

Semantic Days 2010

Challenges of data integration across disciplines for Digital Oilfield of the Future

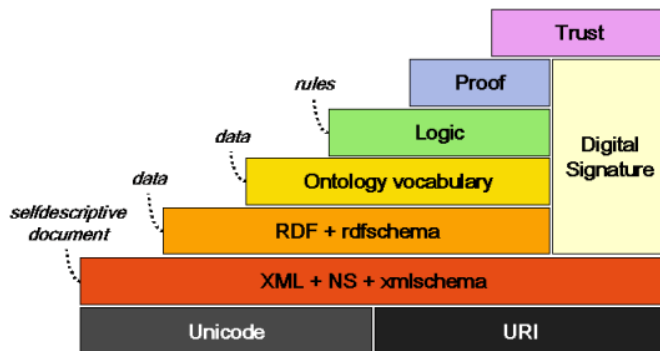
Inge Svensson

BEACON Enterprise Services

June 2nd 2010 - Stavanger

Presentation Outline

- BEACON
- Open Industry Standards
- Data integration and challenges
- BHI Research projects
- Taxonomy developments
- Knowledge management



What is BEACON?

- The BHI platform for remote collaboration, remote monitoring, remote support & remote control
- Based on common standards of technology and workflow to enable a secure, global service delivery model
- Managed at the Enterprise level, made business-appropriate for all product lines and all GeoMarkets

Linking BHI experts and resources...

Through a standard technology and process infrastructure

To BHI Operations at the point of service delivery



Through a standard technology and process infrastructure



- 24x7 Global Service Desks
- Rig-to-office or to workshop connectivity
- Remote Monitoring, Support & Control
- Remote collaboration
- Workflow integration
- Data and Knowledge Management
- Information security

Linking BHI experts and resources...

