

Global Collaborative PLM Solutions for sub-sea applications

*How to increase interoperability using ISO
standards*



10th NATO LCM Conference, 28/29 January 2014
LIFE CYCLE MANAGEMENT IN NATO
From Theory to Action

<http://www.jotne.com>

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JOTNE EPM TECHNOLOGY



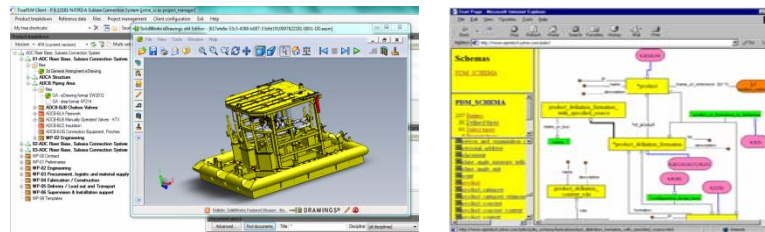
World leaders in Industrial Data Management using ISO standards

Data modeling
Create your own data models, or use for viewing and documentation (ISO)

Database management
The ideal tool for data integration and application development projects

Rule engine
Validate your data sets, using your own business, knowledge rules or any other sets of rules

Web services
For use in web server applications (thin clients)



Universal Solutions for Interoperability and Sharing of Product Data



Jotne in Subsea: Engineering & Manufacturing



Subsea Structures
Manifolds, PLEM, PLET, Riser bases



Subsea Pipeline products



Flexible Pipe laying equipment



Active Pipe Support

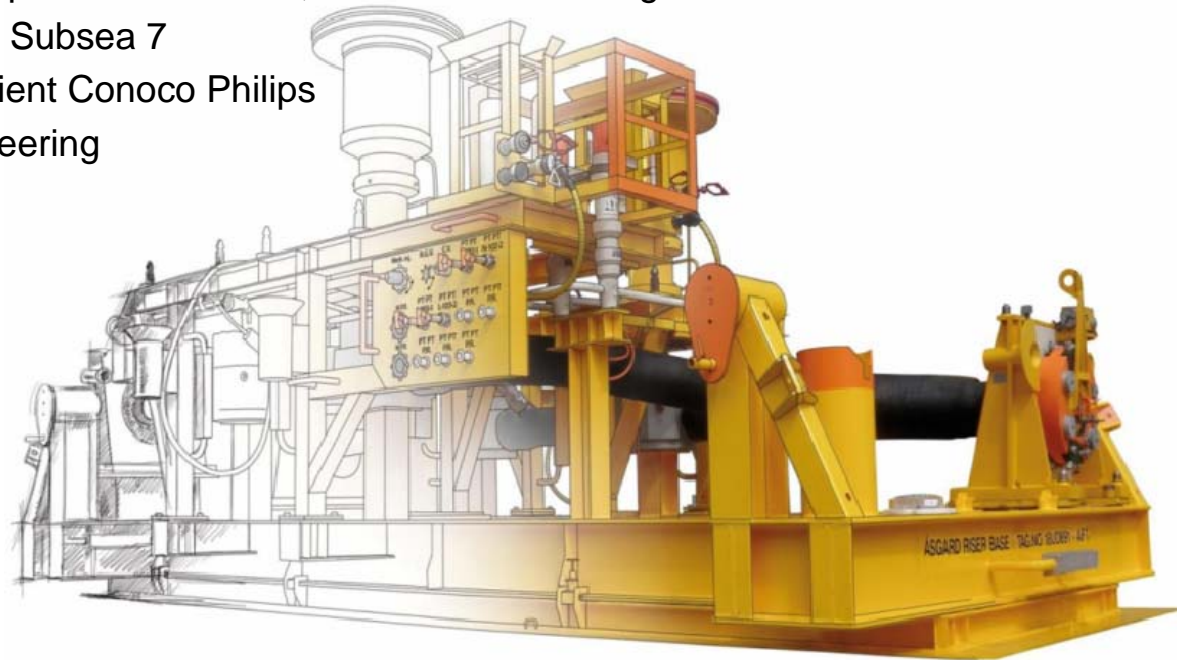
Oil and Gas projects:



PLCS (ISO 10303-239) is used in daily operations managing oil and gas projects.
Some selected projects:



- Eldfisk Pig Launcher
- DRESSER-RAND, Bigfoot, Gas Turbine power module, customer Chevron
- ***Njord A Subsea Manifold System , customer Statoil***
- DRESSER-RAND TURK 3, Gas Compression Modules, Customer Türkmengaz
- SVALIN PLETs and PLRs, Customer Subsea 7
- EKOK Aibel Office Module for end Client Conoco Philips
- BOD ROV Hangar, customer Oceaneering
- Vigdis Feed Study, customer Statoil
- Windpower, Anode Tripods, Statoil
- Future yard planning study



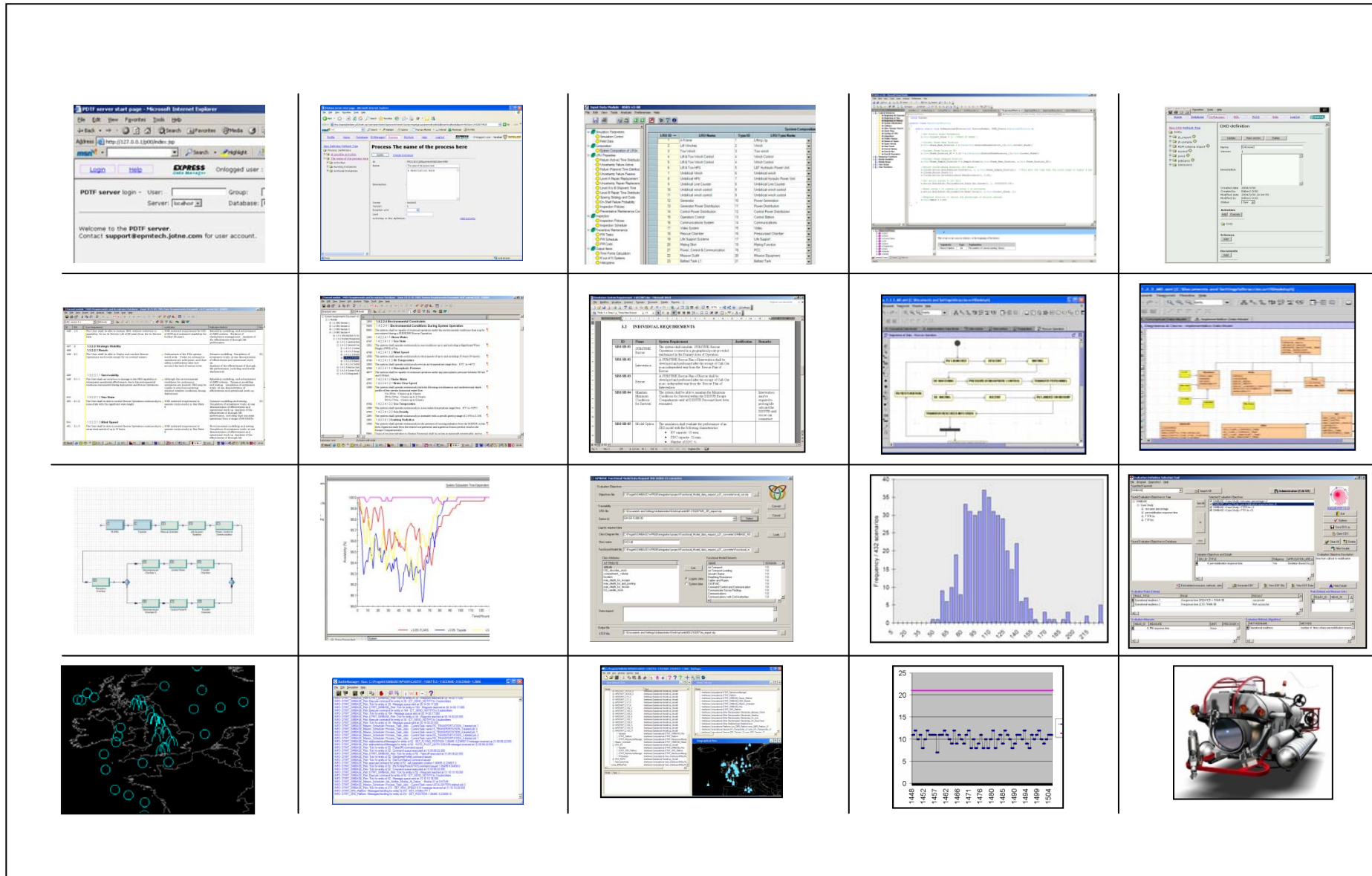


Video showing installation

Key Figures

- Duration: 12 months
- Engineering hours: 10,000
- No. of main suppliers: 6
- Number of Documents: 1000
- Weight: (*3) : 93,000 kg
- 3D models: 35
- Engineering reports: 10
- Project members:
 - Internal 10
 - External 100

