



**Building a sustainable fully  
digital operational plant  
utilising ISO 15926**

**Richard Harris**  
October 2010



## Disclaimer and important notice

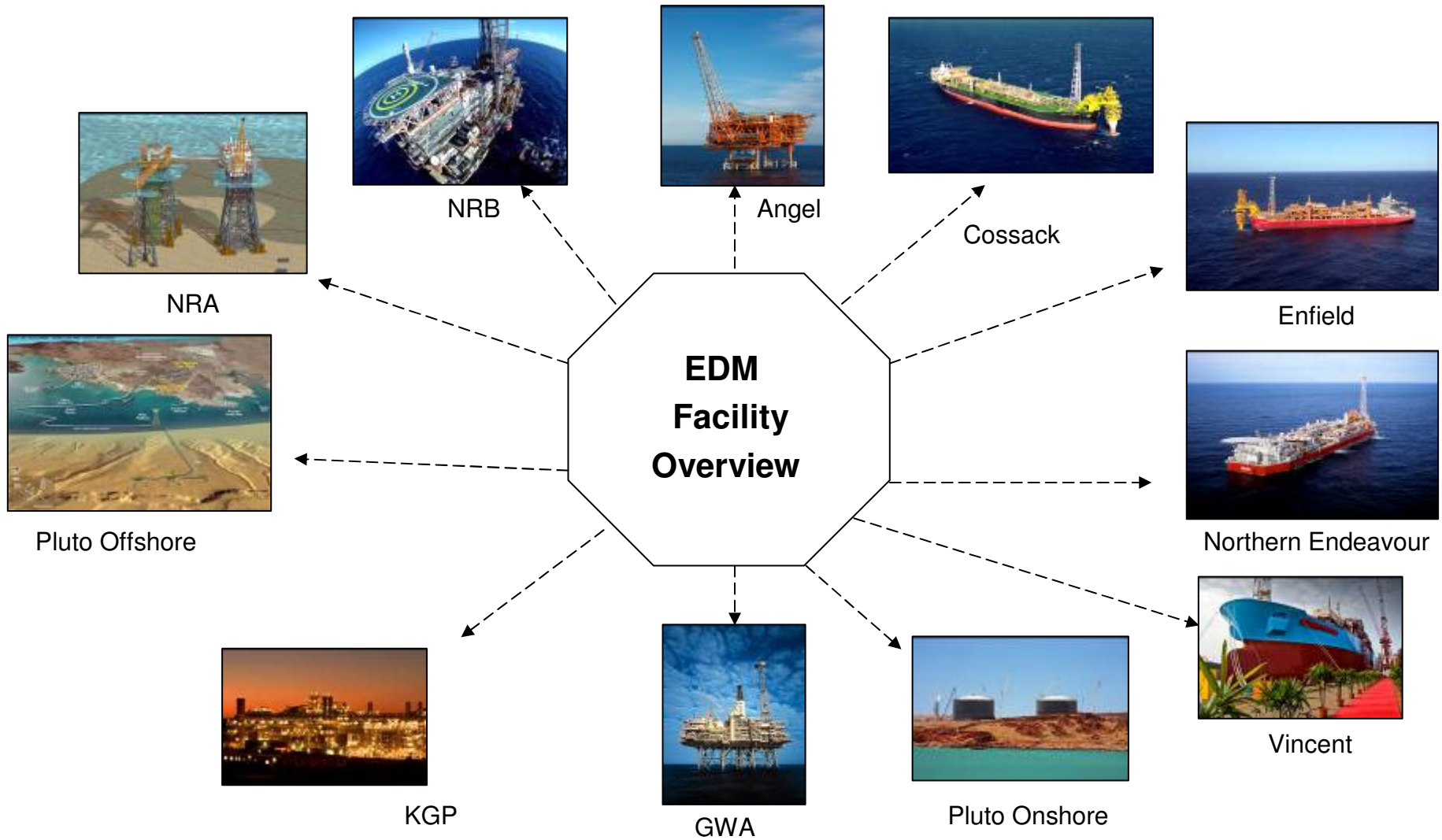
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This presentation contains forward looking statements that are subject to risk factors associated with oil and gas businesses. It is believed that the expectations reflected in these statements are reasonable but they may be affected by a variety of 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

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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 ?

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**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.