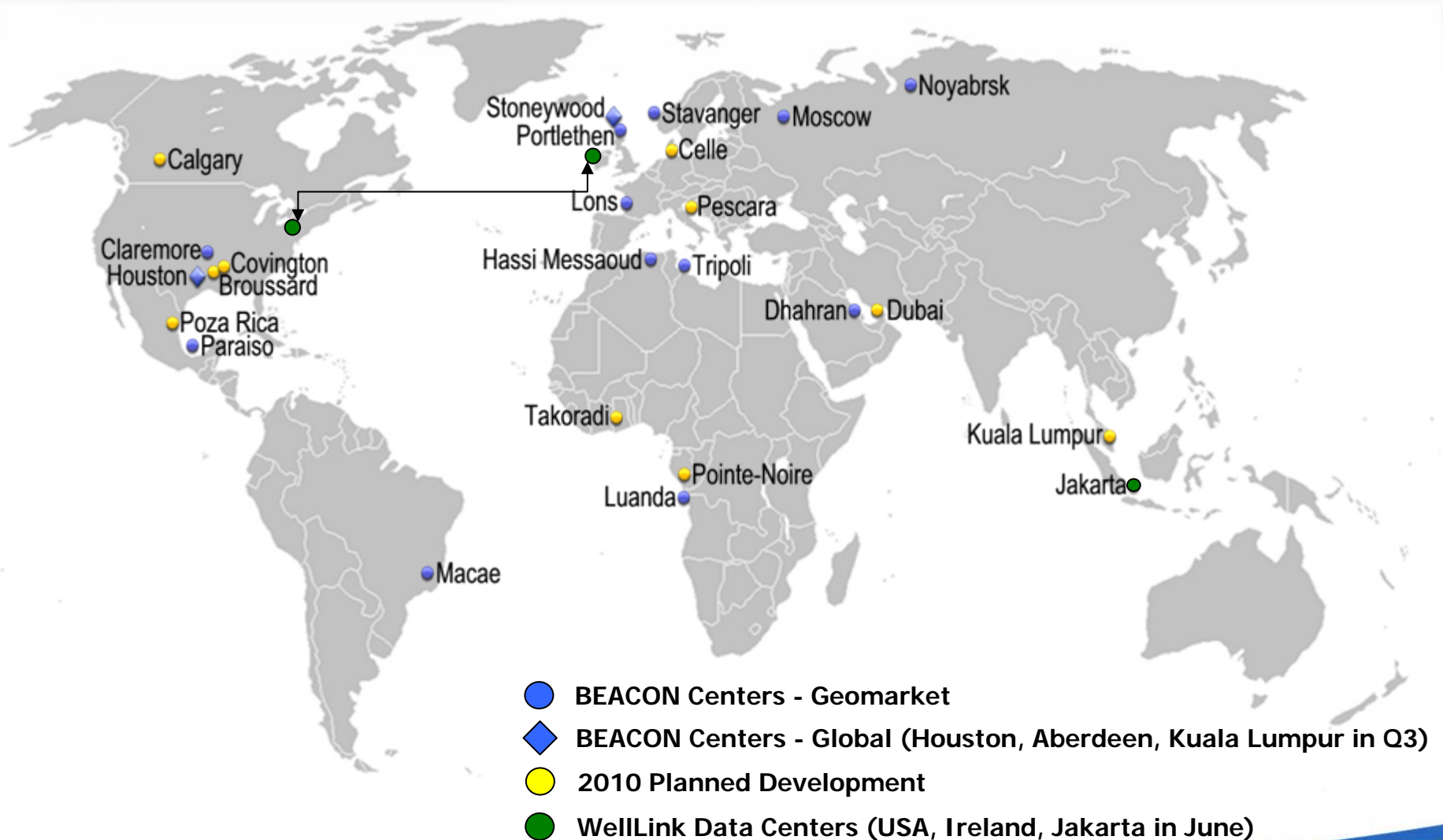


To BHI Operations at the point of service delivery



BEACON Centers

Global Coverage with an Active Development Plan



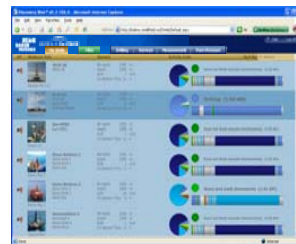
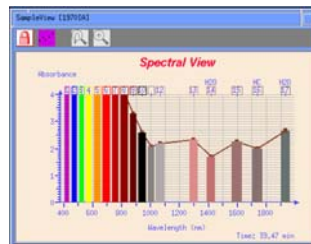
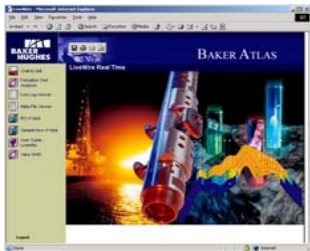
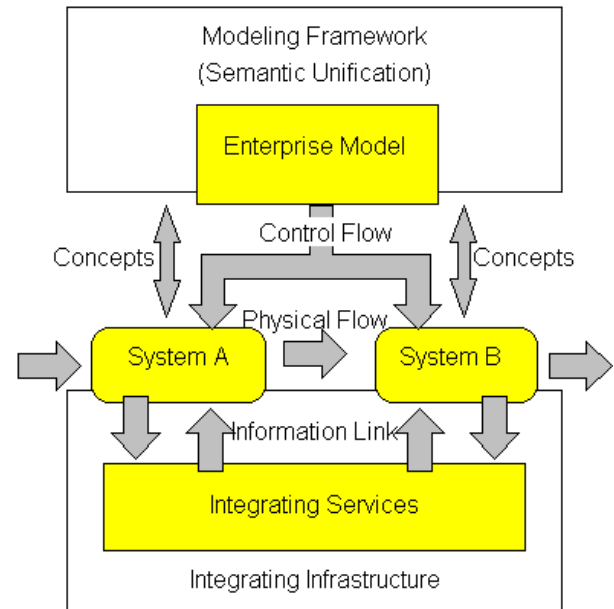
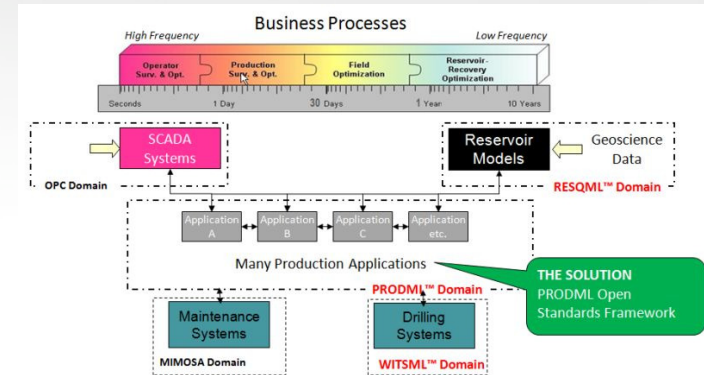
Open Industry Standards

- Open Industry Standards are the base for our technical solutions for Digital Oilfield Operations.
- The standards allows for simple transfer and access to data in a secure way and facilitates quality data.
- We are working with the development of multiple standards used in the industry and we are doing it in cooperation with several key vendors.

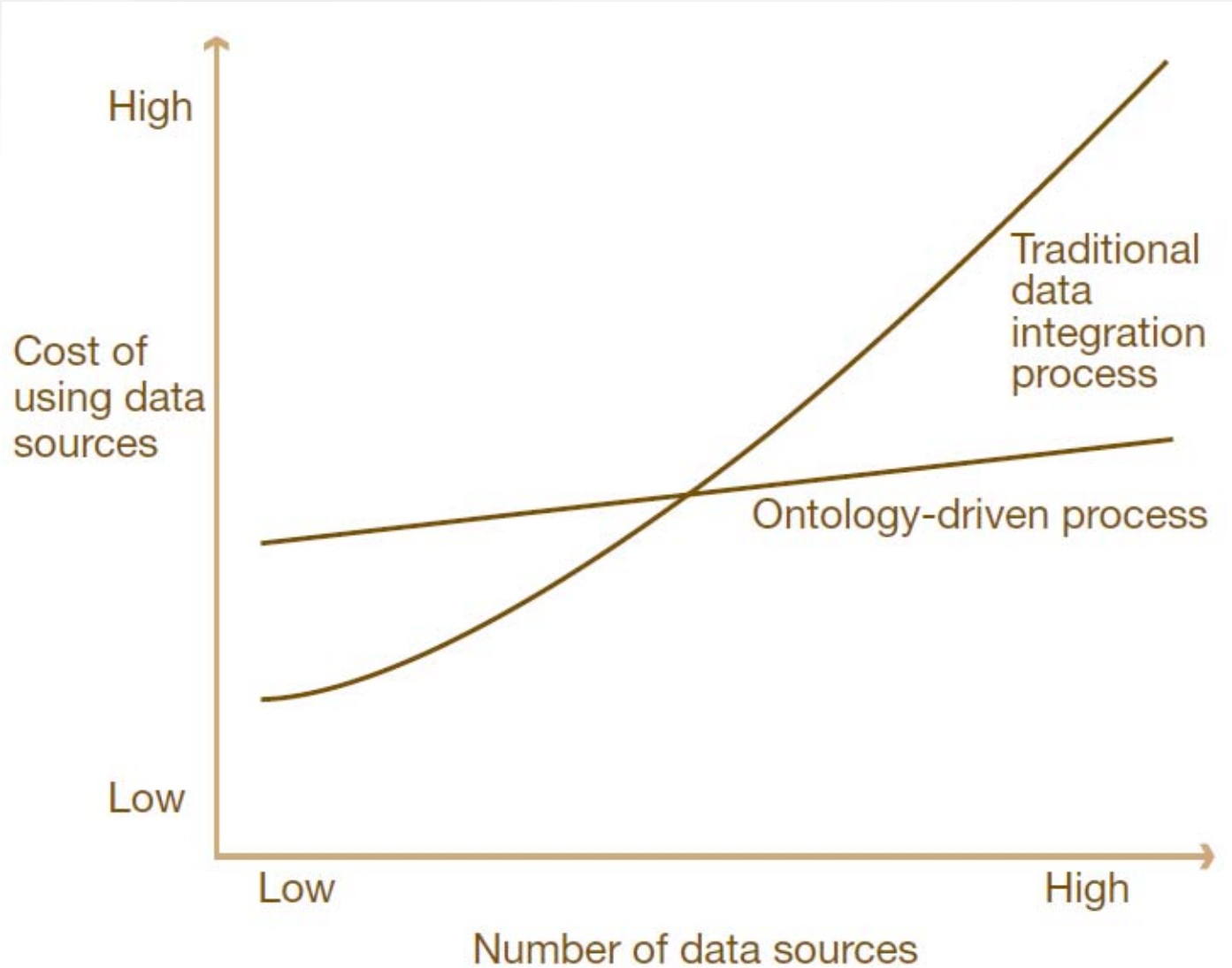


Data integration types/levels

- Hard coding of data interfaces
- Mapping and translation tools
- Common database models/Schemas
- Common transfer methods/protocols. E.g. using XML standards or OPC
- Integration hubs and brokers
- Model-based integration
- Data Federation techniques
- Semantic Integration



