

Workshop: RFID, Internet of Things - Are you ready?

Radisson Blu Scandinavia Hotel,
Holbergsgt.30, Oslo



RFID, Internet of Things in the Oil & Gas industry

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In 2005 there were 1.3 billion
RFID tags in circulation

.... by 2010 there will be 33
billions.



Agenda

- The Norwegian Oil Industry Association (OLF)
- Integrated Operations in OLF
- OLF Guideline No. 112 Deployment of RFID in the oil and gas Industry
- Proposal: RFID project Phase 3
- Internet of Things
- Summing up

The Norwegian Oil Industry Association

Oljeindustriens Landsforening (OLF)



OLF The Norwegian Oil Industry Association

OLF The Norwegian Oil Industry Association is a professional body and employer's association for oil and supplier companies engaged in the field of exploration and production of oil and gas on the Norwegian Continental Shelf

OLF is a member of the Confederation of Norwegian Business and Industry, NHO

The main office is at Forus
OLF also has an office in Oslo

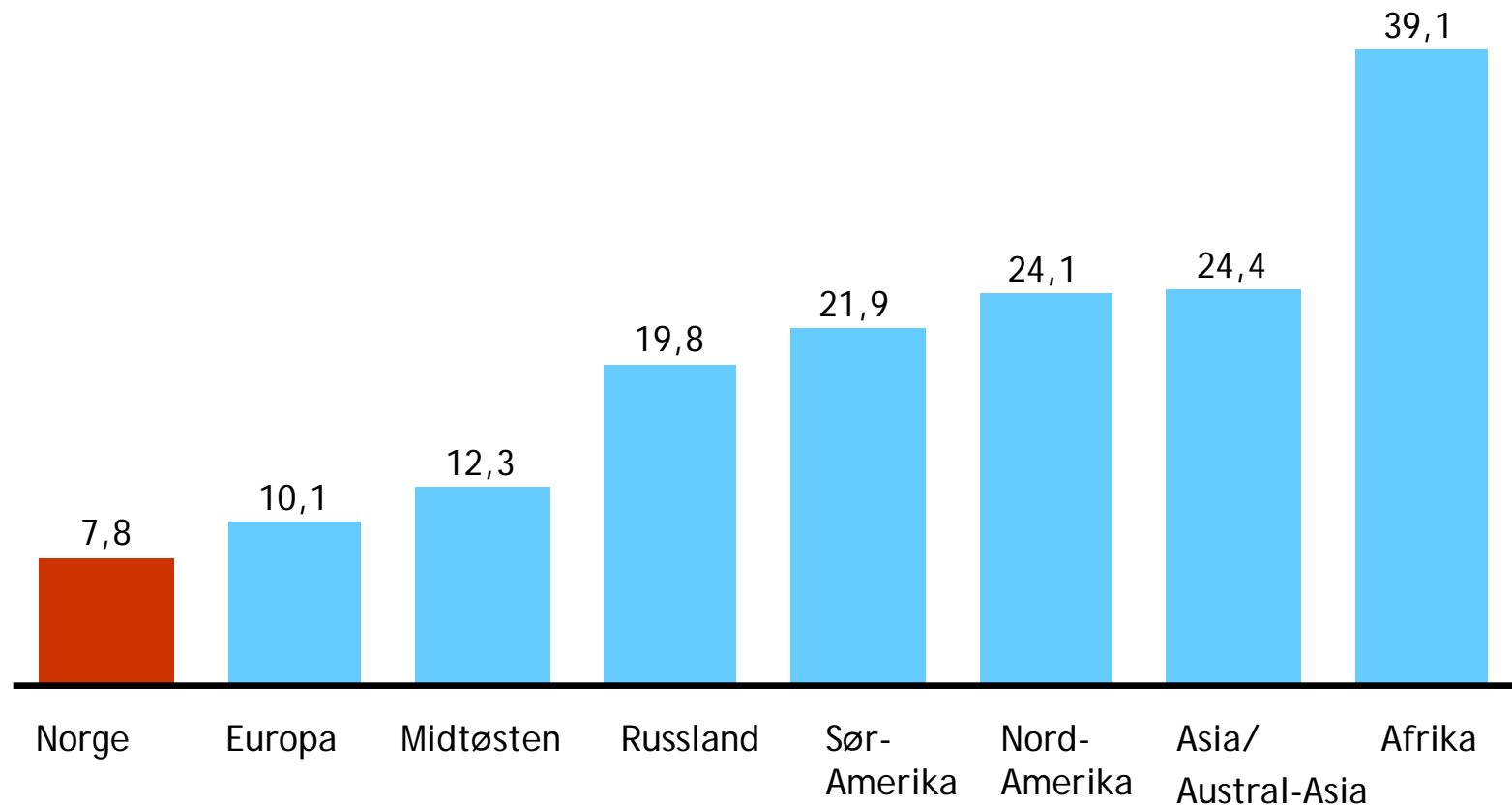
OLF's administration has 39 employees



Gro Brækken, Director General

Norge er verdens reneste olje- og gassprodusent

Kilo CO₂ per fat o.e.



Olje- og gassproduksjon samlet, CO₂- og CH₄-gass inkludert
Kilde: OGP, OLF, Konkraft prosjekt 1

Integrated Operations in OLF

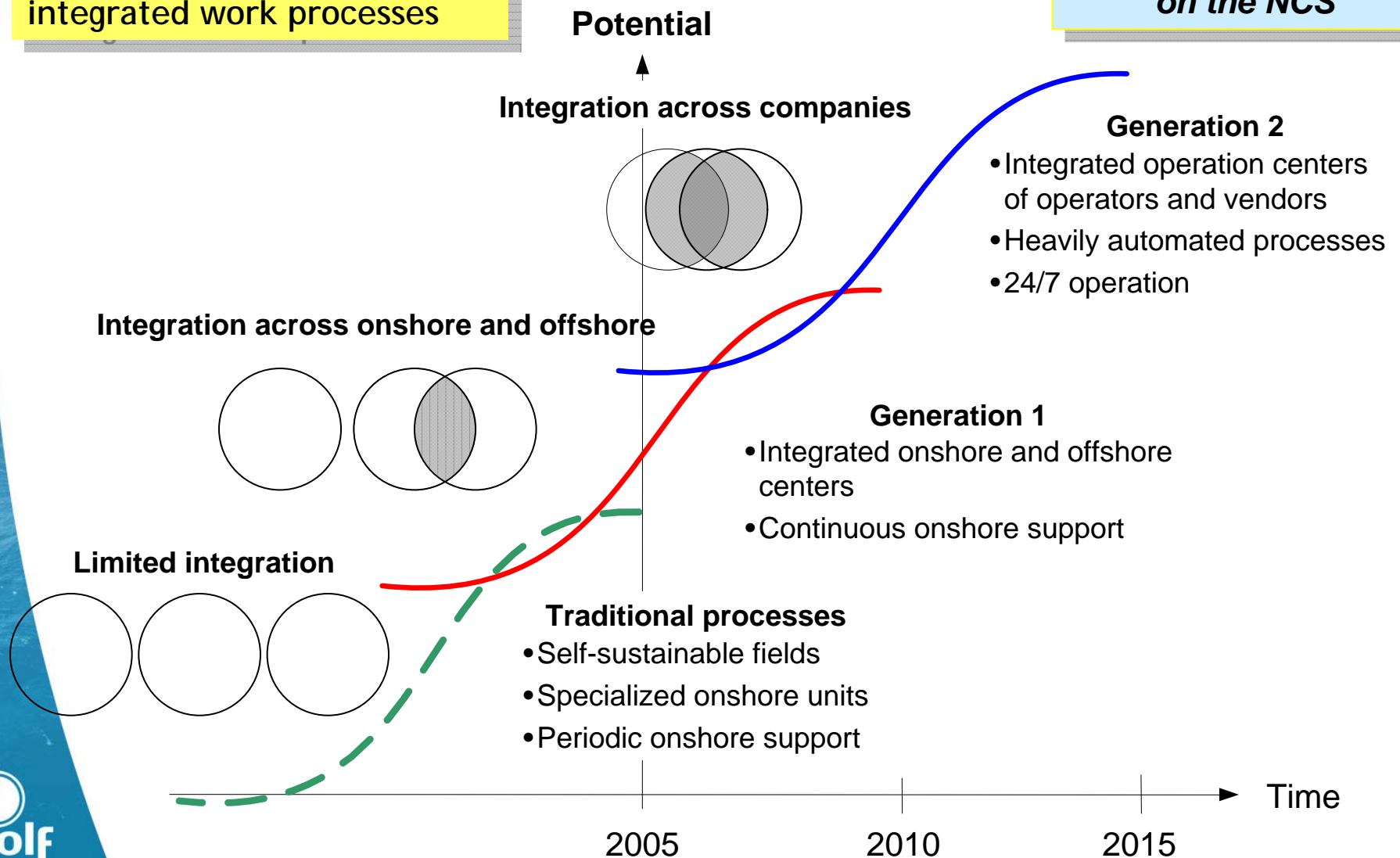
(IO in OLF)

Integrated Operations (IO)