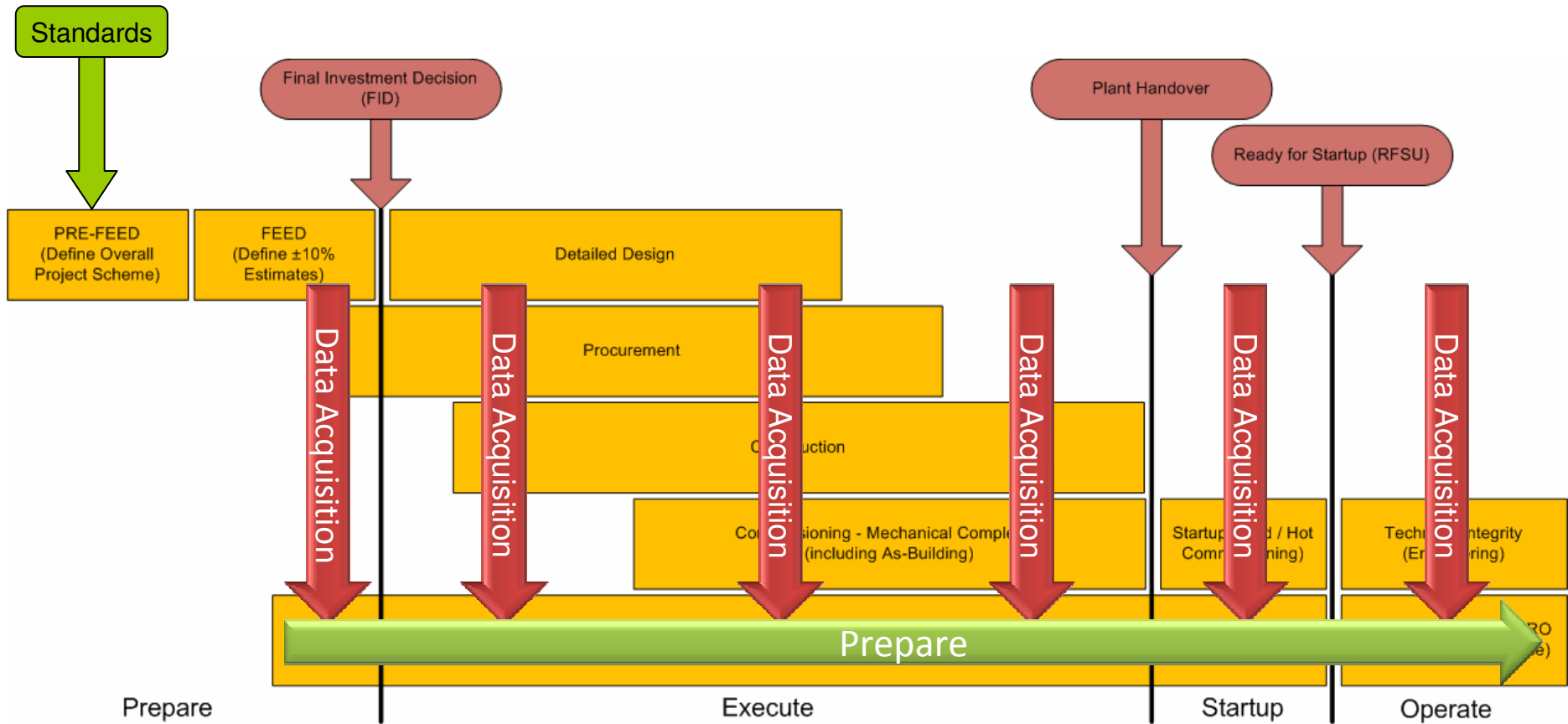
**Complexity** – old data has to be merged and managed with new data. New facilities have to fit in with older facilities. Increased margin for errors in data integrity due to complexity of data relationships

**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





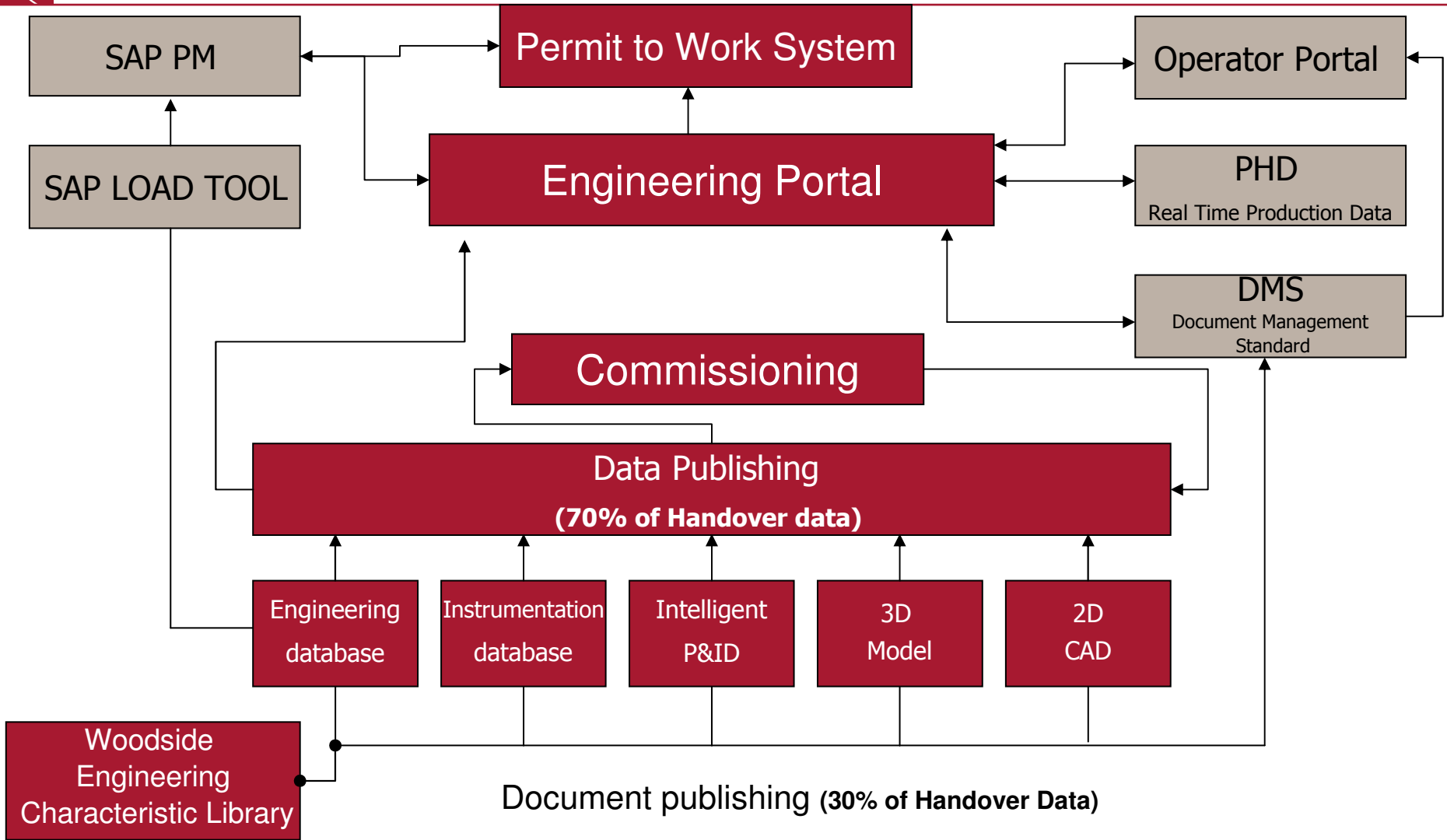
# What Benefits are derived from adopting ISO 15926

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- 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

Production Division - Microsoft Internet Explorer provided by Woodside Energy Ltd.