User perspective



Not an integrated environment



Engineering Tools

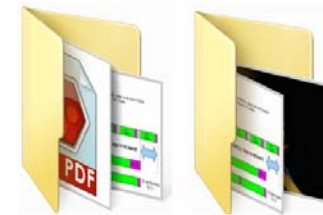


Office Tools

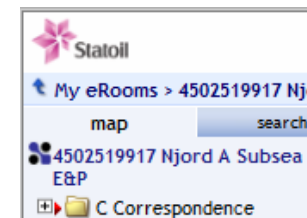


Customer Tools

Ingest tools



FTP Sites



eRoom



ProCoSys



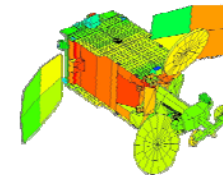
ERP

Overall Requirements:

1. Spending too much time on administrative work (30% is finding info)
2. Standardized engineering environment and dashboard
3. Mandatory with Physical/Product Breakdown structure (PBS)
4. Standard Activity Breakdown (SAB)
 - Manage: Resources, Material, Facilities, Time, Cost etc
5. Support sharing and exchange of high quality information
6. Must be easy to use
7. Have to work with NORSOK standards

The Jotne IT team reused knowledge and technology from advanced Aeronautics, Space and Defence programs to provide a new solution, the **TruePLM** application adopted for Subsea systems.

Systems Engineering principles and detailed Configuration Management functionality from
Aerospace



True Product Lifecycle Management

- **Scope**

- To develop a new generation solution for life-cycle data sharing and long-term archiving targeted for adoption by the Sub-sea Industry

- **Main requirements**

- Basic project / system management
- System lifecycle support
- Project data sharing / supply chain management
- Team collaboration
- Version and configuration control
- Document and data management
- Concurrent engineering/ document dependencies
- Long-term archiving / re-use

- **Enabling technology**

- International standards for product data

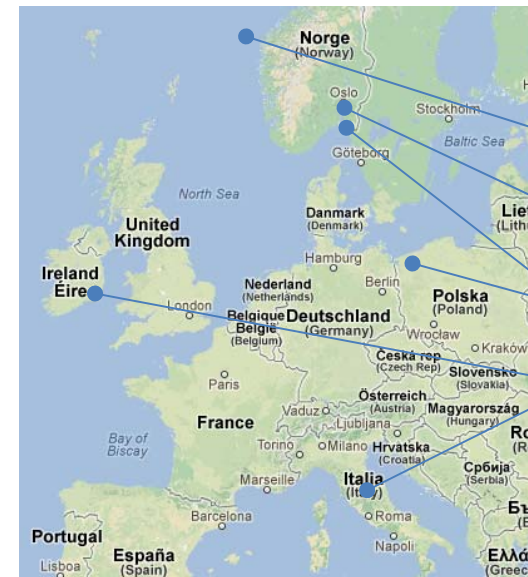
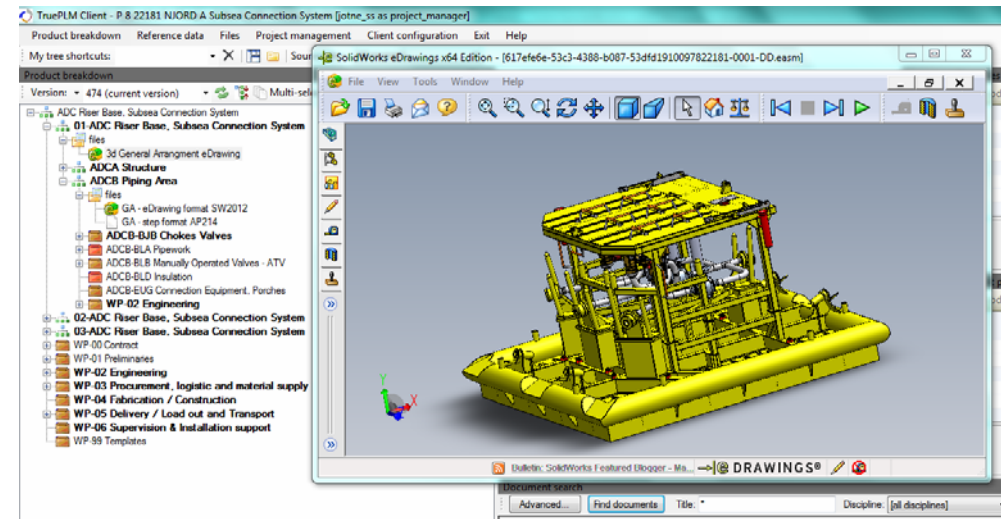