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

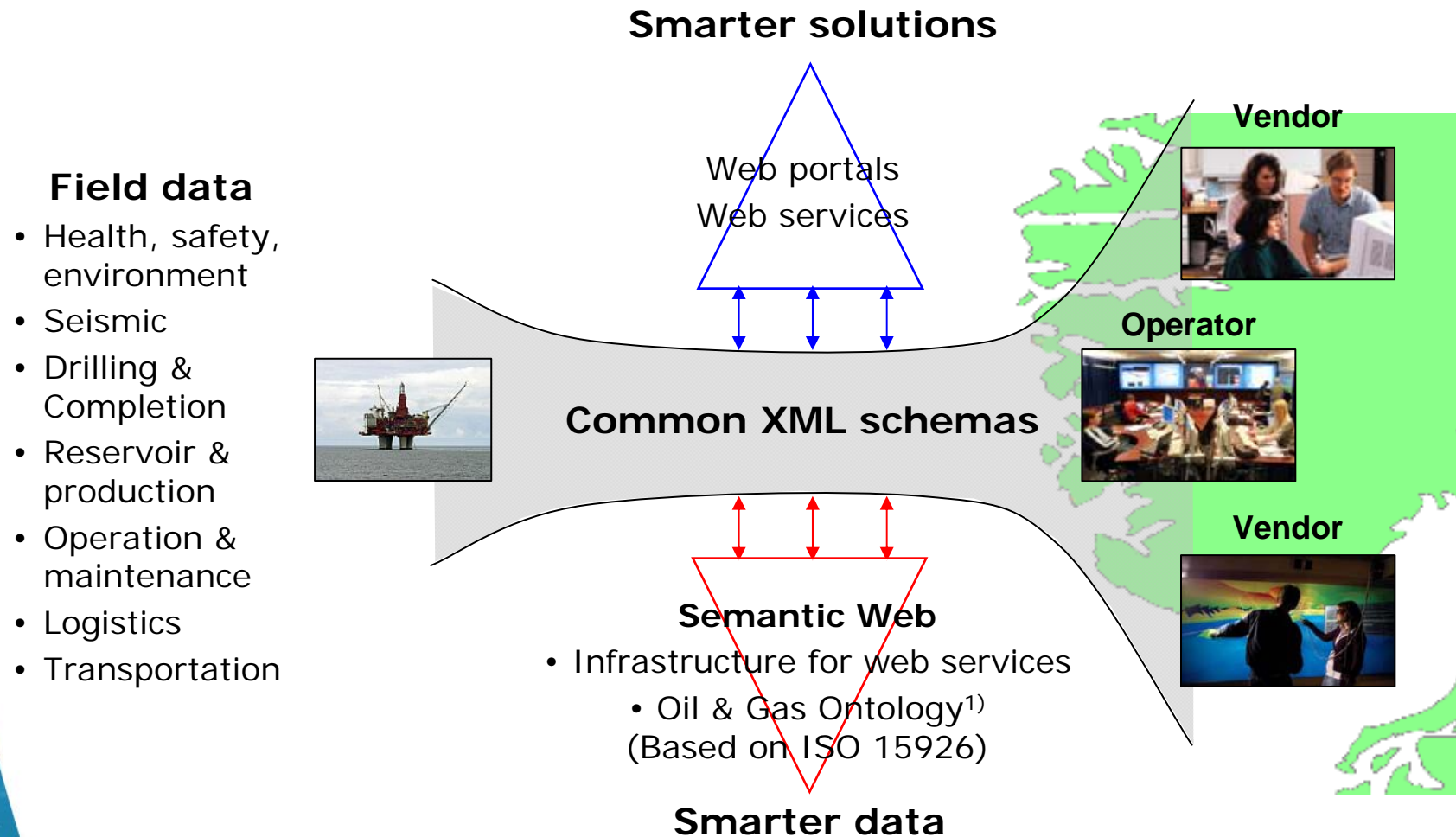
Generation 1 and 2

*IO has a potential of
NOK 300 billions
on the NCS*



OLF's Information Strategy

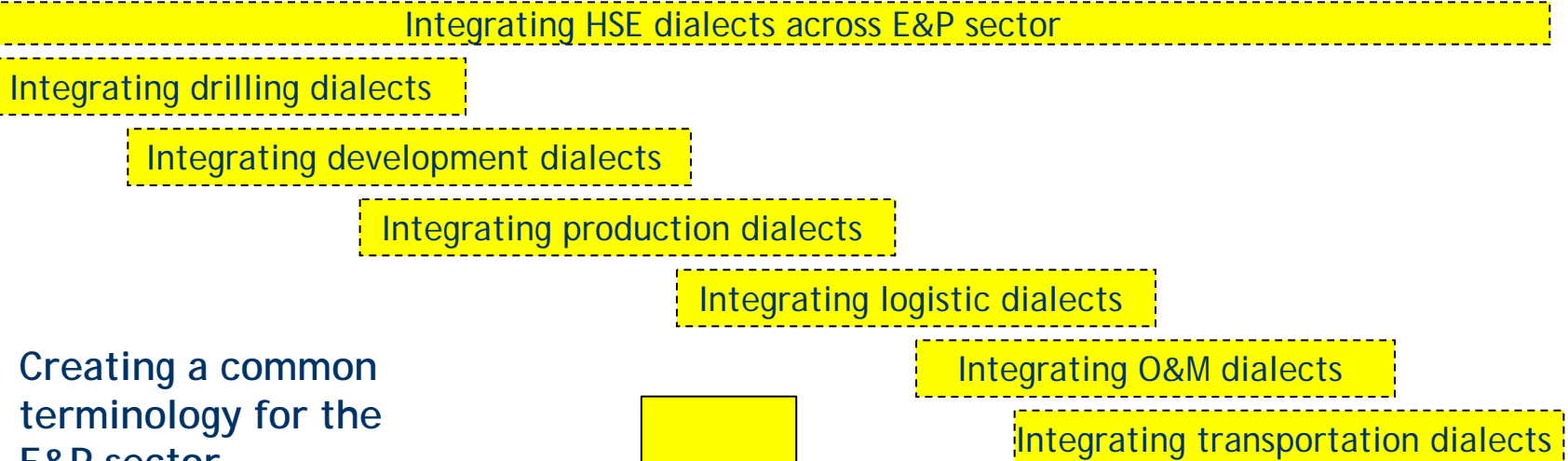
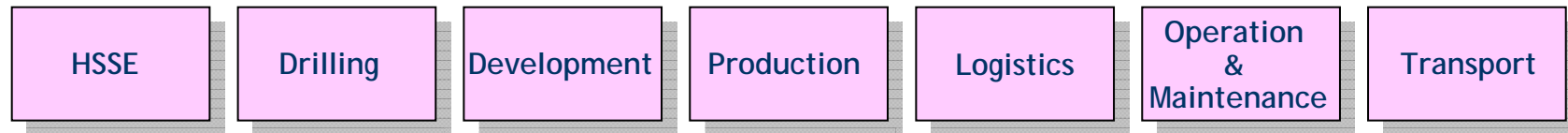
An efficient pipeline for real-time data transferal and analysis



¹⁾**Ontology** = A hierarchical data structure containing concepts, relationships, properties and rules for a specific domain

Harmonizing the E&P terminology

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



Creating a common terminology for the E&P sector

From local domain data standards to an oil and gas ontology

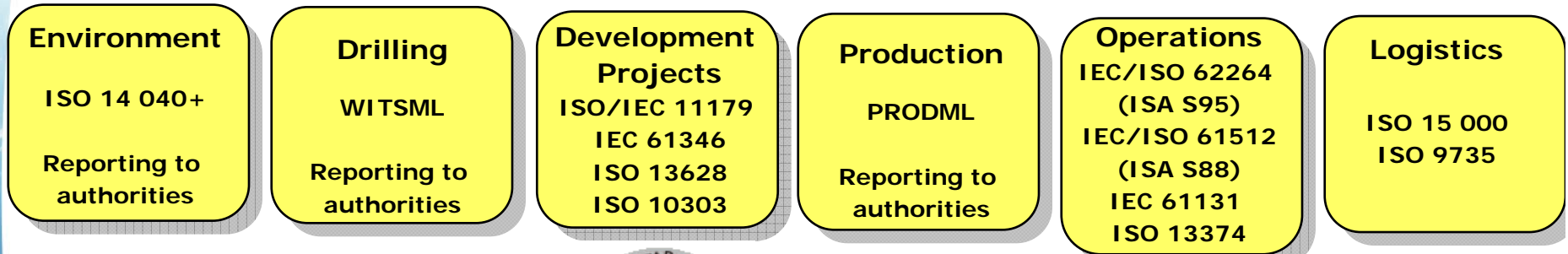


Contains dictionaries, taxonomies and ontologies for relevant business processes in E&P sector