Address: http://connect/organisation/ProductionDivision/Pages/default.aspx

Corporate | Woodside Management System | Organisation | Applications | My Department

Production Division

Content Custodian: Santostefano, Vince V.  
Content Manager: Oaler, Helen H.  
Site Feedback: Please complete form

Classification: Restricted  
Last Updated: 09/06/2009

Message Box

**Technical Integrity Awareness**

I am pleased to inform that a self-learning and assessment tool has been developed to enhance awareness on Technical Integrity amongst our staff in the Production Division. In addition to what, why & how of the Technical Integrity, this learning module cover what role you play in the management of TI.

This on-line training will be made available very soon with instructions from your manager. I encourage you to take up the training & assessment at an earliest opportunity.

**Production Integrity Awareness**

Facility: Angel

Virtual Bookshelves

Facility Server | Perth Server

Quick Links

- Engineering and Technical Standards and Guidelines
- Reporting and Monitoring
- ALIS Engineering Data
- Production Processes
- See (BabelFish) - Process Monitoring
- Health and Safety Homepage
- IS&OH (Surpass)
- Budget & Business Planning Timeline
- Strategic Technology Plan

Production Status

Production Status - May 2009

Actual Production:	5.84 MMboe
Forecast Production:	7.27 MMboe

Note: Golf is latest full day data available, Otway is the VIC Control day.

**Production Division**

For Wednesday 1st July

Facility	Product	Target	Actual	Δ%
MWS	LNG (tonnes)	42.05	44,109	2,051
	LPG (tonnes)	2.53	2,334	-201
	Domgas (t/s)	54	678	38
Condensate (bb)		131.55	137,650	5,172
	Oil (bb)	42.81	44,252	
Northern Endeavour	Oil (bb)	13,22	13,405	182
	Oil (bb)	31.03	33,584	2,551
Nganurra	Oil (bb)	29.07	27,306	-1,766
	Domgas (t/s)	13	143	3
Otway	LPG (tonnes)	2	207	3
	Condensate (bb)	1.5	2,121	572
<b>Operated Total (boe)</b>		<b>773.2</b>	<b>885,614</b>	<b>32,424</b>
Mutineer Exeter	Oil (bb)	18.04	11,470	-6,576
	Oil (bb)	32.0	32,611	522
Gold Shelf	Net (boe)	12.49	12,385	-107
Gold Neptune	Net (boe)	16.39	16,361	-2,052
Gold Power Play	Net (boe)	8.54	8,669	120
<b>All Facility Total (boe)</b>		<b>866.7</b>	<b>885,158</b>	<b>30,433</b>

Engineering and Technical Standards and Guidelines - Restricted External Explorer provided by Woodside Energy Ltd.

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This on-line training will be made available very soon with instructions from your manager. I encourage you to take up the training & assessment at an earliest opportunity.

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WOODSIDE Process Library

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**Process Library**

Facility: Angel

Virtual Bookshelves

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ALIS Asset Lifecycle Information System

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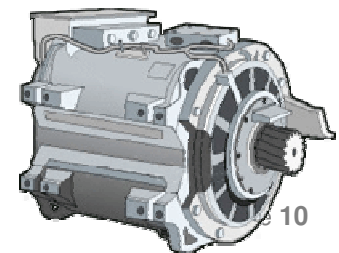
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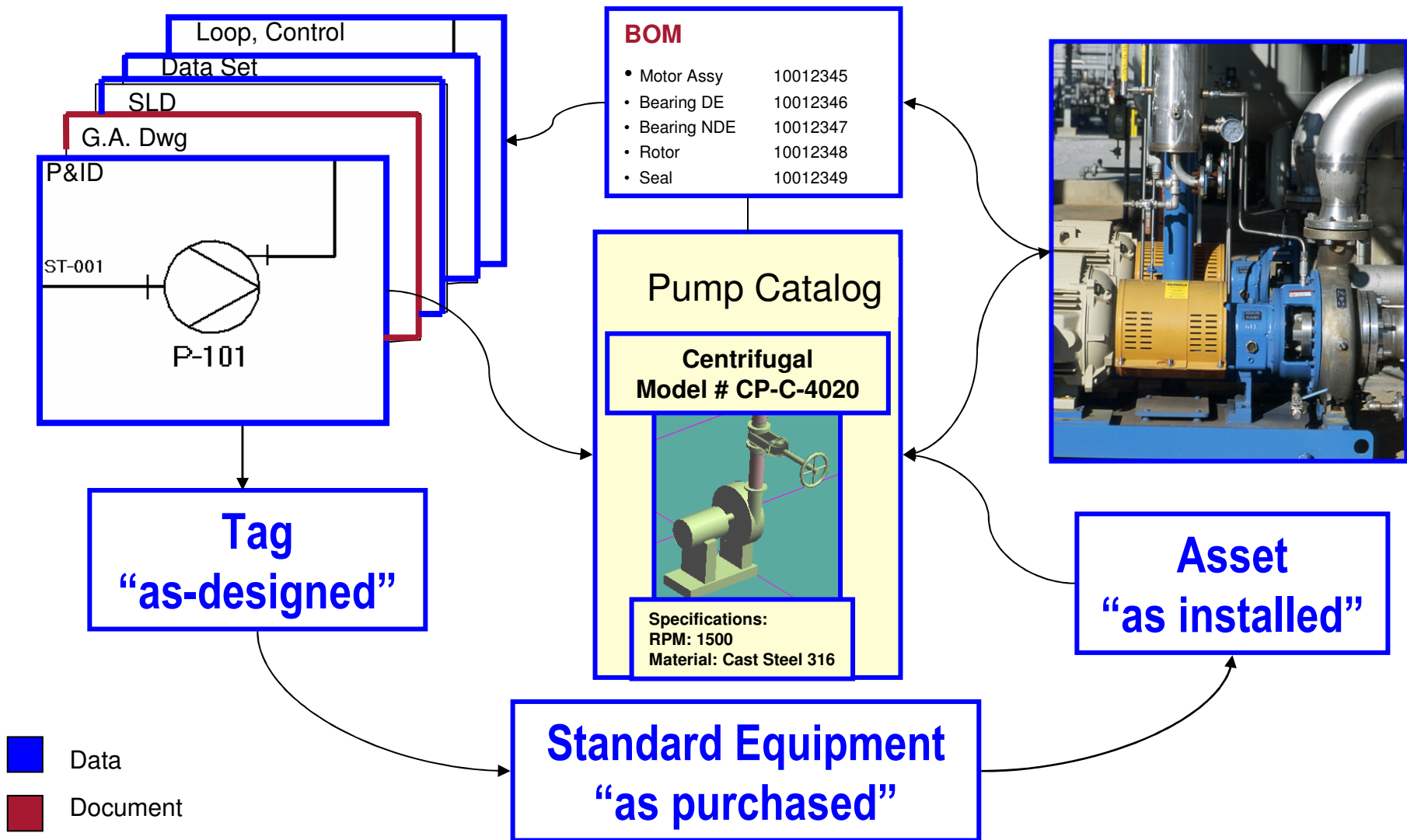
# Who defines and manages digital plant today, it is not just Engineering

