Building a sustainable fully digital operational plant utilising ISO 15926

Richard Harris

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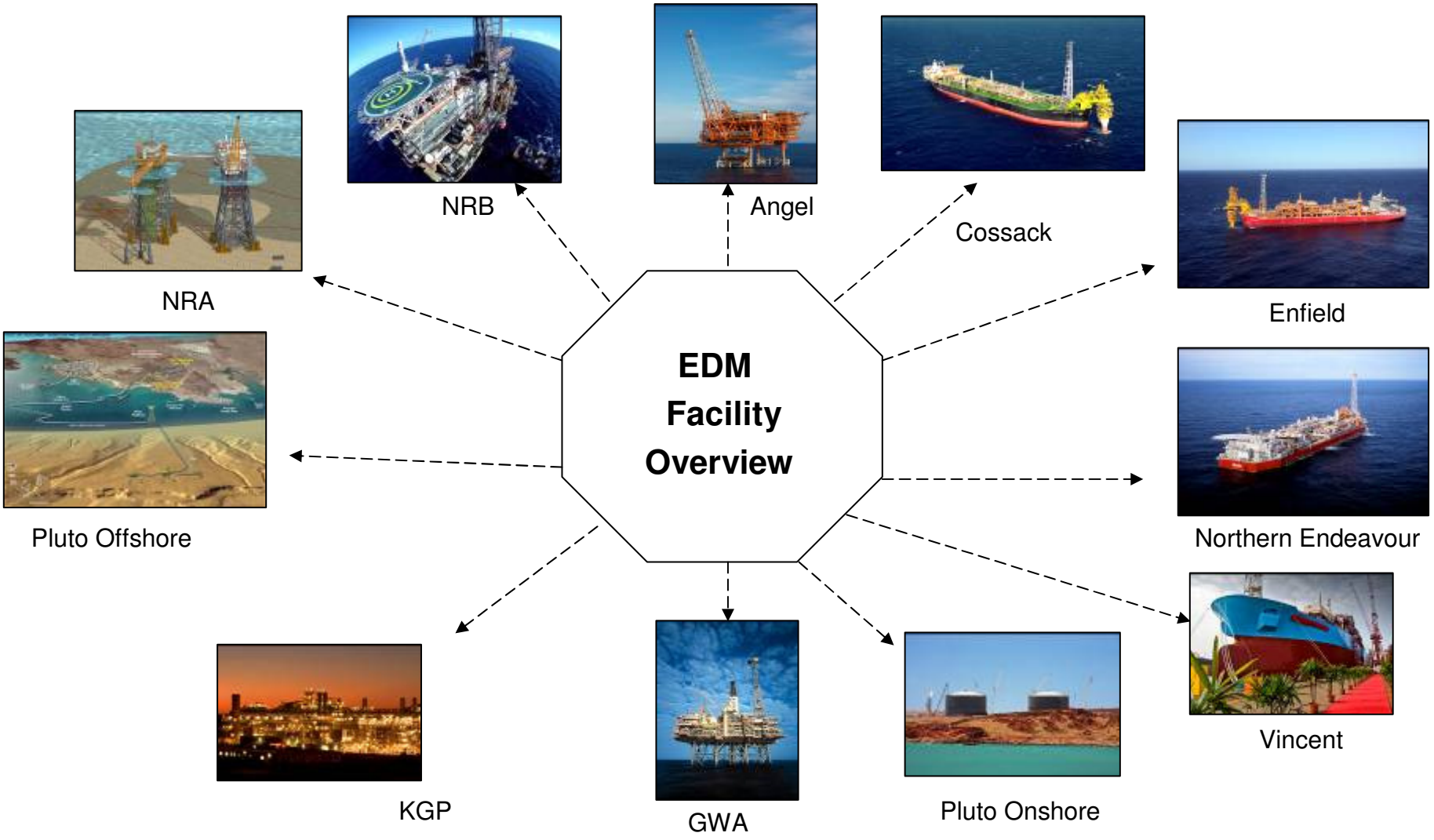
Disclaimer and important notice

This presentation contains forward looking statements that are subject to risk factors associated with oil and gas businesses. It is believed that the expectations reflected in these statements are reasonable but they may be affected by a variety of variables and changes in underlying assumptions which could cause actual results or trends to differ materially, including but not limited to: price fluctuations, actual demand, currency fluctuations, drilling and production results, reserve estimates, loss of market, industry competition, environmental risks, physical risks, legislative, fiscal and regulatory developments, economic and financial market conditions in various countries and regions, political risks, project delay or advancement, approvals and cost estimates.

All references to dollars, cents or $ in this presentation are to Australian currency, unless otherwise stated.

References to “Woodside” may be references to Woodside Petroleum Ltd. or its applicable subsidiaries.

EDM – Engineering Data Management



Woodside's EDM Journey

Our EDM journey commenced in 2005 with clearly defined objectives, originating in the Brownfield projects division and migrating to the Production division in 2007. Practical project completion December 2009.

EDM group established as a core corporate team delivering significant value in cost savings and improved data quality.

Key deliverables

- Select Software Systems, Configure & deploy
- Migrate company legacy data & systems into a digital plant environment
- Develop processes and standards to support a digital plant
- Improve data quality, access and linkage
- Enable efficient handover from Greenfield & Brownfield Projects
- Identification and rectification of data inconsistencies
- Identify value-adding opportunities Enterprise & Next Generation Software
- Early developer & adopter of International standards
- Measure, evaluate effectiveness & achieved cost savings against R.O.I.

Why build a fully digital plant against one common Standard ?

Volume – more and more As Built Plant Master Data is delivered in digital format. The volume of data that will be handed to Production from new Greenfield Projects is multiplying by a factor of 2 to 3.

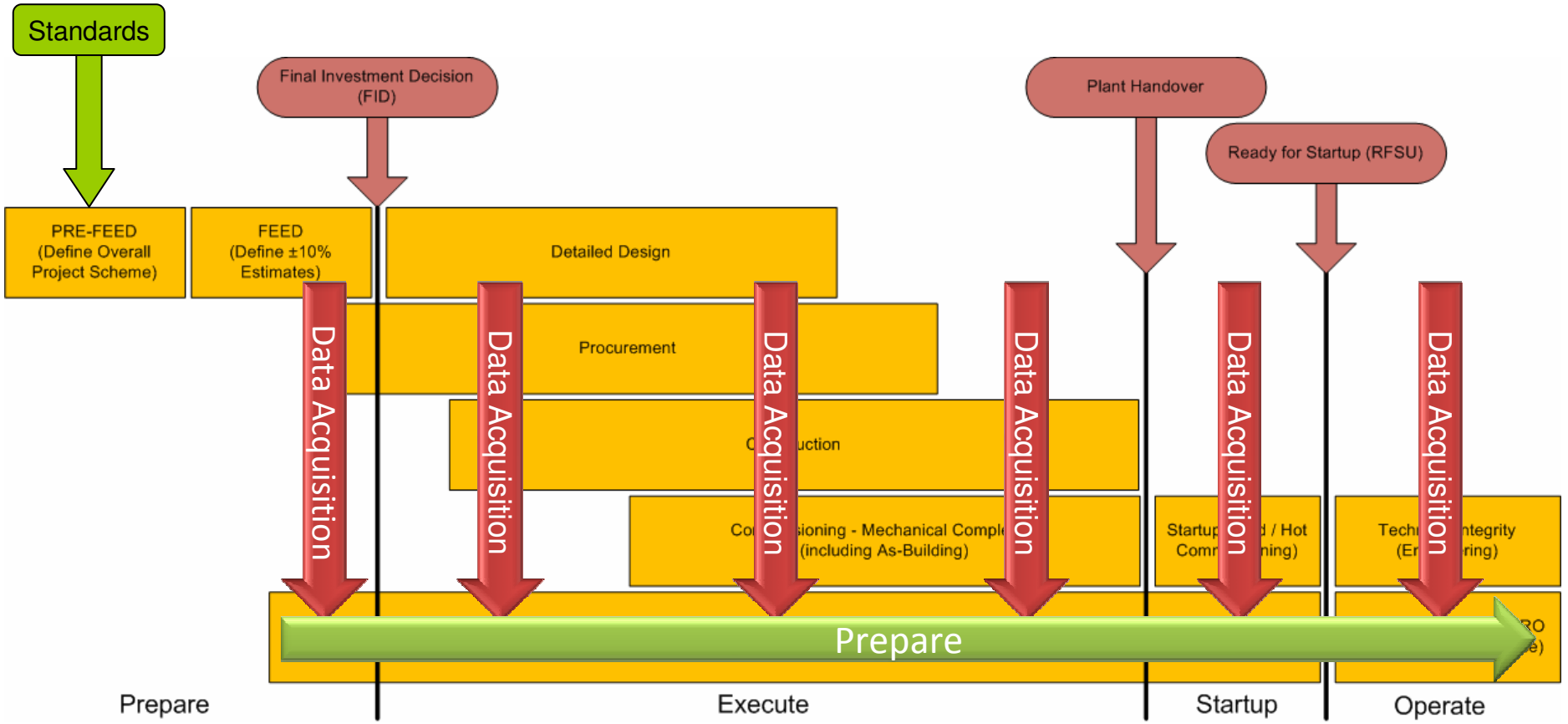
Complexity – old data has to be merged and managed with new data. New facilities have to fit in with older facilities. Increased margin for errors in data integrity due to complexity of data relationships

Capability – competent resources are in short supply in Perth, people who understand Woodside's standards, design principles, operating philosophies are even scarcer.