NORSOK STANDARD
Z-014
Edition 2, May 2012

Use cases – Summary

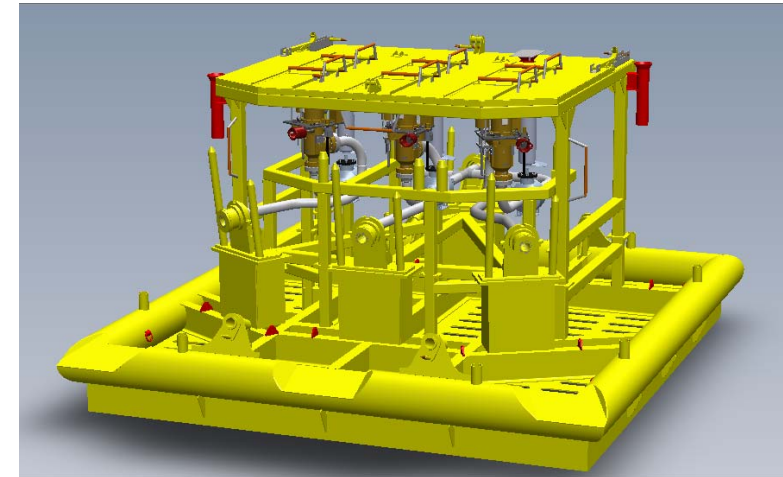
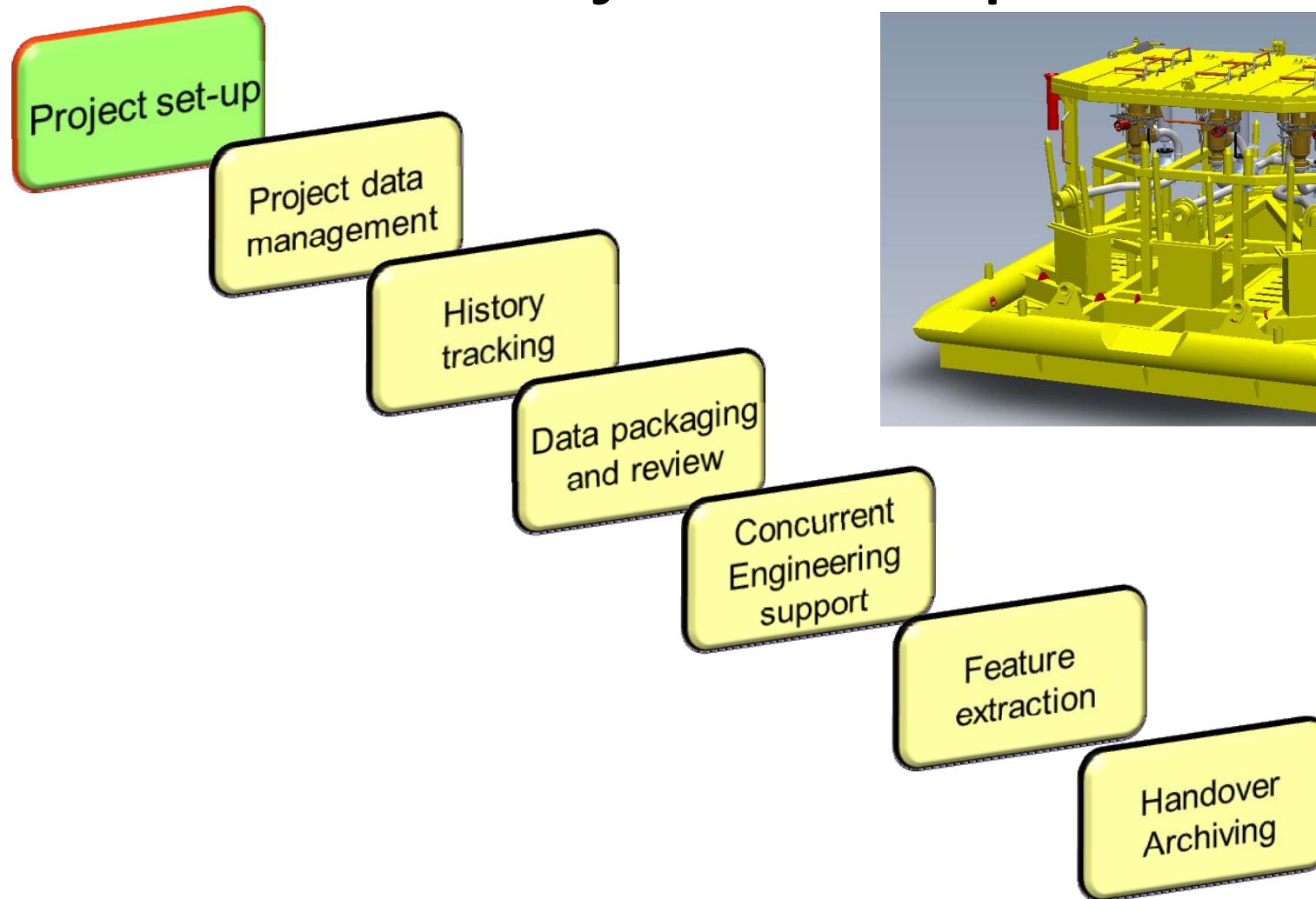


- **Product breakdown structure oriented engineering**
- **Document and data management**
 - E-mails as documents
 - Search
 - History tracking
 - Configuration control
 - Dependencies / sticky notes
- **Concurrent engineering**
 - Project cooperation
 - Supply chain management
 - Notifications
 - Review capability
- **Lifecycle support**
 - Record data along the life cycle
- **Interoperability**
 - Communicate with external formats
 - Import/export using STEP/PLCS DEX
- **Archival**
 - Retention over long periods of time
 - Retrieval application independent

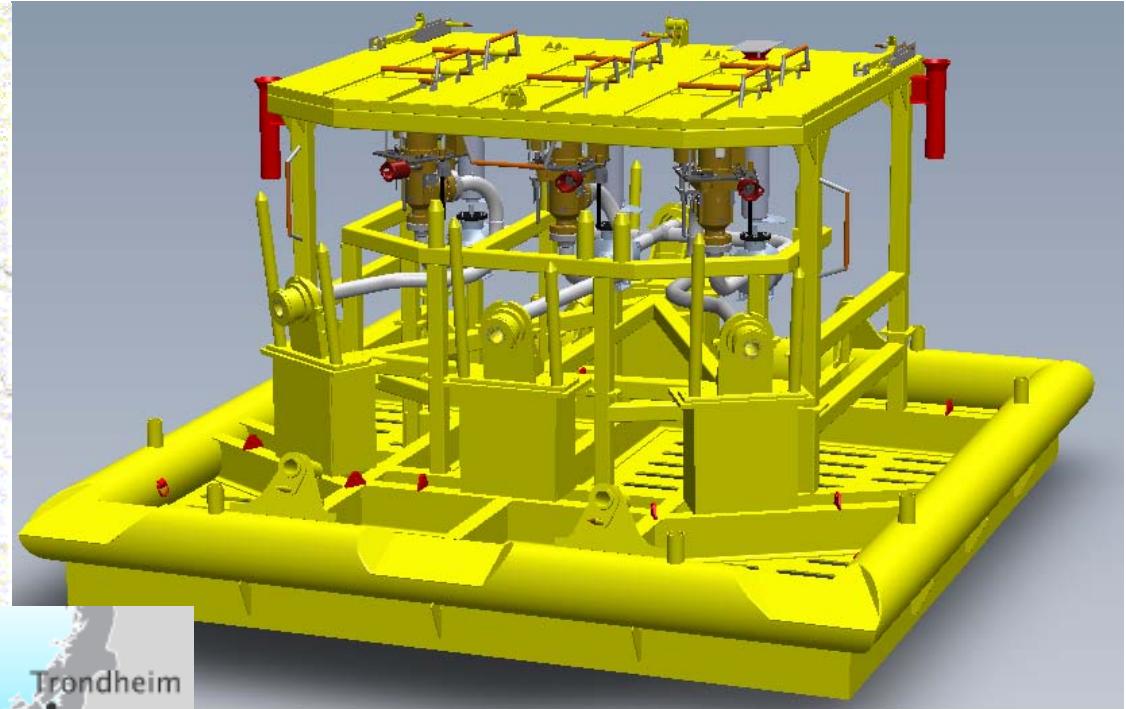
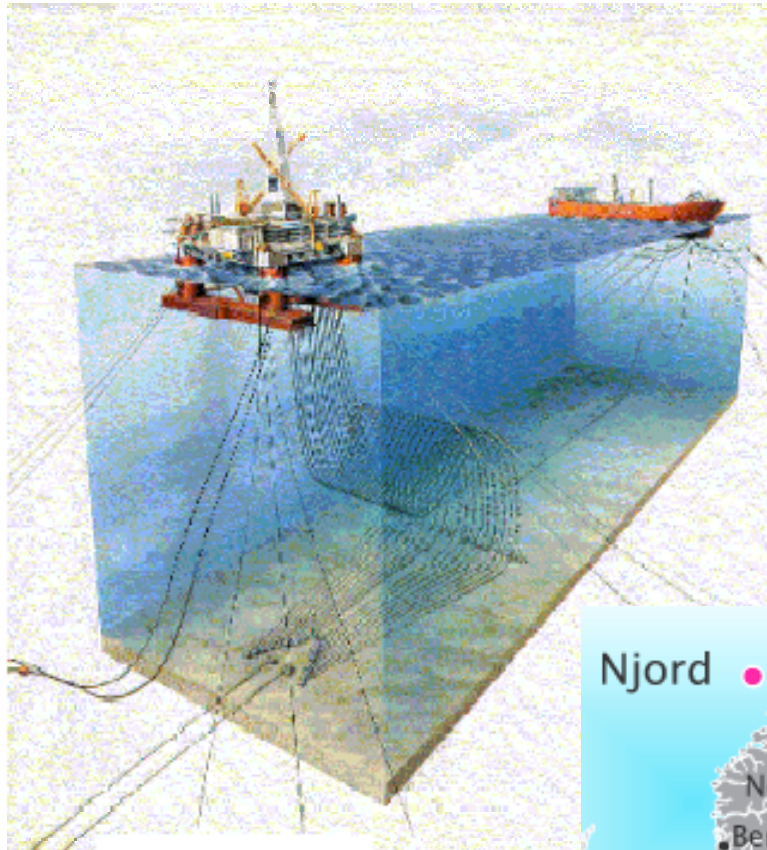