	<b>Engineering</b>	<b>Maintenance</b>	<b>Materials Management</b>	<b>Operations</b>
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:	<ul style="list-style-type: none"> <li>• Connectivity within the process</li> <li>• Design specifications</li> </ul>	<ul style="list-style-type: none"> <li>• Design Specifications</li> <li>• How it has been Operated (actuals)</li> <li>• Maintenance History</li> </ul>	<ul style="list-style-type: none"> <li>• Manufacturer Specifications</li> <li>• Elements defined and managed</li> </ul>	<ul style="list-style-type: none"> <li>• Overlaying Process Model with Controls Model</li> </ul>
Key elements defined and managed:	<ul style="list-style-type: none"> <li>• P&amp;IDs,</li> <li>• Mechanical model</li> <li>• Instrument model</li> <li>• Electrical model</li> </ul>	<ul style="list-style-type: none"> <li>• Functional Locations</li> <li>• Work definition and execution</li> <li>• Cost allocation</li> </ul>	<ul style="list-style-type: none"> <li>• Item No</li> <li>• Price</li> <li>• Lead Time to source</li> <li>• Usage Patterns (for Stocking / Reorder Options)</li> </ul>	<ul style="list-style-type: none"> <li>• SCADA Tags</li> <li>• DCS Model</li> <li>• Measuring Points</li> <li>• Isolation Points (iSSoW)</li> </ul>
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 !!



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





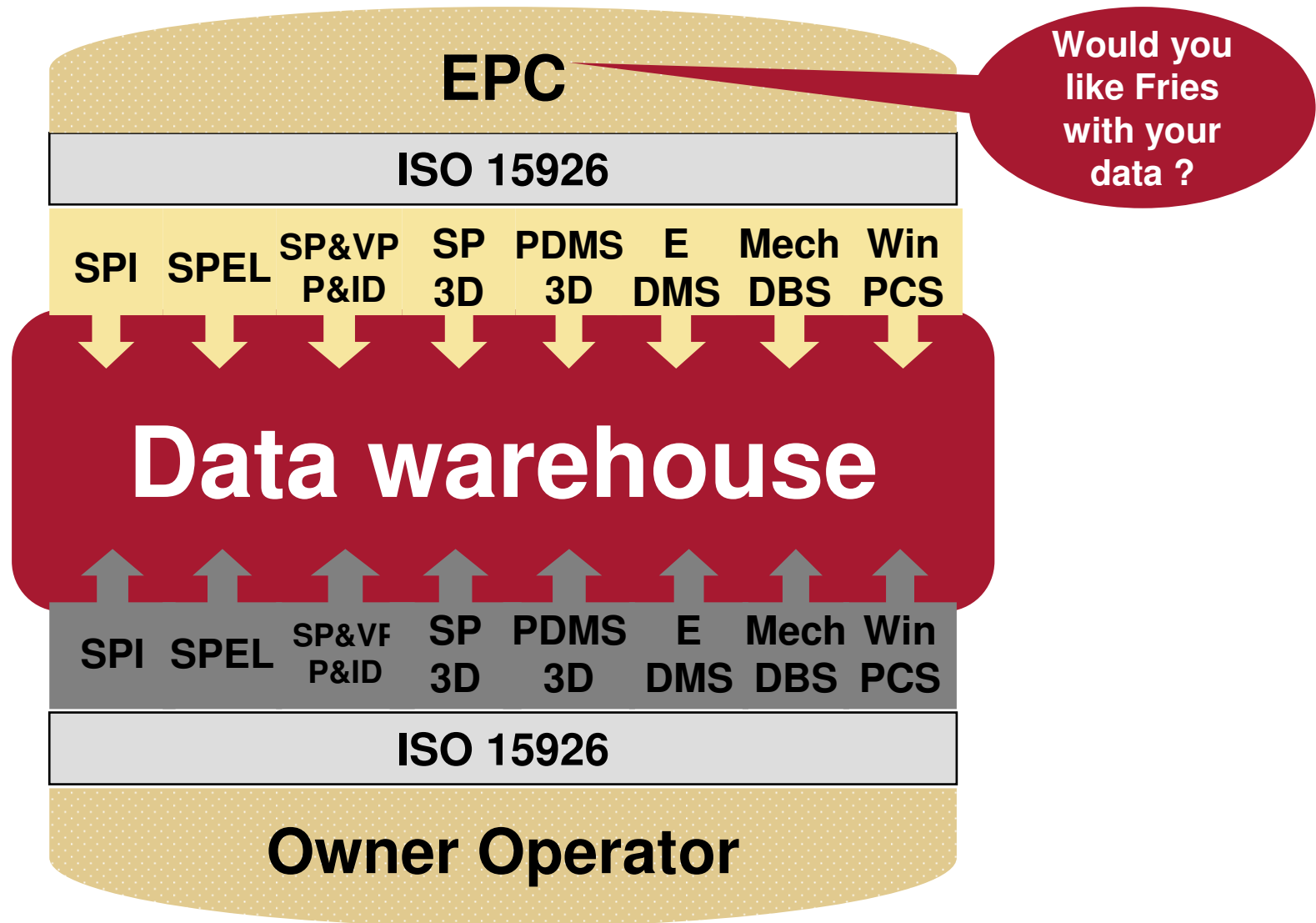
## Why focus on common standards ?

