PCA FORUM 2009 AND MEMBERS MEETING

20-21 October 2009, Hotel Nikko Kuala Lumpur

ISO 15926, interoperability and Integrated Operations (IO)

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Manager IO, OLF
Chairman of PCA
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Data interoperability - Bottom line potential for oil companies on the Norwegian Continental Shelf

NORSOK 1994

25% and 20% cost reduction in APEX and OPEX, respectively, provided data interoperability

→ Potential per year:
NOK 25 billions in cost reduction

Integrated Operations

Access to real time data onshore

→ Potential:
NOK 300 billions in NPV

Exploration

Easy access to quality data

→ Potential unknown

E&P data and ISO 15926

Statements about data

Importance

- Availability of data determines the work processes
- Data is the basis for operational decisions
- Data (and knowledge) is more than 70% of E&P costs

Challenges

- Engineers spend 30-60% of the time searching for data
- Data is not well defined and exits in isolated island
- 50% of the IT costs are washing data

Integrated Operations are lacking data

- Only 5-6% of the production wells are smart well
- Only 5-10% of the equipment is monitored
  - 25-30% of sensor data is incorrect

"We are rebuilding organizations around information"
Peter F. Drucker (2002),
"Managing in the next society",
St. Martin's Book

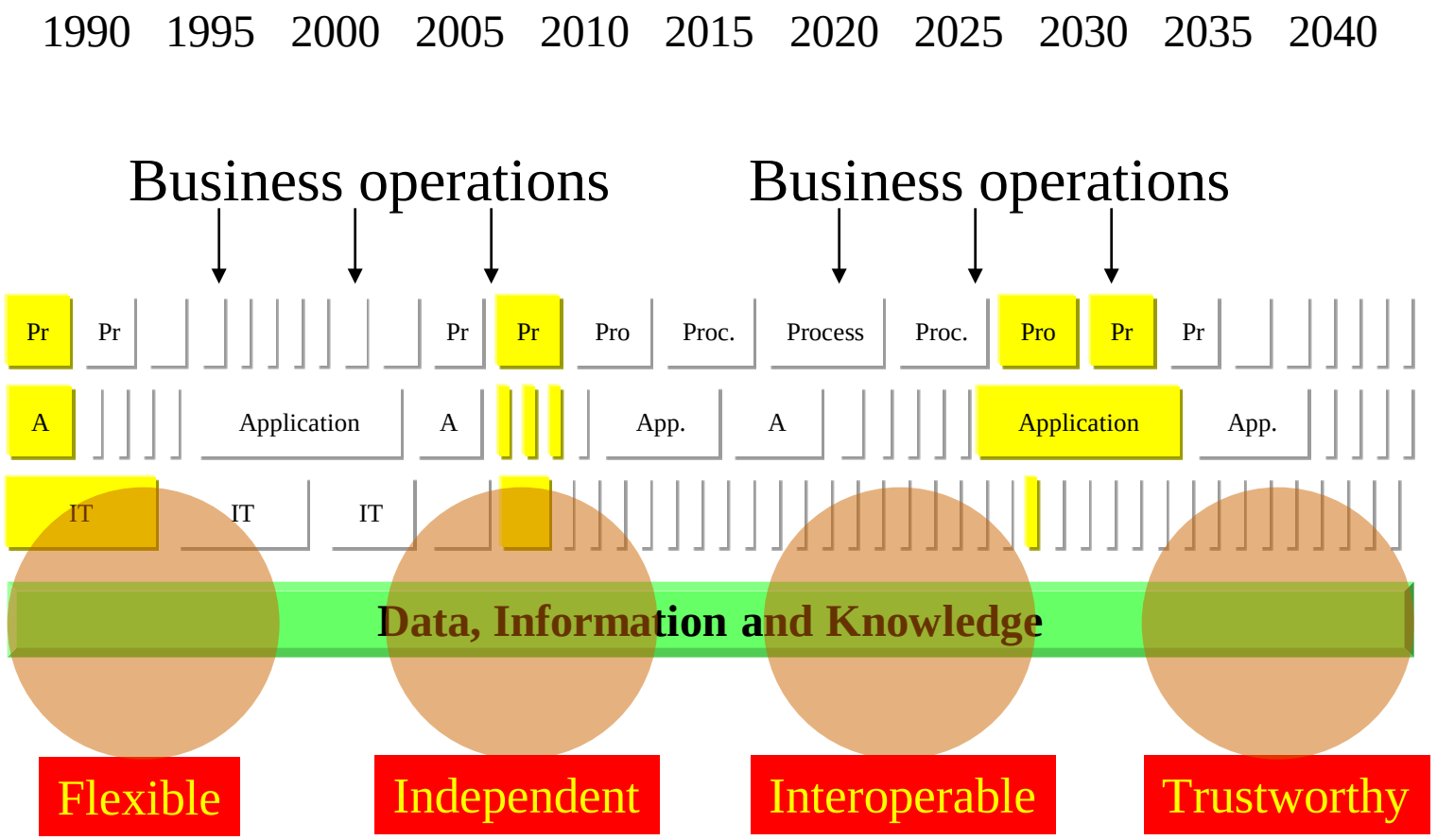
Winning or Losing

Bill Gates, Microsoft, 1999

"Virtually everything in business today is an undifferentiated commodity except how a company manage its information.

How you manage information determines whether you win or lose."

Why data centric approach for standardization?

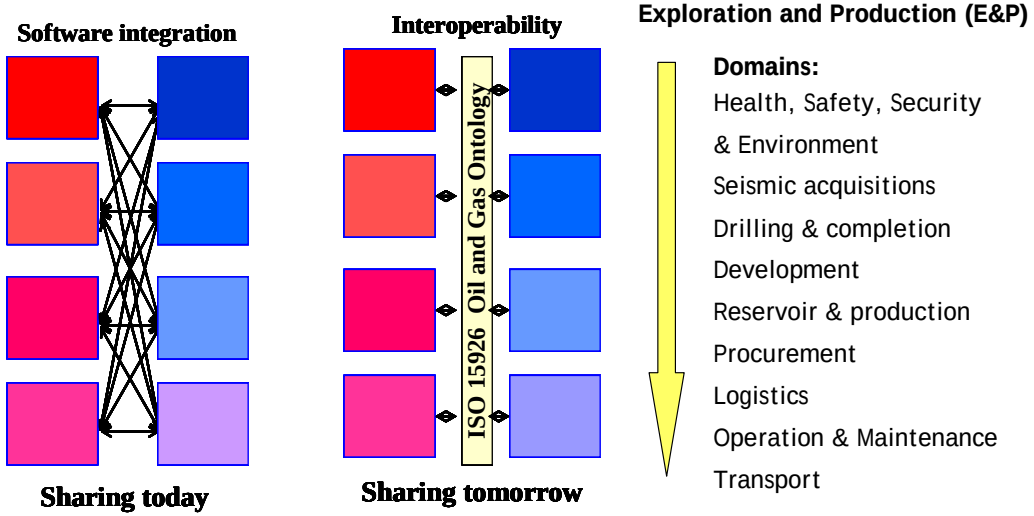


How can we capitalize on this focus?