- Customer
- Engineering
- Fabrication
- Suppliers

Project set-up



Project set-up



NJORD A – Subsea Manifold Systems

- **Set-up options:**

- Define from scratch (especially Physical/Product Breakdown Structure- PBS)
- Import from files (PLCS + RDL), using OWL for Reference data
- From templates in the application

- **Configurable concepts:**

- Use reference data to define the names for:

- Scheduled events types (ISO/ECSS / NORSOK)
- Disciplines (ISO/ECSS / NORSOK)
- Document content types (from requirements)
- File formats (dynamically extended)
- Document status (ISO/ECSS / NORSOK)
- Properties (dynamically extended)
- Sources of data (from requirements)
- User roles

- User administration

May be extended during use of the application to meet customer individual requirements

- **Product information**

- Product breakdown
- Product breakdown change history
- Documents (all submitted versions)
- Metadata for breakdown elements and documents
 - E.g. state of approval
- Relationships among documents
- Relationships among documents and breakdown nodes
- Baselines

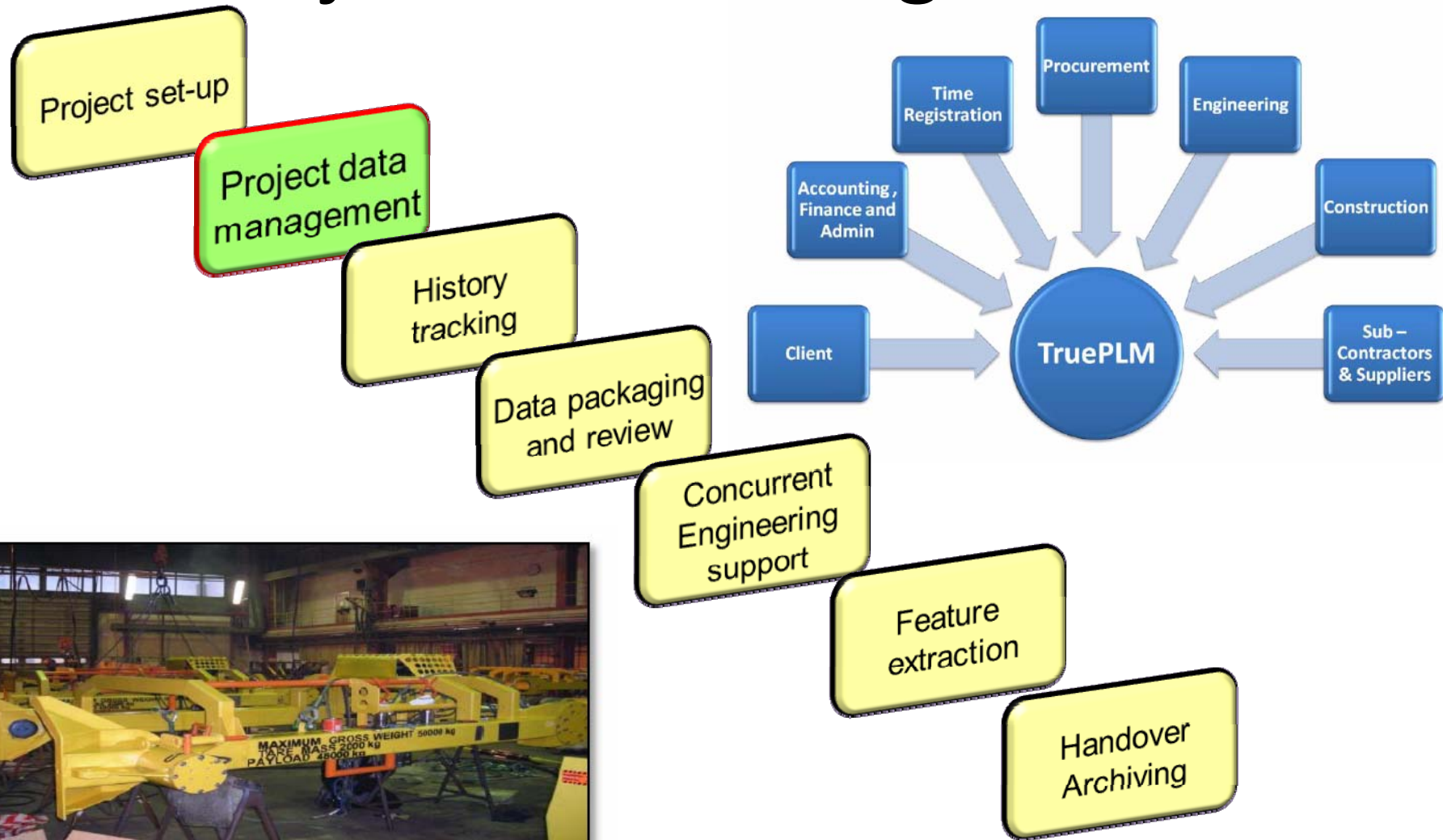
**Enabling collaborative
manufacturing across
the supply network**

**Integrate
maintenance and
operations with
product definition**

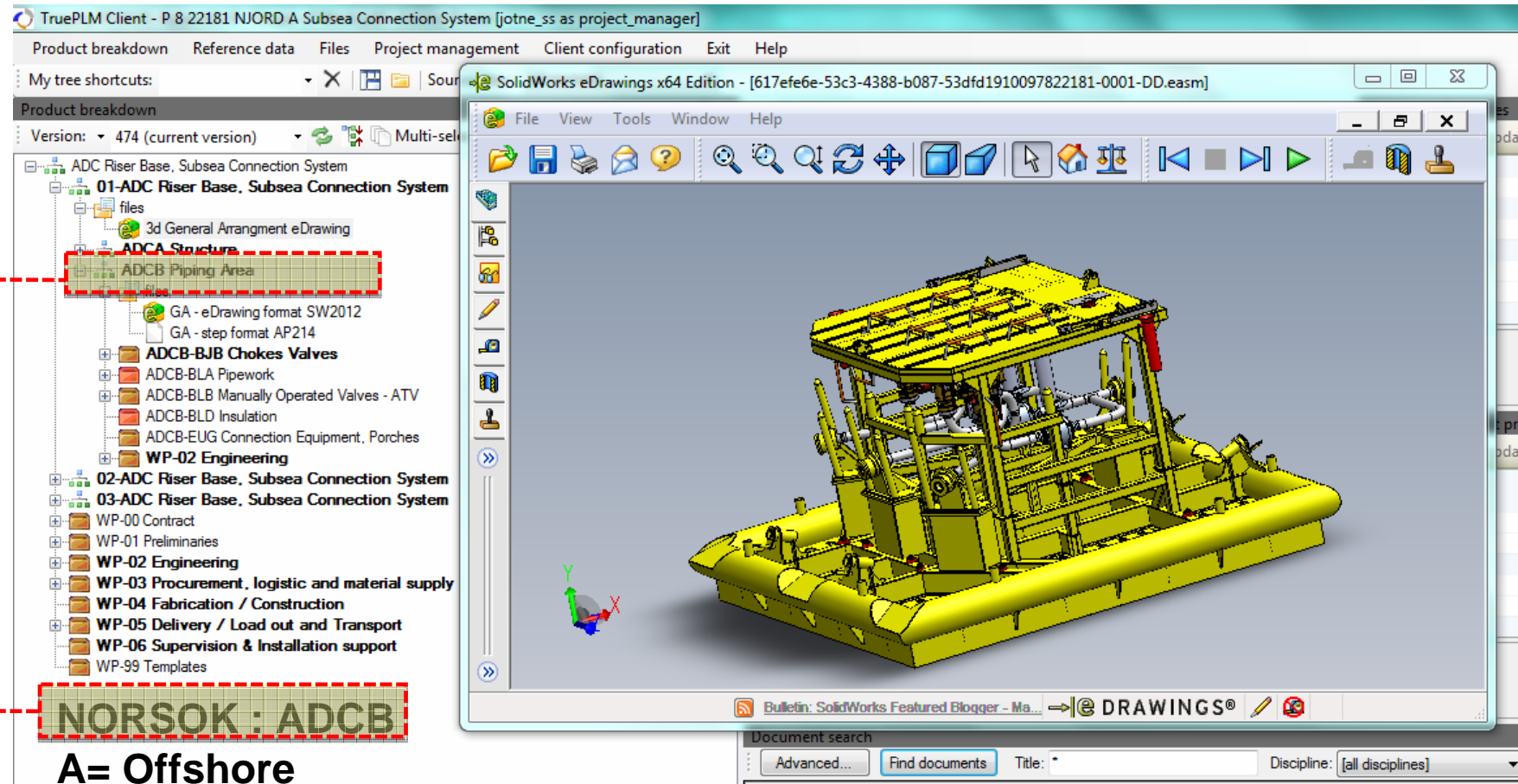
- **Project information**

- Reference data
 - Classes and sub-classes
 - Properties defining the concepts used in the project, such as document meta data
 - Selectable values in GUI
- Milestones: what is planned
- Scheduled events: ongoing reviews, etc
- Actions: to-do lists, who, what and on which objects
- Access control: who has permission to do what

