Application of Model Driven Integration

In StatoilHydro’s F0B project

Jone F. Aarre
Technical Sales Specialist
IBM Oil and Gas CoE, IBM SWG

CIMug meeting
Versterås, June 12 - 2008
Support for Integrated Operations Generation 2 required

- Operators must have information on drilling, production and operation easily and transparently accessible across multiple assets & facilities:
  - for a set of new corporate work processes and applications such as performance analysis, improvement, and real time information based decision support processes,
  - within various upstream domains, - drilling, production, operations

- But:
  - Operators have many oil & gas facilities with significantly different applications and configurations, process tag and data naming conventions,…..
  - Too many isolated and different solutions – across many highly variable oil & gas fields
  - Difficulties implementing common processes
  - Complex applications & interfaces
  - Difficult to adapt quickly
  - Large portion of IT budget spent on maintenance, not on new value add investments
TAIL- IO project - subprojects

Contribute to improve HSE performance, increase production with 5% and reduce operation costs with 30%

F5 Mobile

"Mobile" field operators

F6 Robotics

Robotized facilities

F3 Wireless

Heavily instrumented & networked facilities

F0 Architecture

A – Reference Architecture

B – Real Time Integration Services

F1 CBM

Condition monitoring & early fault detection

F2 Turnarounds

Optimization of turnarounds

F4 Collaboration

3D visualization & collaboration
StatoilHydro and IBM agreed to initiate a project to verify the concept proposed by the IMS strategy project

- **Project idea**
  - Test an integration solution based on an open service oriented architecture, and gain insight into the SOA concept as applied to real-time data from multiple plants
  - Give StatoilHydro the assurance required for a staged, company-wide implementation

- **Project goals**
  - The IMS data shall appear in the same, standardised way
  - The IMS data shall be structured so that data flows easily between systems and users can effectively utilise the data

- **Project objectives**
  - Demonstrate an integration solution based on a SOA architecture and XML
  - Demonstrate an implementation of the S95 standard for real-time (OPC) data
  - Demonstrate an implementation process supporting a staged company-wide implementation
  - Demonstrate configurability and maintainability of the integration model
  - Evaluate concept and present recommendations for further work and implementation
Targets

- **Develop a Real-Time Integration Solution (RTIS) based on F0 Common Integration Architecture, IBM’s Information Integration Framework and relevant ISA & ISO standards as defined in the project documents**
  - For standardized access to information in Statoil’s various IMS applications

- **Ensure and verify that the solution delivers the following capabilities:**
  - Enterprise-wide name space and naming convention that is unique and that is based on industry standards ISO15926, ISA S88/95 and Mimosa
  - Design and creation of asset models and model instances
  - Mapping / management functions supporting configuration and model updates from the DCS and upwards
  - Maintenance, persistence and quality control of data

- **Verify value and functionality through testing of solution on StatoilHydro assets in accordance with selected use cases and tools**
  - Statfjord A and Gullfaks B
Background for architecture viewpoint used in Draft Reference Architecture for OLF Integrated Operations Generation 2 and StatoilHydro TAIL-IO project F0

Aspects to take into account when specifying architecture viewpoints based on IEEE-Std-1471 –

IEEE S3 SOA Reference Model is the baseline for structuring the architecture overview diagrams

IBM C&P IIF
Realtime data and history sensor data integration

NEW UPSTREAM SERVICES

Equipment information, instrument information, tag structures

Realtime and historical measurements

From StatoilHydro TAIL-IO project F0
The Integrated Information Framework
Main building blocks

Existing third party applications

The IIF Solution Studio

New business services

Model-aware server interface

Common semantic exchange model with an enterprise name space

Technical user apps

RT ESB

Web services interface to model and information

Service oriented applications and CSBs

Model Aware Visualization

Enables reusable product calculations and data validation in the model

Service oriented applications and CSBs

Model Aware Visualization

Real time and historical measurement values

Model Aware Client Adapters

Model Aware Server Adapters

Enable event definition, detection and processing

Model services

OPC Client

REST Services

Web Services

Data Historians, Control Systems, Sensors

Engineering Data Warehouse, Project Document Repositories

ERP & Asset Maintenance

Maintenance Supervisor

Plant Engineer

Plant Supervisor

Plant Engineer

Plant Supervisor

OPC Server

Database

XML/SQL

Calcs Defs

Data validation

Event Processing

Event Definition

Model Aware Services if

Model Aware Services if

Enables event definition, detection and processing
C&P Framework Manufacturing Operations Concept

- **Integrated Information Framework (IIF) is the set of practices and technologies that provides:**
  - Global visibility into manufacturing Information and performance
  - Presentation of information in the context of equipment configurations
  - Easy Maintenance

- IIF provides:
  - Foundation for internal manufacturing collaboration (Performance Improvement) and execution (Operational Excellence)
  - Ability to effectively maintain equipment relationships, track events and conditions across multiple plants
  - A technology neutral lingua franca reference framework plant model based on recognized global standards
  - A federation of data, not a replication
Integration Pattern – bridging real time with enterprise systems

- Access to the RT data directly at its master source, - data currency optimized
- Accessing OPC, and Web Services, or any Enterprise Application asset through ESB eliminates information barriers

Architecture instantiated through IIF

from Norwegian Oil Industry Association and StatoilHydro TAIL-IO project F0
Semantic Model – integration using common industry model

- Standards based ontology.
- Common asset model across facilities and systems
- No change in the local plants
IIF – RSM Metamodel
RSM - standards approach and industry participation

RSM Team
- ISA 88 – Dennis Brandl
- ISA 95 – Keith Unger
- PCA/OLF – Nils Sandsmark, Thore Langeland, Magne Valen Senstad
- MIMOSA - Alan Johnston, Ken Beaver
- OAGi – Dave Connelly
- WBF – Dave Emerson
- OSIsoft – Jack Aude
- DOW – Russ Dickinson
- SISCO – Herb Falk
- IBM – Vishwanath Narayan
Reference Semantic Model Objectives and Functions

- The RSM essentially answers the Open Operations and Maintenance model requirements
- Connects measurements, equipment, planning and scheduling, life cycle management, etc. throughout an enterprise
- The RSM is not a data model and does not constrain the way applications implement the information contained within the model.
- The RSM facilitates the exchange of information it does not store or replicate data. Federates Instances of the IIF/RSM across the Enterprise.
- The RSM provides a “Contextual Naming Service for equipment and measurements, keeps track of “equipment and process states”.
- The RSM provides multiple enterprise navigation methods that allows the access of process equipment, measurements, and document connectivity for visualization, and provides a “role based” information capability
- The RSM can be “queried” to find equipment and related information to like documents and “pseudo static” data by Web Service based applications.
- The RSM provides a base for “Model Aware Adapters”
The RSM and SOA Provides a True Industry Content Base for an Enterprise

Federated SOA/RSM IIF Instances Interoperating on a WAN

- ERP Applications
- Desk Top Applications
- Remote Users, Vendors
- Cell Phones & Smart Phones
- MRO, & Engineering Databases
- Any Portal or Web Service App

Web Services Engine

Composite Business Service

- Standards Based Transactions
- Email, Thin Net Client Access, Hierarchical Views Based on Log On, Excel and OPC Access

Security

Document Management

Programmable Logic Controller

SQL Database

Distributed Control System

© Copyright IBM Corporation 2008
The RSM in action

IBM Oil & Gas Centre of Excellence
Instantiated for StatoilHydro