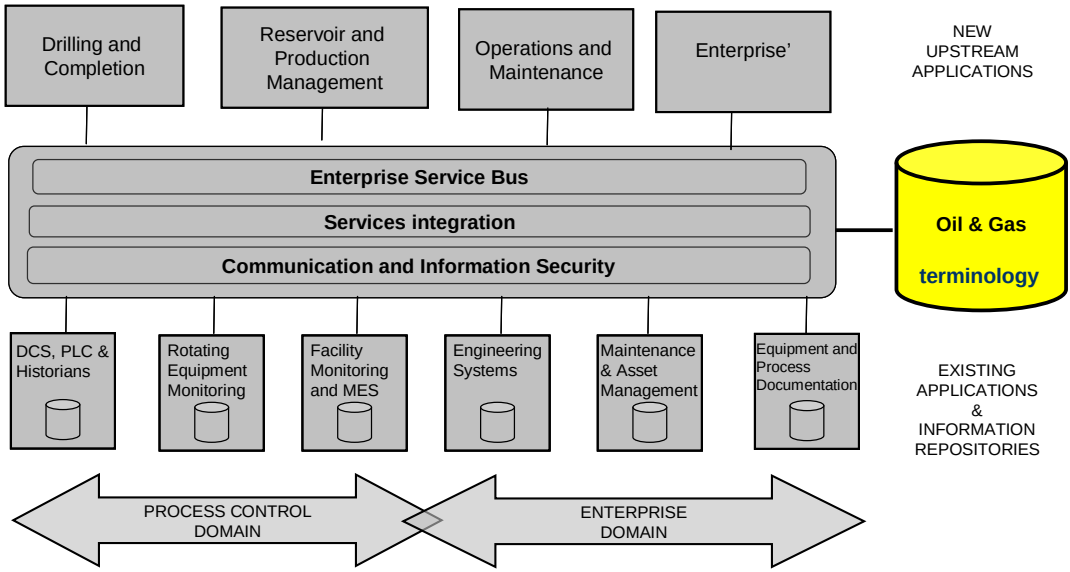
What is needed for data interoperability?

- E&P ontology for global oil and gas industry

From software integration to data interoperability using ISO 15926



- Standardized data exchange mechanism (Enterprise Service Bus)



Construction of the oil and gas ontology

XML Schema

XML Schemas:

HSE:

- ✓ Yearly environmental report

Drilling

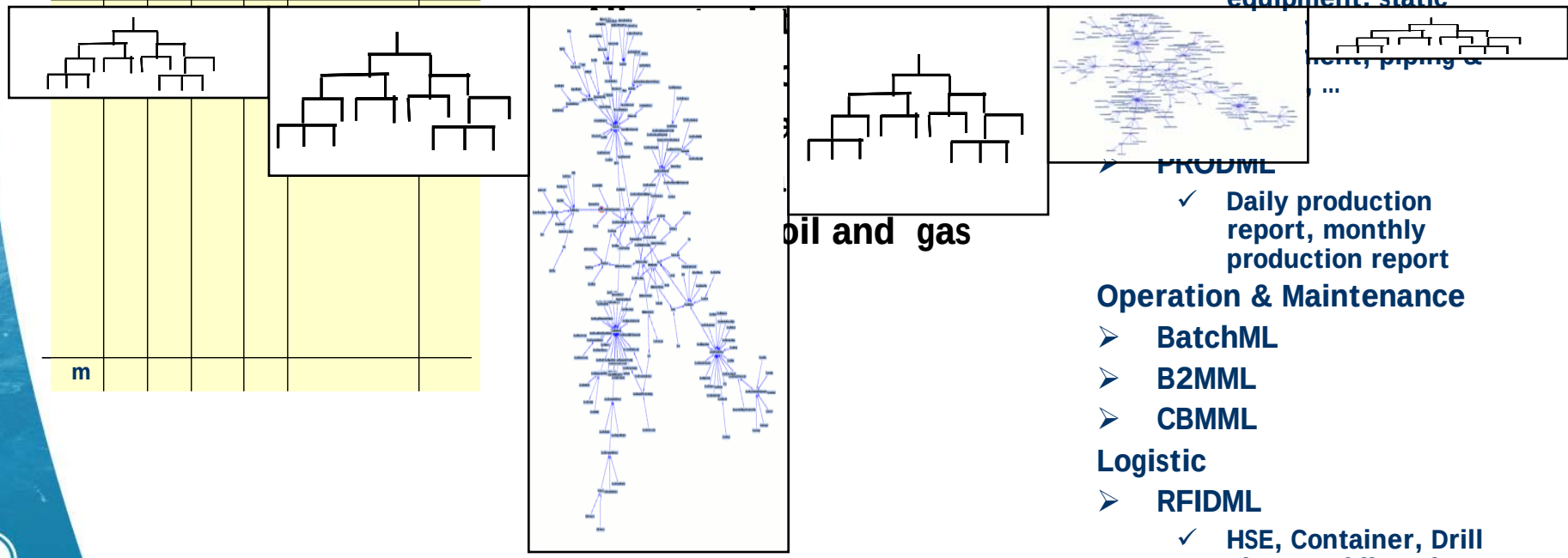
- ➢ WITSML
  - ✓ Daily drilling report

Development/Operation

- ➢ DataSheetML
  - ✓ Instrumentation, electrical, subsea equipment, static

The oil and gas ontology (today)

No.	N1	N2	N3			Nn
1	HSE			Drilling	Development	Production	Operation	Logistics
m								



oil and gas

- ➢ PRODML
  - ✓ Daily production report, monthly production report

Operation & Maintenance

- ➢ BatchML
- ➢ B2MML
- ➢ CBMML

Logistic

- ➢ RFIDML
  - ✓ HSE, Container, Drill pipes, Mobil equipment and fixed equipment

From domain data standards to an oil and gas ontology

Standards and specifications across E&P value chain

Environment
ISO 14 040+
Reporting to authorities

Drilling
WITSML
Reporting to authorities

Development Projects
ISO/IEC 11179
IEC 61346
ISO 13628
ISO 10303

Production
PRODML
Reporting to authorities

Operations
IEC/ISO 62264 (ISA S95)
IEC/ISO 61512 (ISA S88)
IEC 61131
ISO 13374

Logistics
ISO 15 000
ISO 9735

ISO International Organization for Standardization
energistics
Intelligent Data Sets · POSC Caesar Association · FIATECH · Accelerating Deployment of ISO 15926
energistics
MIMOSA
The OpenO&M
ISO International Organization for Standardization

Data integration based on ISO 15926 for creating an Oil and Gas Ontology (OGO)

RDS
Contains dictionaries, taxonomies and ontologies for relevant business processes in oil and gas
http://posccaesar.org/

ISO International Organization for Standardization
POSC Caesar Association
W3C Semantic Web

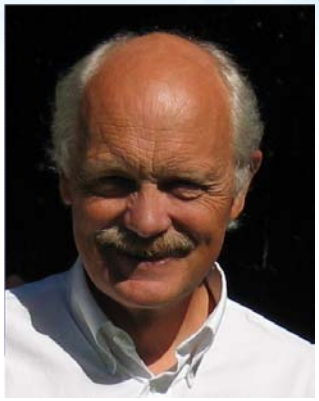
Who are addressing the data challenges?

- POSC Caesar Association (PCA)
- PCA's members
- OLF/EPIM
- IO in the High North (IOHN)
- Norwegian Academic Network
- Energistics
- FIATECH, USA
- OpenO&M, USA
- CIEAM (Cooperative Research Centre for *Integrated Engineering Asset Management) Australia*

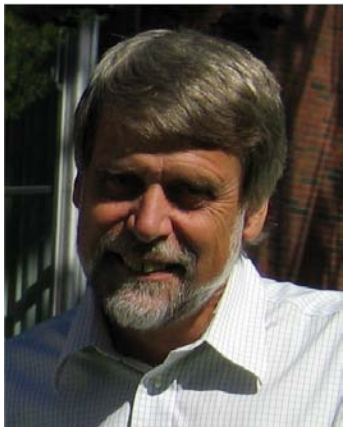
POSC Caesar Association (PCA)

- PCA was established in 1997
- In 1997 PCA initiated:

  ISO 15926 “Integration of life-cycle data for process plants including oil and gas production facilities”
- PCA has focus on the development, maintenance and enhancement ISO 15926
- More information: http://www.posccaesar.org/



General Manager
Nils Sandsmark



Technical Manager
Magne Valen-Sendstad

Solution providers deploying ISO 15926

- ✓ AspenTech
- ✓ AVEVA
- ✓ Bentley
- ✓ Capgemini
- ✓ Dassault
- ✓ EPM
- ✓ Epsis
- ✓ Eurostep
- ✓ IBM
- ✓ Comos
- ✓ Intergraph
- ✓ Invenia
- ✓ National Oilwell Varco
- ✓ Noumenon Consulting
- ✓ NRX
- ✓ Octaga
- ✓ TietoEnator
- ✓ Tektonisk (ShareCat)

ISO 15926 is extraordinarily robust and complete, both in its specification and the technical infrastructure through which it is deployed.

