Plant Data Life Cycle Management in Nuclear Power

Frank-Peter Ritsche
Project Management Initiative / Framatome ANP

The Framatome ANP Information Management System in collaboration with Owner/Operators
Plant Data Life Cycle Management

deals with the question, that all EPCs always wanted to know:

O/O = Owner/ Operator  EPC = Engineering/ Procurement/ Construction Contractor
A little bit of history...

1989  Siemens and Framatome established a subsidiary NPI (Nuclear Power International) in Paris.

1993  Development of the EPR (European Pressurized Water Reactor) started in NPI with financing of EDF and German utilities. In the frame of the EPR development, a software project „CAPE“ defined and implemented mainly inhouse developed engineering tools.

2001  With the merger of Framatome and Siemens Nuclear Power Generation to Framatome ANP under the head of AREVA group, the new company (34% Siemens, 66% AREVA) became the world’s premium nuclear supplier.

2002  Framatome ANP entered the competition to bid for the Finnish new reactor. A taskforce was set-up to define the IT infrastructure for the engineering and execution of the project.

2004  The Consortium Framatome ANP – Siemens AG was rewarded by the contract to build the 5th nuclear reactor in Finland as a turnkey project, against strong competition from the US and Russia.
Information Management Solution

Our partners are the world market leaders in their field

Primavera - Time and resources management
Documentum - Documentation management
SAP - Commercial management
Aveva - Vantage VPD (PDMS) for 3D Design
Vantage VPE and VPRM
In the frame of the implementation of AVEVA tools for the Olkiluoto 3 project Framatome ANP contracted to AVEVA mayor enhancements to VPE and VPD:

- integration of valve catalogue in VPE
- extension of attributes in VPE workbench (from 80 to > 300 per module)
- interface with electrical & I&C tools
Today more than 200 Engineers in 5 different locations in France, Germany and Finland are designing simultaneously the EPR detailed plant layout in 3D
Information Management Solution

Framatome ANP is taking full advantage of the complete and fully integrated suite of AVEVA tools

- VPE P&ID and VPE Workbench for process design
- PDMS (VPD) for 3D plant layout
- VPRM for material management
- MDS for detailed support design
- Model Manager for interfacing VPE and VPD
- Global for synchronizing the 3D around the globe
This network illustrates the complexity of the information flow between the various modules of the Framatome ANP Information Management System. However - most interfaces can be covered by standard software of the major software suppliers today.
In 2004 Framatome ANP started developing the concept for the operation and maintenance management system for Olkiluoto 3 together with TVO. It is the vision of TVO to operate the first reactor of the 3rd generation worldwide with an innovative OMS, that will be „state of the art“ by the year of plant commissioning 2009. The tools, which Framatome ANP has introduced in the frame of the IMS for Olkiluoto 3 will be basic modules of this innovative OMS.
The AREVA-group is serving the entire lifecycle of a nuclear power plant, from uranium mining to fuel fabrication, from plant construction to service and power transmission and distribution. Framatome ANP as part of AREVA provides supplies and services in the four business groups **plants, service, components** and **fuel**.

**Plant Data Life Cycle Management** means:

Building partnership for service with the O/O by handing over data from EPC to O/O such, that it best supports the O/O during operation, service, maintenance.
Plant Life Cycle Management – IMS Strategies

- Complexity
- Time

- Digital Business
- Plant Life Cycle Management
- Product Data Management - IMS -
- 3D-CAD
- 2D-CAD

Actual status in Framatome ANP

“Best practice“ on market

Status of research

(Reference given to M. Abramovici, University Bochum CADplus Business+Engineering Ed. 2/2005)
Plant Life Cycle Management – IMS Strategies

Product Data Management - IMS -

Information Management System (IMS) – current strategies

- flexible architecture by tool-networks, no „mother-of-all-data“
  → Information Management System IMS
- alliance with market leaders
  → Aveva, SAP, Primavera, Documentum, Crystal...
- introduction of web-technology
  → AREVA net, (... VNET?)
- Networking between Partners and Contractors
  → Siemens PG, Sofinest
Plant Life Cycle Management – IMS Strategies

Plant Life Cycle Management – objectives

- **Data Handover to O/O**
  - Aveva versus Intergraph, O/O required formats
- **EPC strategies to support O/O during operation & service**
  - Operation & Maintenance Management System
- **Engineering Re-use**
  - EPR Finland, France, Modularization
- **Cross functional project-/ plant data management**
  - define structures & formats with O/O
  - standardization for data collection from O/O
  - process for experience exchange between all EPR O/O
Digital Engineering & Services – visions

- Full workflow-integration of management and design tools
  - SAP – VPRM – P3E – VPE – VPD - Documentum
- e-business
  - Procurement → Suppliers
  - Marketing → Customers
  - Engineering → Customers and Partners
Although some O/O specify the system applications for 3D or Engineering Databases, we strongly support delivery of data to the O/O in neutral formats, that survive the plant life time. This concept superscedes the question, whether to deliver in „AVEVA“ or „Intergraph“ formats
Costs increase with higher complexity of data models, without significant increase of a benefit to the O/O:

- license and maintenance fees for engineering tools
- qualification costs for engineering resources

Maintaining the data through the plant life is an option to be provided by an EPC, however data updates can also be managed in neutral formats.