Cost Savings – History indicates that it is more cost effective and efficient to have a progressive rather than a big bang handover of Plant Operating Information at the point of commissioning.

Plant Life – our plant lifecycles are extending from 25 to 40+ years, proper management of 'As Built' Plant Master Data is mandatory if we are to retain our Licence to Operate and assure our Safety Case

How it comes together – Plant data collection

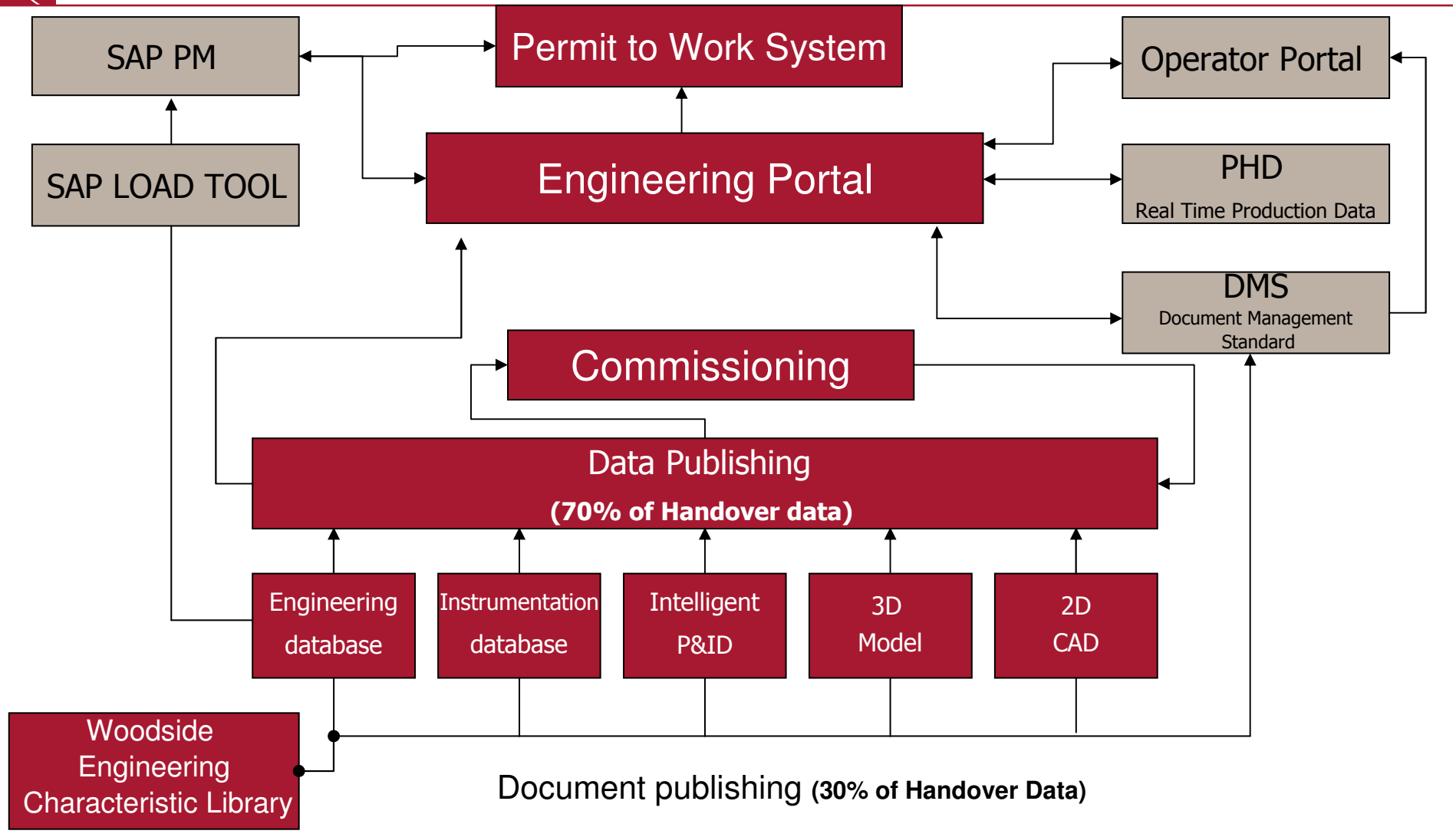


Deploy

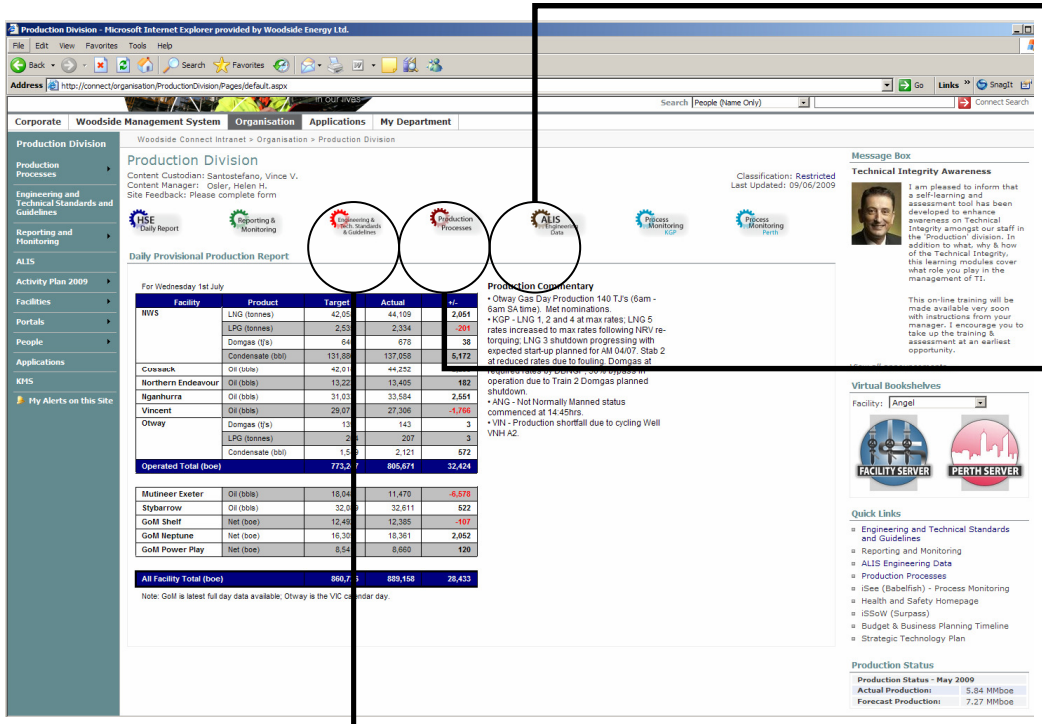
What Benefits are derived from adopting ISO 15926

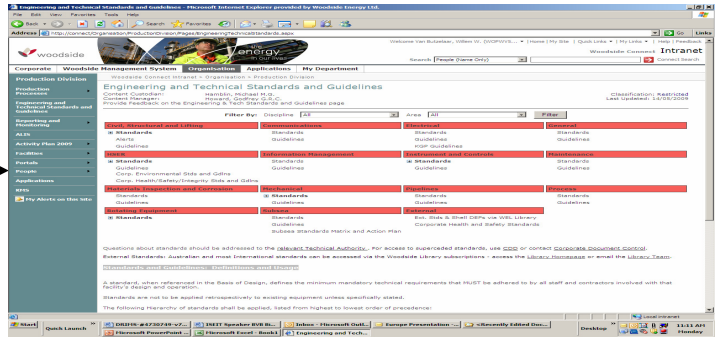
- Select software that best-fits your organization
  - No need to change based on the project needs
  - Integrate with your other systems
  - Maximize your personnel, minimize re-training
  - It's the "green" thing to do
- Access to all data across lifecycle
  - Data always available for re-use
  - Legacy storage in a non-proprietary format
- Large and small organizations benefit equally
  - Benefits irrespective of organization size or geographic distribution

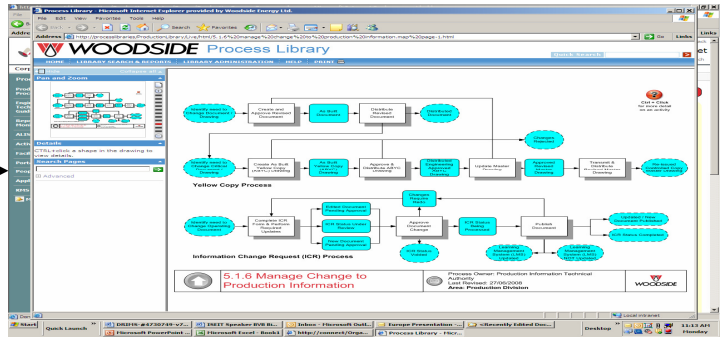
Engineering Portal relationship to EDM applications

