

Datamation/Technology Appraisals' Lifecycle Process 2003¹

London, May 2003

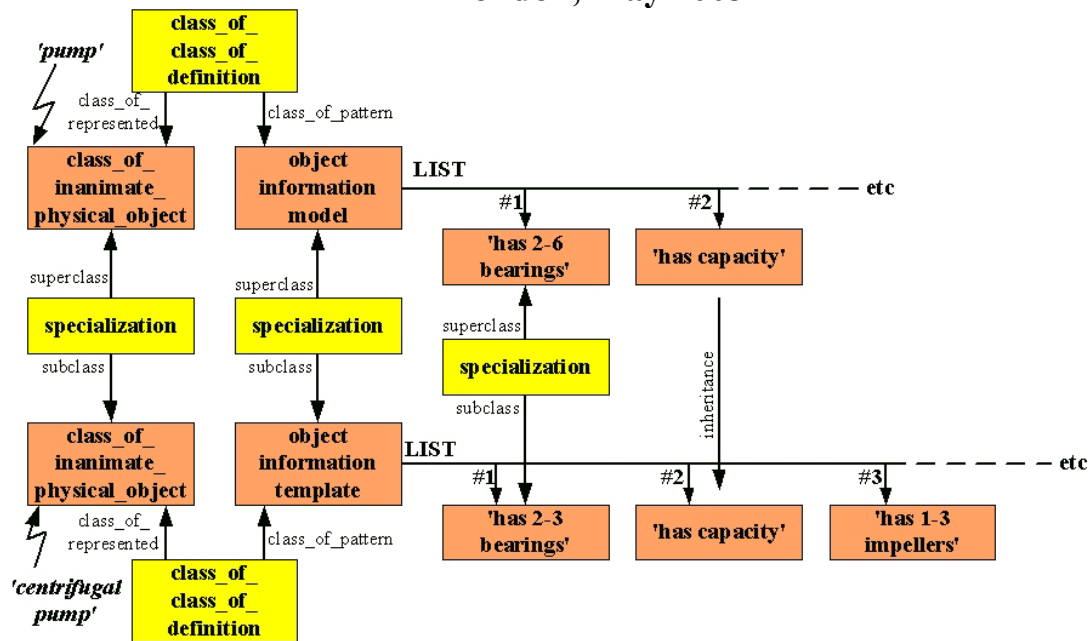


Figure 1 XML-based data modeling in ISO 15926-7².

Introduction

When an engineering prime contractor (EPC) builds a large facility, be it an offshore FPSO³ or a power station, huge data management issues arise. These are compounded when the construction company hands the project over to the Owner Operator (OO – usually the oil company). Much thought has gone into technical data models (POSC/CAESAR, EPISTLE, STEP, ISO 15926) which set out to standardize the way engineering data is recorded and served-up to the different stakeholders. These have had a limited impact, partly because the EPC industry is dominated by a few large companies who have their own internal processes and ‘standards’ and who may be reluctant to share these with competitors. Last time we reported on Plant Information Management (back in 1999) the Statoil/Oracle Synergy project – which set out to build an ‘implementable’ version of the POSC/CAESAR⁴ data model – was in full swing. Today, Synergy is no more, but Statoil’s interest in standards-based data models remains – as witnessed by papers on the [Kristin](#) and [Asgard B](#) fields. More generally, there is renewed focus on the cost-effectiveness of the data warehouse as part of the handover process. While such issues were well understood four years ago, today companies are spending large amounts on data collection and clean-up. Another trend is the increasing communications between the EPC and OO early in the project’s life. By integrating – or at least planning for integration – early in the project, the drama of a ‘big bang’ handover can be attenuated.

Highlights

- [Intergraph’s SmartPlant Foundation on the Kristin field.](#)
- [InfoWeb – ‘the web is the computer’](#)
- [Information handover on Shell’s Bonga FPSO](#)

¹ Conference proceedings available from [Datamation](#).

² Image courtesy InfoWeb and Fluor Corp.

³ Floating Production Storage and Offloading system.