Neutral data allows for:
- Viewing and navigation
- Managing data (data repository)
- Interfacing with OMS functions

Exchange format allows for:
- Interface with system app’s
- Update of system app’s by any engineering provider
Data Handover to O/O

The technology works!

- PDS to PDMS conversion solutions now available from AVEVA
- But it needs experienced, skilled personnel to make it really effective
- 100% complete, one-pass, fully-automatic conversion is over-optimistic!
- Early deployments involve service & software components

Statement:
EPC strategies to support O/O during operation & service

Operation & Maintenance Management System

Which information needs the Owner to operate & maintain the plant?
Engineering Re-use

Re-use of complete original configuration for new project – Challenge: integration/ replacement of a different tool

Modularization: Re-use of a part of the original configuration for new project – Challenge: structure of modularization to be considered in early design
Cross functional project-/ plant data management

Challenges for the data management process:

- Define structures & formats with O/O
- Standardization for data collection from O/O
- Process for experience exchange between different O/O

Plant data configuration management within the AVEVA tools shall enable

- relations between same sets of data of different projects
- management of same data as one set within several units of a plant
Cross functional project-/ plant data management

Plant configuration management scenarios for Framatome ANP:

- EPC: EPR Finland, EPR France (Design & Construction)
  „Compare design data of main coolant pump in EPR Finland and EPR France“
- EPC: EPR Finland, EPR France (Service & Maintenance)
  „Compare service data of main coolant pump in EPR Finland and EPR France“
- EPC: EPR China (Design & Construction, one O/O, several units)
  „Manage design data of main coolant pump in Unit 1 and 2 as one set of data“
- O/O: EPR China (Operation, one O/O, several units)
  „Manage service data of main coolant pump in Unit 1 and 2 as different sets“
- EPC-O/O Information exchange during operation/ service/ maintenance
  „Exchange service data of main coolant pump between O/O and EPC“
- O/O-O/O Experience exchange during operation
  „Exchange operation experience of main coolant pump between O/O‘s“
The O/O maintains a plant in steel and a digital plant for a 60 years lifetime.

With handover the EPC provides data to O/O in defined format & structure.

Data content and data structure survive 60 years, the tools do not!

O/Os need more data for the „OMS“ than the EPC manage in the „IMS“.

The O/O will create more data during plant operation & service.

Early collaboration O/O-EPC is cheap, late collaboration is expensive.
AREVA is a world leader in energy and connectors. The group includes COGEMA, Framatome ANP (Advanced Nuclear Power), FCI (Framatome Connectors International) and AREVA T&D (Transmission and Distribution). AREVA’s nuclear business – which encompasses the full range of activities from uranium mining through reactor design and construction to reprocessing of spent fuel – accounts for the majority of group sales.

Framatome ANP is an AREVA and Siemens company. With a total workforce of 14,000, Framatome ANP is the world’s premier nuclear supplier. The company supplies products and services to customers across the globe from its offices and facilities in France, Germany and the USA. Framatome ANP’s focus includes comprehensive engineering, electrical and instrumentation and control (I&C) systems, nuclear services, modernization, fuel supply and component manufacture for a wide range of reactor designs (including those supplied by other vendors), and the development and turnkey construction of nuclear power plants and research reactors. The jointly-owned company is headquartered in Paris, with regional subsidiaries in the US and Germany. In Framatome ANP, AREVA has a 66 % and Siemens a 34 % stake.
AVEVA are proud to announce ISEIT 2005’s Keynote Address:

**Plant Data Life Cycle Management in Nuclear Power**
Frank-Peter Ritsche, Head of PMI (Project Management Initiative), Framatome-ANP RGP

The European Pressurized Reactor (EPR) project in Olkiluoto is one of the most significant power projects in the world today, being Europe's first new nuclear power development in ten years. The EPR design could set a new precedent in power generation in many countries and is attracting the attention of governments and engineering companies across the globe. Frank-Peter Ritsche, Head of the Project Management Initiative for Framatome-ANP RGP will be giving an invaluable insight into plant data lifecycle management within the unique environment of the power industry.

Mr Ritsche has led the global Framatome ANP Project Management Initiative for the German region since July 2005. Before, Mr Ritsche led the task force that defined and implemented the Framatome ANP Information Management System in France and Germany since its beginning. In his function as head of the Project Logistics department, he was responsible for the definition and implementation of the project infrastructure (administration, time scheduling, documentation and IT) for the turnkey NPP project in Finland. Mr Ritsche has been working for 13 years in nuclear and conventional power plant projects, specialising in Quality Management, Site Management and Project Management with major projects in Spain, Slovakia, Japan and Singapore.