From domain data standards to an oil and gas ontology



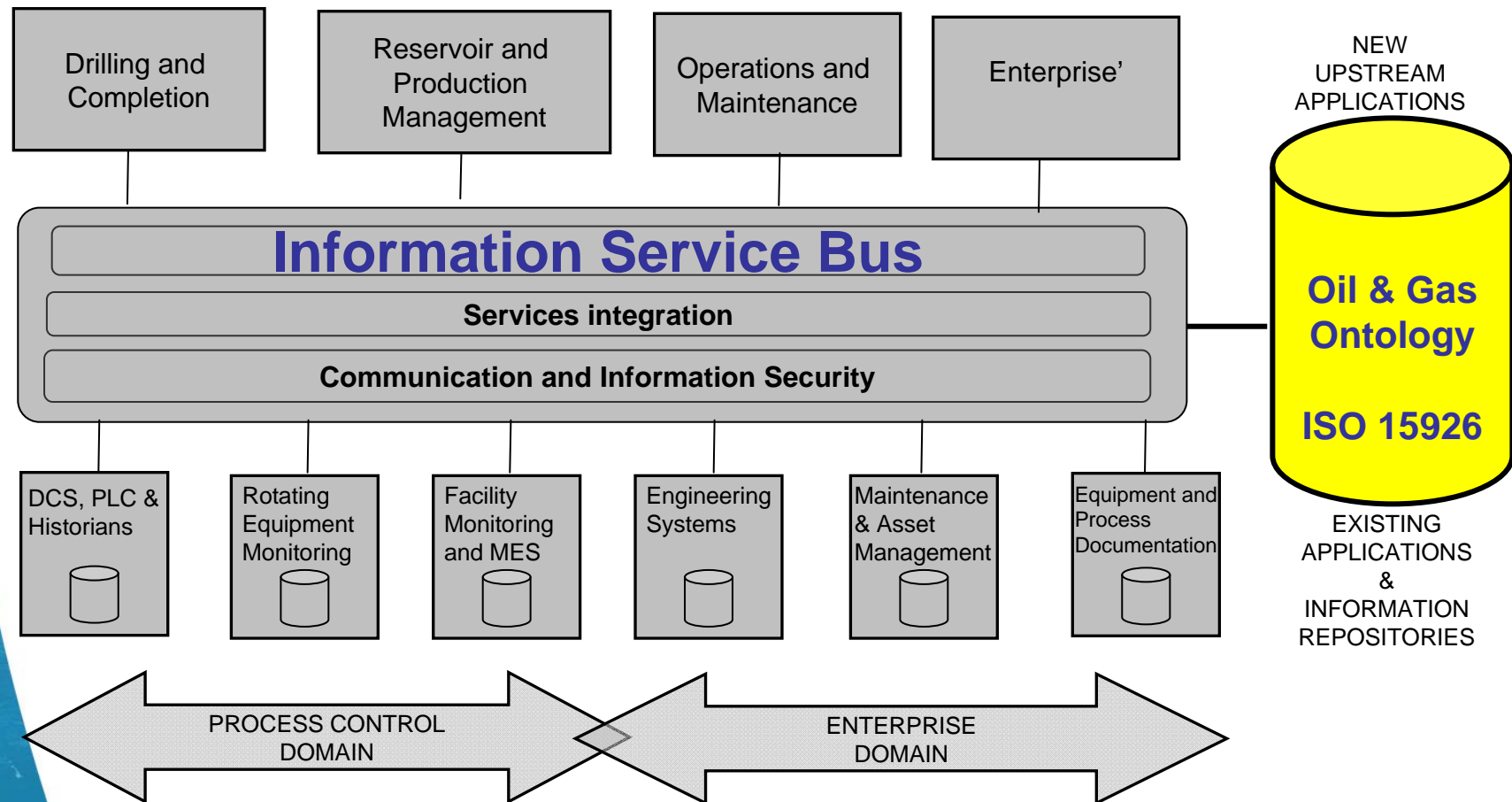
Standards and specifications across E&P value chain



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

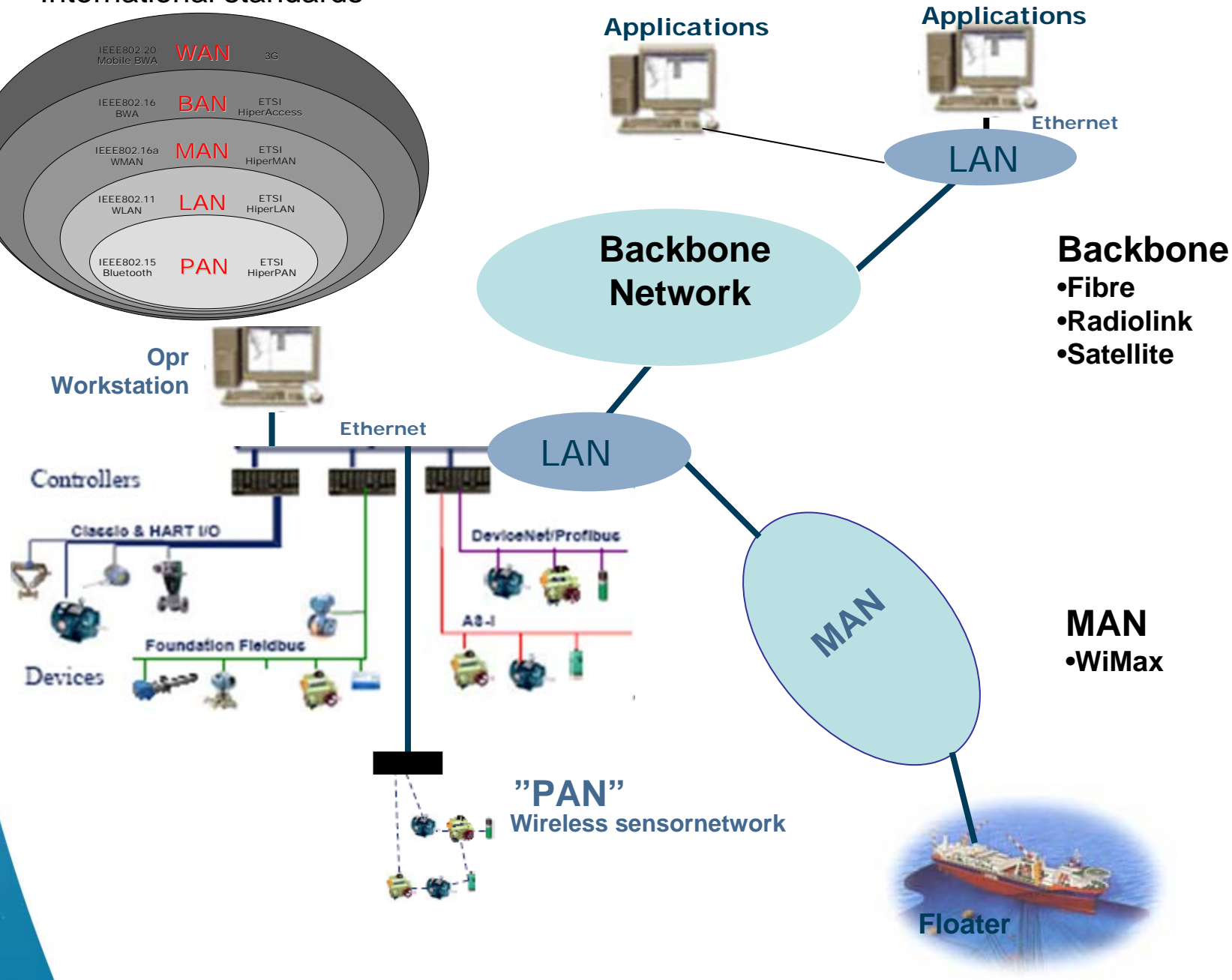
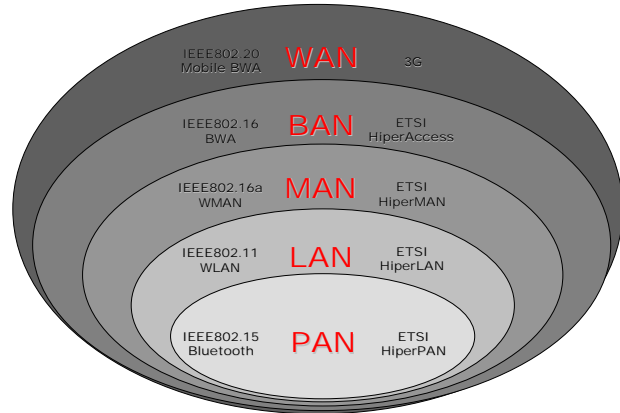


Reference IT architecture for OLF's IO G2



Much more data - a lot new of communication technologies

International standards

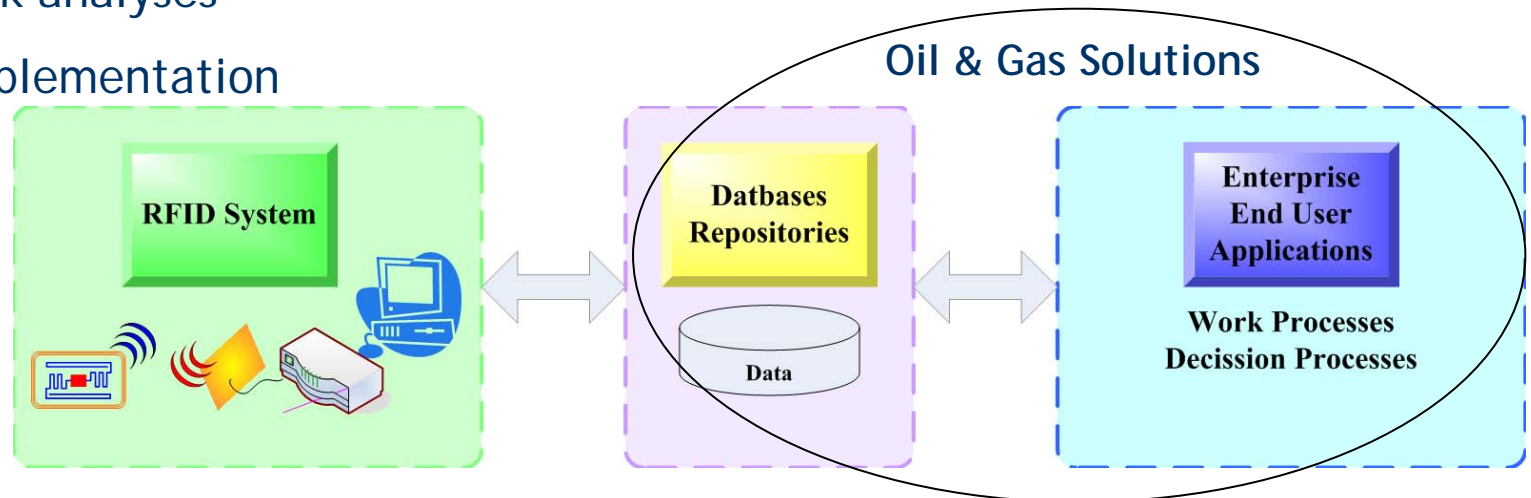


OLF Guideline No.112:

Deployment of RFID in the oil and gas industry

The only reason to deploy RFID in the offshore industry is to get access to information!