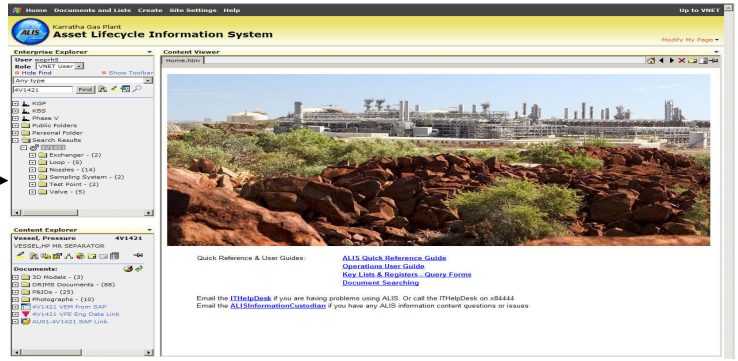


Strategic Data Management Portal









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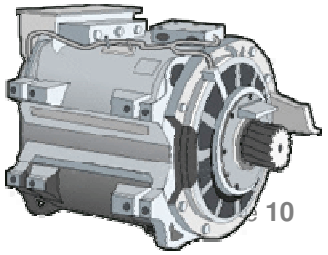
Who defines and manages digital plant today, it is not just Engineering

	Engineering	Maintenance	Materials Management	Operations
Focus:	Will this equipment fulfil it's Process requirements?	How do we maintain this equipment and make sure the costs of that maintenance are charged back appropriately?	How do we buy, stock and replace this equipment, either as a single unit or as a collection of spare parts (BOM)?	How can this equipment be monitored and controlled?
Typically interested in:	• Connectivity within the process • Design specifications	• Design Specifications • How it has been Operated (actuals) • Maintenance History	• Manufacturer Specifications • Elements defined and managed	• Overlaying Process Model with Controls Model
Key elements defined and managed:	• P&IDs, • Mechanical model • Instrument model • Electrical model	• Functional Locations • Work definition and execution • Cost allocation	• Item No • Price • Lead Time to source • Usage Patterns (for Stocking / Reorder Options)	• SCADA Tags • DCS Model • Measuring Points • Isolation Points (iSSoW)
Change Management:	Technical Change Management	SAP Master Data Change Notifications	Manual forms	Nothing official, for changes to the DCS, tools like Honeywell's Doc4000 are used, but not consistently.

In the end, it is all the SAME piece of equipment !!



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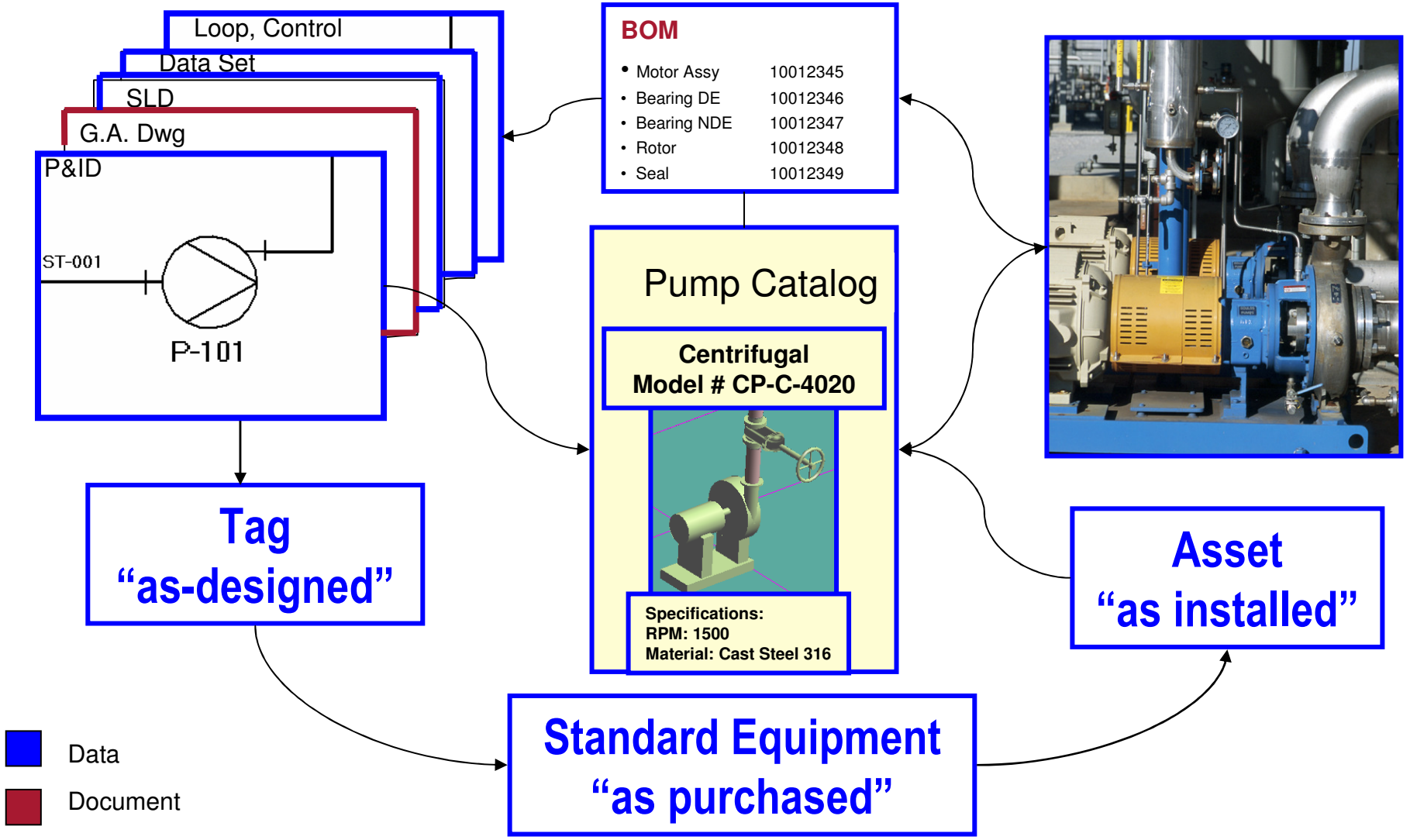
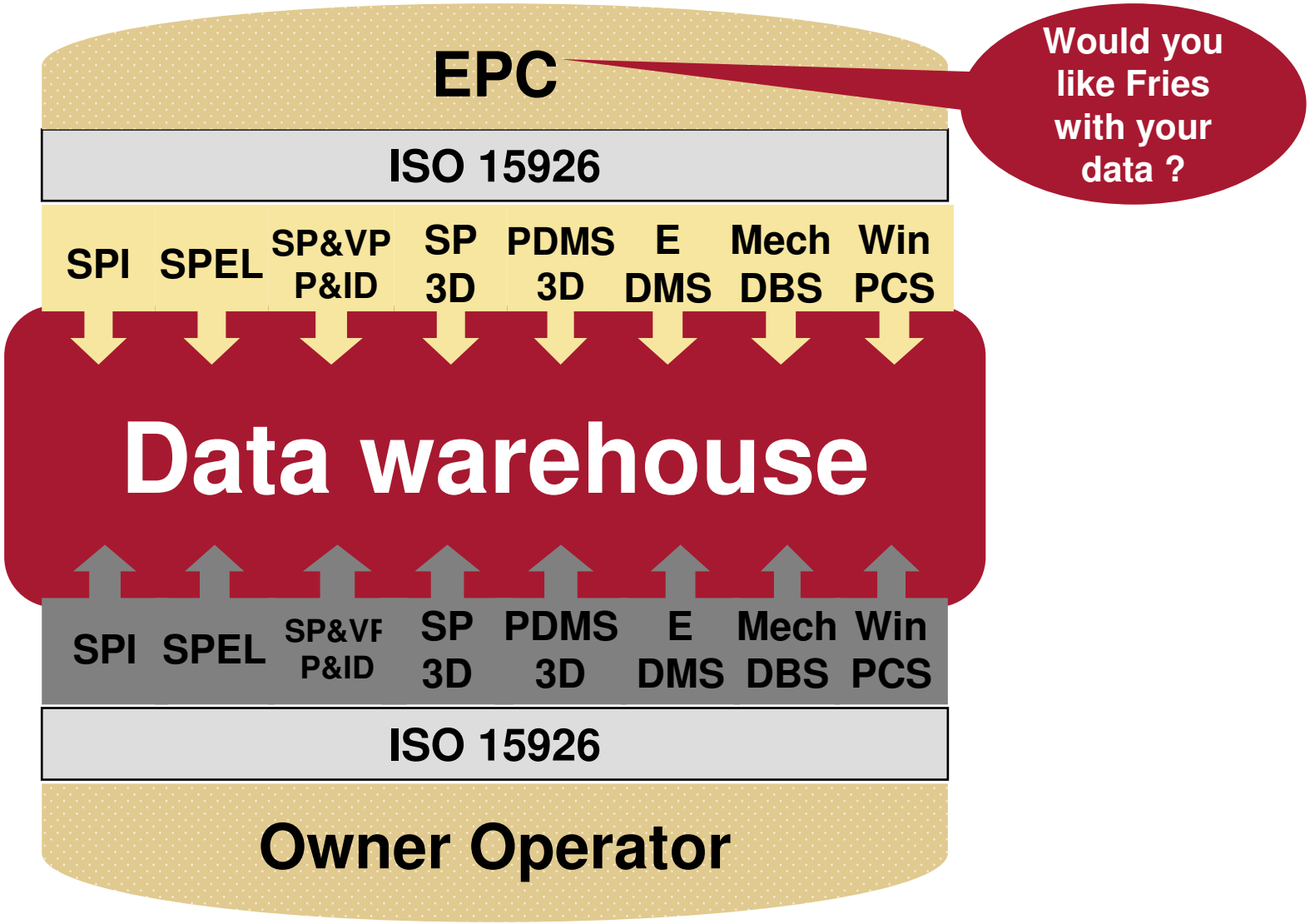