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- 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 !

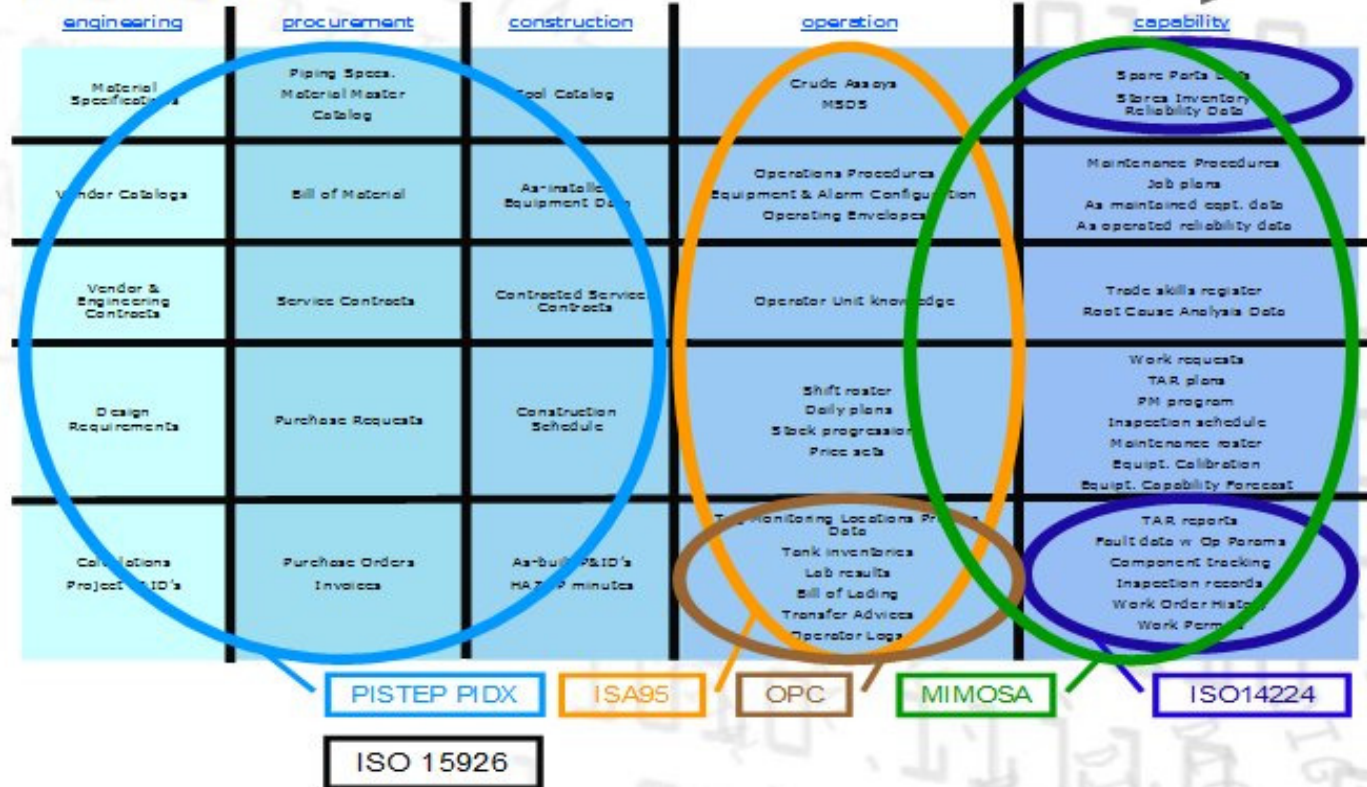


# What standards?

Reproduced with permission from BP

## bp data model map

plant lifecycle



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



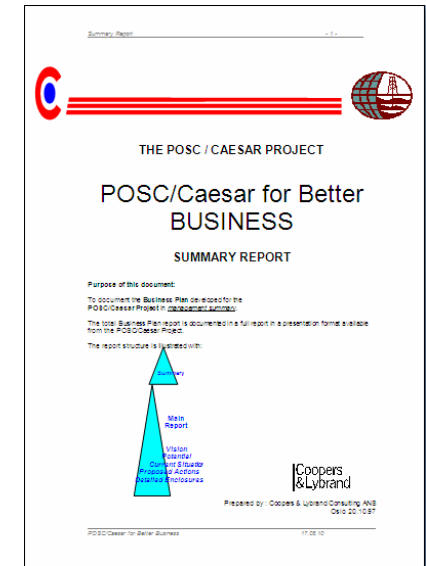
# Industry Research - Benchmarking Against Industry Offshore Oil & Gas Asset Lifecycle