Project data management



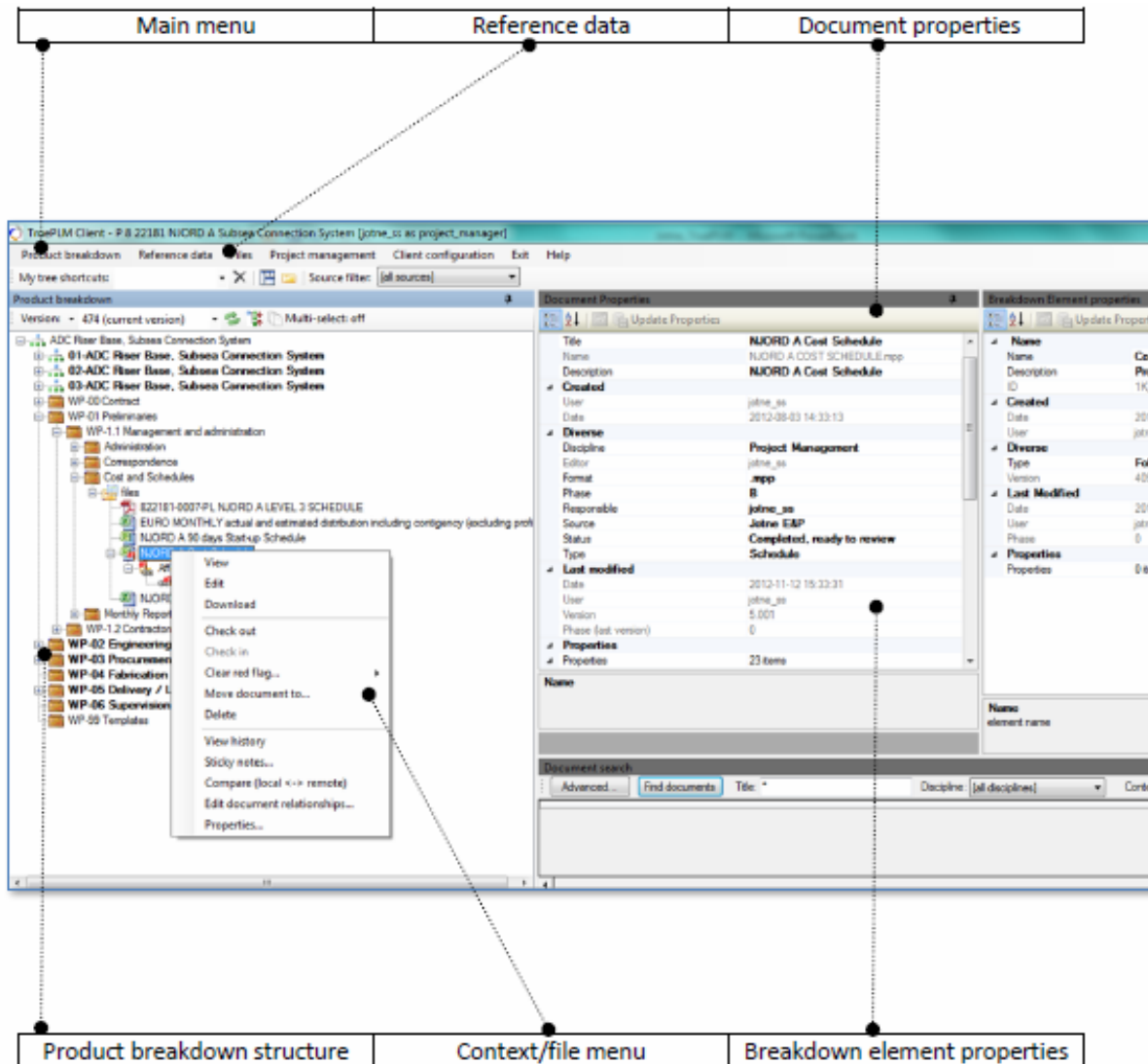
Project data management



A= Offshore
AD= Subsea
ADC = Riserbase
ADCB = Manifold / Piping Area

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Project data management



The challenges of the Information Age

interoperability of information technology, addressed by data exchange & sharing solutions

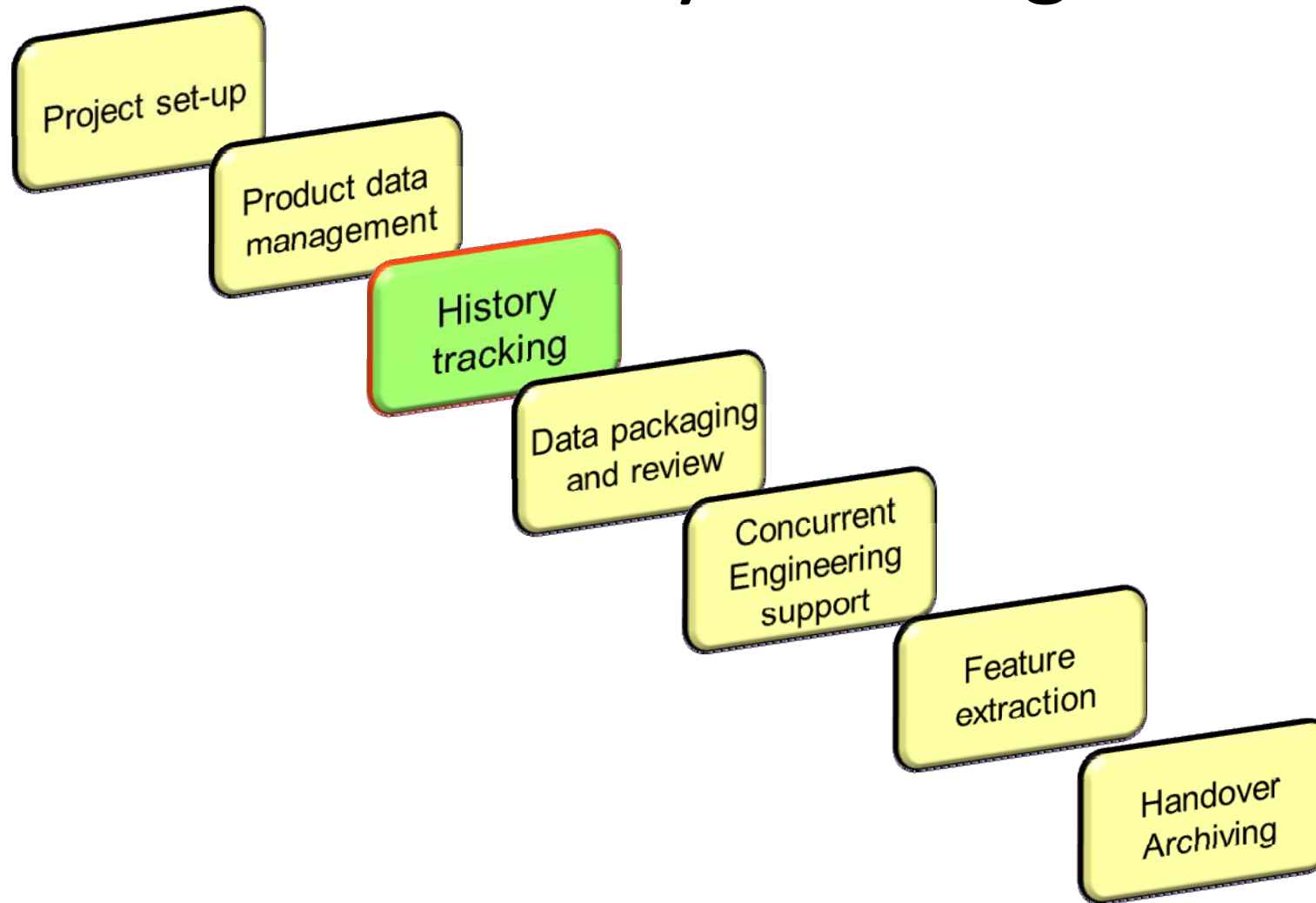
common enterprise-wide views of information, addressed by data integration solutions