⁴ Note that despite the name, [POSC/CAESAR](#) has no formal relationship with [POSC](#). The name is shared, not the data modelling technology.

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Process Lifecycle Strategy

Information Management in Process and Power Industry – AMEC Upstream

Pete Mayhew, Information Manager, AMEC Upstream Oil & Gas, believes that the key issue for IM is not IT but cultural change. IM challenges include asset handover with typically 2000 major equipment items, 200k tags and 2.5 million attribute values. AMEC deploys the STEP data model inside ORBISS - Open Reusable Business Information Step Structured. This is described as a business model 'based on evolving harmonized POSC CAESAR/EPISTLE/STEP industry standard reference data library (RDL)'. AMEC works with [Quillion](#) for data management, [Datanomic](#) for data cleaning (which represents 70% of the effort) and [Cimage](#) Novasoft (document management). Data ownership remains a major issue. Previous issues of performance, security and bandwidth have largely been solved. AMEC's Open Re-usable Business Information Step Structured (ORBISS) deploys a 'consistent business model' across all projects. Software can call up data from the data warehouse and link into the 3D model. IM is no longer a 'by-product of technology'. Mayhew concludes that 'it is business requirements and quality that are the challenges' and noted that AMEC's 2000 software applications have been rationalized 200!

Q&A

(Shell) Why don't business people understand these issues?

Don't know! It has taken time for IM people to understand, too long.

How do you ensure the accuracy of data?

By comparing source data with extracted data. We get a less than 1% error rate.

How do you educate third party data providers?

We have tried. In tenders, with retention until we get electronic info – vendors would rather give paper⁵.

Ownership of data? How do you impose who takes ownership?

We force the issue!

Integrated Asset Management – Ewan Botterill, AVEVA

Aveva used to be CadCenter (flagship product Vantage). Botterill pointed out that contrary to usage, asset management is not a 'cycle' and different tools and approaches are required at different times in life of a plant. Engineering used during construction is different from maintenance and needs its own tools. Also the EPC and OO have different views of data. As Bottrill says, "getting a fully integrated, clean, fixed data set to populate a data warehouse may never happen – as a project evolves, so does the volume and completeness of the data." Rather than a single source for all data, Bottrill advocates a 'single point of access to data' with as much data as possible moved from EPC to OO systems on handover. This is colorfully termed the 'evergreen digital plant'. Aveva leverages ISO 15926, XML Template and RDL via Microsoft .NET and Sharepoint – BizTalk. At least 50% of the cost of integrated asset management goes into content services.

Comment (Shell) A lot of people in oil and gas are already using STEP – especially part 42.

Plant Information Handover Strategies – Dalip Sud, Shell Global Solutions

Sud asked what was required to improve the handover process, noting that despite 10 years of STEP 'we are still re-keying in data'. Outstanding issues include the fact that in some cases, 50% of equipment cost is information. Also half of all documents handed-over are supplied by vendors and many lack a common naming convention. A roadmap to address these issues is required from the standards bodies. Other issues arise from geographical dispersion. To keep costs down, GE does product design in India. STEP has delivered enough today to use

⁵ The issue of small vendors who only work with paper – either drawings or specs was raised

although it is still incomplete. Sud notes the increasing use of the web for data sharing and workflow management but suggests that an ISO certified process is needed for web delivery.

Q&A

What standards are there for document naming?

No agreement yet but have a first set in EPISTLE.

What sort of cost efficiencies and savings?

Up to 50% in manpower costs across companies.

Engineering to Operations, a change in mindset – Ian Bishop, Foster Wheeler

Bishop states that the industry expected more business benefits from data sharing which have so far failed to materialize – although the original arguments still hold true. There has been a big movement in standards and web technology – both have moved forward. While there are a number of web-based IT solutions – CAD systems, collaborative tools etc., we have not yet achieved a true collaborative, sharing environment. Factors weighing against this are our focus on reducing costs, a ‘document centric’ approach – it would be better to have structured data and more intelligent systems. The Holy Grail of the single data base is lost! We still need both document and asset-centric views tolerant of low bandwidth global access. Engineers are risk averse and slow to change – being document-centric is a comfort to some. We need to build an engineering critical path based on key information, managing key information with documents and accepting that non-critical data will lag.