AREVA group is No. 1 worldwide in the nuclear power cycle. Framatome ANP, a member of the AREVA group, is currently leading a US$3 billion project in Finland for the turn-key construction of the European Pressurized Reactor (EPR) in Olkiluoto. This project is supported by an Information Management System (IMS) - a network of engineering and project management tools from the main market-players. VANTAGE from AVEVA for complete, integrated 2D, item engineering, 3D design, visualisation, deliverables, procurement and project control; Documentum, Primavera P3E and SAP. Framatome ANP is also defining its strategies towards a Plant Data Life Cycle Management in preparation for the data handover to the Owner Operator, and with regard to the future markets for the EPR; especially in France, China and the US.

To register, visit [www.iseit.com](http://www.iseit.com)

**ISEIT 2005 – A part of the bigger picture...**
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<tr>
<td>0800</td>
<td>Registration in Tagungszentrum Foyer</td>
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<tr>
<td>0830</td>
<td>Conference commences in Conference Room 'Grosser Saal'</td>
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<tr>
<td>0830</td>
<td><strong>Introduction</strong></td>
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<tr>
<td></td>
<td>by Justin Roux, Head of Marketing, AVEVA</td>
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<tr>
<td>0845</td>
<td><strong>Introduction</strong></td>
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<td>by Richard Longdon, Chief Executive, AVEVA</td>
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<tr>
<td>0915</td>
<td><strong>Presentation</strong></td>
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<td>by Hans van der Drift, Regional Vice President, AVEVA</td>
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<tr>
<td>0945</td>
<td>'Plant Data Life Cycle Management in Nuclear Power'</td>
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<tr>
<td></td>
<td>by Frank-Peter Ritsche, Head of PMI, Framatome ANP GmbH</td>
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<tr>
<td>1030</td>
<td>Break</td>
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<tr>
<td>1100</td>
<td>'Integrating Materials Management to the EPC Supply Chain'</td>
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<tr>
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<td>by Rafael Velasco, Project Engineer, CB&amp;I</td>
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<tr>
<td>1145</td>
<td>'Gaining a Competitive Edge Through Collaboration Technologies'</td>
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<td>by Jonathan Knowles, Director of Worldwide Market Development, Autodesk</td>
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<tr>
<td>1230</td>
<td>'RLC' Lunch in the Foyer</td>
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<td>1400</td>
<td>Sponsor Presentations</td>
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<td><strong>EIED Case Study Presentation</strong></td>
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<td>by Mr Ghafarizadeh, Deputy M.D., EIED</td>
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<td>Break</td>
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<tr>
<td>1615</td>
<td><strong>ALSTOM Case Study Presentation</strong></td>
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<td>by Dirk Hanewacker, Manager Global Engineering Process &amp; IT, ALSTOM</td>
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<tr>
<td>1700 hours</td>
<td><strong>Solution and Business Futures</strong>&lt;br&gt;by Derek Middlemas, Executive Vice President of Business Strategy, AVEVA</td>
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<tr>
<td>1915 hours</td>
<td>Social Event - Dinner and Entertainment in Room 'Grosser Saal'</td>
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**Wednesday, 12 October 2005**

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<tr>
<td>0900 hours</td>
<td>Conference commences in Kriftel/Kelkheim Conference Room</td>
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<tr>
<td>0900 hours</td>
<td><strong>Introduction</strong>&lt;br&gt;by Justin Roux, Head of Marketing, AVEVA</td>
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<td>0915 hours</td>
<td><strong>Keynote Address</strong>&lt;br&gt;by Maurice Tayeh, Senior Vice-President, C.I.O., Technip</td>
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<td><strong>Introduction to Project and Workflow Demonstrations</strong>&lt;br&gt;by Dave Wheeldon, Group Product Development Director, AVEVA</td>
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<td>'AVEVA Engineering IT Solutions - See how our VANTAGE suite supports your engineering workflow' by Cristoph Fedler, Arne Winkler, Ian Smith, Les Elby, Christine Briessman, John Allen and Stefan Ellinger of AVEVA</td>
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<td>1015 hours</td>
<td><strong>Executive Breakfast</strong> (Invitation by prior arrangement)&lt;br&gt;Round-table business and strategy discussions with AVEVA directors and senior product development managers</td>
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<tr>
<td>1015 hours</td>
<td><strong>Data Creation Part One - Getting the Engineering Right</strong></td>
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<td>1115 hours</td>
<td>Break</td>
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<tr>
<td>1145 hours</td>
<td><strong>Consuming Data Part 2 - Making Information Work Harder</strong></td>
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<tr>
<td>1215 hours</td>
<td>Lunch in Restaurant Feldberg</td>
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<td>1400 hours</td>
<td><strong>Petronas Case Study Presentation</strong>&lt;br&gt;by Wan Hassan Wan Mamat, Senior Manager, Petronas</td>
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<td>1530</td>
<td>Break</td>
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<tr>
<td>1600</td>
<td>'The Voice of the User Group' by Winfried Voigt, VE Solutions and Randy Williams, Executive Account Manager, AVEVA</td>
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<tr>
<td>1630</td>
<td>Open Forum</td>
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<td>Audience and presenters in open forum</td>
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