Cost - Semantic Data Integration

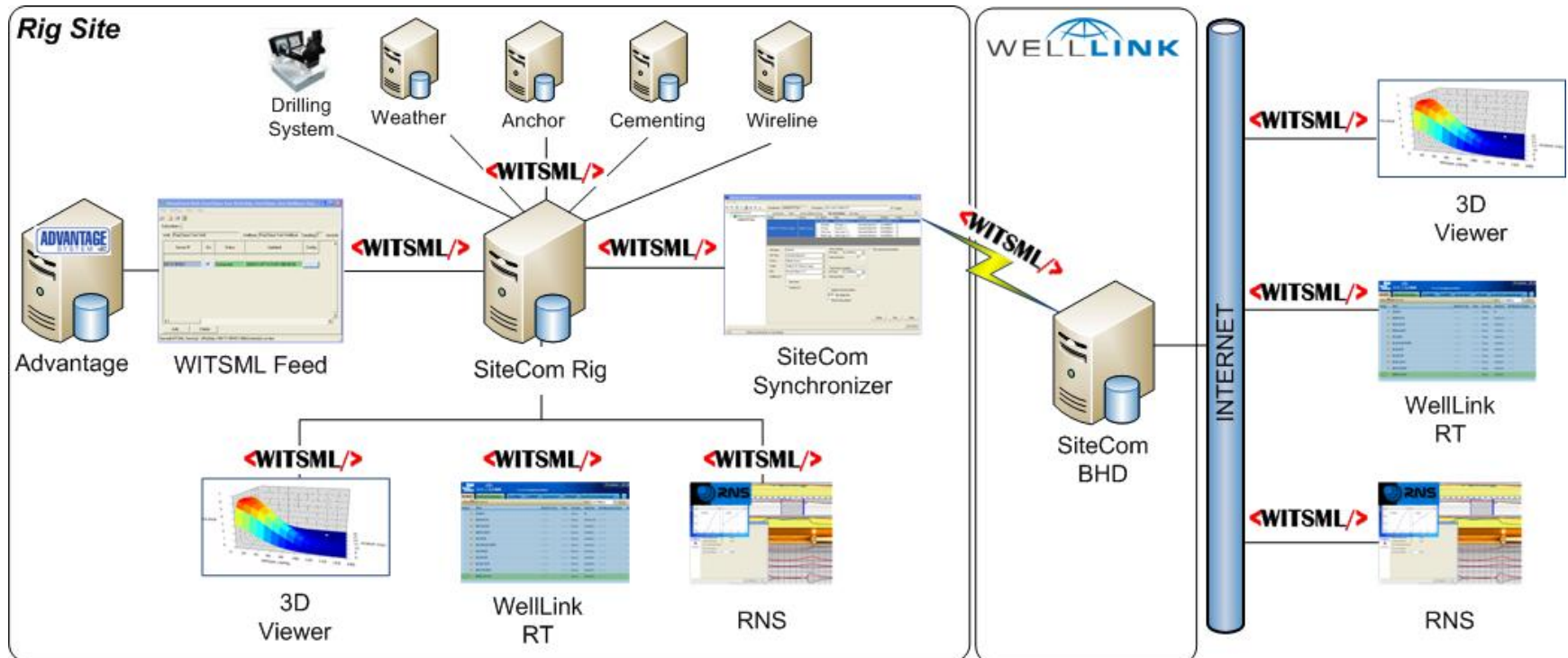


Source: PricewaterhouseCoopers

Example : Data Aggregation

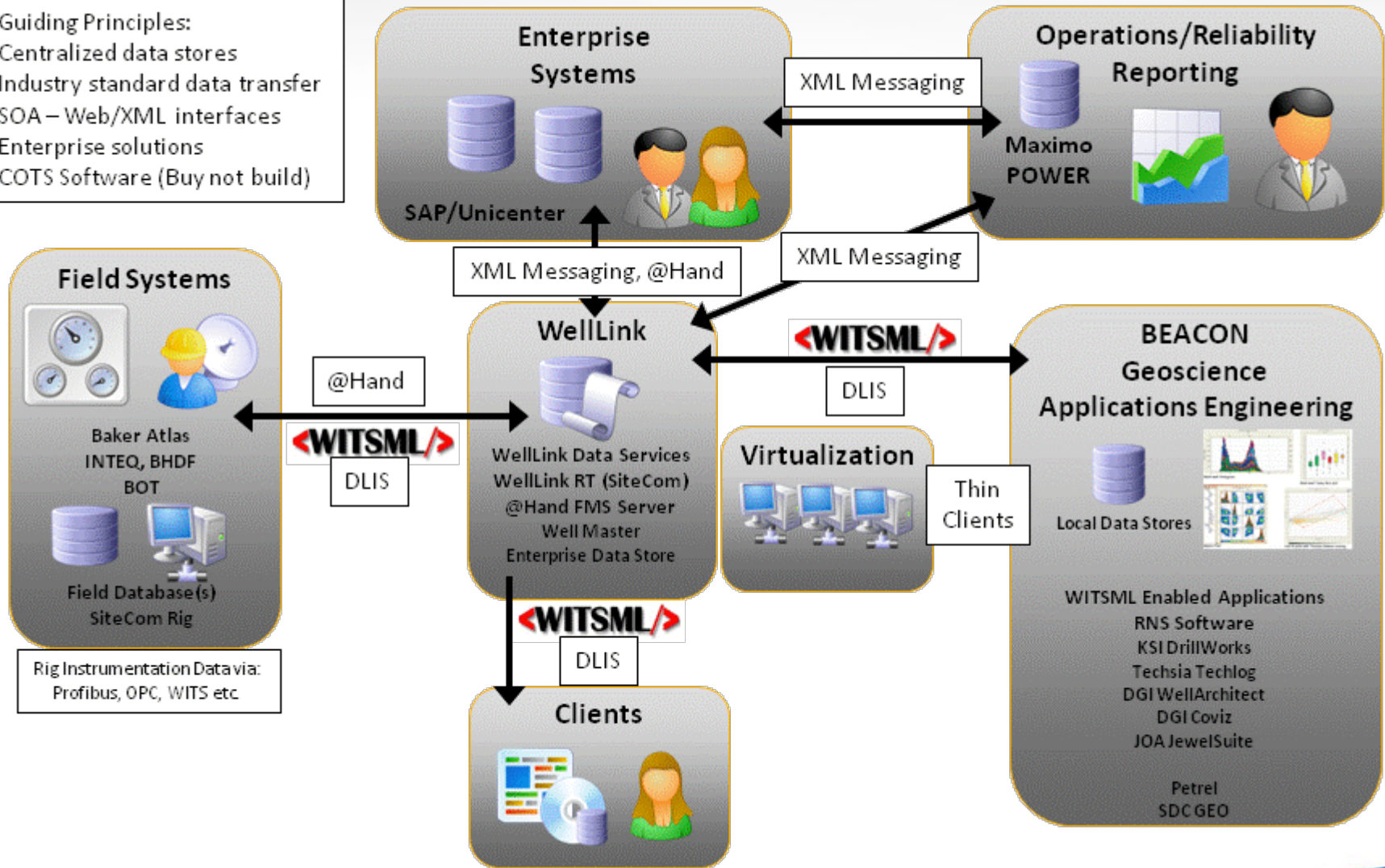
SiteCom Rig as a real-time data hub it is the repository for all sources and recipients. Data synchronized to BHI central store at BHD.