Why focus on common standards ?

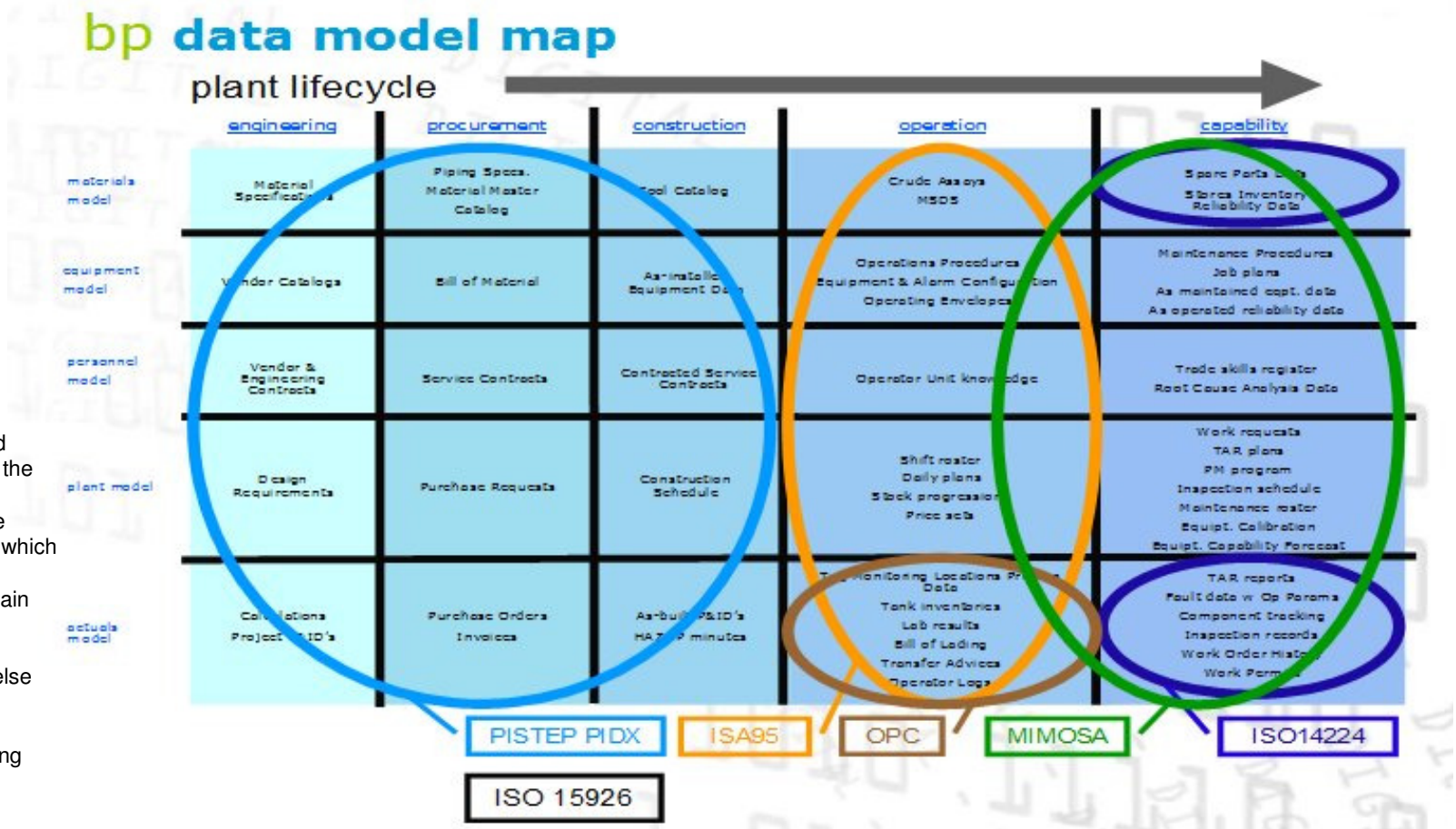
- Integration pre-requisite – Mega Project Environment
- Common information language and format
- Reduce time for handover between life-cycle phases
- Set direction for Owner Operators and EPC's
- Ensure Uniformity – Apples are Apples not Pears
- Reduced errors on input
- Reduced costs to maintain ($m's)

Hamburger Approach – Same standards same tools !



What standards?

Reproduced with permission from BP



ISO 15926 is a standard about interoperability in the process industry. An important part of it is the Reference Data library, which holds technical class descriptions of all the main equipment items, pipe, instruments, buildings, activities and anything else used in engineering, constructing, procuring, operating and maintaining process facilities

ISA 95 is the international standard for developing an automated interface between enterprise and control systems

OPC standards specify the communication of industrial process data, alarms and events, historical data and batch process data between sensors, instruments, controllers, software systems, and notification devices.

MIMOSA standardizes the interface between plant floor systems (including PDM) and EAM systems. The MIMOSA standard is complementary to OPC, which handles the real-time communication aspect of interfacing with plant devices.

ISO 14224 – sets the standards for collection and exchange of reliability and maintenance data for equipment

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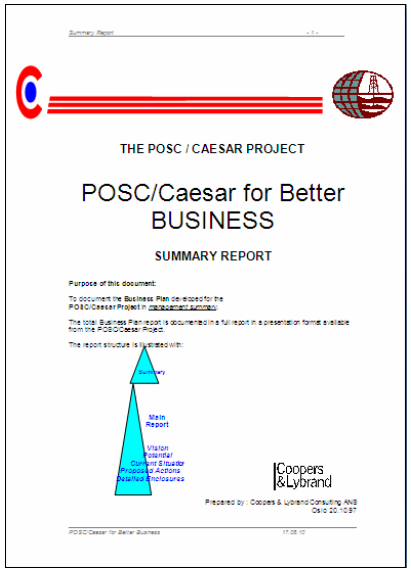
Industry Research - Benchmarking Against Industry Offshore Oil & Gas Asset Lifecycle

POSC/Caesar for Better Business Summary Report - Prepared by: Coopers & Lybrand Consulting, Oslo 20.10.97


THE POSC / CAESAR PROJECT

POSC/Caesar for Better BUSINESS

SUMMARY REPORT

Purpose of this document:

To document the Business Plan developed for the POSC/Caesar Project in management summary.

The total Business Plan report is documented in a full report in a presentation format available from the POSC/Caesar Project.

The report structure is illustrated with:

Coopers &Lybrand

Prepared by : Coopers & Lybrand Consulting AS Oslo 20.10.97

Analyzed the benefits that accrued from managing information for offshore oil & gas installations through the plant lifecycle and came up with the following productivity benefits.