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

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





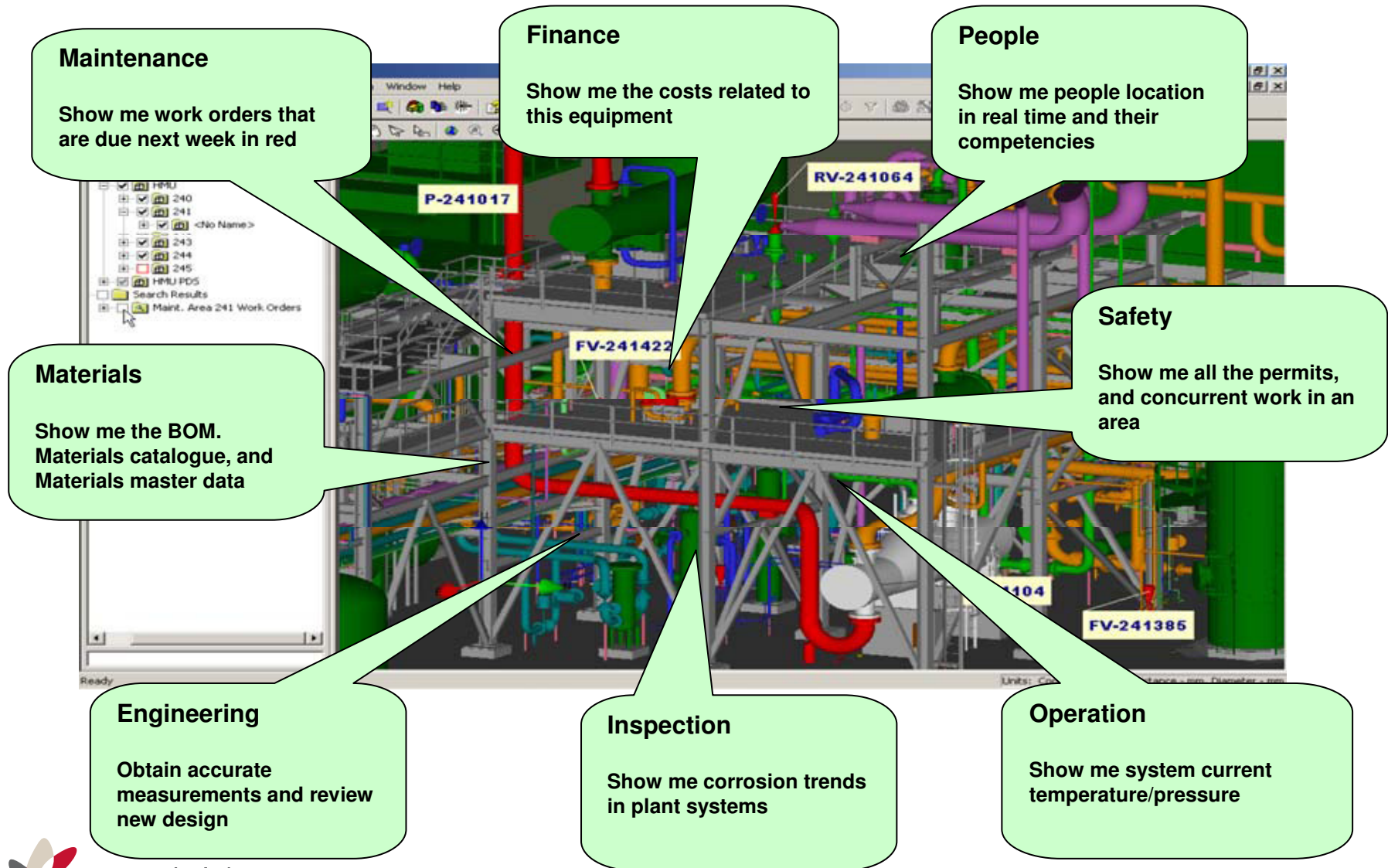
## What Benefits are derived from adopting ISO 15926

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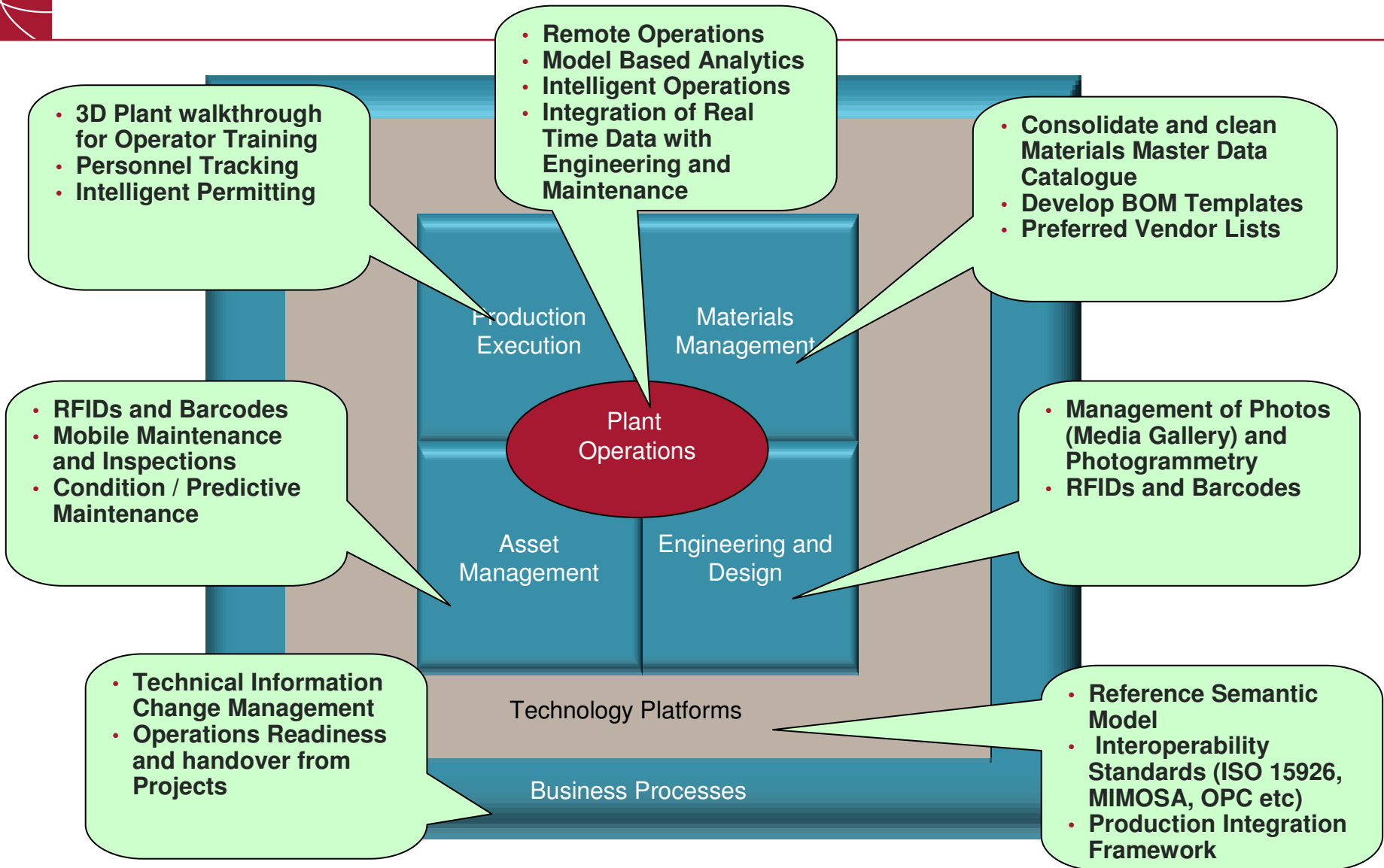
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# The value of digital plant – the end goal