WellLink RT application used to show data on the rig. WITSML data available offshore for various applications.



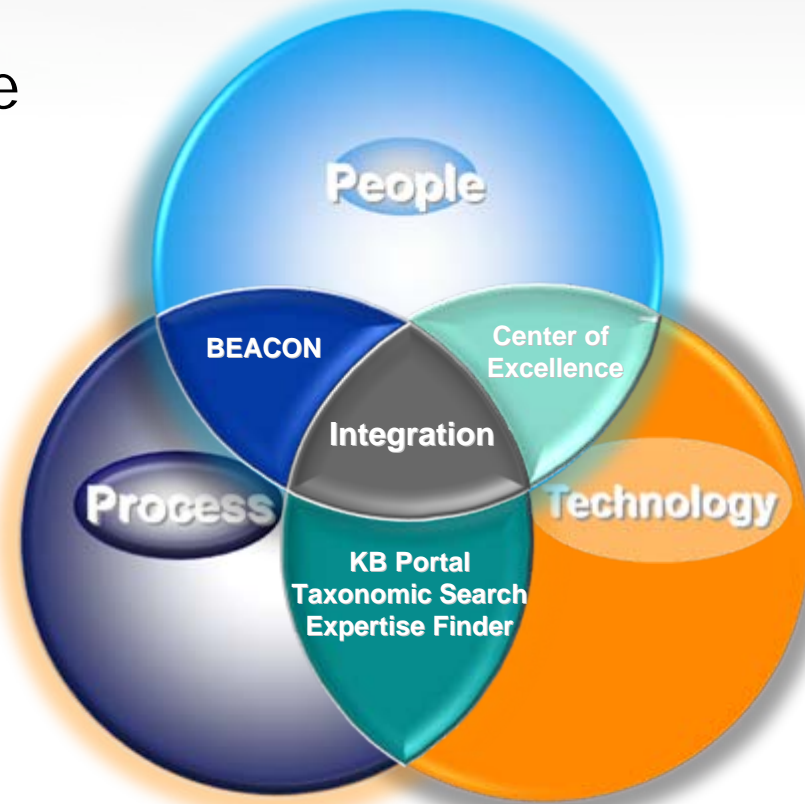
Example : WITSML Data Integration

Guiding Principles:
 Centralized data stores
 Industry standard data transfer
 SOA – Web/XML interfaces
 Enterprise solutions
 COTS Software (Buy not build)



Data Integration : Current Challenges

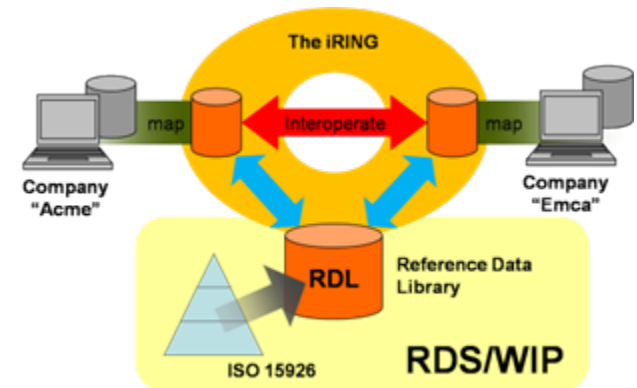
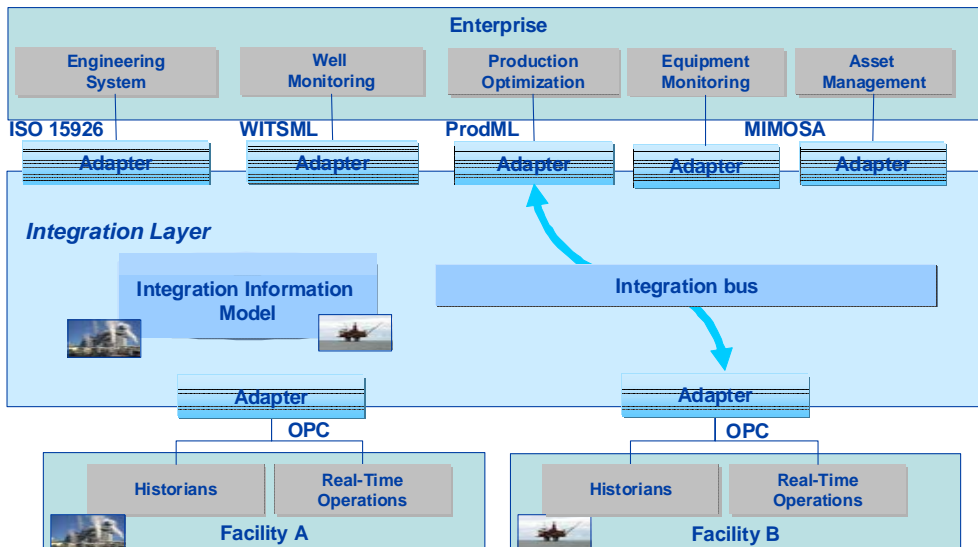
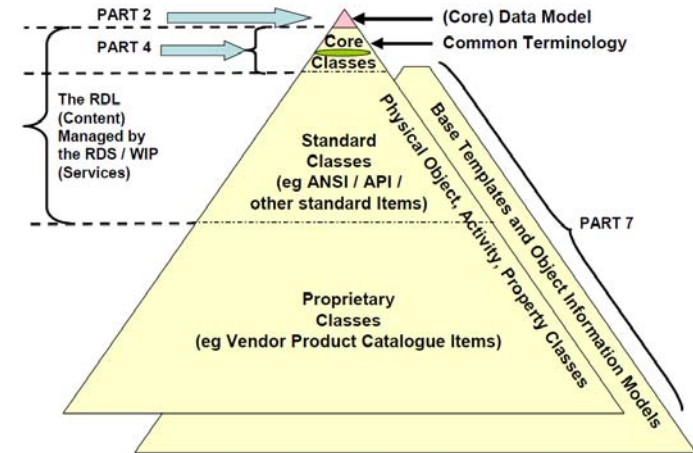
- Poor integration/data sharing between companies at the rig-site
- Poor integration/data sharing between expert centers from various service companies
- Enormous increase in data volumes. Customer requests.
- Integrating data from different disciplines.
 - The services are operated differently with other terms.