Effective Life cycle Information Management – Anne-Marie Walters, Schlumberger SEMA

Walters observes that in the North Sea there are new operators coming in with IM issues relating to declining production in small fields with a shorter life. All phases of design, production, operation and maintenance are more expensive than in GOM. Margins are lower and investments higher. New operators need to quickly capture legacy data on production, maintenance, geology and finance. When Forties was acquired by Apache (from BP) data capture took 4 weeks – but engineering info was missing and some information was unreadable. The cost of missing information can be high; Walters cited 20% of a £ 2.5 million project on building plant records – but this is a conservative number – there are much worse cases. Working out what’s there is costly and adding ‘life’ to a field requires modifications, maintenance is not always updated after modification. SEMA solutions involve portal-shared networks, standards-based applications architecture and common hosted data models.

Comment “Industry hasn’t embraced collaborative sharing of information.”

Panel session

The quoted 1% error rate is ‘much too high’ – but according to AMEC, ‘it used to be as much as 10%’. 50% of documentation is from subcontractors and suppliers – standards would be useful here but EPCs can’t do it on their own. AMEC has 100 people involved in data and document management, communities of engineering practice and IT. Do owner operators want to give a budget for data handover⁶? Yes – but sometimes project managers don’t embrace the concept of maintenance.

⁶ Handover is a recurring theme - new technology projects need to take into account data handover, and operating maintenance etc right from day one and all data should be available to everyone right down the line, associating the future operators and their data or document needs for the whole life cycle.

Projects

Information handover on Shell’s Bonga development – [Michiel Molenaar](#) and [Matthew West](#).

Molenaar described Shell’s \$ 4 billion Nigerian Bonga deepwater project, implemented by no less than five EPCs located in 3 time zones. The Bonga Strategic Asset Management Solution (SAMS) covered standards setting and data management for handover from the EPCs to the Owner Operator. The project involved establishing standards, classifications, a ‘Hand-over Guide’ and quality program.

Handover applications included.

Engineering	E-Spir (Shell Global Solutions)	Electronic Spare Parts and Interchangeability Record
Engineering	IN-Tools (Intergraph)	Instrumentation design and engineering software
Data Directory	Information Handover Guide (IHOG)	
	SAP Blueprint (?)	
	Livelink	
	In-House Applications	