NRX, March, 2007

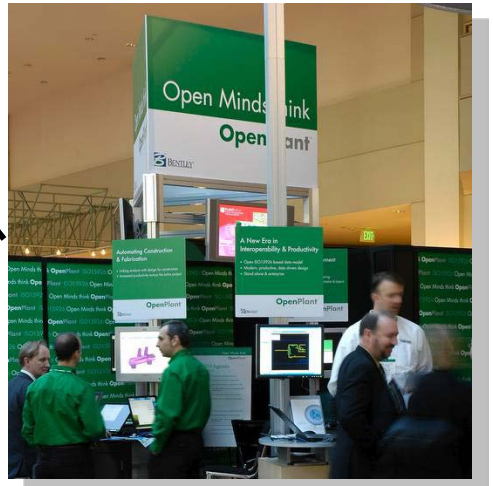
We thinks ISO 15926 is beyond the tipping point.

AspenTech, December, 2007

Bentley Systems has released OpenPlant software products for the creation and management of plant infrastructure based on the ISO 15926 data model.

Bentley, January, 2008

Bentley's stand at daratechPLANT 2008



OLF and EPIM

OLF has initiated and completed terminology and format (XML) work of:

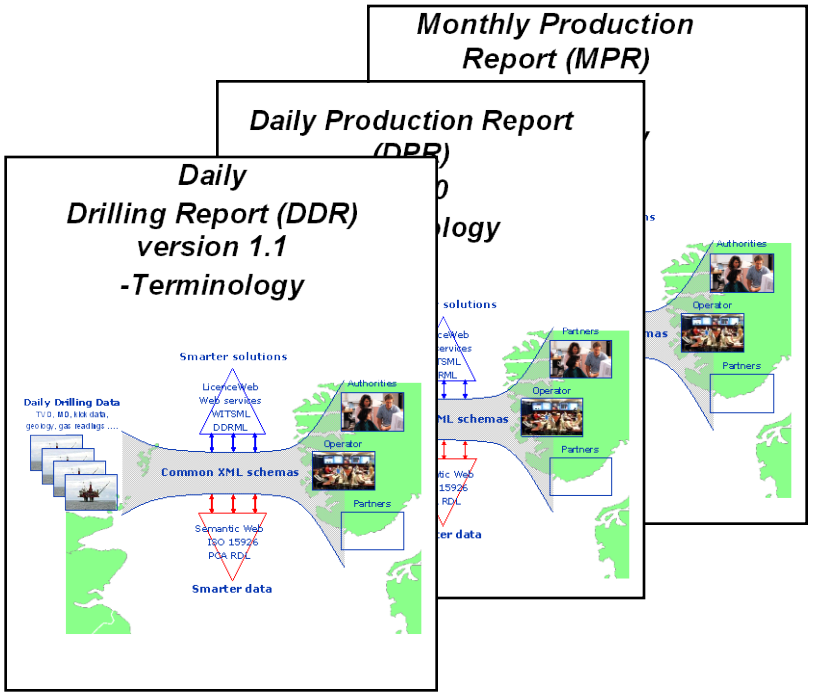
- Daily drilling report
- Daily production report
- Monthly production report
- Yearly environmental report

OLF has initiated work on:

- Terminology work in O&M
- Reference IT architecture
- NorHub – database for equipment information
- RFID - ontology

http://www.olf.no/rapporter/category229.html

EPIM has the management of these reports:



http://www.epim.no/visartikkel.asp?id=1251

IO in the High North

Integrated Operations in the High North – Joint Industry Project

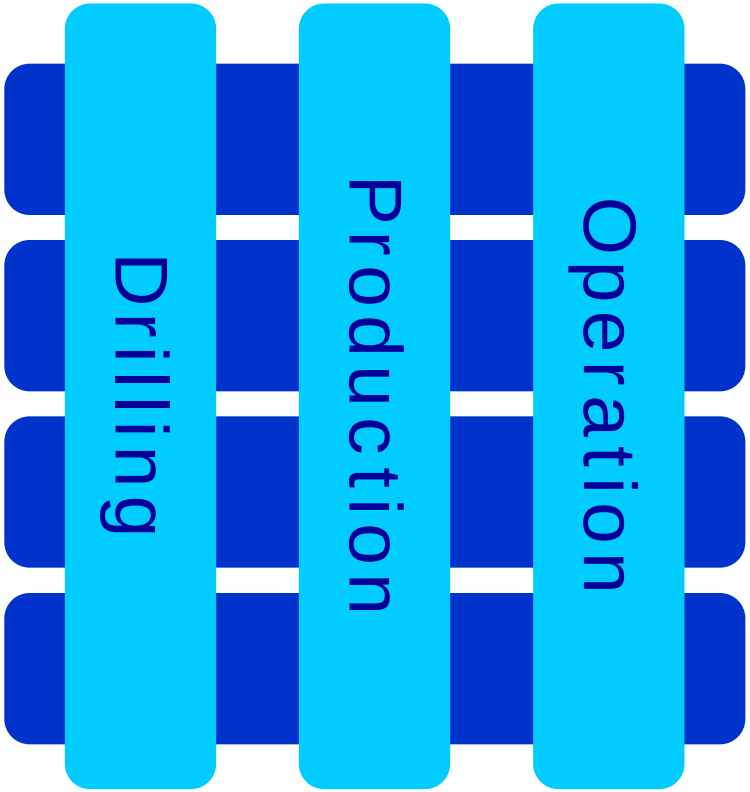
Business processes

Manage risk

Integrate

Transfer

Capture



Digital platform

Some of the sponsors:

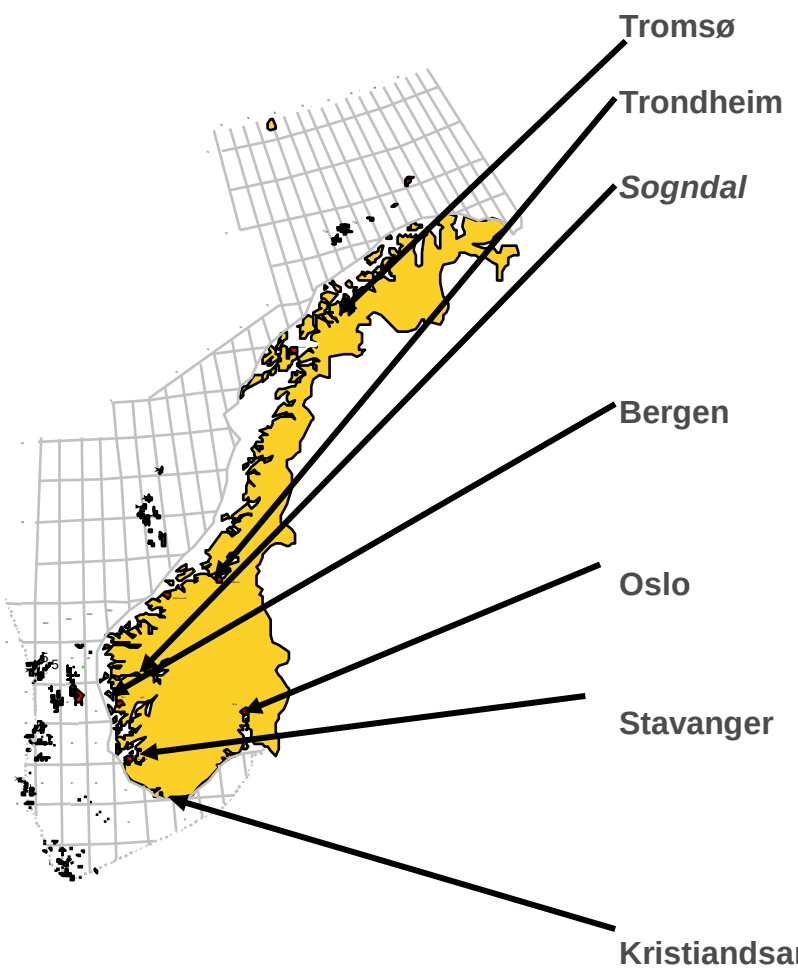
- StatoilHydro
- ENI
- The Norwegian Defence
- Epsis
- Baker Hughes
- National Oilwell Varco
- DNV
- Kongsberg
- Siemens
- ABB
- IBM
- SAP
- Cisco
- SAS