ISO 15926



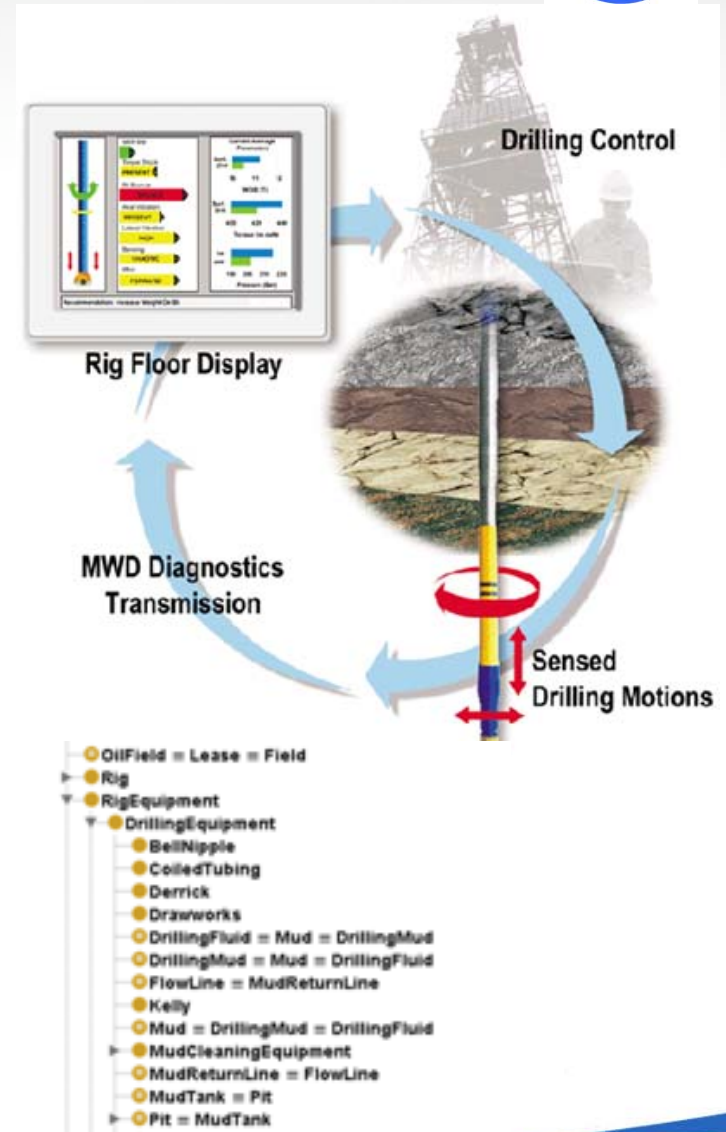
- Integration using a top level ontology
- Reference data
 - Semantic lifting
 - Common terms
- iRING
 - Open Source interoperability solutions
- Essential in IOHN architecture(s)



Drilling Communication Standard



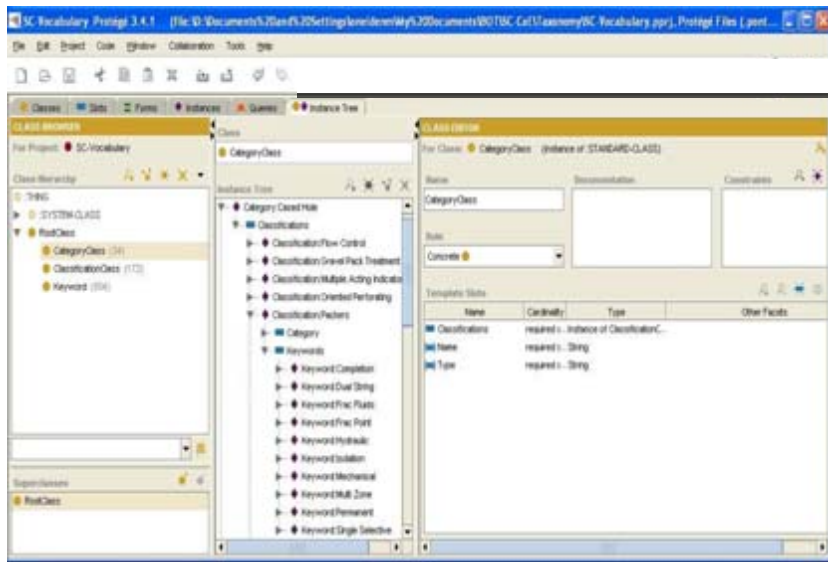
- Developed in AutoConRig/IOHN
- New web service based standard to communicate with the Drilling Control System
- Powered by semantic web
- Benefits of standard:
 - Automation
 - Allows open loop control and envelope protection from remote locations e.g. an expert center
 - Aim is to replace verbal communication between service company and driller.
 - Control can be extended out of the drilling control system for integration with advanced models and real-time surface and downhole data



BHI Reference data developments

- Sand Control Domain Taxonomy

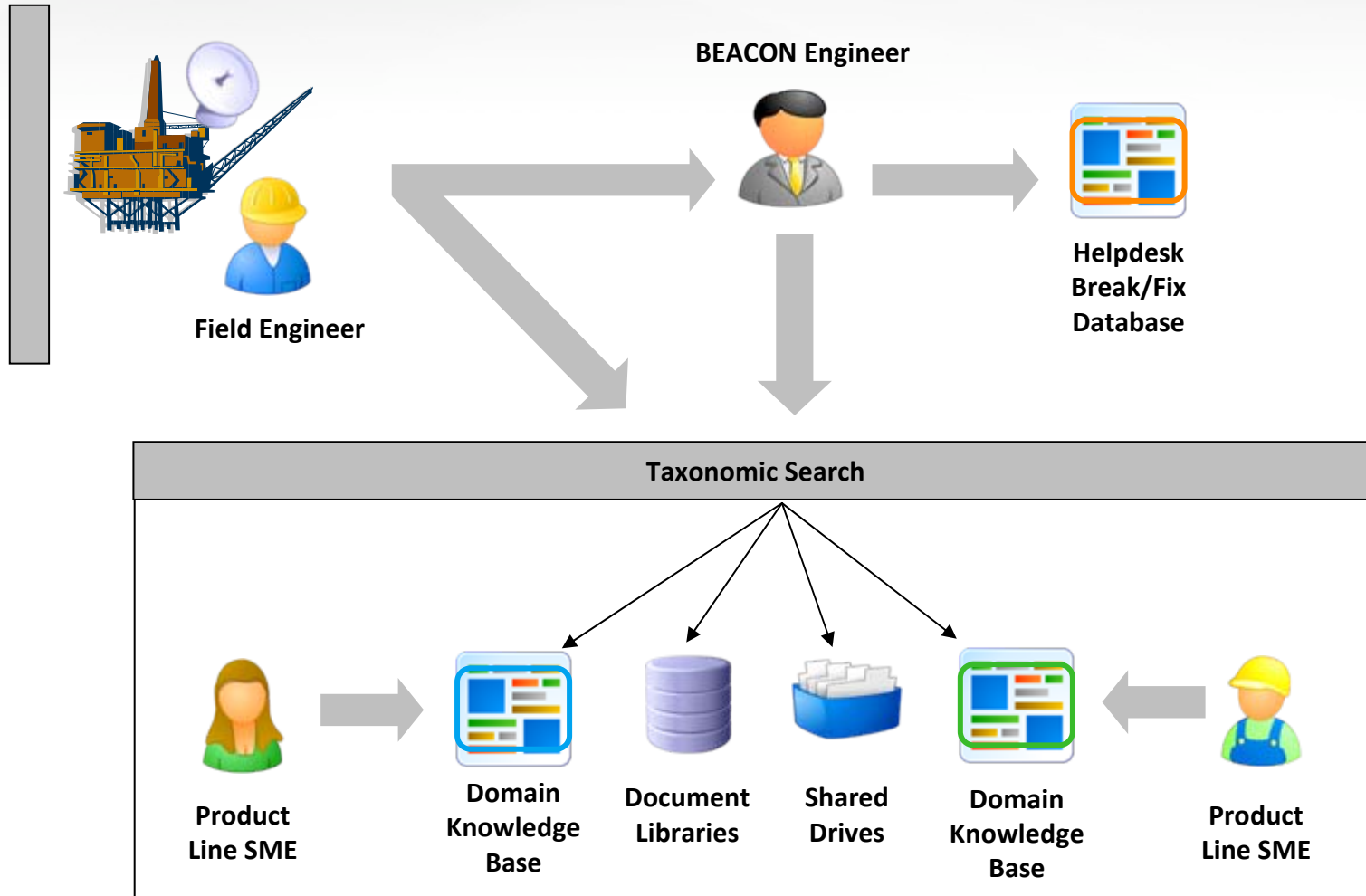
- Over 1,400 terms
- 170 classification groups
- 34 categories
- Three-level hierarchy being used throughout the program
- Development in Protégé and Excel