When managed holistically an operator could **reduce the whole life cost of the asset by 10%** and, within specific lifecycle phases the following were achievable:-

- Reduction 10-30% of concept development time
- Reduction 15-28% of engineering hours
- Increase 30% engineering productivity
- Reduction 10-30% cost of quality and change management time
- Reduction 15-20% commissioning engineering hours
- Reduction 60% hand-over and start up costs
- Reduction 10-20% IT costs
- Reduction 10-20% operational costs

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What Benefits are derived from adopting ISO 15926

- Select software that best-fits your organization
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  - Integrate with your other systems
  - Maximize your personnel, minimize re-training
  - It's the "green" thing to do
- Access to all data across lifecycle
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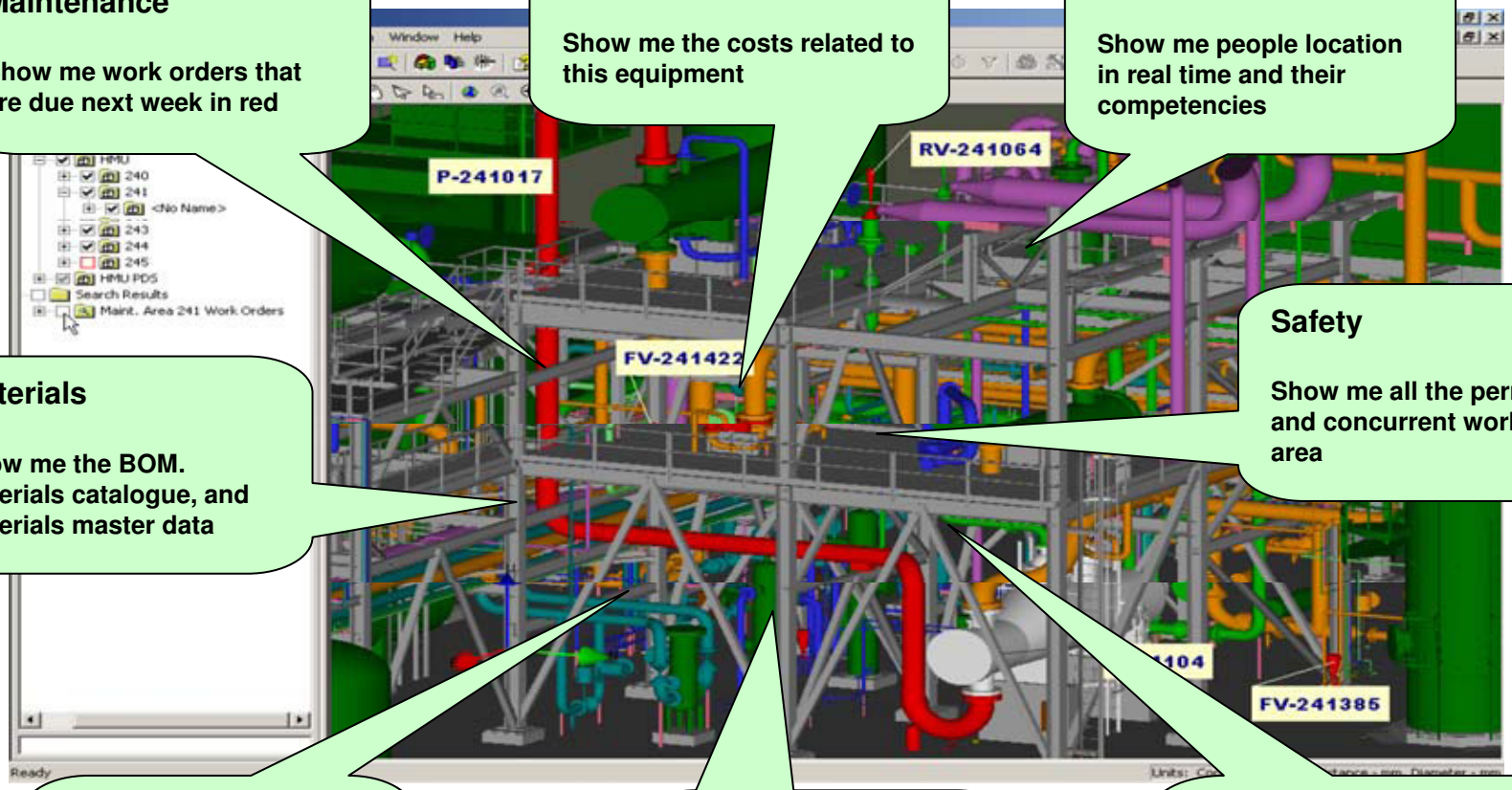
The value of digital plant – the end goal



Maintenance

Show me work orders that are due next week in red

Finance

Show me the costs related to this equipment

People

Show me people location in real time and their competencies

Safety

Show me all the permits, and concurrent work in an area

Materials

Show me the BOM. Materials catalogue, and Materials master data

Engineering

Obtain accurate measurements and review new design

Inspection

Show me corrosion trends in plant systems

Operation

Show me system current temperature/pressure

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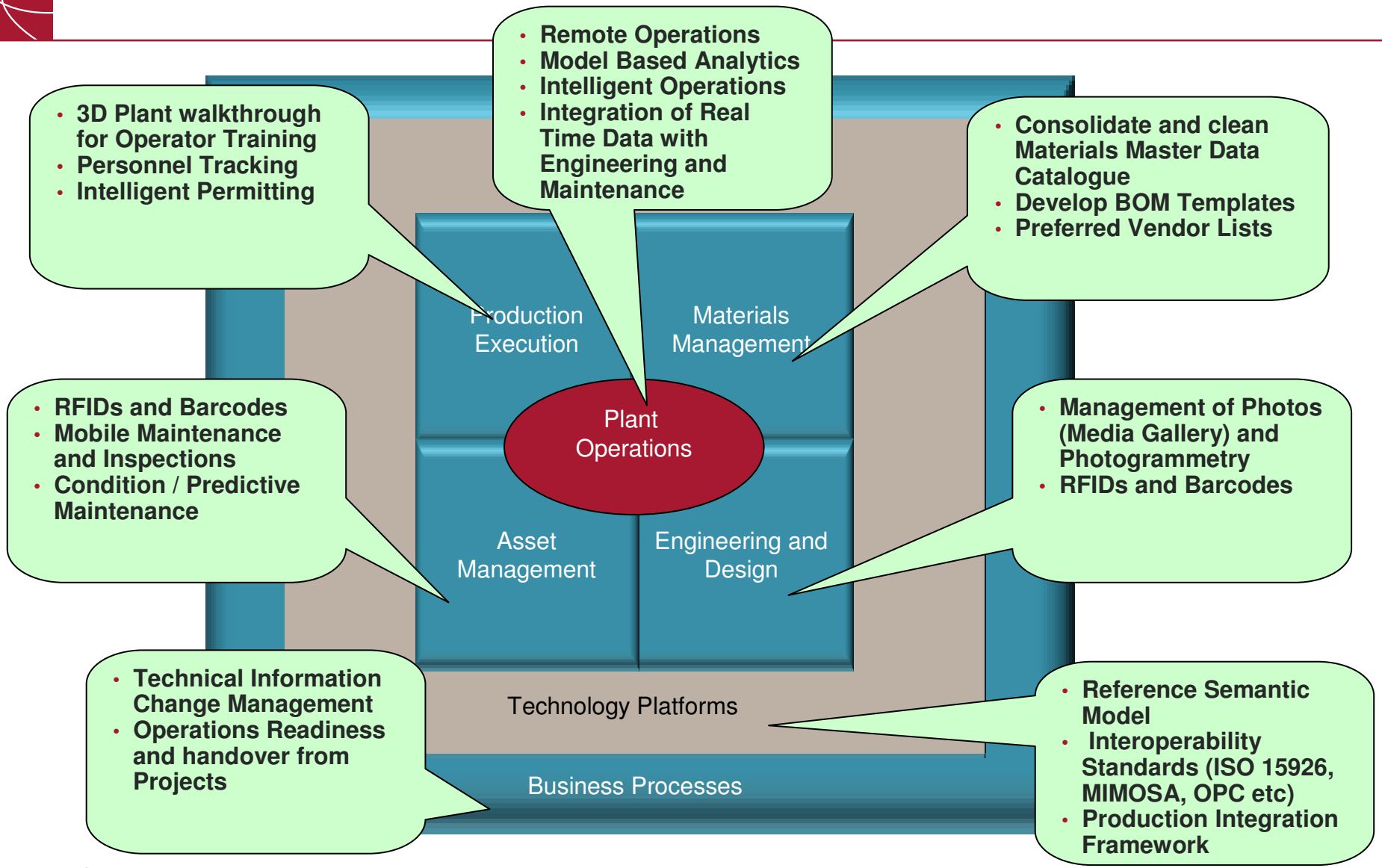
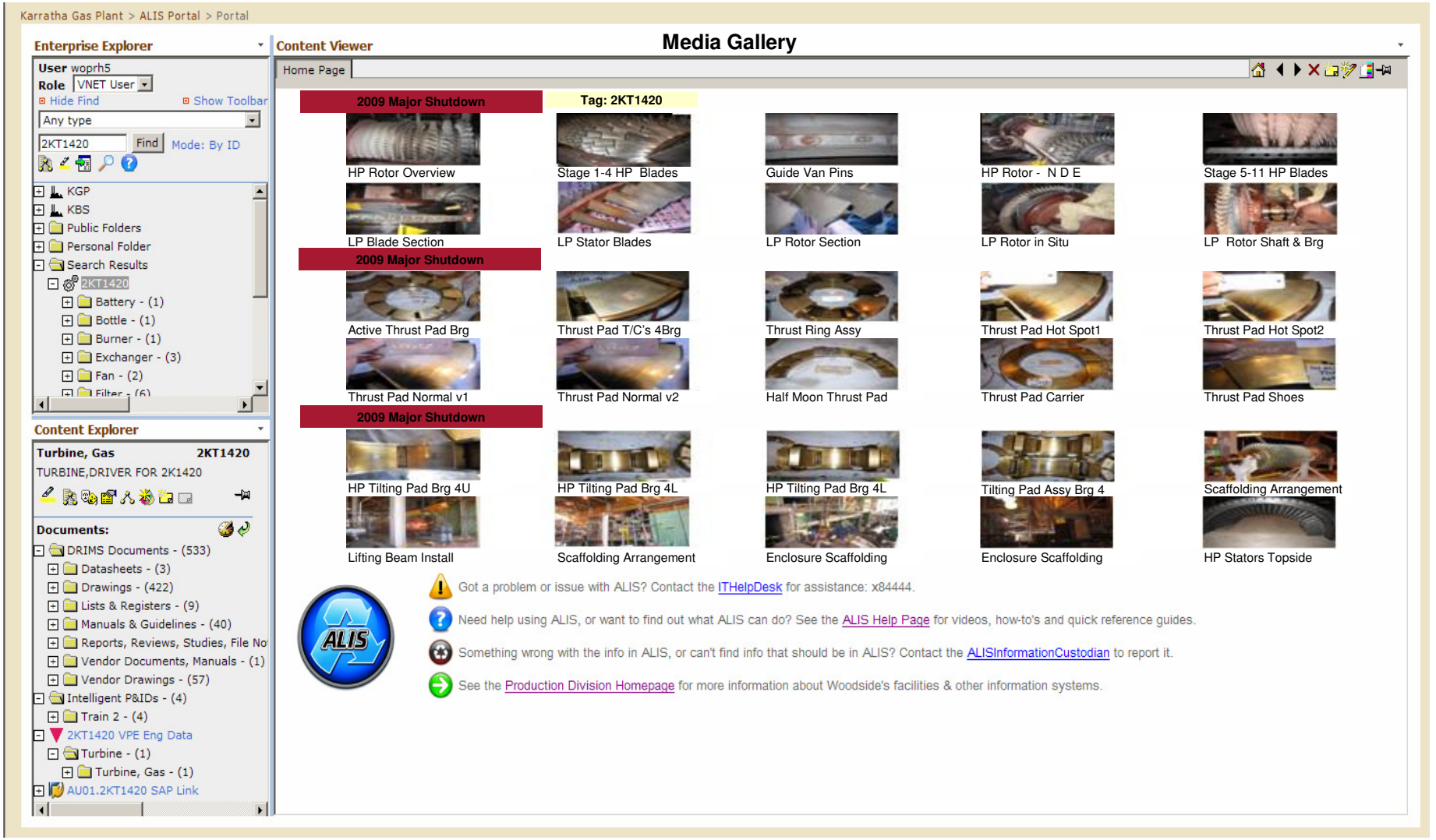
Taking us there – Current initiatives