abelia

FSi

olf

ISO 15926 and Semantic Technologies Network sponsor by GDF SUEZ E&P Norge



Terje Aaberge,
Vestlandsforsking

Jon Atle Gulla,
Professor, NTNU

Anders Andersen,
Associate Professor, UiTrø

Marc Bezem,
Professor, UiB

Andreas L. Opdahl,
Professor, UiB

Arild Waaler,
Professor, UiO

Chunming Rong,
Professor, UiS

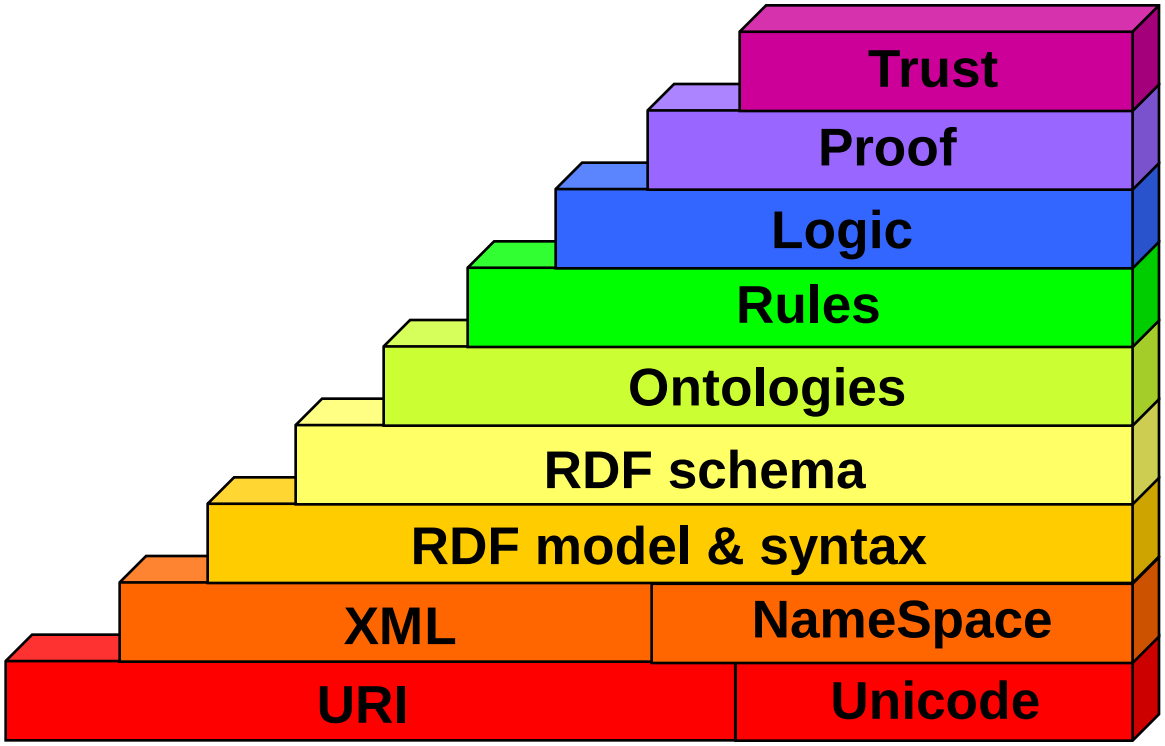
Rolf Nossum,
Professor, UiA

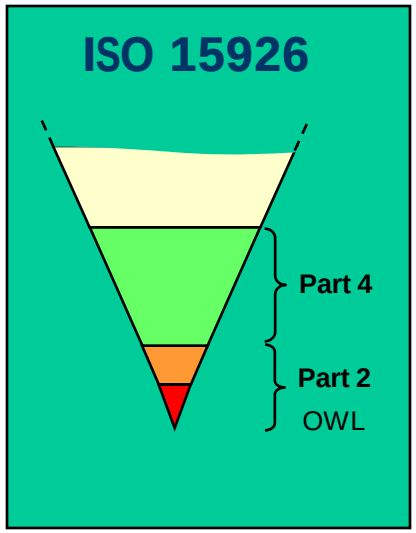
GDF SUEZ

reward for best paper for young researchers

Some possibilities and challenges

The layers of the Semantic Web

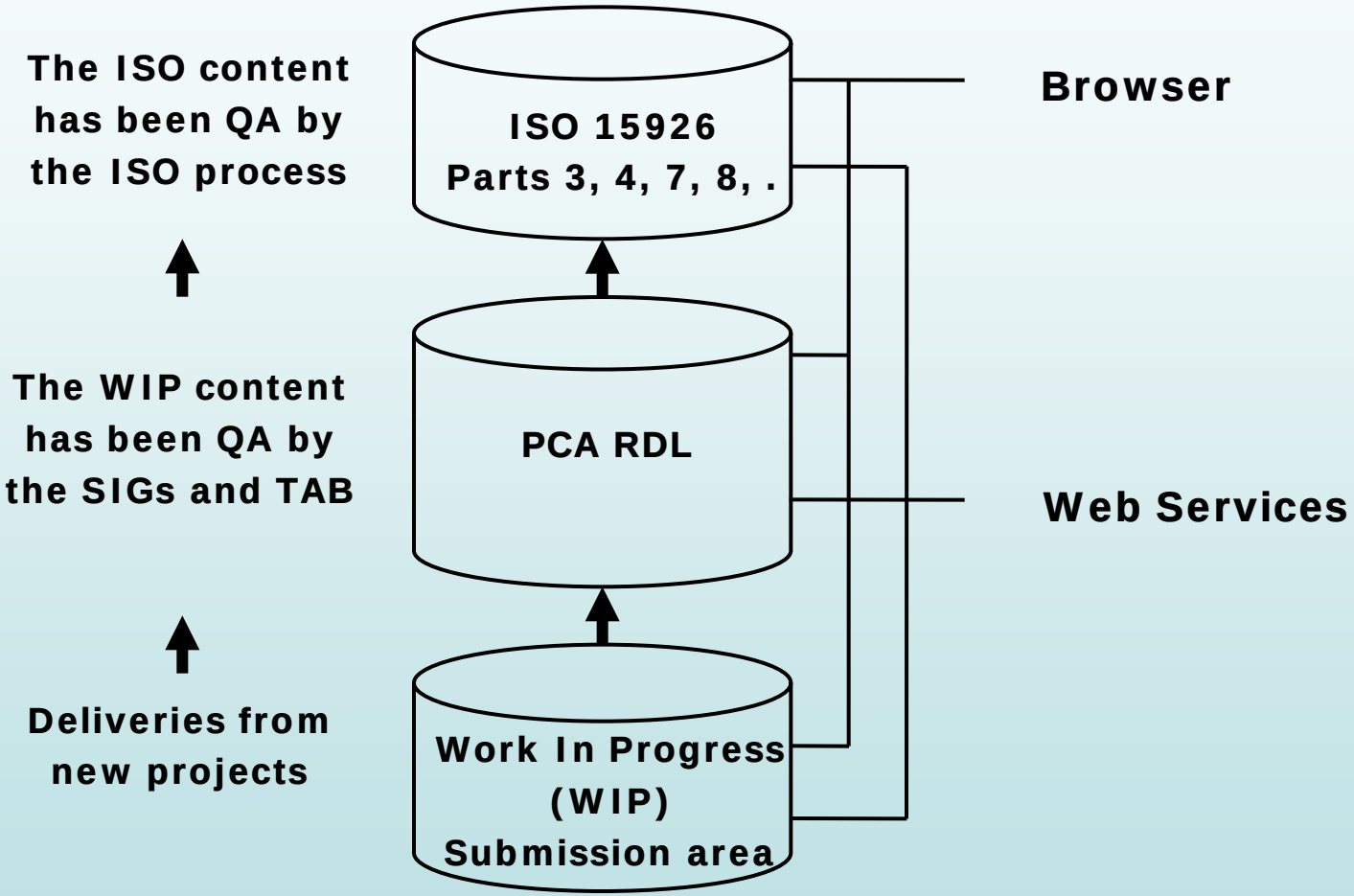




how to make a statement

basic technologies

Maintenance and Enhancement of the RDL



Integrated Operations (IO)

Integrated Operations (IO) = data

OLF's definition of IO in 2003:

- IO is integration of work process for drilling, production, operations and maintenance in real time