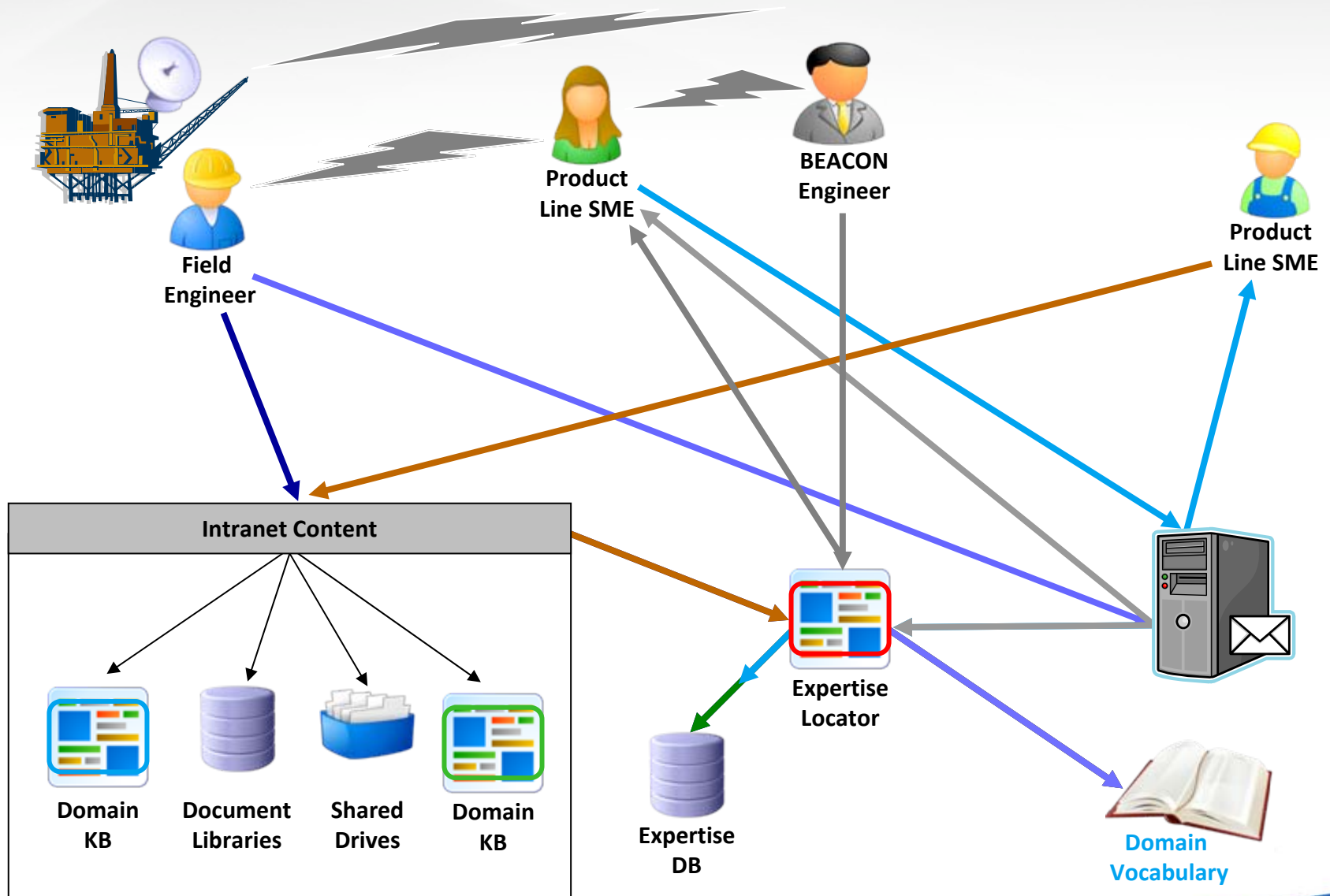
Problems & Best Practices	
Problems Addressed	<ol style="list-style-type: none">1 BALLING - Cutting Structure Balling2 BIT - Steerability Inadequate3 DRILL STRING DYNAMICS - Stick-Slip
Failure	<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="text" value="Comment"/>
Generic Operating Practice	<ol style="list-style-type: none">1 DRILL AHEAD - Minimise Vibrations2 DRILL AHEAD - Bit Balling3 DRILL AHEAD - Treat mud
Best Practice Link	<input type="text" value="Paste link to specific Integ standard Global or regional operating practices."/>