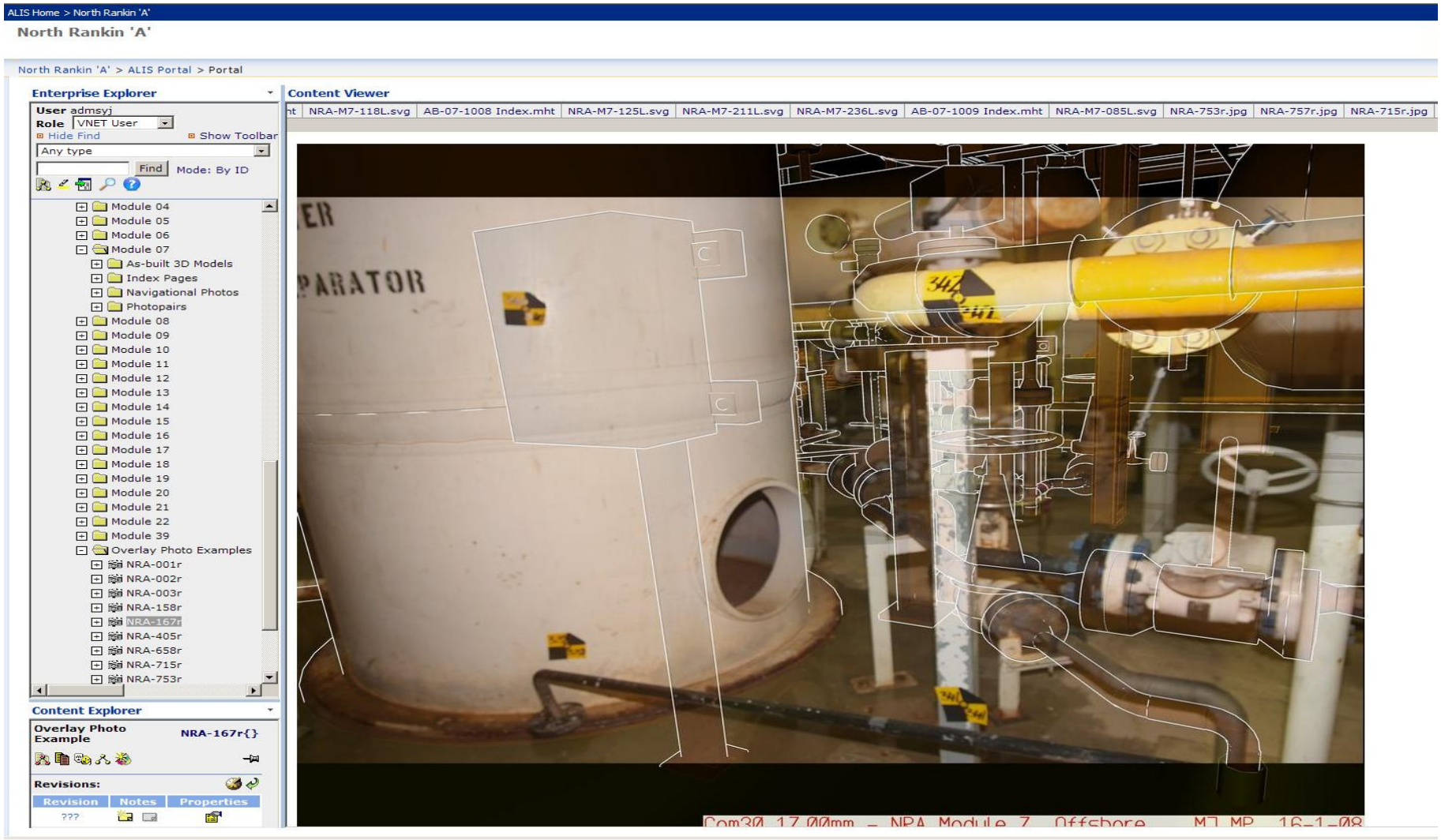


A Sample of Current Initiatives

Current projects - Media gallery



Current projects - Photogrammetry Rejuvenation and Capital Projects



Outdated hardcopy drawings or using photos…

Karratha Stabiliser 1 – from photos to digital plant in 29 days….

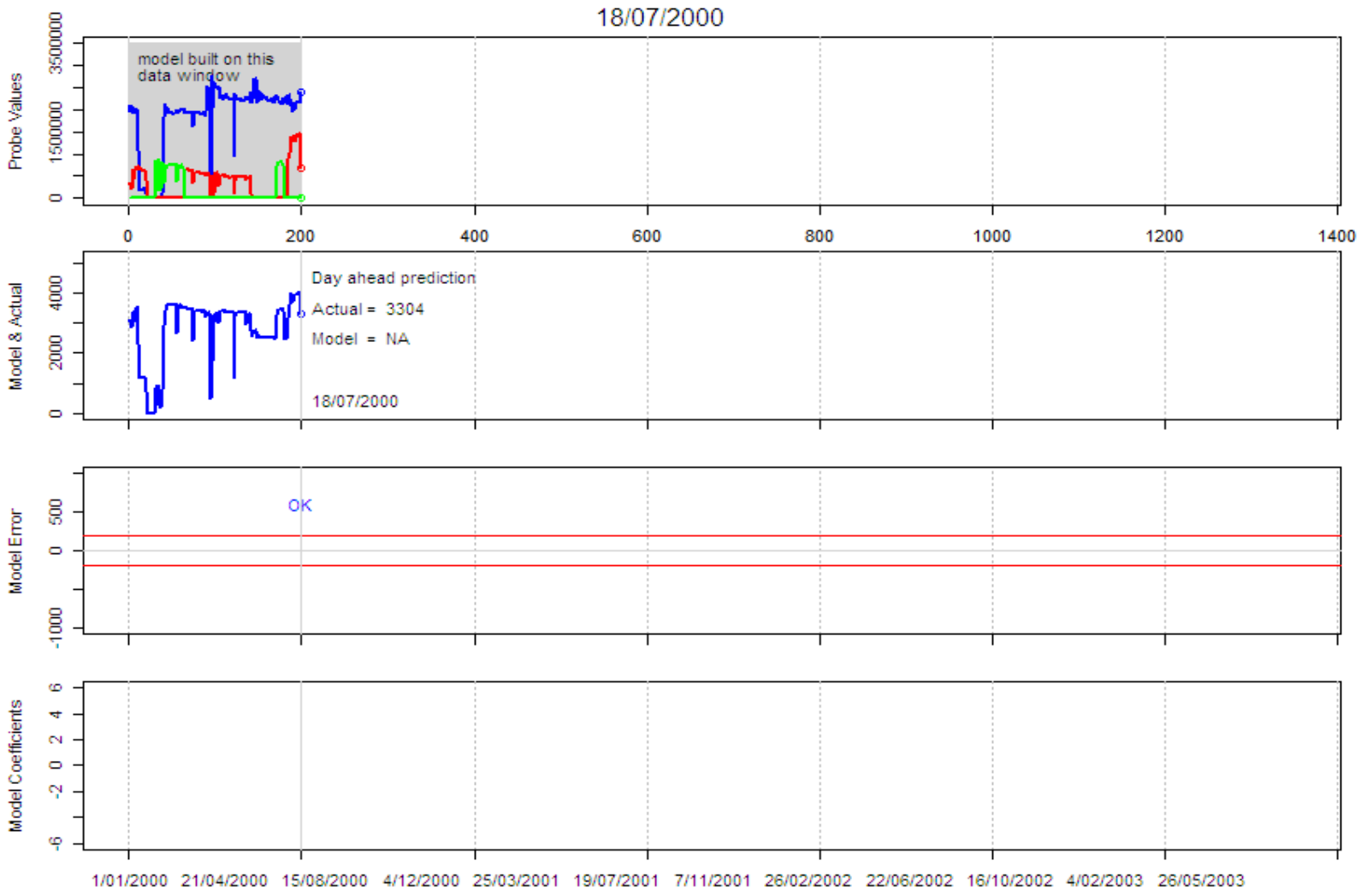
Current Initiatives – Integration of Real Time Data