# Taking us there – Current initiatives





From theory to practice ...

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# A Sample of Current Initiatives

# Current projects - Media gallery

Karratha Gas Plant > ALIS Portal > Portal

**Enterprise Explorer**

User woprh5  
Role VNET User

Hide Find Show Toolbar

Any type

2KT1420 Find Mode: By ID


Search Results

- 2KT1420
  - Battery - (1)
  - Bottle - (1)
  - Burner - (1)
  - Exchanger - (3)
  - Fan - (2)
  - Filter - (6)


**Content Viewer** Media Gallery

Home Page

**2009 Major Shutdown**




HP Rotor Overview




LP Blade Section


**Tag: 2KT1420**




Stage 1-4 HP Blades




LP Stator Blades




Guide Van Pins




LP Rotor Section




HP Rotor - N D E



LP Rotor in Situ




Stage 5-11 HP Blades




LP Rotor Shaft & Brg


**2009 Major Shutdown**




Active Thrust Pad Brg




Thrust Pad Normal v1




Thrust Pad T/C's 4Brg




Thrust Pad Normal v2




Thrust Ring Assy




Half Moon Thrust Pad




Thrust Pad Hot Spot1



Thrust Pad Carrier




Thrust Pad Hot Spot2




Thrust Pad Shoes


**2009 Major Shutdown**




HP Tilting Pad Brg 4U




Lifting Beam Install




HP Tilting Pad Brg 4L




Scaffolding Arrangement




HP Tilting Pad Brg 4L




Enclosure Scaffolding




Tilting Pad Assy Brg 4