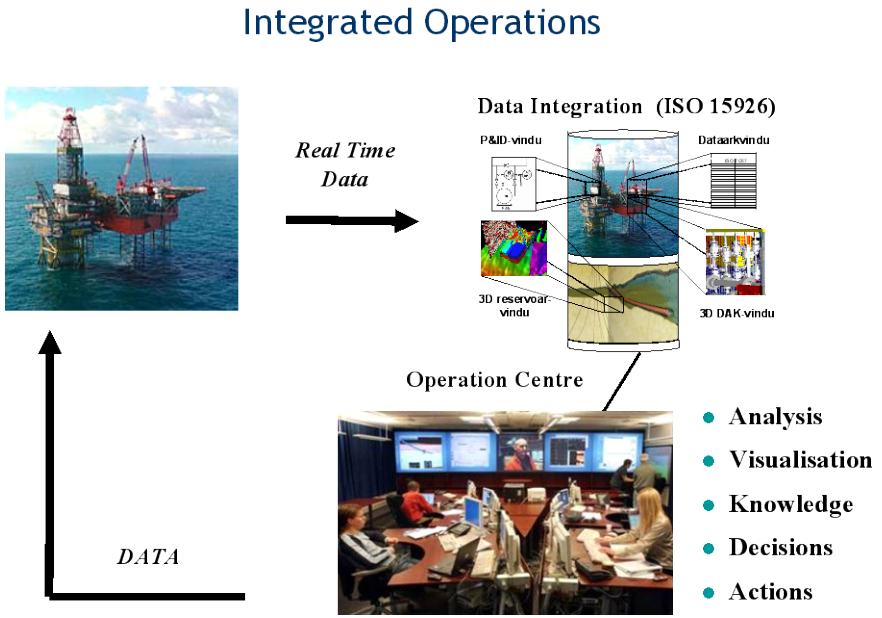
Later generalization:

- IO is integration of work processes for operations in real time.

Later simplifications:

- IO is real time data onshore from offshore fields and new integrated work processes

- IO is safer, faster and better decisions



OLF's IO Generation 1 and IO Generation 2

- IO Generation 1

  IO G1 is integration between offshore and onshore. Expected implemented in the period 2005-2010

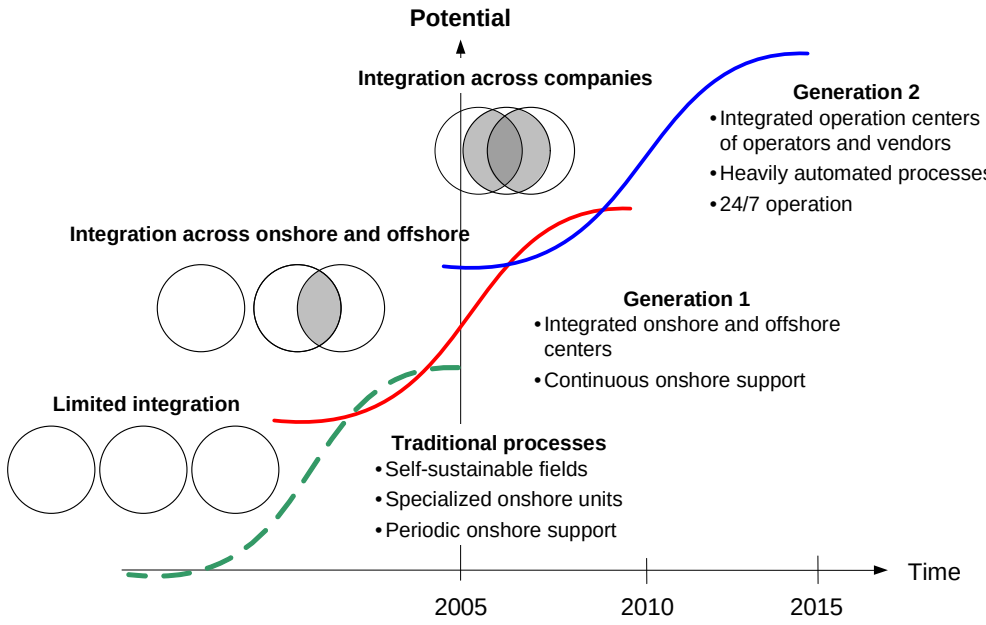
  The operators have now to a large degree implemented IO G1.

- IO Generation 2

  IO G2 is integration between operator and suppliers and more automation. Expected implemented in the period 2010-2015

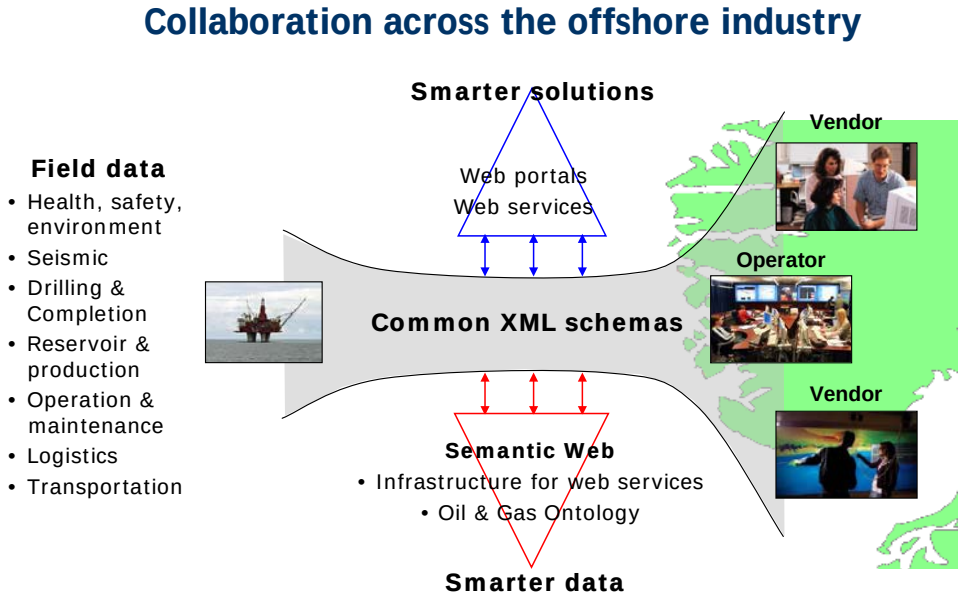
  However, the implementation of IO G2 on the NCS requires a joint industrial effort to establish a common solution for an information highway.