DCS installations on every facility, and nearly every unit, hundreds of thousands of process data tags

Challenges we are facing:

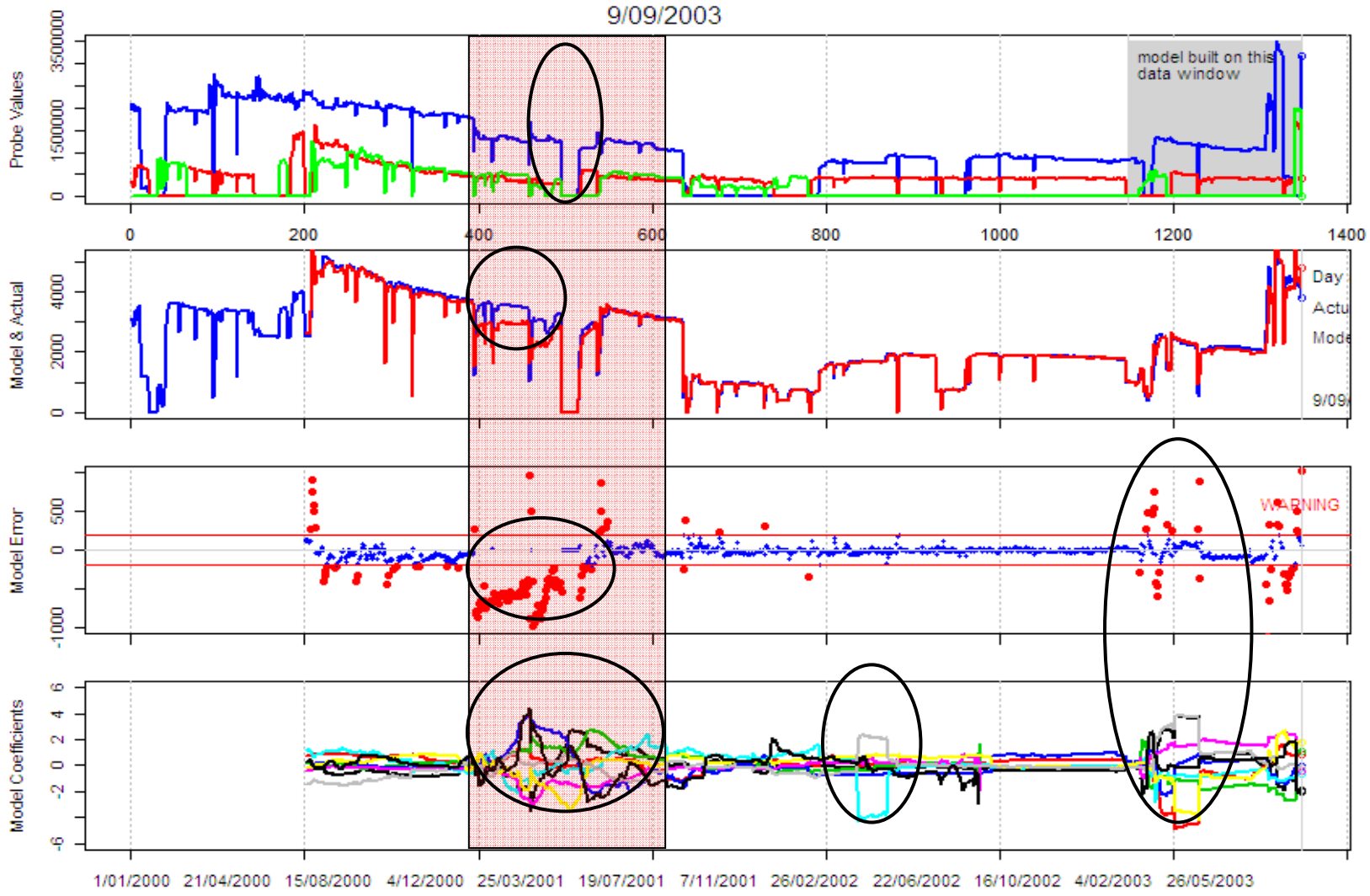
- Volume is growing rapidly, engineers are drowning in data
- Our focus has to be on exceptions
- Smart surveillance and analytics need to be part of the new engineers toolkit
- Using history to predict the future, model driven analytics
- Upstream systems are demanding consistent and verified values
- Change management is paramount

Current Initiatives – Data Driven Model Based Predictive Analysis
(a window on Real Time Analytics)



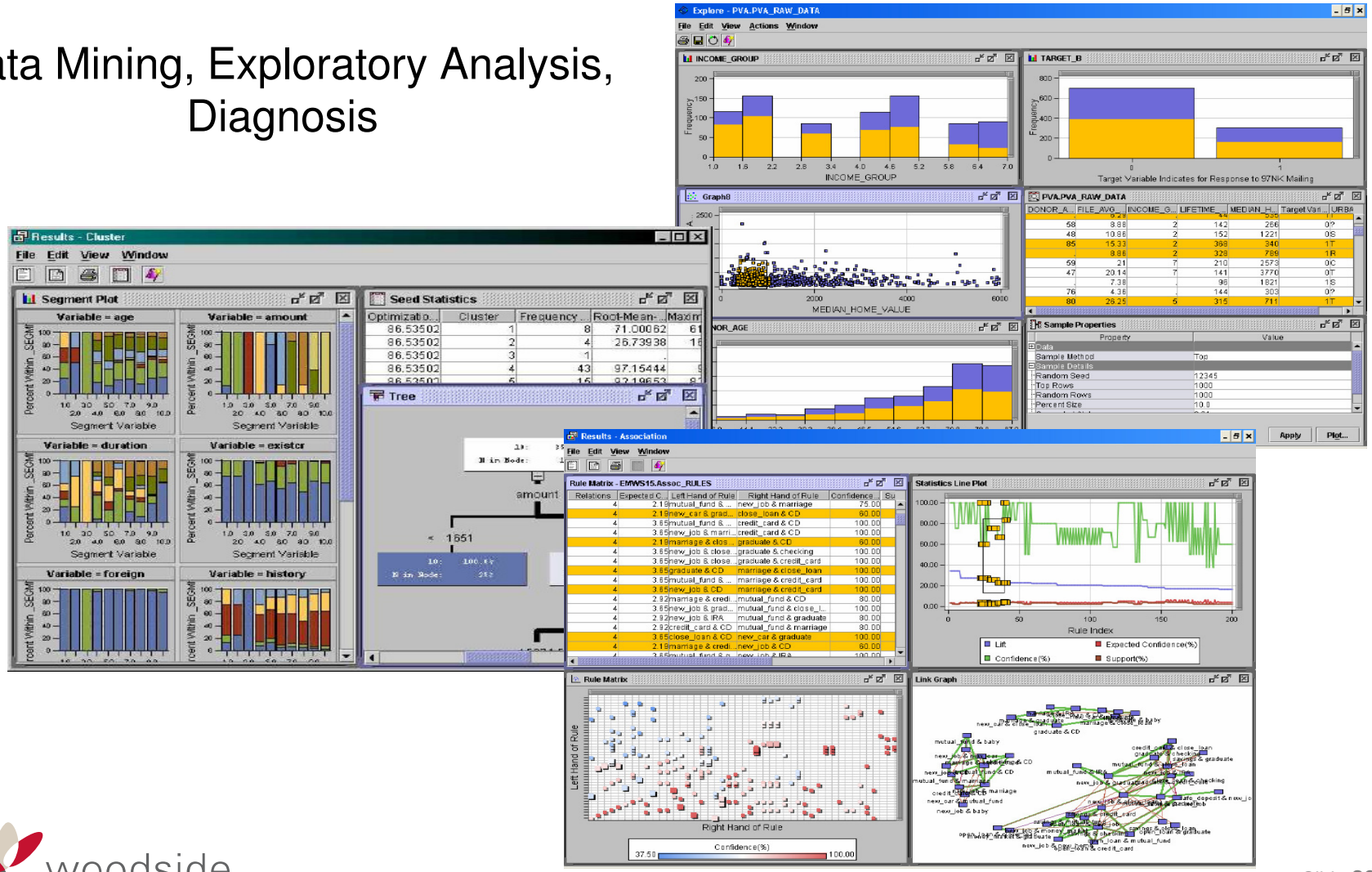
Current Initiatives – Data Driven Model Based Predictive Analysis