Finding the Right Content at the Right Time

Reference Knowledge Management



Finding the Right Person at the Right Time



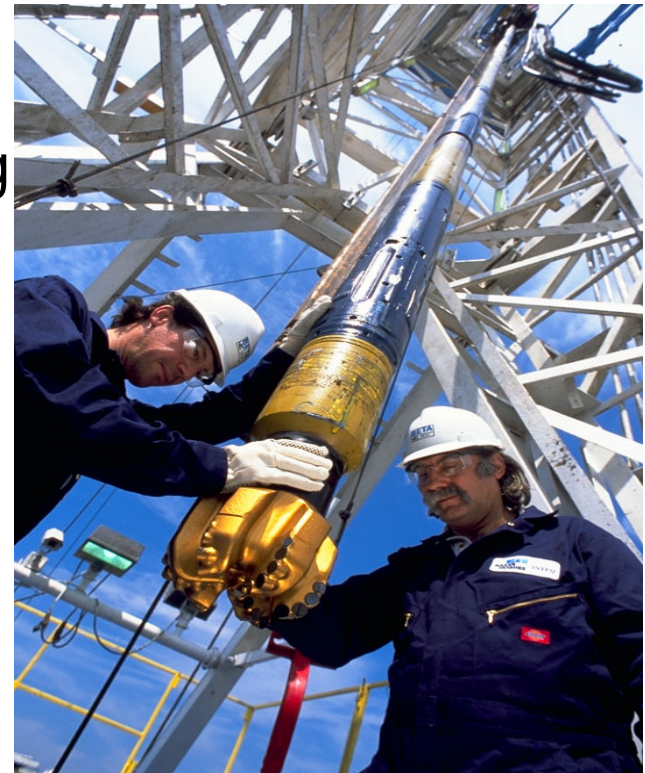
Linking the Right People with the Right Solution at the Right Time



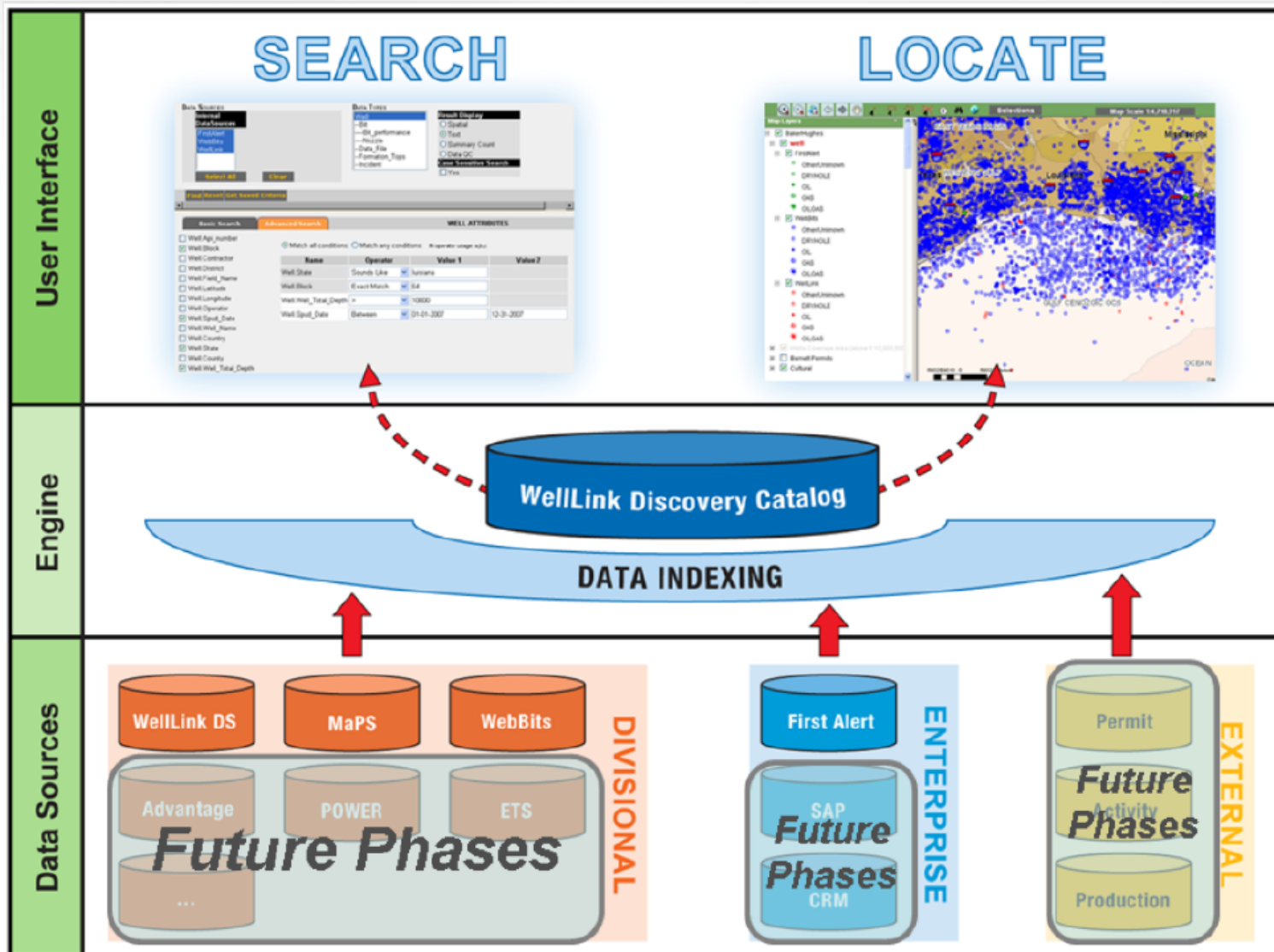
Benefit	Results
Discover	Hidden expertise and valuable info in the flow of people's work
Find	Available people and useful media that can help you get your work done
Collaborate	With the best possible experience in a single click
Navigate	Business information and relative documents
Measure	Adoption trends, find knowledge gaps and track business impact