IO Generation 1 and 2



OLF's IO Generation 2

- IO G2 is efficient collaboration in real time between an operator and its suppliers and that requires a common set of communication standards for the offshore industry
- OLF has initiated the work on necessary communication standards for IO G2 based on ISO and World Wide Web Consortium (W3C)



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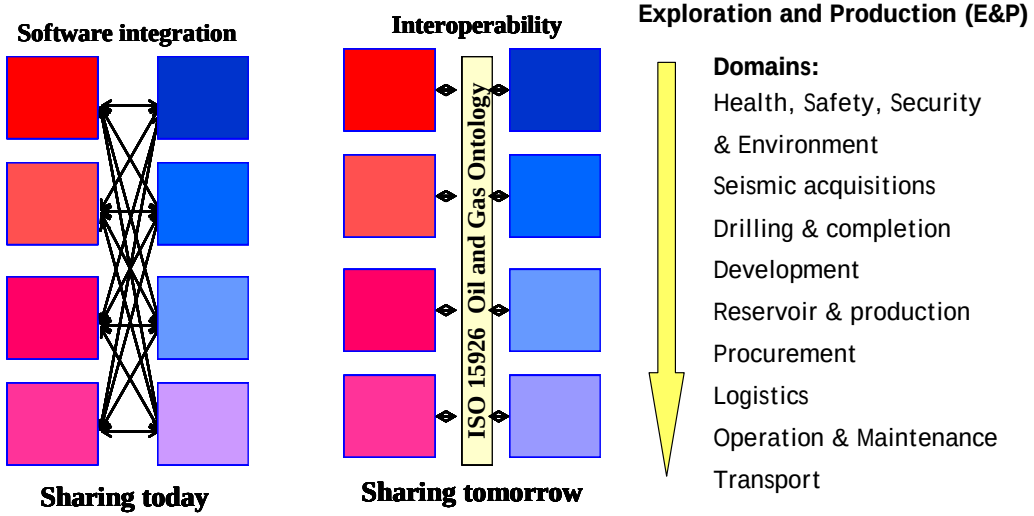

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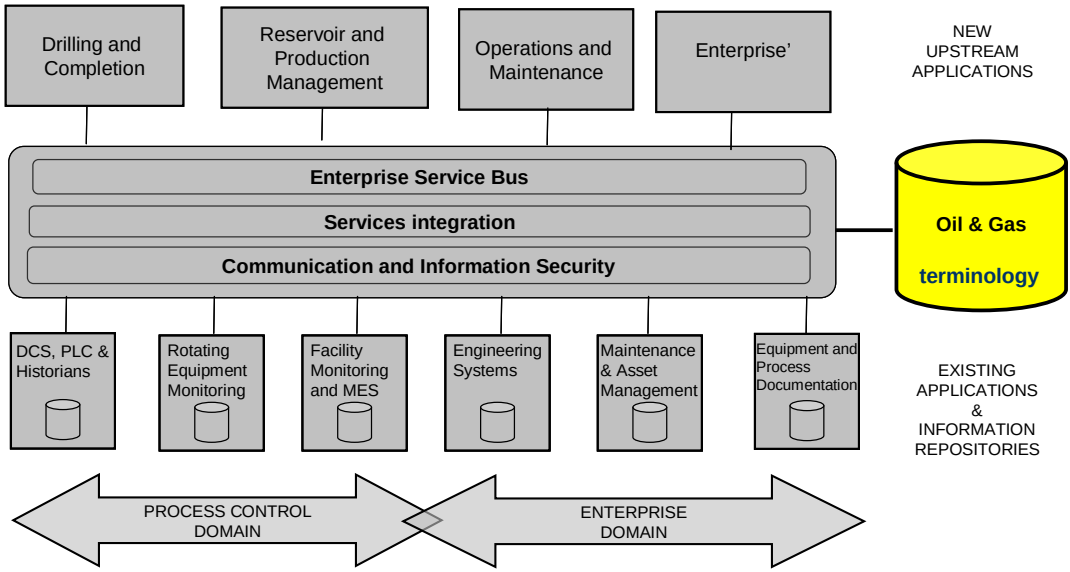


More data on the way!

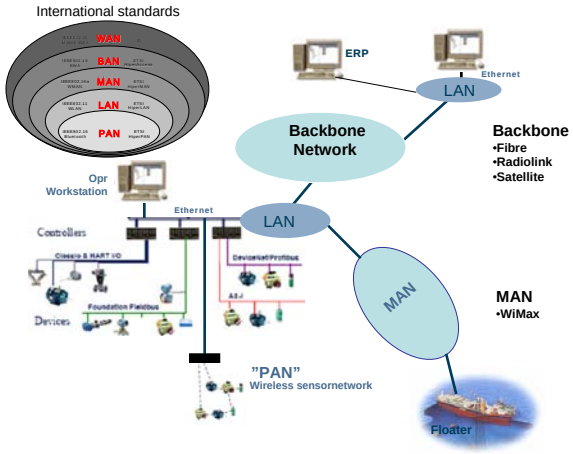
- The information highway
  - ✓ Data capture
    - RFID
  - ✓ Data transmission
    - Fiber optics and WiMax
  - ✓ Data integration
    - Reference architecture for IO G2
    - Harmonizing E&P terminology
  - ✓ Data security
    - A set of OLF guidelines with basic requirements for information security

- Today's IT solutions have already major digestions problems, new technologies provide much more data – requiring new IT architectures

- More and more of the communication will be between computers requiring languages based on reasoning understandable by computers

Fiber optics on the NCS

New technologies provide more data



Machine-to machine communication

An estimated 2 billion people will be on the web by 2011 ….

…and a trillion connected objects – cars, appliances, cameras, roadways, pipelines – comprising the "Internet of Things"

NorHub

NOR-HUB

A Common Equipment Repository

for NCS

An initiative from
OLF

That can save the industry
over a billion NOK annually

Supported by :

Why NorHub?