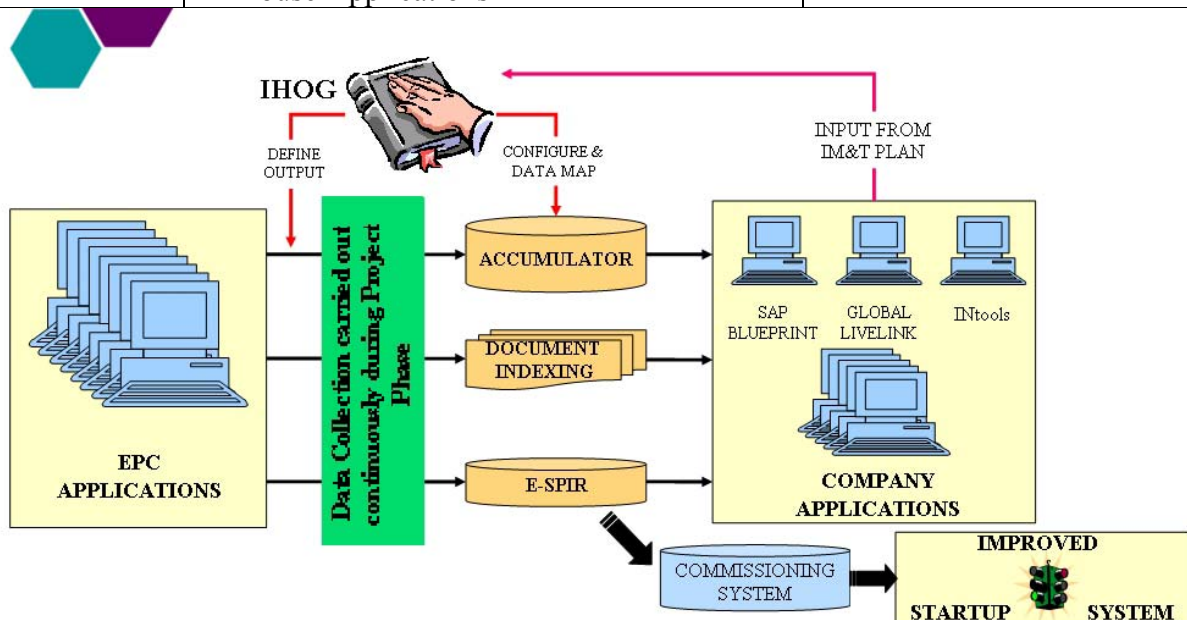


Figure 2 Overview of Bongo data capture workflow⁷.

Lessons learned included the need for contractual clarity – especially the link between technical and commercial terms) and the need to communicate through frequent meetings. Staff quality is also an issue⁸.

Kristin – the ‘paperless’ offshore project – [Bjorn Henrik Magnus](#), Statoil

Magnus stressed Statoil’s close relationship with EPC Kvaerner Oilfield Products (KOP). Kristin is a high pressure, high temperature North Sea development operated by Statoil. The project set out to get rid of paper-based working practices and to replace them with electronic systems. The project applied to suppliers – there will be ‘no paper to or from suppliers to Kristin’! A demo followed of the PIM data warehouse (built around [Intergraph’s SmartPlant Architecture](#) – see also [SmartPlant Foundation](#)). Web Portal access allows for information

⁷ Image courtesy Shell IT International.

⁸ We discussed the role of Standards in Bonga with Molenaar. Standards aren’t working because each project is different. Industry is also suffering from education levels and staff turnover – there just aren’t enough good people. “There are cheaper and better services in India than in the West”.

exchange and sharing with stakeholders. Statoil has reached an agreement for document exchange with 450 equipment manufacturers. The combination of the Oracle plant database and the 3D model was impressive – particularly the 3D navigation through the PIM data warehouse. The 3D model is designed to cover material take-off, inspection and most important – to faithfully represent the facility ‘as built’. The model also served for 3D-Visionarium-based familiarization exercises.

Q & A

What effort/investment was made in the in data exchange?

Aker Kvaener interfaces existed, these have been improved. Migrating working practices is more costly than IT.

Is the 3D model cost effective in operational phase?

A. Sometimes not (because of migration). On Kristin yes.

What of 3D operations?

A. For modification, all documentation is covered by the 3D model. Inspections can be carried out too.

[Asgard B, a STEP-wise approach to standardization – Terje Ulltang, Statoil](#)

Implementing Lifecycle Information (LCI) on Asgard, the world’s largest floating gas production platform was ‘a brave decision’. The Asgard data warehouse is the first version of Statoil’s Plant Information Management (PIM) system – implementing the ‘main ideas’ of POSC/CAESAR. PIM is now considered a Statoil best practice and has been implemented at Snohvit and Kristin. Data sharing between PIM and SAP is now a key focus – with the intent of facilitating e-business. The paper outlined the scope of POSC/CAESAR, the data model and reference data library and datasheets. POSC/CAESAR mapping was performed by Statoil, Kvaerner and Intergraph.

Data Modeling and Standards

[Integrated Oil and Gas Operations– Thore Langeland, OLF](#)

Langeland (formerly with Statoil – now with the Norwegian industry body [OLF](#)) has been a longtime advocate of standards as an efficiency driver in offshore construction and handover. According to Langeland the ‘trend’ is towards a single data model and reference data library based on ISO 15926⁹ (more on this from [POSC Caesar](#)). Langeland invokes many ‘IT solutions’ for the offshore which have enabled remote operations and staff reductions – but the role of POSC Caesar’s standards is far from clear. Bold claims such as a “5 – 10% hike in production” are made¹⁰.