1. What kind of data can RFID provide?
2. How will RFID data change existing work processes?
3. Which new work processes/applications needs these data?
4. How does that improve existing processes?
5. Which RFID technology is most appropriate?
6. Cost/benefit analyses
7. Pilot
8. Risk analyses
9. Implementation

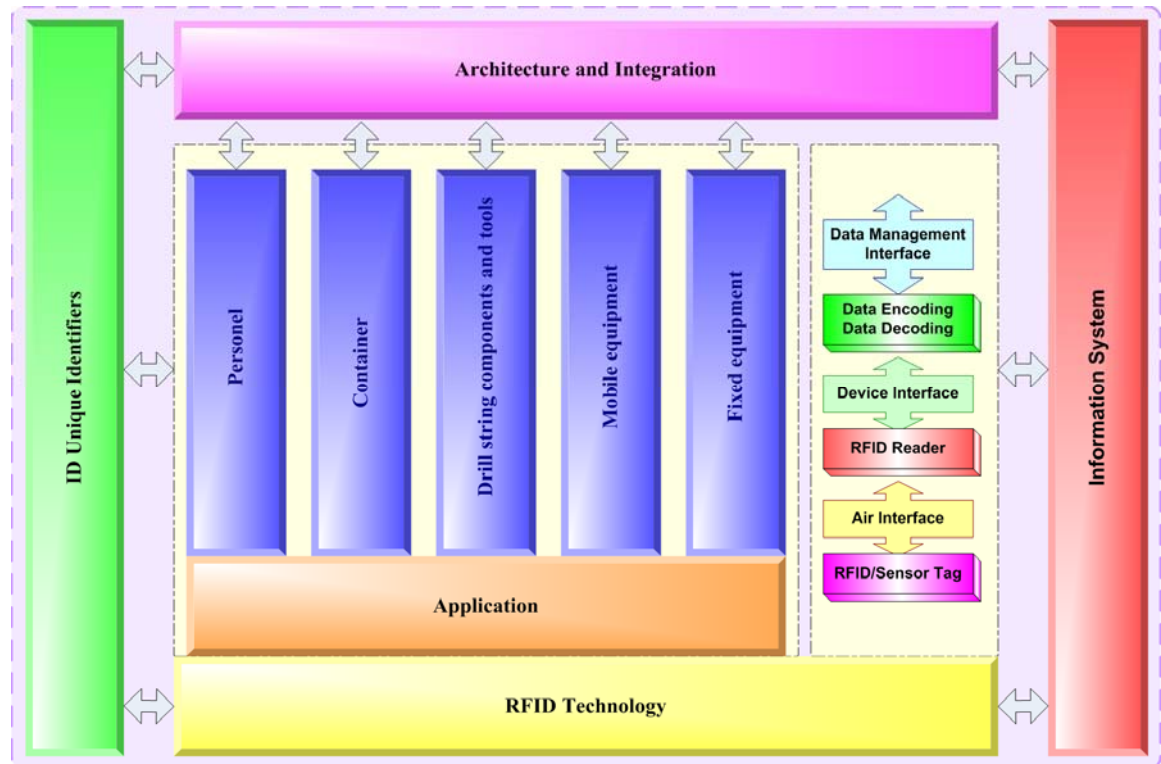


OLF Guideline No.112: Deployment of RFID in the oil and gas industry

Deployment of RFID on the NCS for the domains:

- ✓ Personnel
- ✓ Containers
- ✓ Drill strings
- ✓ Mobile equipment
- ✓ Fixed equipment

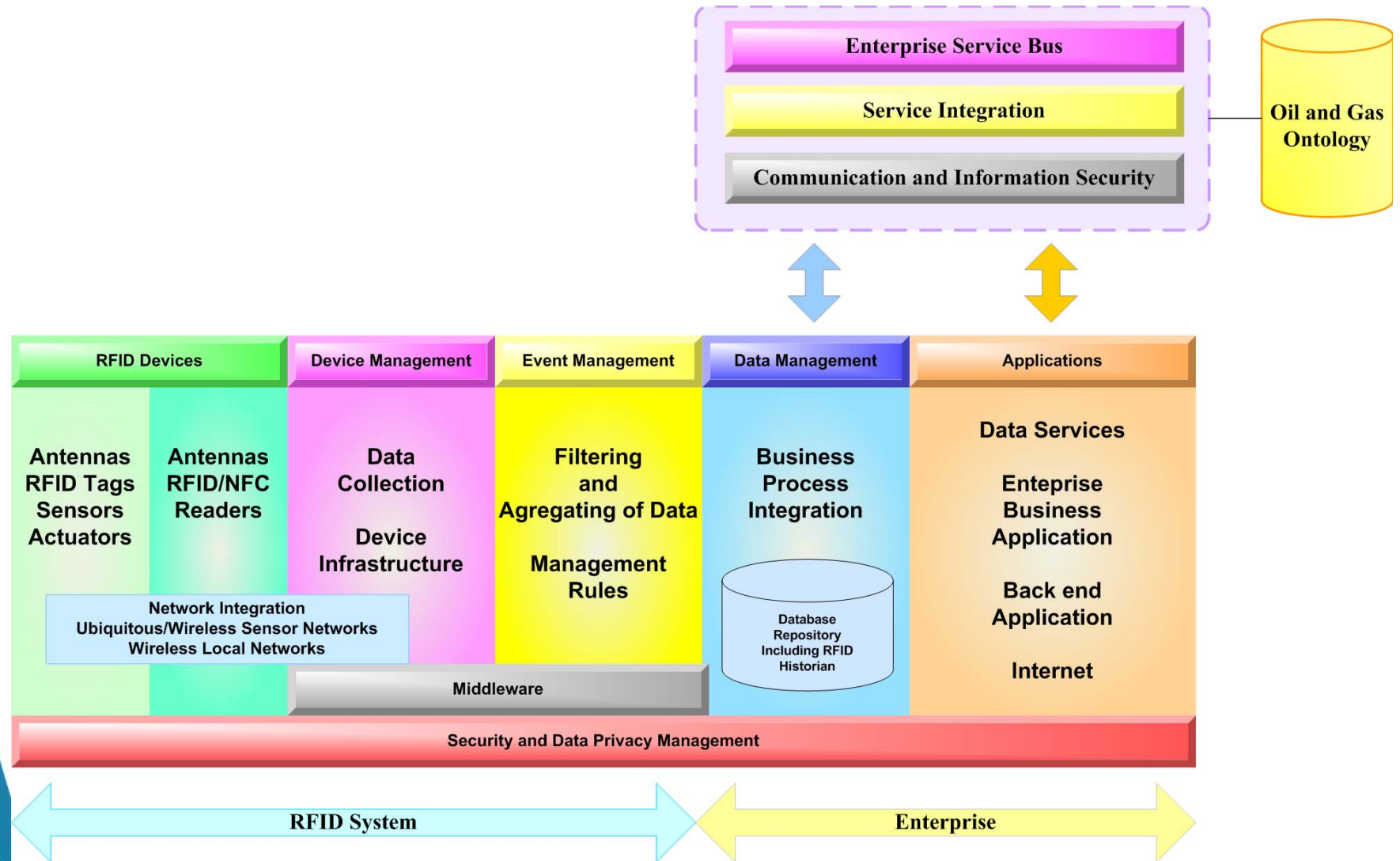
The guideline is based on ISO standards



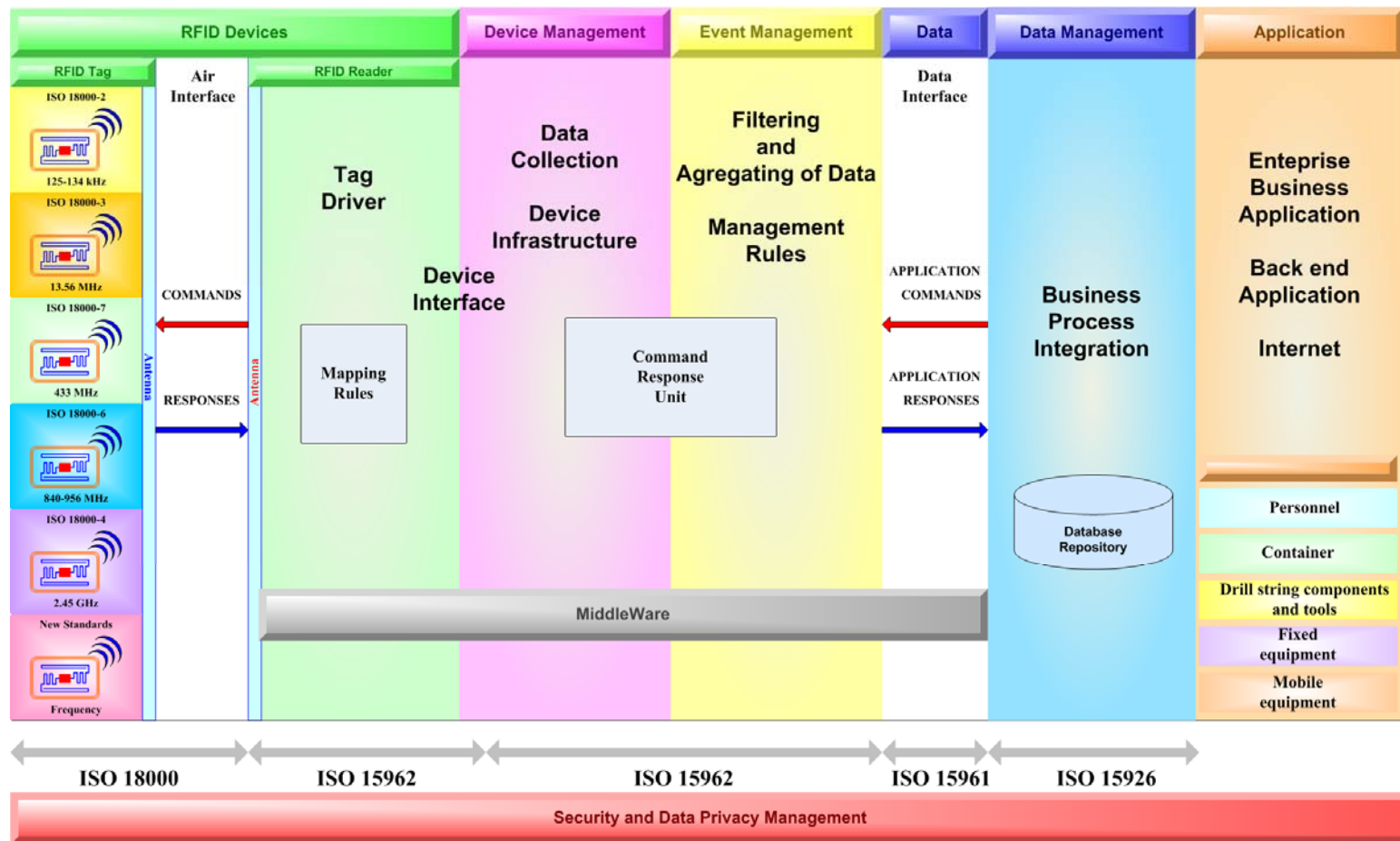
The Guideline is available at:

<http://www.olf.no/guidelines/112-olf-guideline-for-deployment-of-radio-frequency-identification-rfid-in-the-oil-and-gas-industry-article19582-301.html>

OLF Guideline No.112: Deployment of RFID in the oil and gas industry



OLF Guideline No.112: Deployment of RFID in the oil and gas industry



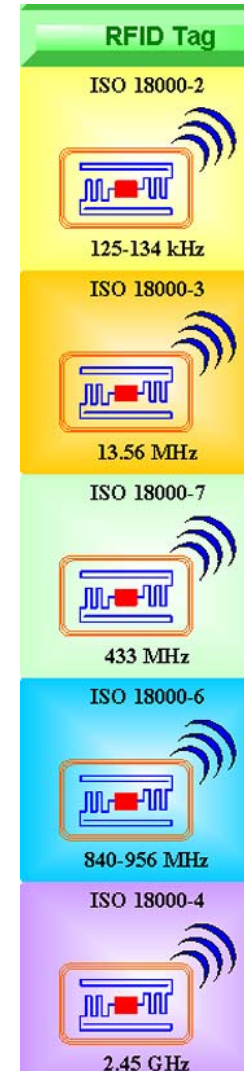
IT architecture for IO G2

End-users applications

OLF Guideline No.112: Deployment of RFID in the oil and gas industry

RFID Tag Technology - ISO/IEC 18000

- OLF has chosen ISO/IEC 18000 as the basis for RFID tag Technology
- The communication protocol for the air interface is defined for each part of the standard



OLF Guideline No.112: Deployment of RFID in the oil and gas industry

Unique Identification Number (UIN) - ISO/IEC 15459

- OLF has chosen ISO/IEC 15459 as the basis for UIN
- The solution should accommodate existing ID schemas
- The above choice ought to make it easy to move to future solution for Internet of Things and IPv6



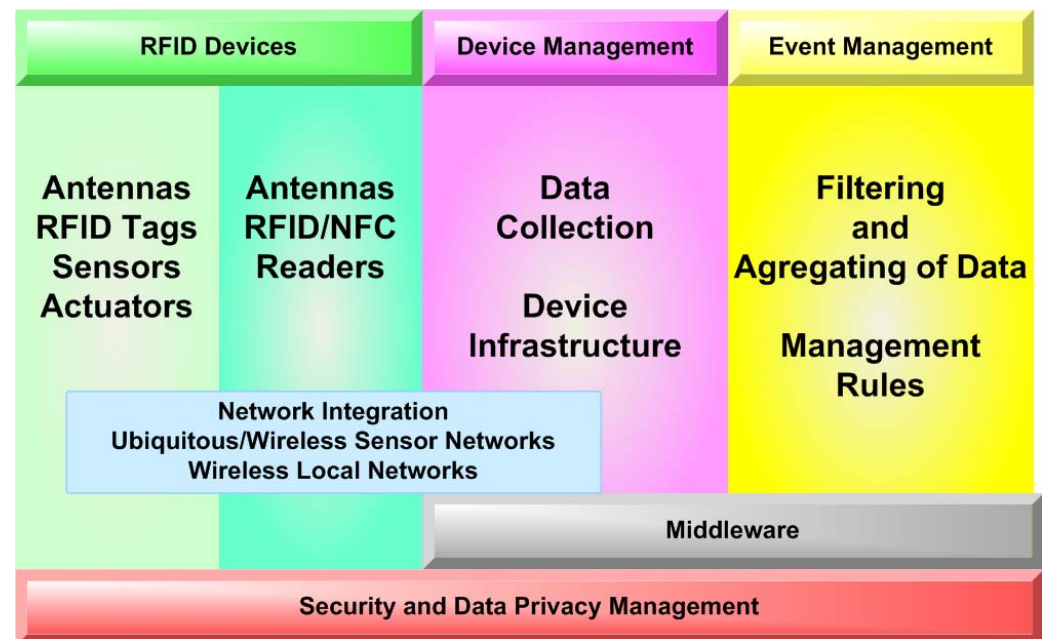
128 code symbol

ISO/IEC 15459 Unique Identifier 128 code symbol

OLF Guideline No.112: Deployment of RFID in the oil and gas industry

Communication protocols for the reader - ISO/IEC 15961/62

- ISO/IEC 15962 deals with the communication with the RFID tag
- ISO/IEC 15961 addresses the interface with the application systems

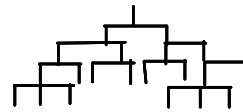


OLF Guideline No.112: Deployment of RFID in the oil and gas industry

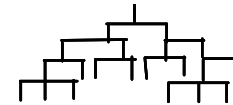
Terminology for extended RFID data - ISO 15926

- Data to be shared between two or more stakeholders/ applications should be stored in an RFID data repository and structured according to ISO 15926
- Some of the syntax from ISO/IEC 15961/62 will be included in the RFID terminology as well as the UIN

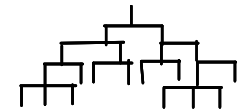
Taxonomy for events and per domain



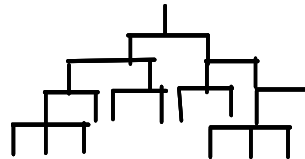
Events



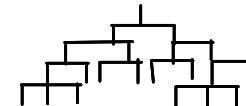
Container



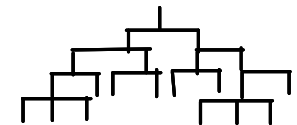
Drill string



Personnel



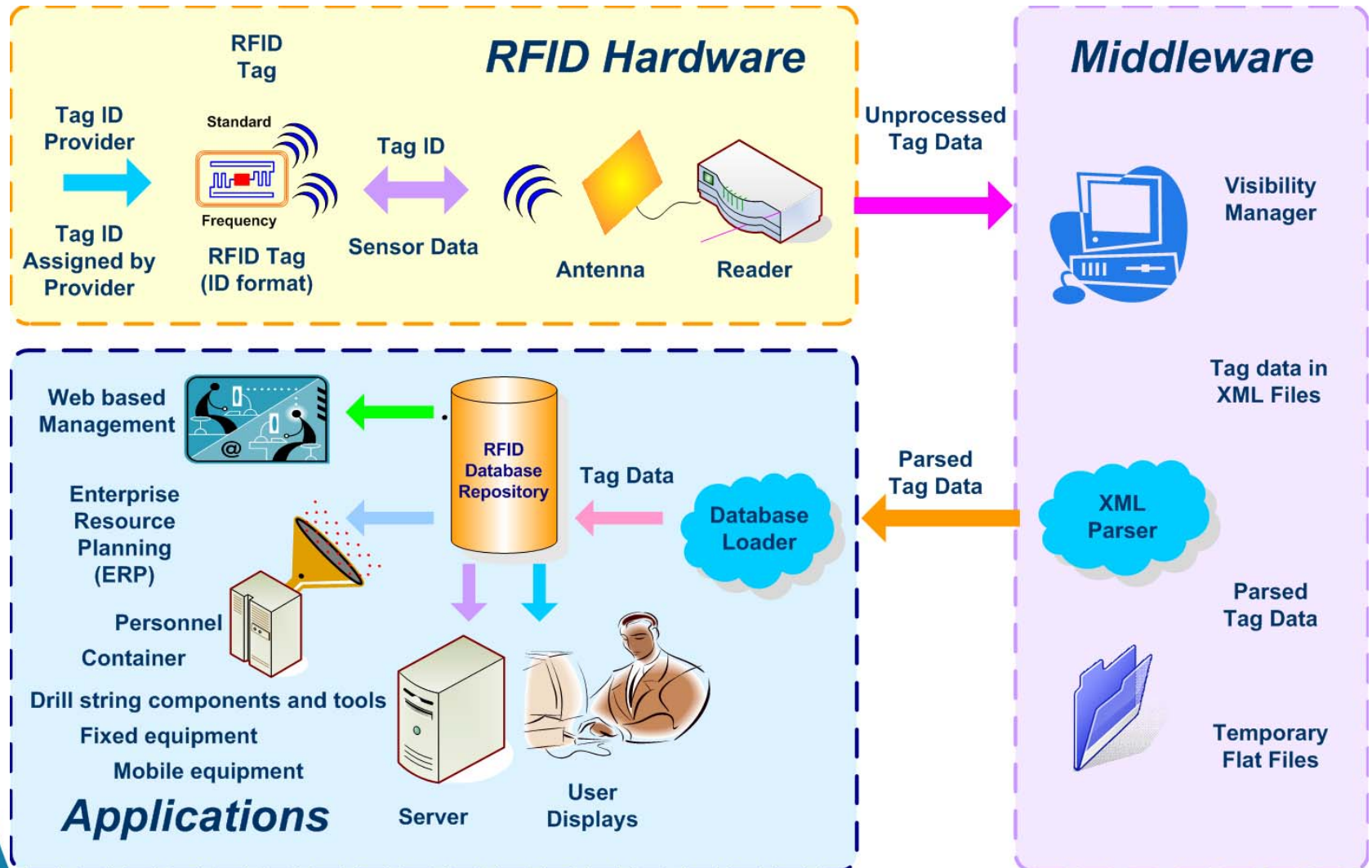
Mobile equipment



Fixed equipment

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A possible RFID architecture - logical view