obsolescence of information technology, addressed by data archiving solutions

freedom from vendor lock-in, addressed by open data solutions

multiple viewpoints, addressed by solutions embodying data independence

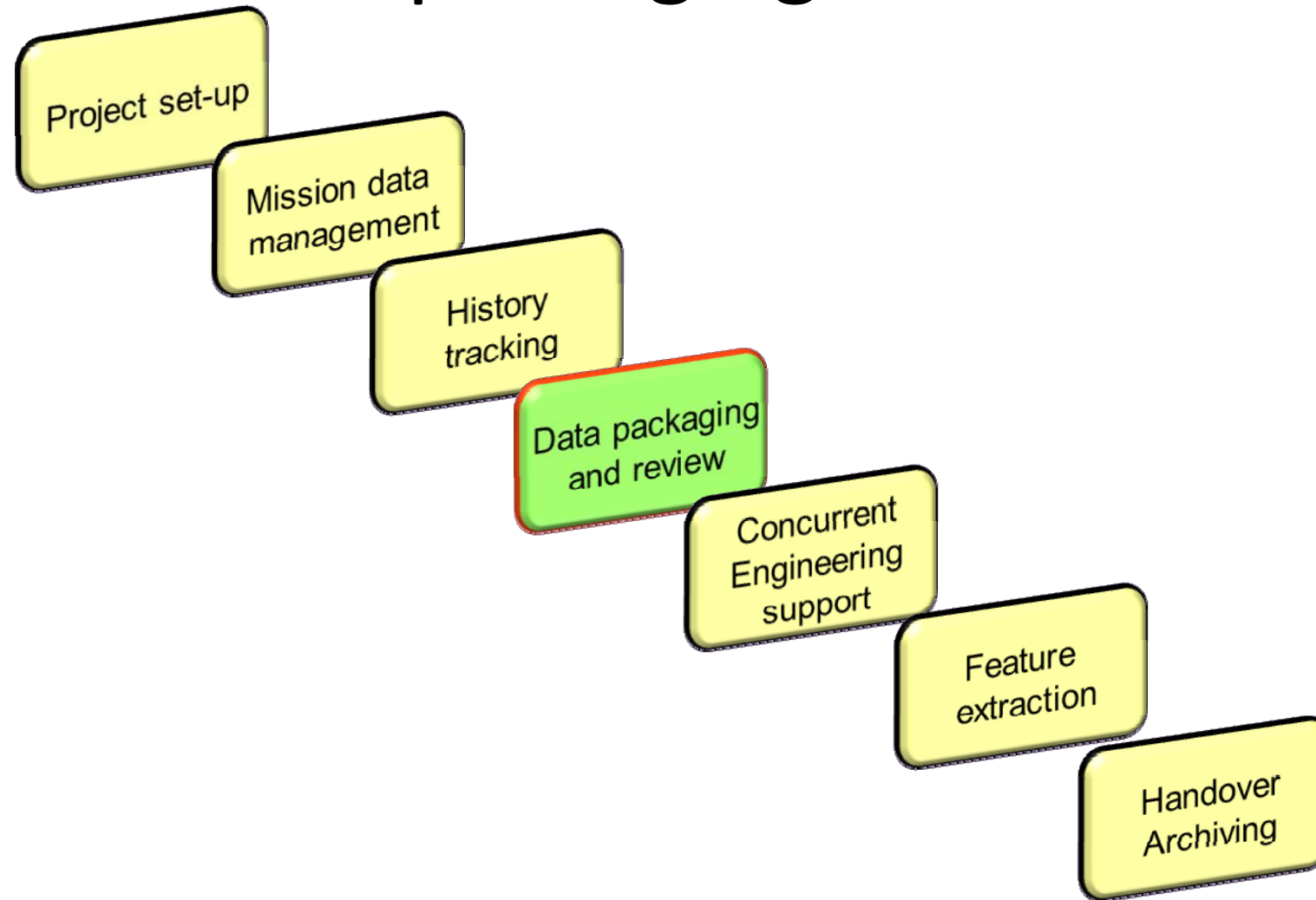
History tracking

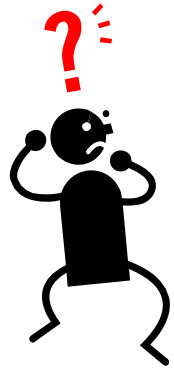


- During the project lifecycle, a lot of changes happen
 - In document contents
 - On the product structure
- Sometimes you need to know
 - How the project data looked at some critical point
 - What changes happened since then, and why
 - Who and when did it
- TruePLM solution:
 - History tracking
 - Document versions
 - Product data versions
 - Baselines / Data packages

- **Document check-out/in**
 - Lock documents for other users
- **Versioning**
 - Compare document versions
 - Go back in PBS history
- **Compare baselines**

Data packaging and review





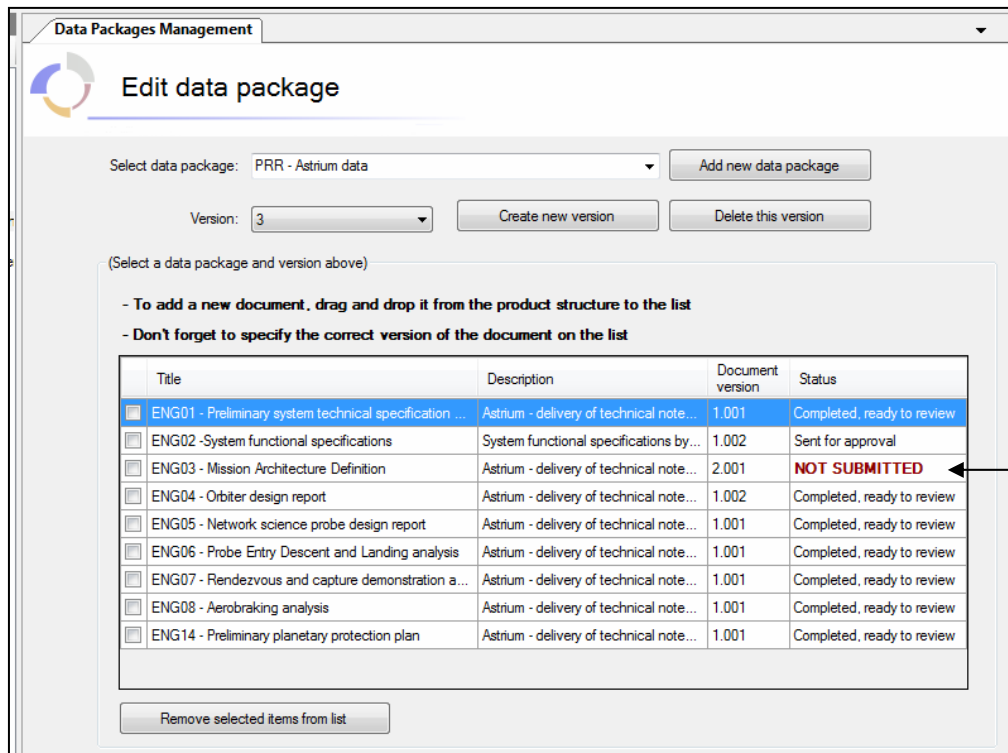
- Where are the documents we need now?
- Which version of each document is the right one to read / review / edit / comment?
- Why was a document changed and by whom? Does anyone remember?
- Which documents are relevant...
 - On a given project subsystem / discipline / subdomain ...
 - On a given phase of the project life cycle
 - For a given event, such as a review, meeting, evaluation...



