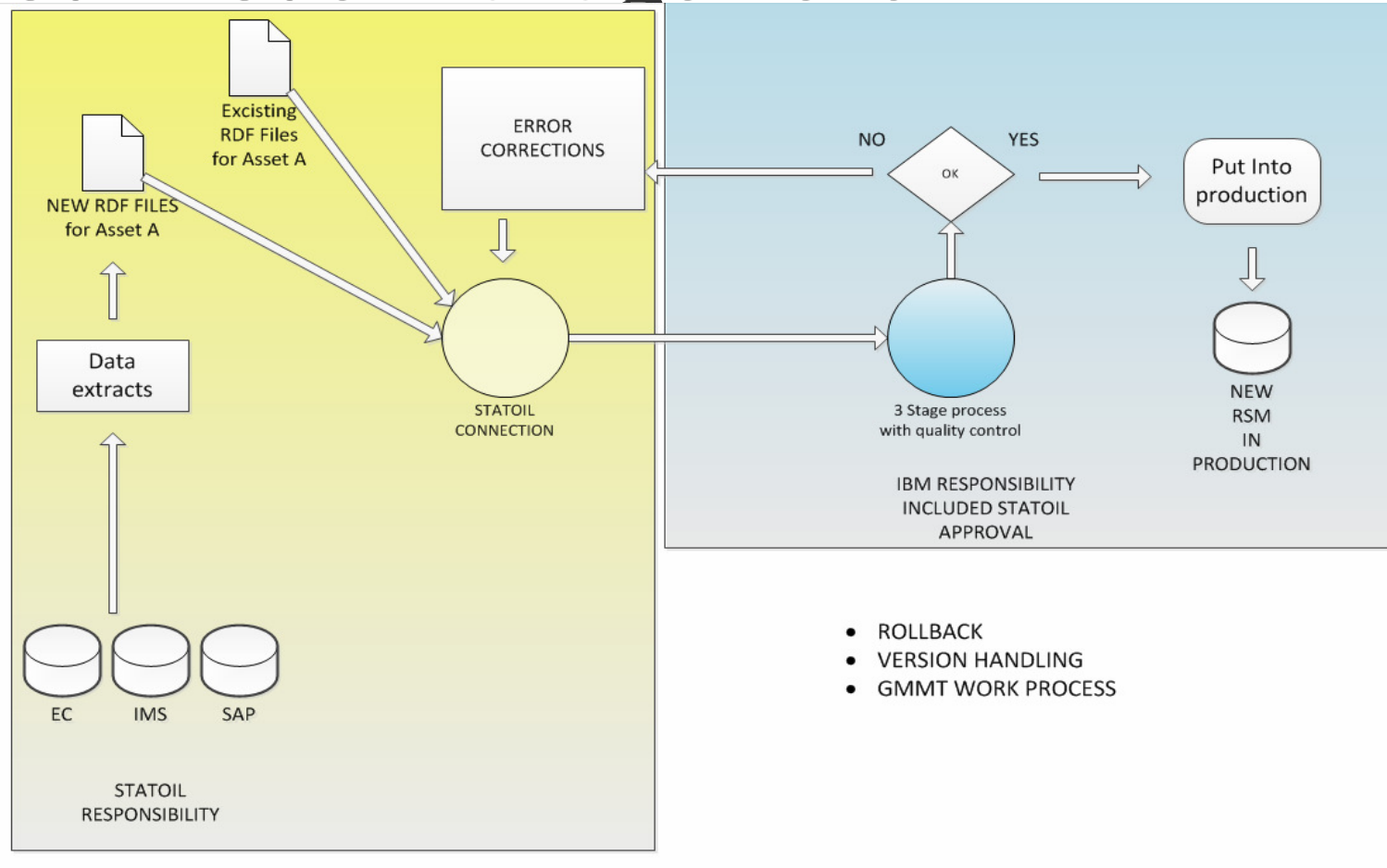
The instance model is established and maintained by Statoil.

In this work we also aim to support international standards.

MapIT

FUTURE ROADMAP

Statoil

Future Roadmap

- New applications prepared to be new consumers of data and services delivered by GODI

- Work with one domain at time to build information models

- Increase use of rich semantics

- Focus on Business to Business (horizontal integration)

- Increased use of new services within GODI – Complex queries – SPARQL ENDPOINT and Triple store – Complex Event Processing

New applications

- Some new initiatives to be put in production on top of GODI
  - TIMP (Technical Integrity Management Program)

  - WIMS (Well Integrity Management System)

  - RIM (Raiser Integrity Management)

  - CM Portal (Condition Monitoring)

  - PEMS (Predictive Equipment Monitoring System)

Statoil

Never ever give up!