Project proposal:

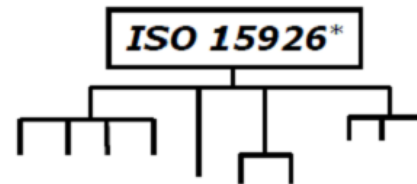
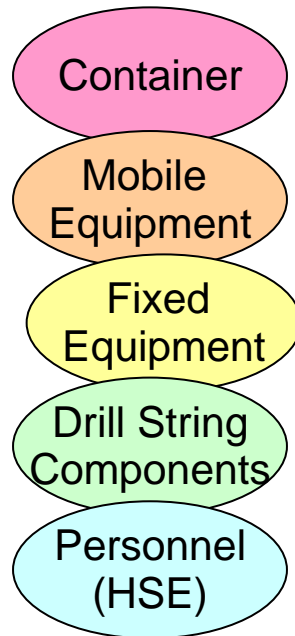
RFID phase 3

RFID Phase 3

- May 20 - meeting with the operators
- Proposed project:
 - ✓ Global Unique Identification Number based on:
 - ISO 15459
 - ISO 15961and established as Part 5 in ISO 15926
 - ✓ Establish semantics and XML schema for
 - All deployment areas according to ISO 15926
 - ✓ Extending scope of Guideline no. 112 to cover
 - ISO/IEC 24753 - Wireless sensors
 - ISO/IEC 24730 - Real Time Location Systems
- To be started up in August/September 2010 provided funding

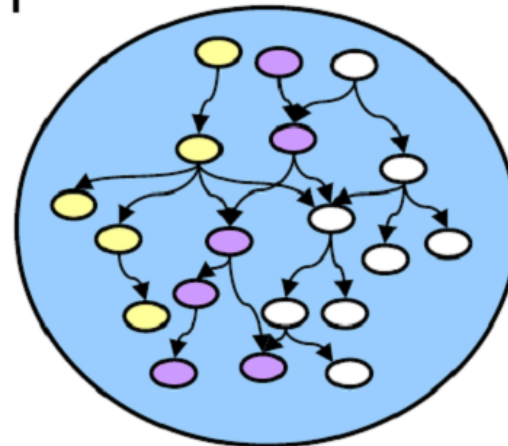
5 Deployment Areas of RFID Reference Data

Domain Specific
Nomenclatures



Structure and add
to ISO 15926
Reference Data
Library (RDL)

Oil and gas
ontology
(Reference Data)



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

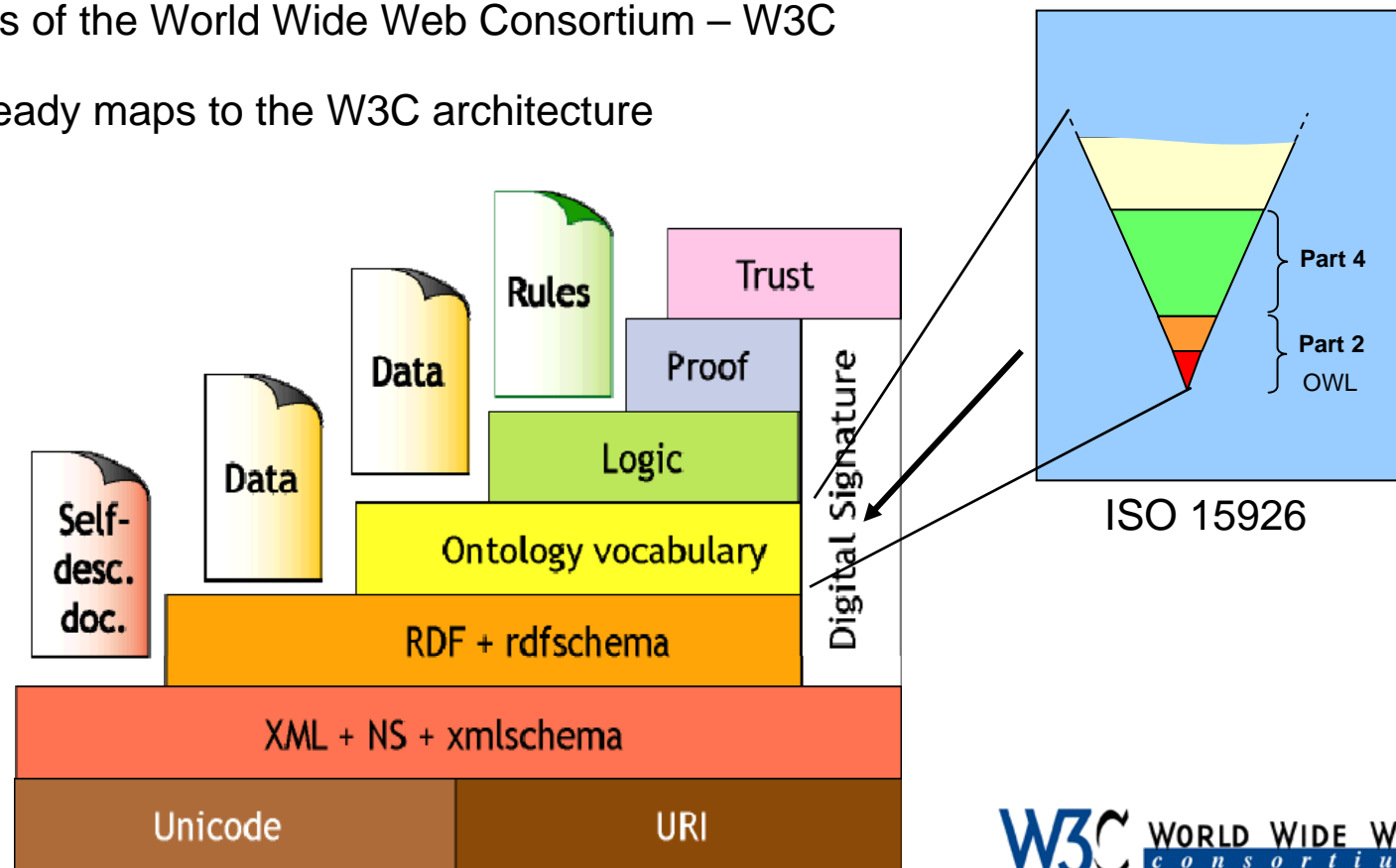
Semantic Web Stack

Architecture for the Semantic Web

The basic principles can be used to help solve enterprise interoperability

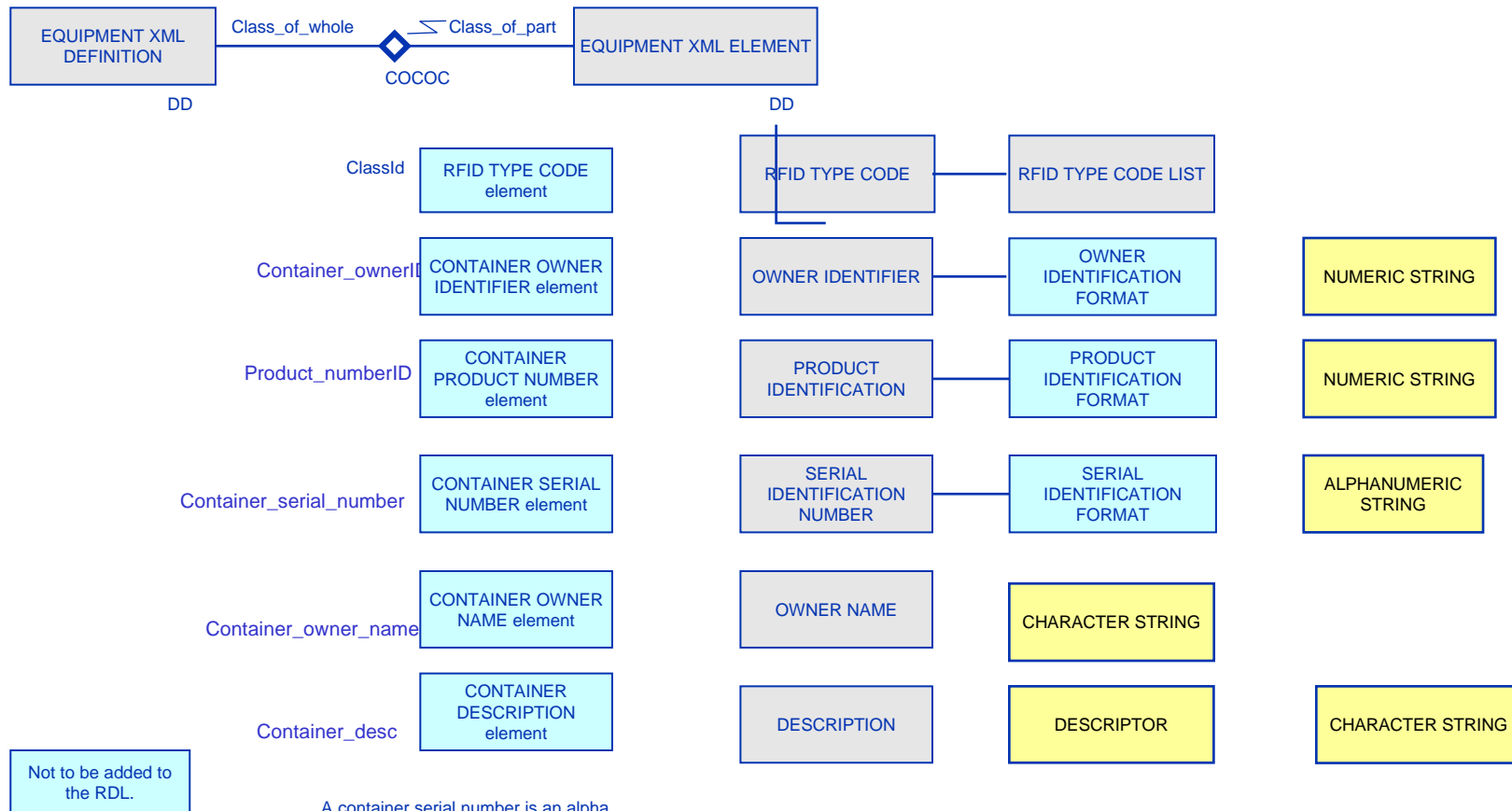
Open Standards of the World Wide Web Consortium – W3C

ISO 15926* already maps to the W3C architecture



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

XML data elements



A container serial number is an alpha numeric number (36 bit, 11 digit) for Containers on the NCS. The serial number is one part of the RFID-tag information.