Operator

1-5 Purchase Orders

Contractors

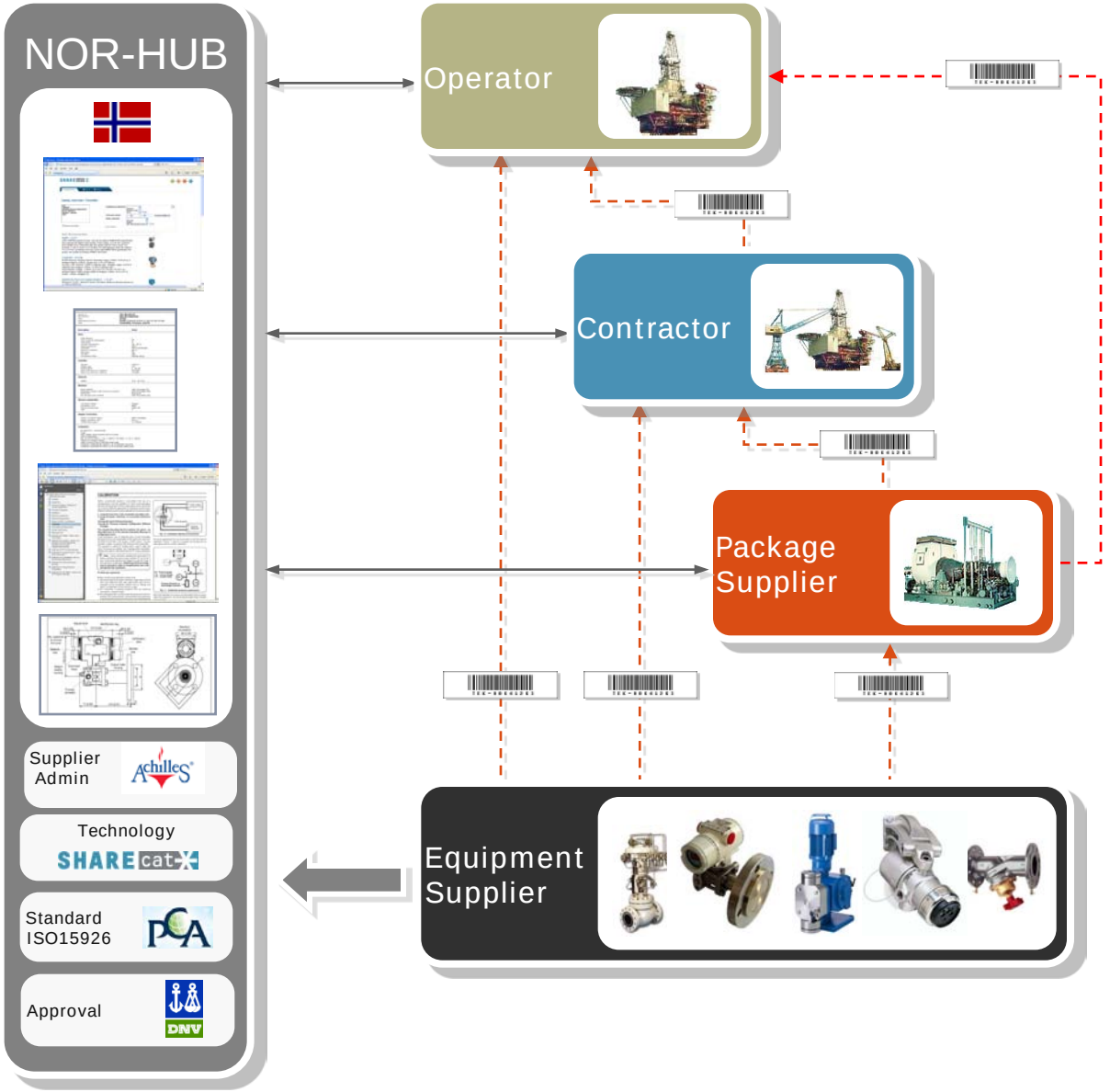
100-200 Purchase Orders

Package Suppliers

10-100 Purchase Orders

Suppliers

NOR-HUB
pre-qualified information delivered once and for all



NorHub savings

- Work efficiencies in
  - Requisiton/Procurement processes in operation
  - Modification projects
  - Development projects
- Reduced prices from suppliers

ANNUAL SAVING POTENTIAL FROM NorHub NOK 1,3 BILLION

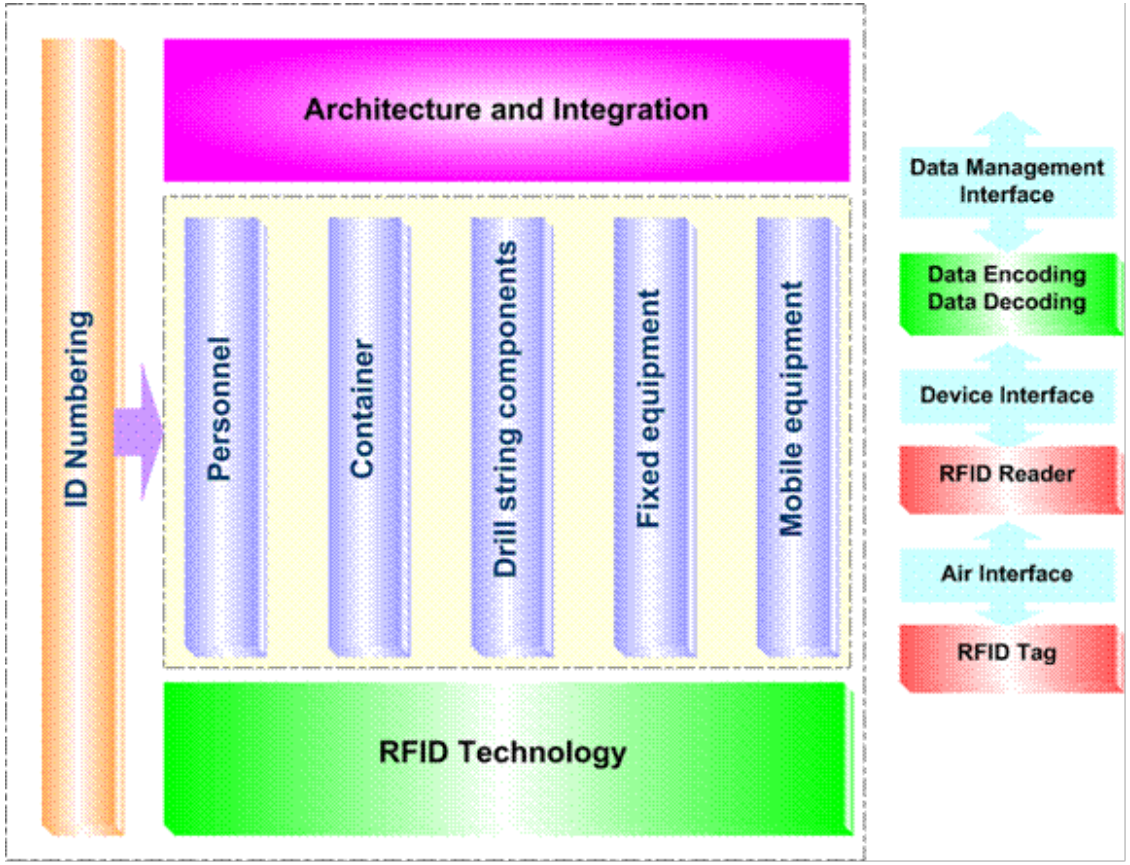
Radio Frequency Identification

OLF Guideline for deployment of RFID on the NCS

Deployment of RFID on the NCS for the domains:

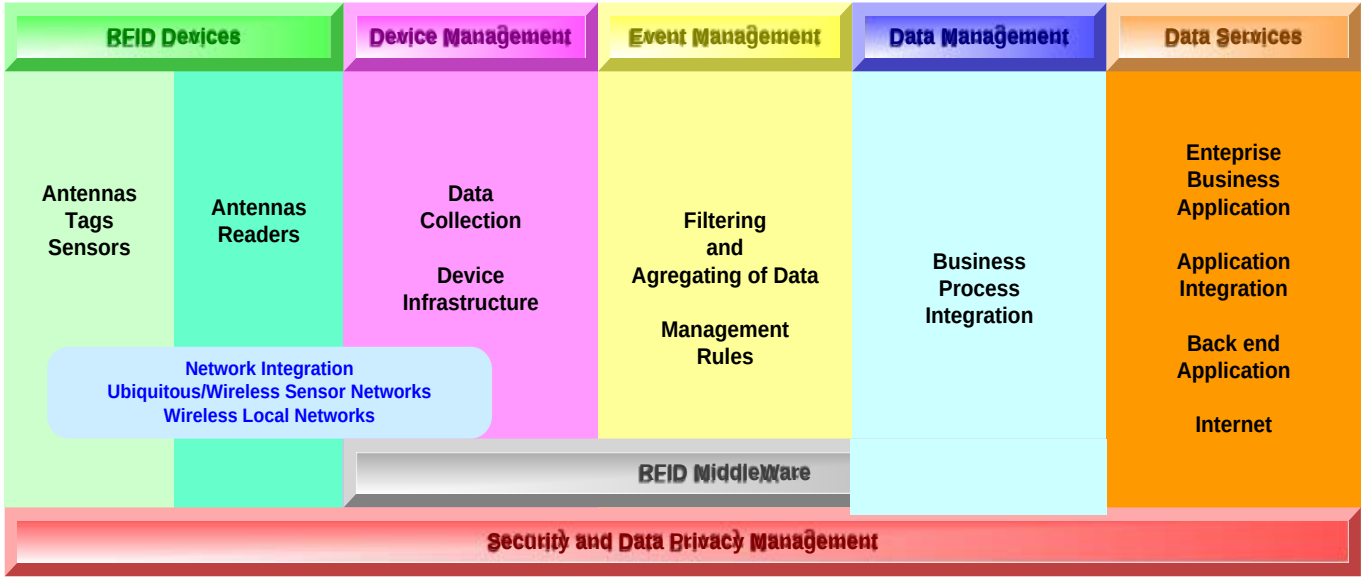
- ✓ Personnel
- ✓ Containers
- ✓ Drill strings
- ✓ Fixed and mobile equipment