The solutions are not trivial ...

- Especially on projects that generate large amounts of documents, and
- When data and documents evolve during the lifetime of the project, and
- When documents and data are generated from different sources
 - Subcontractors, external systems, ...

- **Additional uses of data packages**
 - Can be used as a “checklist”: data packages can contain versions of documents that are expected, but not yet submitted.
 - Data packages can be versioned.

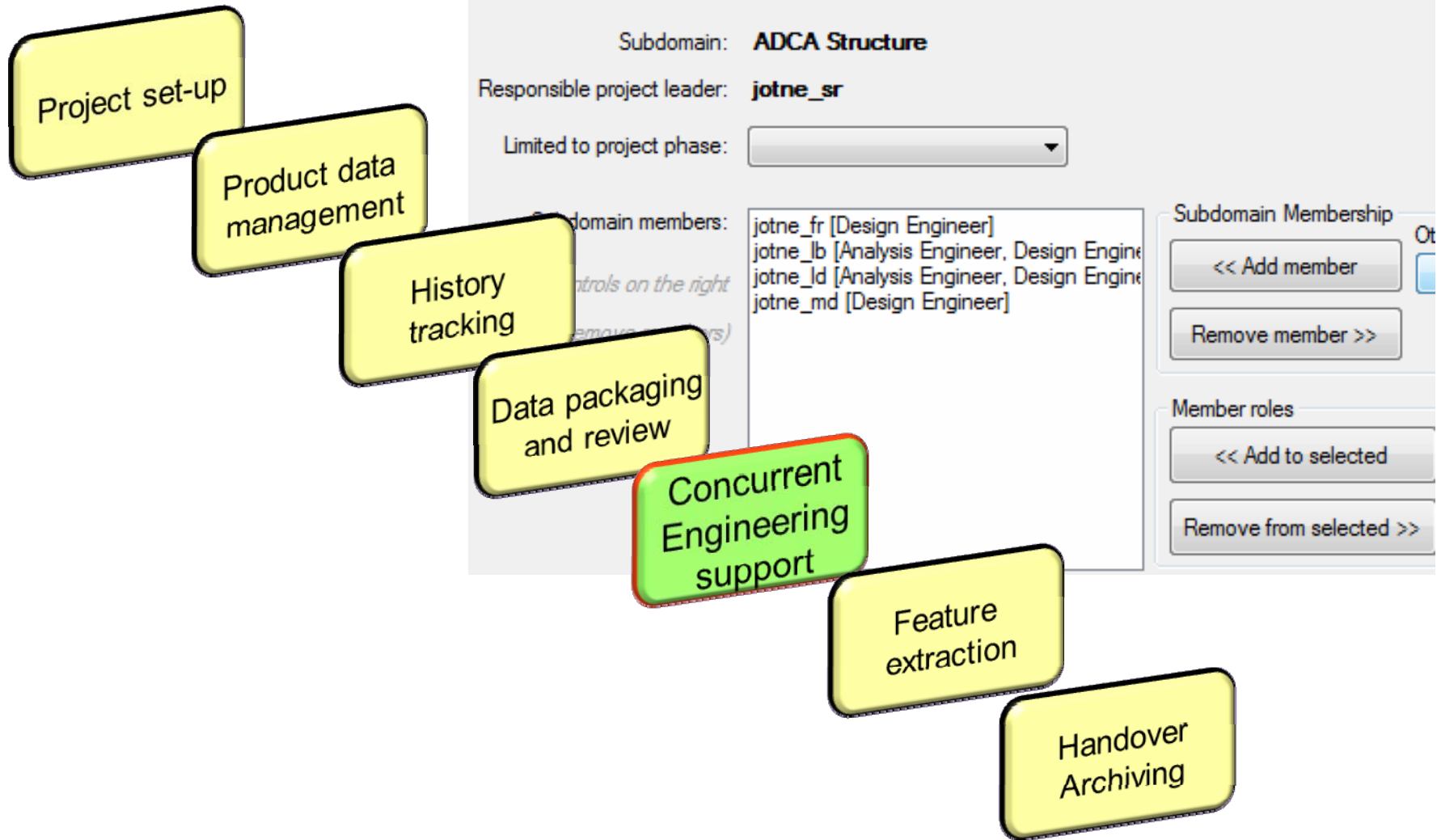


The screenshot shows the 'Data Packages Management' interface. At the top, there's a tab labeled 'Data Packages Management' and a sub-header 'Edit data package'. Below this, there are controls for selecting a data package (currently 'PRR - Astrium data') and a version (currently '3'). There are buttons for 'Add new data package', 'Create new version', and 'Delete this version'. Below these controls, there are instructions: '(Select a data package and version above)', '- To add a new document, drag and drop it from the product structure to the list', and '- Don't forget to specify the correct version of the document on the list'. A table lists documents with columns for Title, Description, Document version, and Status. The table contains 9 rows of data. The first row is highlighted in blue. The second row has a status of 'NOT SUBMITTED' in red text. Below the table is a button labeled 'Remove selected items from list'.

Title	Description	Document version	Status
<input checked="" type="checkbox"/> ENG01 - Preliminary system technical specification ...	Astrium - delivery of technical note...	1.001	Completed, ready to review
<input type="checkbox"/> ENG02 - System functional specifications	System functional specifications by...	1.002	Sent for approval
<input type="checkbox"/> ENG03 - Mission Architecture Definition	Astrium - delivery of technical note...	2.001	NOT SUBMITTED
<input type="checkbox"/> ENG04 - Orbiter design report	Astrium - delivery of technical note...	1.002	Completed, ready to review
<input type="checkbox"/> ENG05 - Network science probe design report	Astrium - delivery of technical note...	1.001	Completed, ready to review
<input type="checkbox"/> ENG06 - Probe Entry Descent and Landing analysis	Astrium - delivery of technical note...	1.001	Completed, ready to review
<input type="checkbox"/> ENG07 - Rendezvous and capture demonstration a...	Astrium - delivery of technical note...	1.001	Completed, ready to review
<input type="checkbox"/> ENG08 - Aerobraking analysis	Astrium - delivery of technical note...	1.001	Completed, ready to review
<input type="checkbox"/> ENG14 - Preliminary planetary protection plan	Astrium - delivery of technical note...	1.001	Completed, ready to review

New issue of this document is expected, but still missing!

Concurrent engineering support



Project set-up

Product data management

History tracking

Data packaging and review

Concurrent Engineering support

Feature extraction

Handover Archiving

Subdomain: **ADCA Structure**

Responsible project leader: **jotne_sr**

Limited to project phase:

Subdomain members:

- jotne_fr [Design Engineer]
- jotne_lb [Analysis Engineer, Design Engine]
- jotne_ld [Analysis Engineer, Design Engine]
- jotne_md [Design Engineer]