DD – document definition

Container XML working example

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
- <OffshoreInd>
- <ContainerInfo>
  <ClassID>3</ClassID>
  <Container_ownerID>100254</Container_ownerID>
  <Container_owner_name>SWIRE</Container_owner_name>
  <Product_numberID>1455567</Product_numberID>
  <Container_desc>MUD Container</Container_desc>
  <Container_serial_number>FSM1724</Container_serial_number>
  <Certificate_number>74907</Certificate_number>
  <Certificate_exp_date>2008-11-04</Certificate_exp_date>
  <Container_manufacture_date>2004</Container_manufacture_date>
  <Payload>5250 kg</Payload>
  <Max_gross_weight>7100 kg</Max_gross_weight>
  <RentingCompany>Kongsberg Offshore</RentingCompany>
  <ContainerTypeZ015>U07</ContainerTypeZ015>
  <ProcessEventDateTime>2008-02-11T13:23:55</ProcessEventDateTime>
  <ProcessEvent>Loading ship</ProcessEvent>
- <Location>
  <locationLat>60.412327</locationLat>
  <locationLong>5.011482</locationLong>
  <locationName>CCB Ågotnes Plan 1</locationName>
</Location>
</ContainerInfo>
</OffshoreInd>
```

Protégé Ontology Work Bench

The screenshot displays the Protégé Ontology Work Bench interface. The top menu bar includes File, Edit, Ontologies, Reasoner, Tools, Refactor, Tabs, View, Window, and Help. The toolbar contains icons for navigation and editing. The main workspace is divided into several panes:

- Left Pane (Class Hierarchy):** Shows the asserted class hierarchy for `rdl:DRILL_STRING`. The hierarchy starts with `owl:Thing` and branches into various subclasses, including `rdl:DRILL_STRING` and `rdl:PIPE`.
- Right Pane (Class Description):** Displays the description for the selected class, `rdl:DRILL_STRING`. It includes the following information:
 - Class Annotations:** `Annotations: rdl:DRILL_STRING`