(what it tells us) Historical View



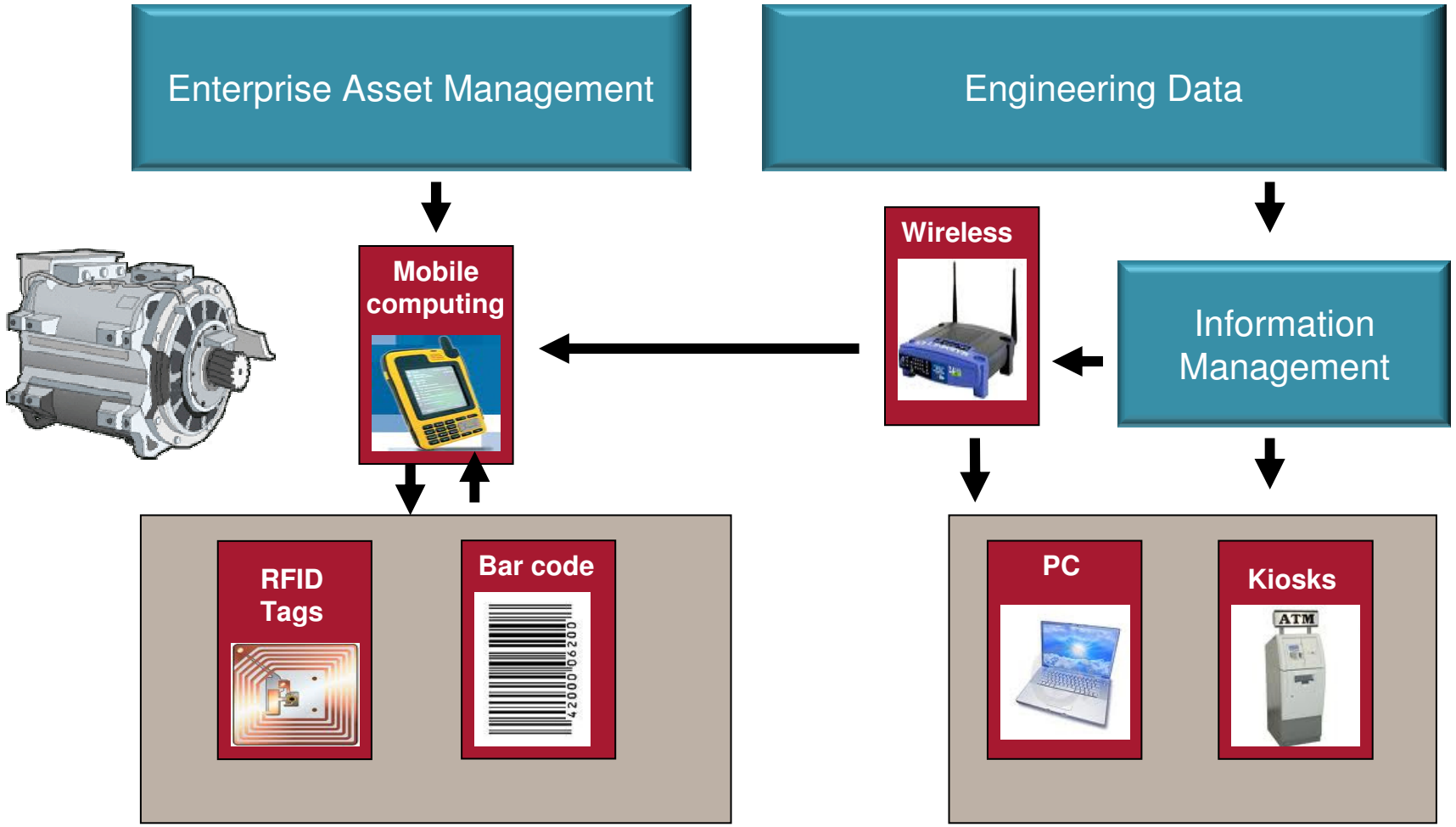
Current Initiatives – Predictive Integration of Real Time Data

Data Mining, Exploratory Analysis, Diagnosis

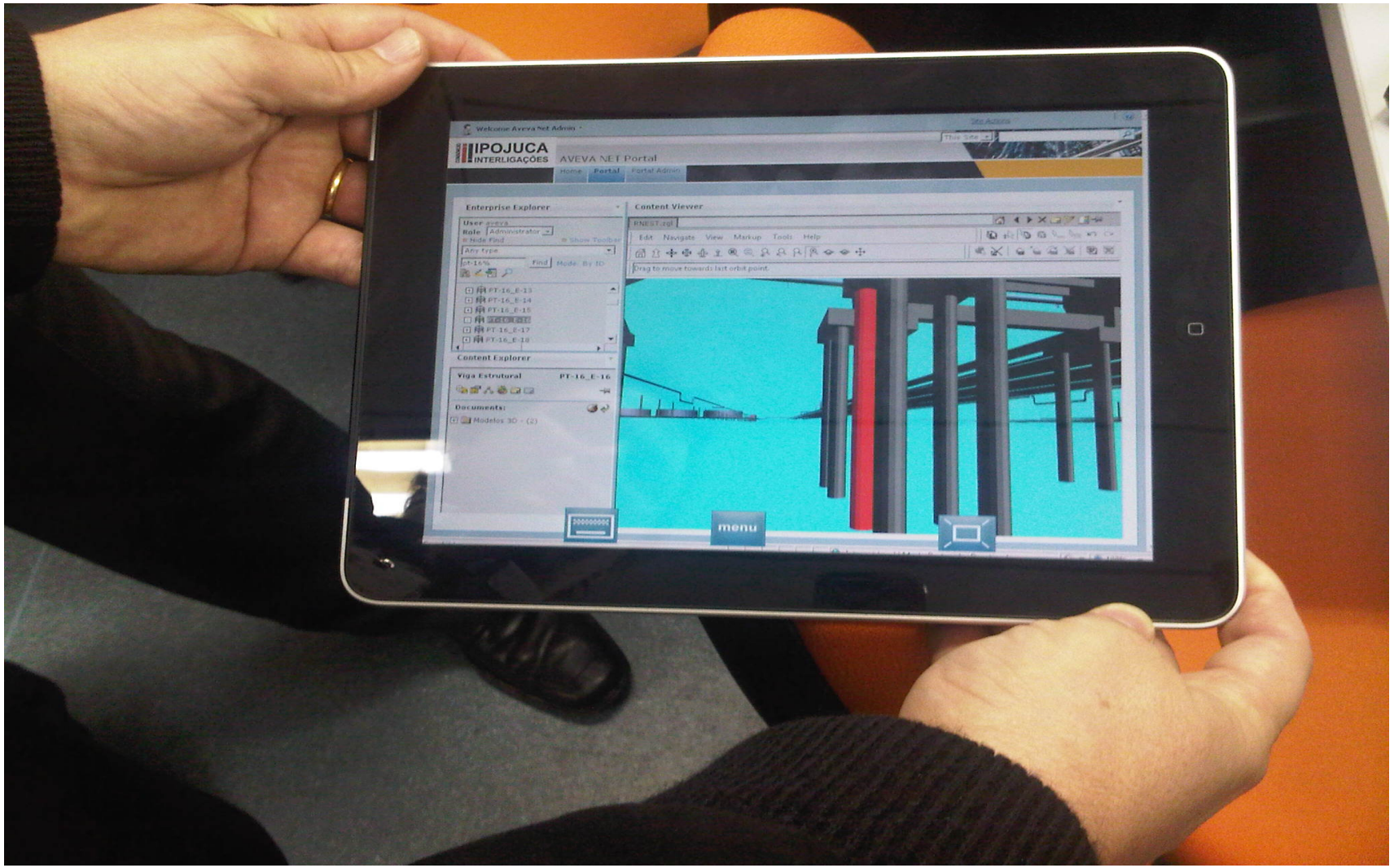


Current Initiatives - 3D Plant walkthrough for Operator Training

Current initiatives - Mobile computing on the move



It does work today



But we want more

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Questions!