Lessons Learned

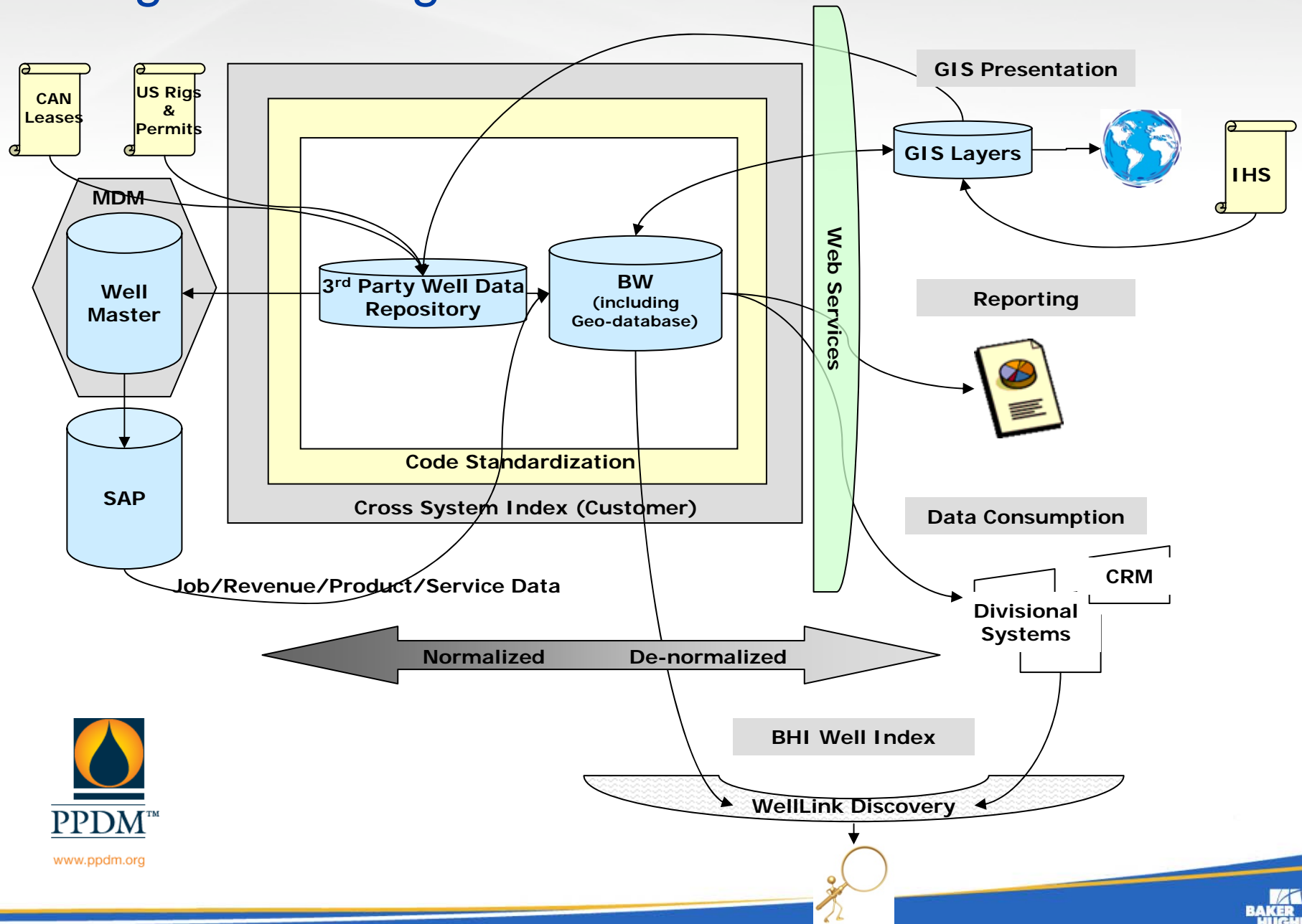
- Domain taxonomies/vocabularies are extremely powerful
 - We have found multiple uses in other application areas
 - Creating good taxonomies (and getting consensus) is hard
 - Partitioned taxonomies are probably required in technical domains
 - Few good tools exist for taxonomy management
- New domains to follow



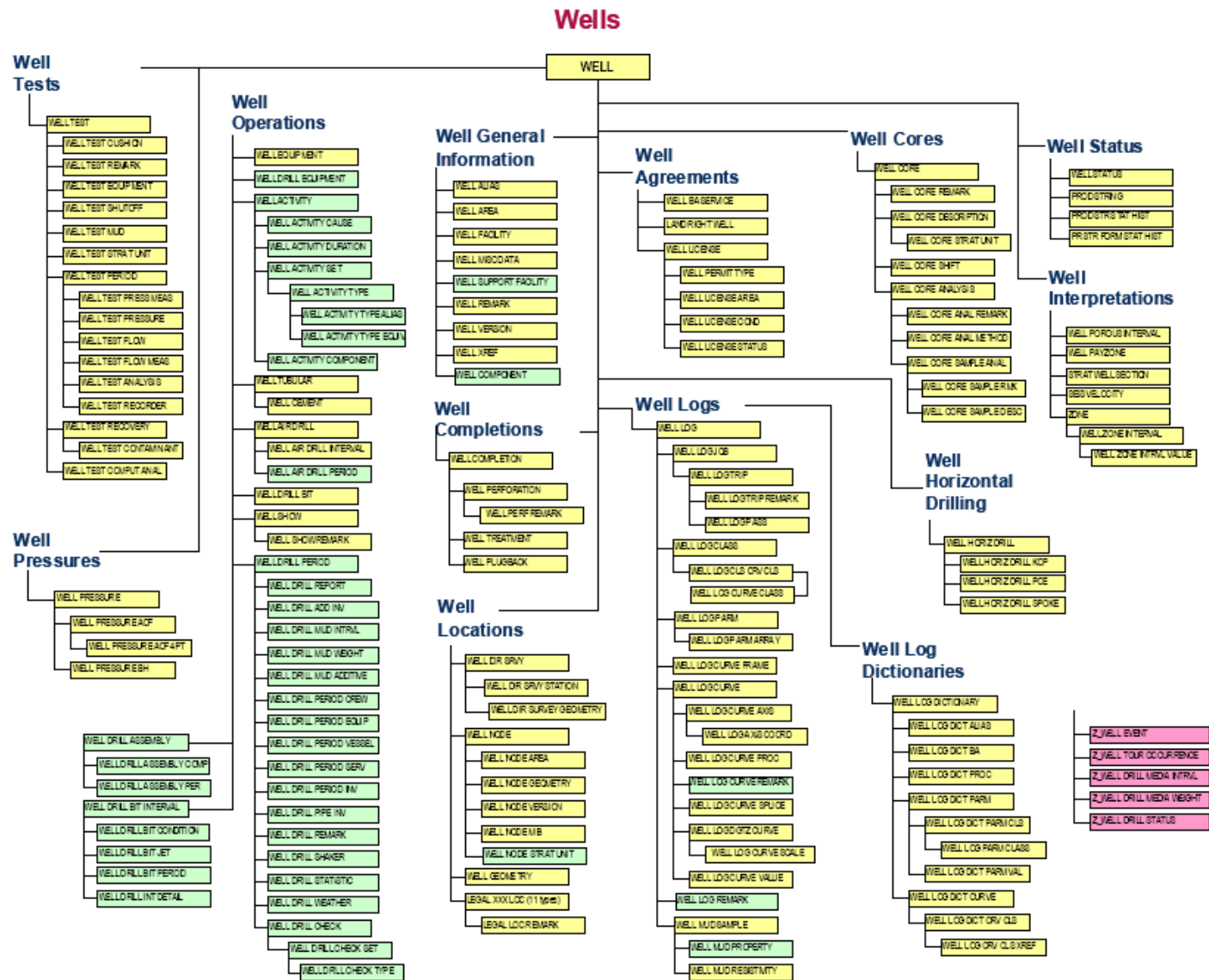
Integrated Well Data



Integration using PPDM model



PPDM Well Objects





Questions?

inge.svensson@bakerhughes.com