 - Annotations:** `hasExplanatoryComment`
 - hasExplanatoryComment:** "Used to transmit fluid and rotational power from the kelly drive or top drive to the drill collars and bit. Often, especially in the oil patch, the term is loosely applied to both drill pipe and drill collars. Some type of drilling fluid is almost always pumped down the inside of the drill string and circulated back up the annulus, or ring shape void between the drill string and the formation."
 - hasDefinition:** "An artefact that is an assembly of drill pipe with attached tool joints."
 - hasIDPCA:** "RDS648718821"
 - label:** "DRILL STRING"

Acknowledgements This work was conducted using the Protégé resource, which is supported by grant LM007885 from the United States National Library of Medicine.
<http://protege.stanford.edu/>

Internet of Things

- Data integration - that means focus on semantic & ontology
 - ✓ IO in OLF
 - ✓ W3C
 - ✓ EU
 - ✓ Standard Norge
 - ✓ ISO

[SemanticDays2010](#) May 31-June 2, Stavanger

Thank you for your attention!

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

Winning or Losing



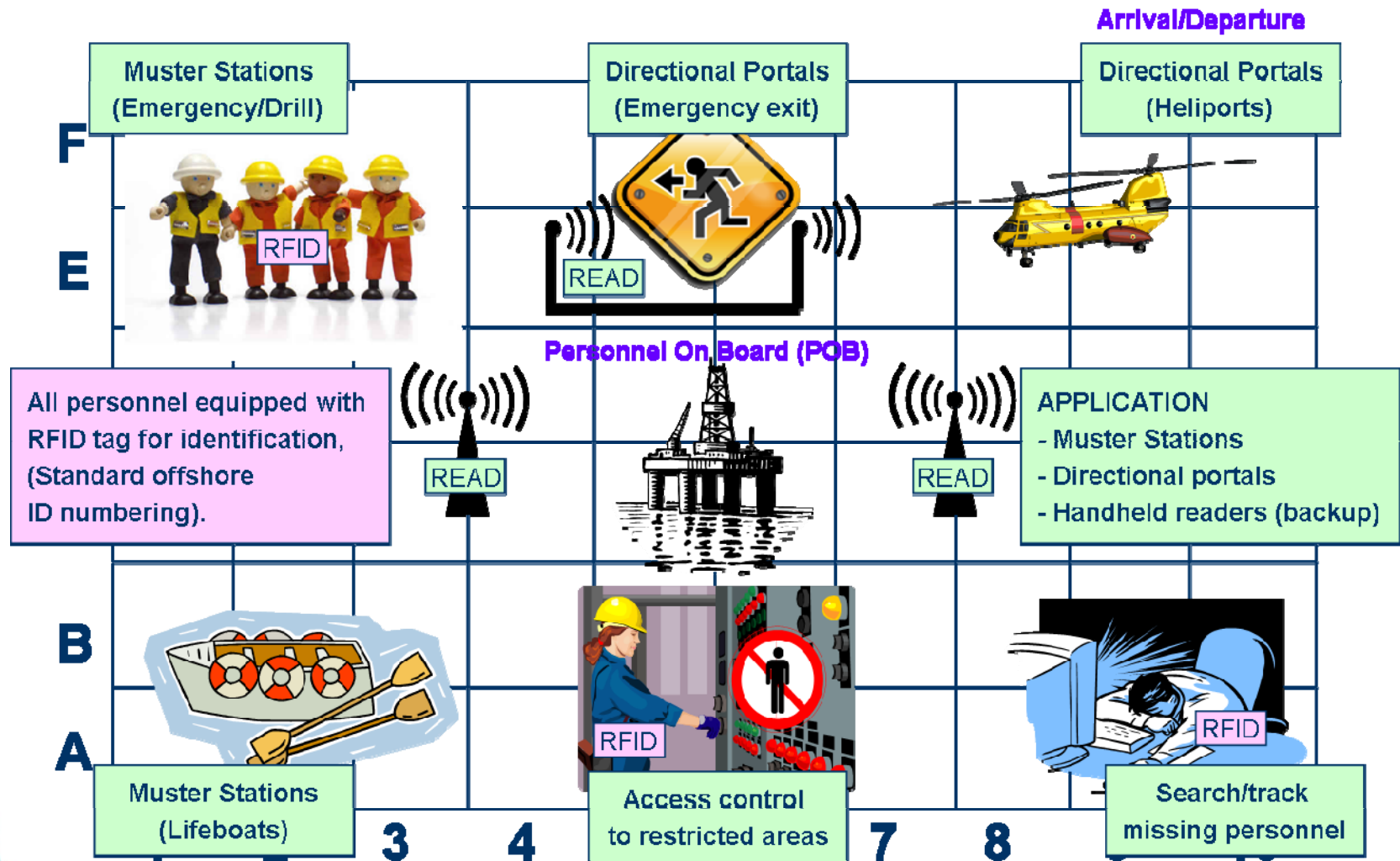
Bill Gates, Microsoft, 1999

"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."

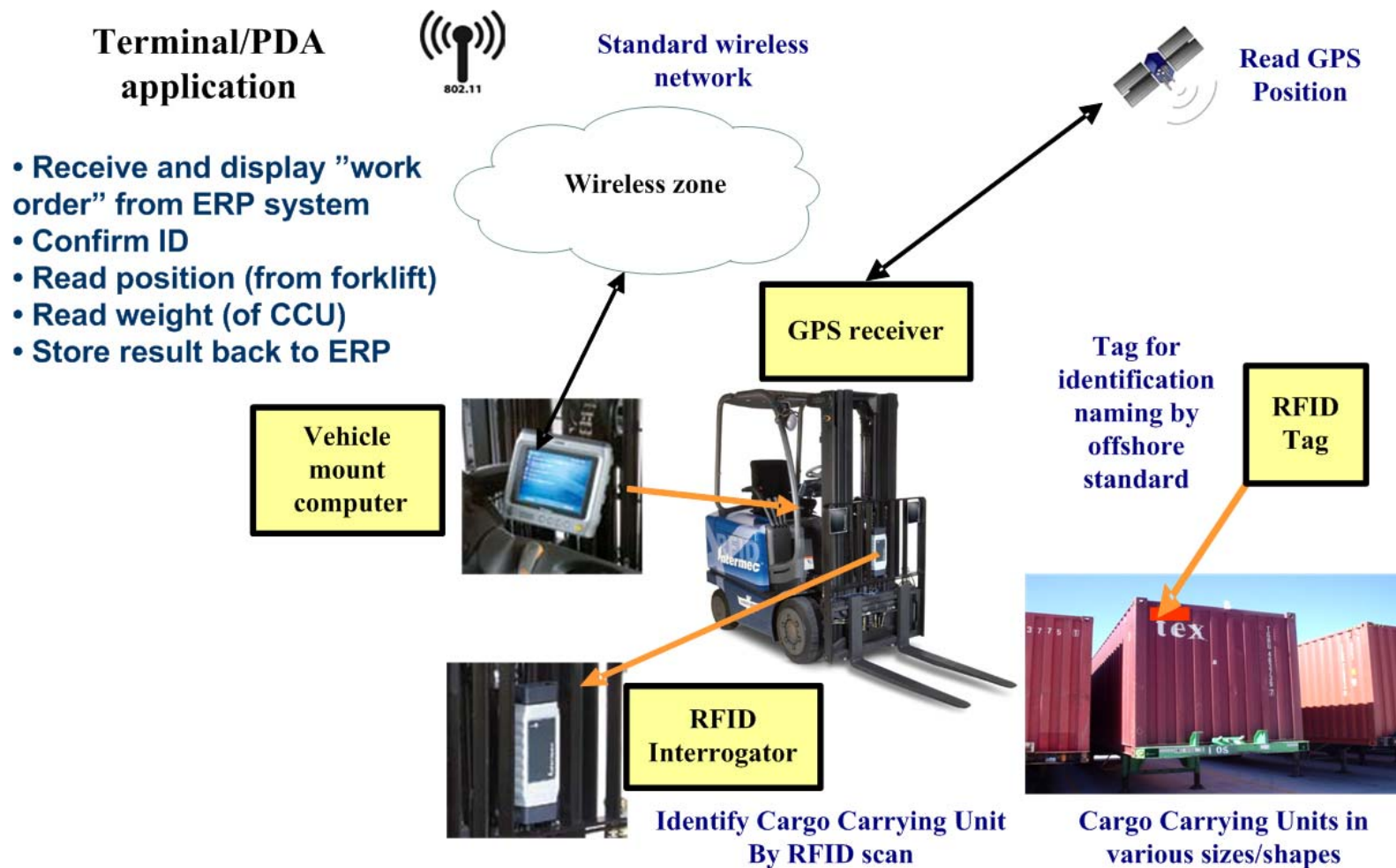
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Part 5 Personnel



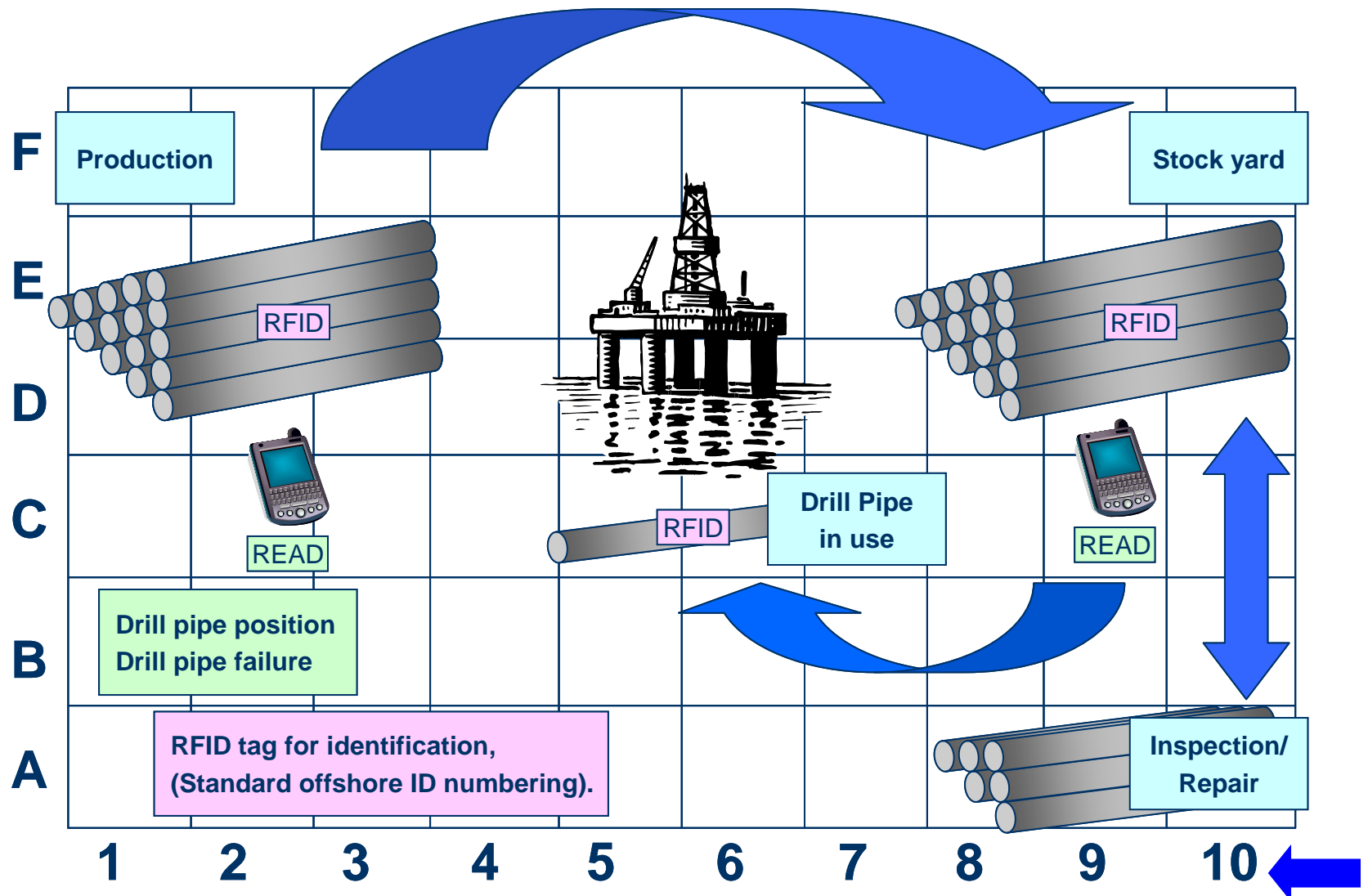
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Part 6 Cargo carrying unit (CCU)



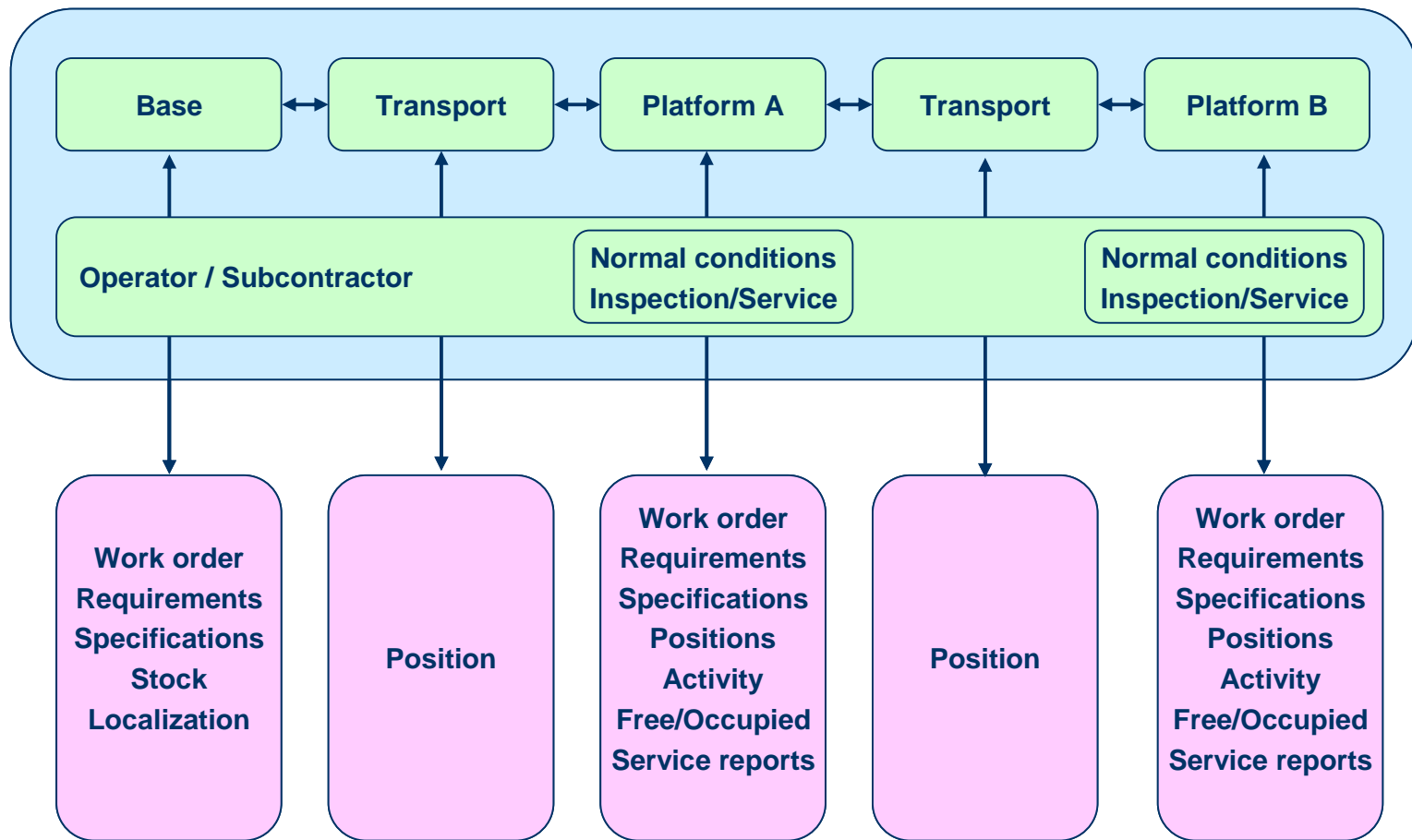
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Part 7 Drill string components



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Part 8 Mobile equipment



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Part 9 Fixed equipment