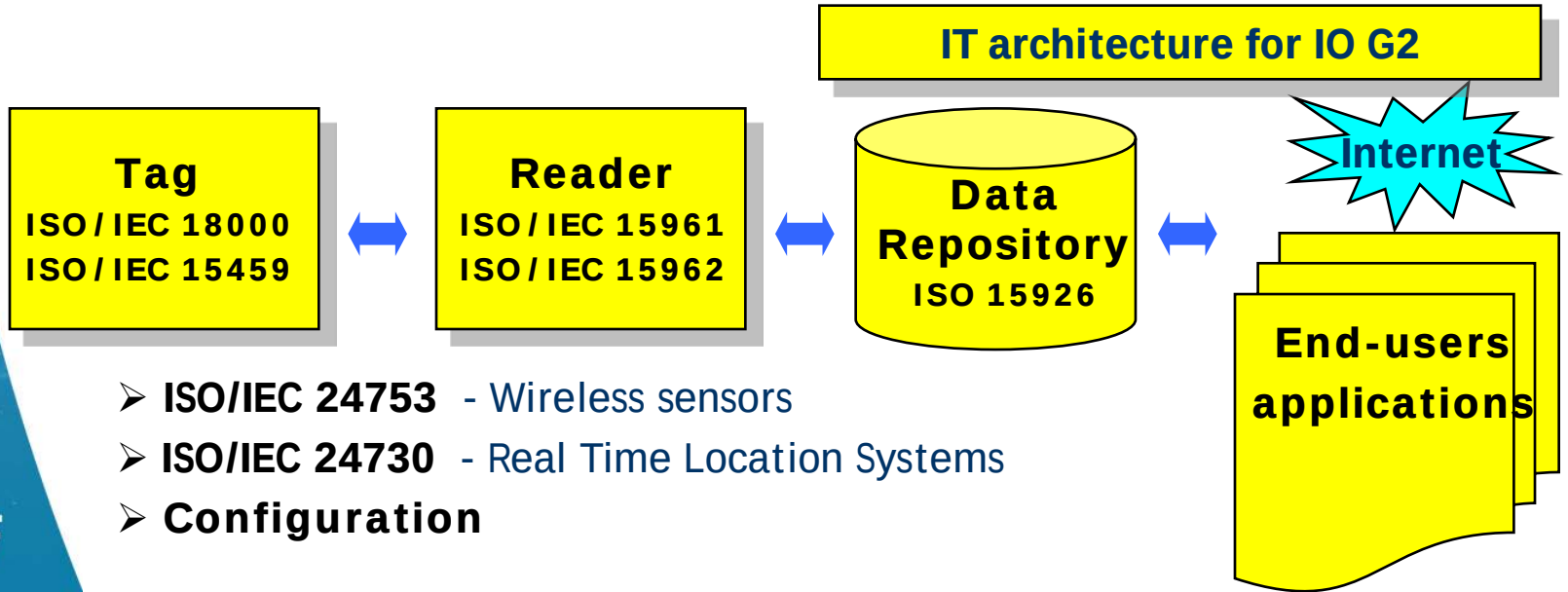
The guideline is based on ISO standards



Project Manager Ovidiu Vermesan, SINTEF

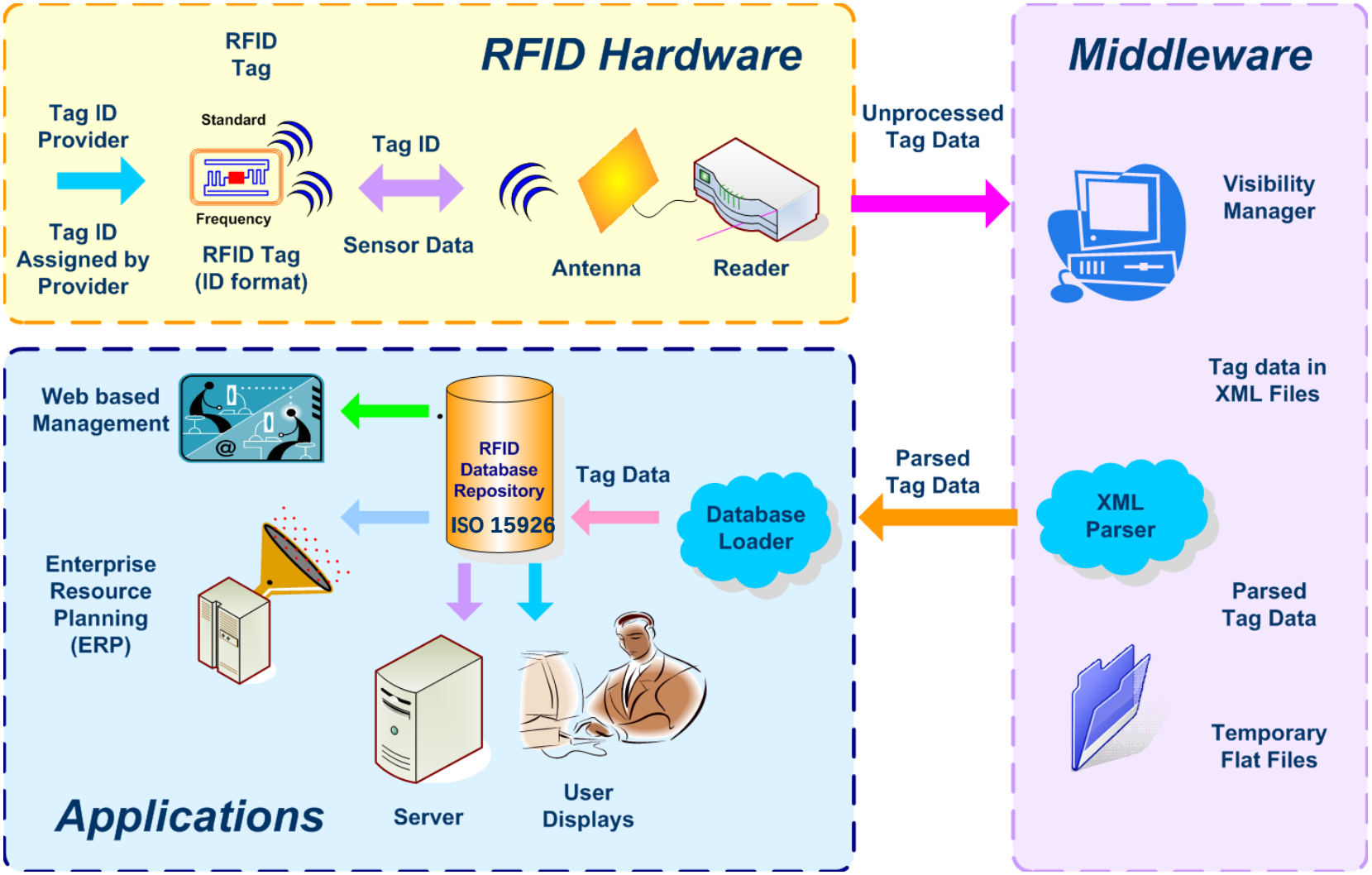
Core elements of RFID deployment in IO





- **ISO/IEC 24753** - Wireless sensors
- **ISO/IEC 24730** - Real Time Location Systems
- **Configuration**

A possible RFID architecture – logical view



Thank you for your attention!

Compete and collaborate - co-epitition - is the way to stay alive in the global economy.