[Supply chain integration – Magne Valen-Sendstad, POSC/CAESAR Association](#)

Multiple suppliers and parts lists can easily lead to inconsistencies in product catalogues. Sendstad points out that standardization in data models is not enough – content too must be standardized. Content should be described in a neutral way – which is where the ISO 15926-4 RDL standards can be leveraged.

[EPISTLE - the Infoweb. Implementing ISO 15926 in XML – Hans Teijgeler, Fluor Corp.](#)

An interesting and very technical paper on leveraging existing standards work through the use of XML Schemas. These allow for mapping from EPC classification schemes to OO models. ‘Facades’ provide a ‘public view’ of data - exposing an ISO 15926-7 (equates to 15926 in XML) compliant interface to the outside world. Facades can let a contractor limit usage and visibility of internal data to that which is required by third parties operating outside the

⁹ POSC CAESAR current work program involves getting the data model approved as an international standard, extending the RDL and developing a set of ISO 15926 and ISO 18876 data sheets for procurement and handover.

¹⁰ Langeland’s claims for efficiency gains, standards convergence and his oblique references to POSC and WITSML are hard to interpret.

firewall. URI dispatch mechanisms allow for synchronization of different local terminologies. Very much ‘work in progress’ - an entreaty for others to take part in EPISTLE projects. Current ISO 15926 status - Part 2 - data model sent to ISO for Final Draft ballot. Part 4 - reference data - the Epistle RDL has 18,000 classes now. Part 7 - implementation methods will be sent for ballot in June 2003.

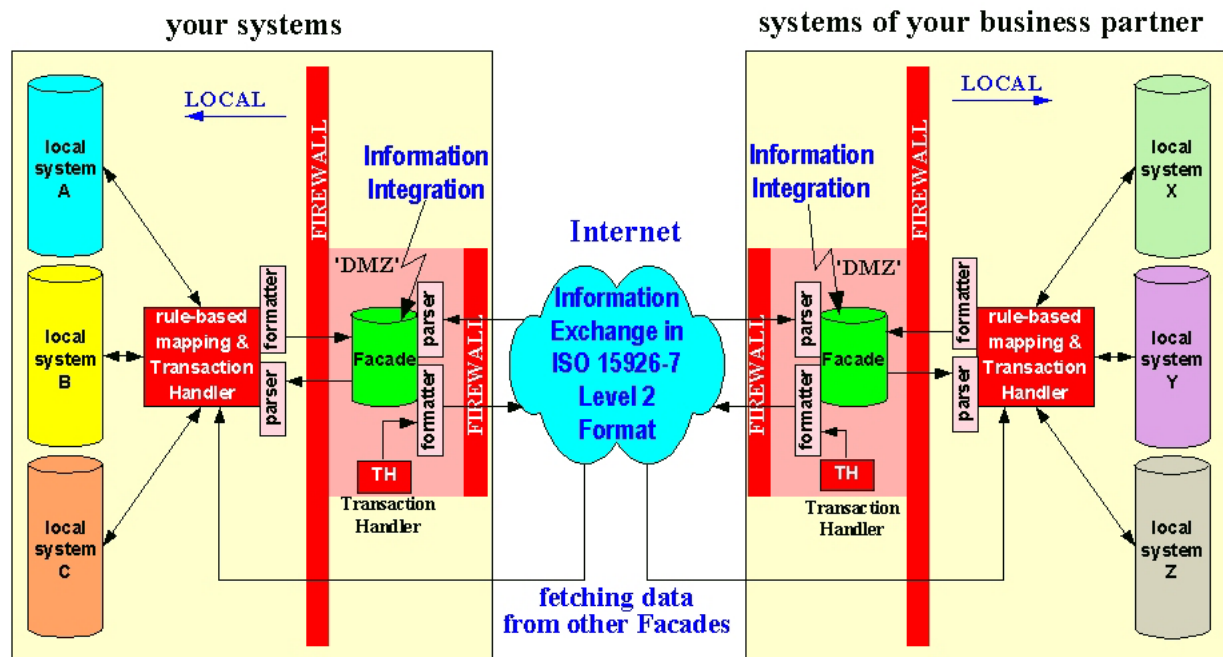


Figure 3 Using ‘Facades’ for information sharing¹¹.