Subdomain Membership

<< Add member

Remove member >>

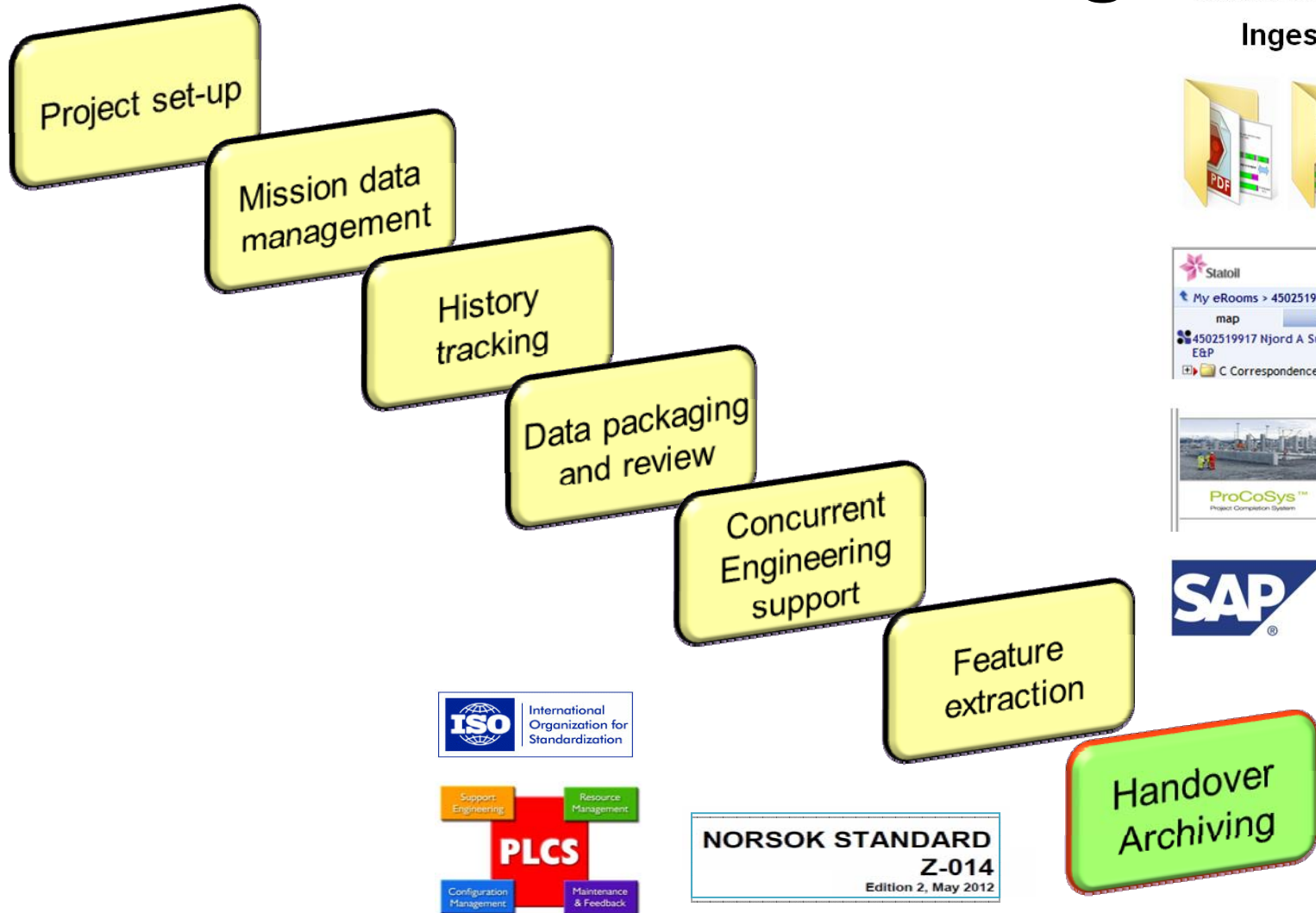
Member roles

<< Add to selected

Remove from selected >>

- **Approval**
 - Modify document status
- **Reviews and related activities on data packages**
- **Actions on documents**
 - Assigning actions to persons, on objects
 - Notifications to the users
 - Keeping an overview on action statuses
- **Informing and warning other users about document version issues**
 - Sticky notes
 - Document relationships + red flags
- **Overview of the project milestones**
 - Baselines and events can be related to milestones

Handover, Archiving



Customer Tools

Ingest tools



eRoom



ProCosys



ERP



Space brings savings to offshore oil and gas



technology transfer programme



ESA TECHNOLOGY TRANSFER BUSINESS INCUBATION BUSINESS OPPORTUNITIES SPACE SOLUTIONS

Technology Transfer Programme Office

- About us
- Benefits

Business with Technology Transfer

- Technology Transfer Process
- Technology Transfer Network
- Technology Forum

Business with the Incubator

- Mission
- Locations
- How to apply

Business with the Fund

- Open Sky Technologies Fund

ESA intellectual property (IP)

ESA > Our Activities > Technology > TTP2



Search here

SPACE BRINGS SAVINGS TO OFFSHORE OIL AND GAS



Offshore platform

18 November 2013 Software for building ESA spacecraft is helping to improve safety and drive down costs for engineers operating deep sea oil and gas installations.

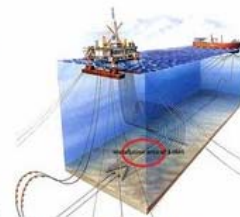
The expense of extracting energy from under the sea and the potential for fire or oil spills should things go wrong mean that companies are always looking for better ways to operate

offshore installations.

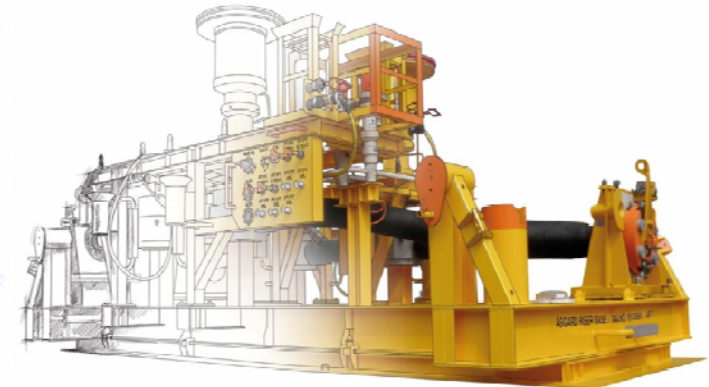
Now, the EDMTruePLM™ (TruePLM) product lifecycle management tool, developed for ESA spacecraft programmes is improving efficiency for oil and gas industries.

Having spent years working with ESA on their Cassini-Huygens and Envisat satellites, Sverre Samdal from Jotne Industrier, a Norwegian company primarily involved in energy exploration, saw how TruePLM could also work for offshore industry because, "spacecraft and underwater machines present similar technical challenges."

"Every project, whether it's a satellite or an oil rig, generates piles of documentation from designs, calculations and testing to contracts and emails," says Sverre.



Deep-sea installations



Network



- TruePLM

[http://www.esa.int/Our_Activities/Technology/TTP2/Space brings savings to offshore oil and gas](http://www.esa.int/Our_Activities/Technology/TTP2/Space_brings_savings_to_offshore_oil_and_gas)



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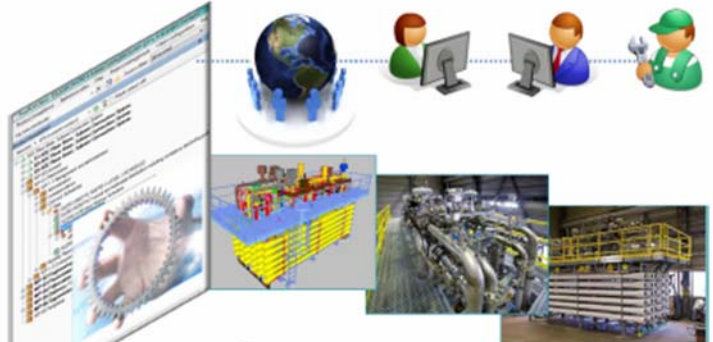



Conclusions of using TruePLM for Oil&Gas

- A tool to improve efficiency in engineering, operation and support
- Implementation of Oil and Gas structuring and standards according to Norsok in the PBS, SBA and document structure
- All project data across phases and disciplines collected in one database, from feasibility study to decommissioning.
- Several organisations can work on the same PBS by managing read/write/delete access
- Oil and Gas projects have long durations, 20-40 years is common; ISO standard formats important to be able to read the data over time
- Focus on transparency: History tracking of changes with date and user, every version viewable and downloadable. A must for final documentation and Life Cycle Information (LCI) Management.




From idea to manufacturing and operations
Share, exchange and archive your PLM data

Exchange
 Integration
 Validation
 Archival



Past | Future

Video about Interoperability