‘The web is the computer’ – no duplication of data – the promise is of true lifetime information integration through XML-based plug-in integration of web applications. See the [InfoWeb home page](#).

Product Lifecycle Support – STEP-ping out of design – Tim King, LSC Group.

ISO 1030 (STEP) is best known as a CAD/CAM standard but is being extended to product lifecycle support – as ISO 10303-239 – or AP239. King described early implementations of this work by various (non oil) organizations. King also discussed possible convergence of AP 239 with ISO 15926 to conclude that this is unlikely in the short term. This is due to the different ‘communities’ – product manufacturing (PLCS) for 1030 and oil and gas production for 15926.

Migration of plant process models with EPISTLE and STEP – Adrian Laud, Noumenon Consulting.

Laud traced the thought process behind the major data modeling exercises of the construction industry. The main aim is to have a neutral model containing plant data which can be shared between all players. The original STEP (ISO 1030) standard created problems because of its rigidity. The EPISTLE (ISO 15926 and API 221) standard introduced the concept or the Reference Data Library (RDL) external to the standard itself. But EPISTLE has shortcomings in terms of geometry. Noumenon advocates a solution involving combining EPISTLE with geometry from STEP. Laud presented Noumenon’s XmpLant technology for data migration. XmpLant interfaces with the major construction software tools and has been used on several major projects in shipping and plant. A screenshot showed AVEVA’s VNET Portal view of 3D plant data imported with XmpLant.

¹¹ Image courtesy InfoWeb and Fluor Corp.

Outside oil and gas

Ship and FPSO classification – Wiggo Smeby, Det Norske Veritas

Wiggo Smeby, CTO with [Det Norske Veritas](#) (DNV) described life-cycle process management in the shipbuilding and FPSO industries. DNV used to have 12 km of paper archives. These have now been transferred to a digital archive and all new data is electronic. DNV's [Nauticus](#) software is used for lifecycle management of facilities. By using the internet, the location of plant and technical staff is 'immaterial'. Knowledge management is important, on a £ 60 – 70m investment the ROI is said to be 'favorable'. With 5,000 ships in the fleet it is worthwhile.

Q&A

How is integration of software applications achieved?

DNV tries to use the STEP standard but it is difficult. Customers can work inside their system, exchange with CAD systems through a collaboration with Intergraph.

How important is work sharing?

Very – the workload varies; sometimes people are overloaded in some parts of the world. Work processes are standardized worldwide.

What did training 1600 staff involve?

2 years training which was very expensive at about £20million. This included on-line and formal training with local classrooms teaching and 'hand-holding'.

Open standards ?

We have been discussing them, but we are concerned about competitors¹².

¹² We understand this to mean that they don't want the competition to see what they're doing!

Exhibitors

Aveva	Project Resource Management Enterprise NET – Plant DNA Engineering Information and Workflow Model ¹³ (EIWM). XMpLant	sales@aveva.com
Babcock	Managed information services, engineering studies, modeling etc.	Chris Lees bdandt@babcockbes.co.uk
Cimage Novasoft	Content lifecycle management	marketing@cimage.com
Datamation	Engineering Online – internet-based information service for collaborative engineering. Reports on Product Lifecycle Management	Kais Al-Timini info@datamation.co.uk
Intergraph	SmartPlant Foundation	
LSC Group	Military logistics – ISO 1030 (STEP)	David Pearce
Schlumberger SEMA	Consultancy Services	
Quillion	Data cleanup, data management. Partner in Shell's Shearwater development.	info@quillion.com
CEA	4D Explorer – browser and data mining for engineering.	

¹³ Developed from the Oracle-Statoil Project Synergy.

Glossary

RDL	Reference Data Library	Content for the data model – pumps, pipes and other objects' specifications
EPC	Engineering Prime Contractor	
OO	Owner Operator	
LCI	Life Cycle Information	
PLCS	Product Life Cycle Support	
ISO 10303	An International Standard for the computer-interpretable representation and exchange of product data	
ISO 15926	Lifecycle activities and processes of oil and gas production facilities	
STEP	International STEP Centers	