Enclosure Scaffolding







Scaffolding Arrangement



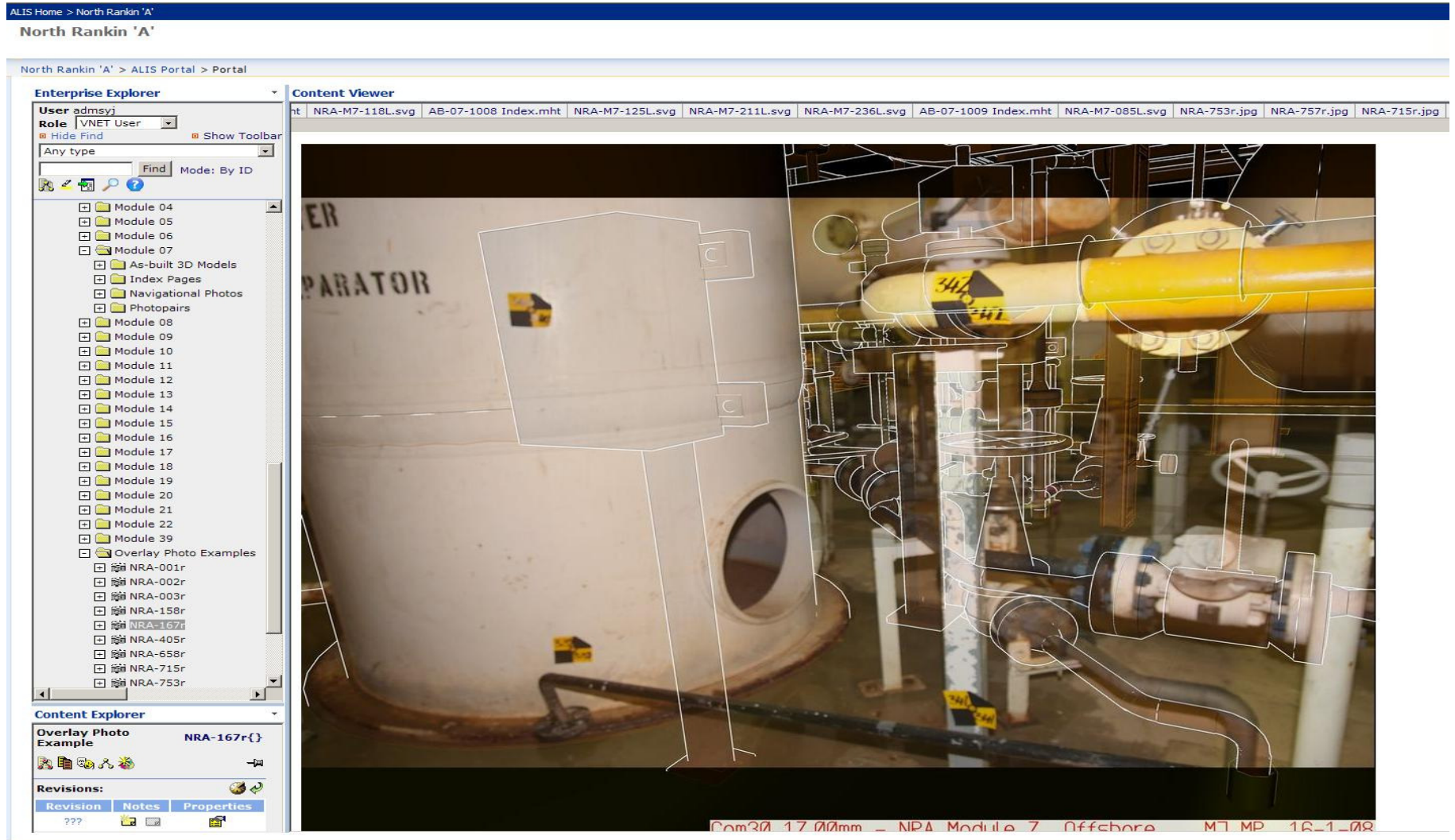
HP Stators Topside



-  Got a problem or issue with ALIS? Contact the [ITHelpDesk](#) for assistance: x84444.
-  Need help using ALIS, or want to find out what ALIS can do? See the [ALIS Help Page](#) for videos, how-to's and quick reference guides.
-  Something wrong with the info in ALIS, or can't find info that should be in ALIS? Contact the [ALISInformationCustodian](#) to report it.
-  See the [Production Division Homepage](#) for more information about Woodside's facilities & other information systems.



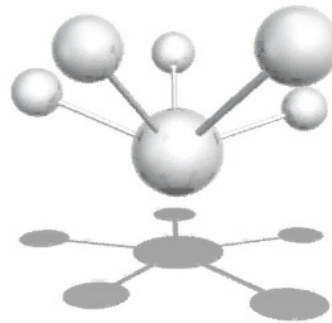
# Current projects - Photogrammetry Rejuvenation and Capital Projects



# Outdated hardcopy drawings or using photos...

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

## *Offset*



[www.offsetservices.co.uk](http://www.offsetservices.co.uk)

Karratha Gas Plant - Stabiliser 1 Unit



## Current Initiatives – Integration of Real Time Data

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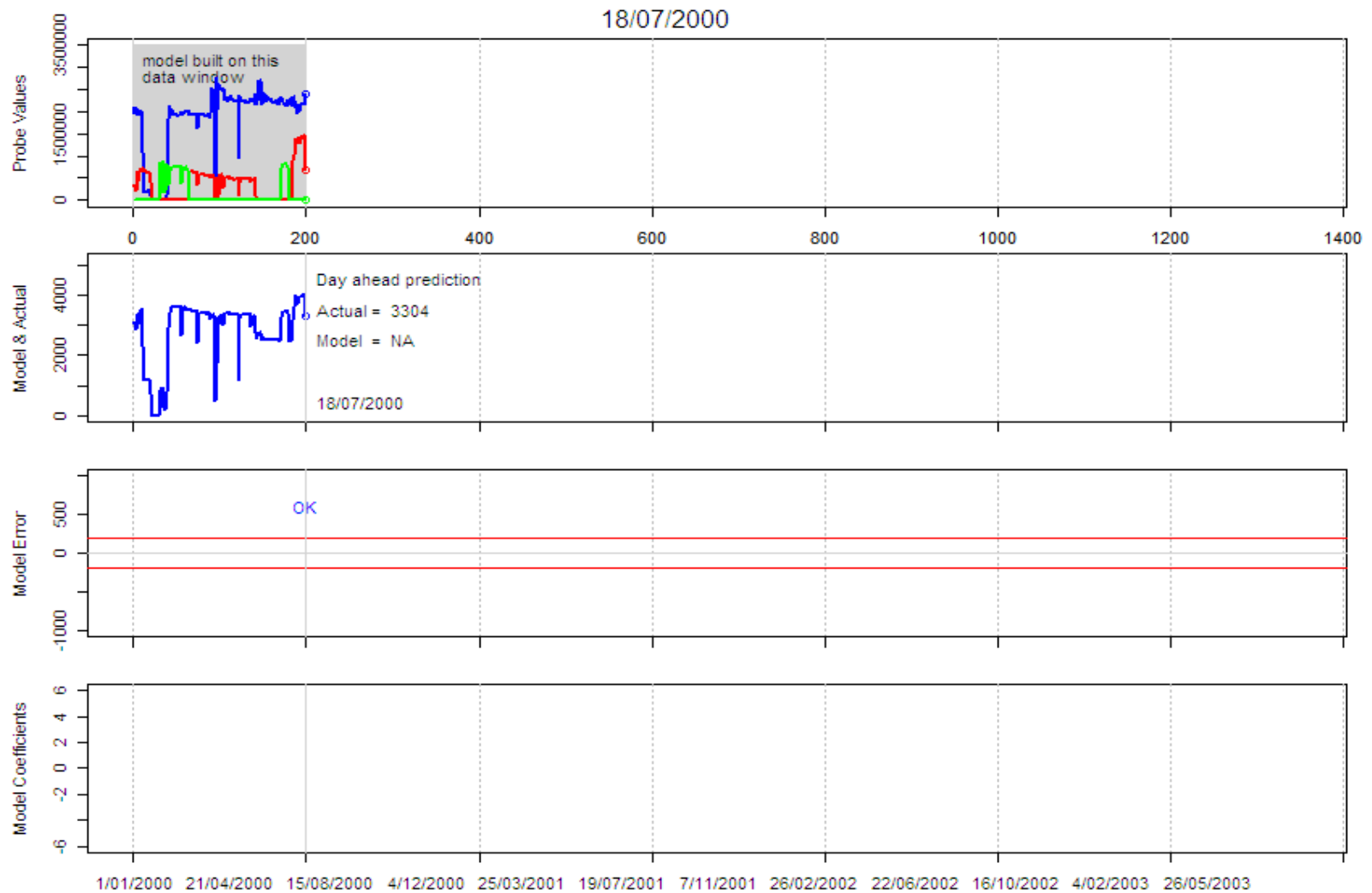
DCS installations on every facility, and nearly every unit, hundreds of thousands of process data tags

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



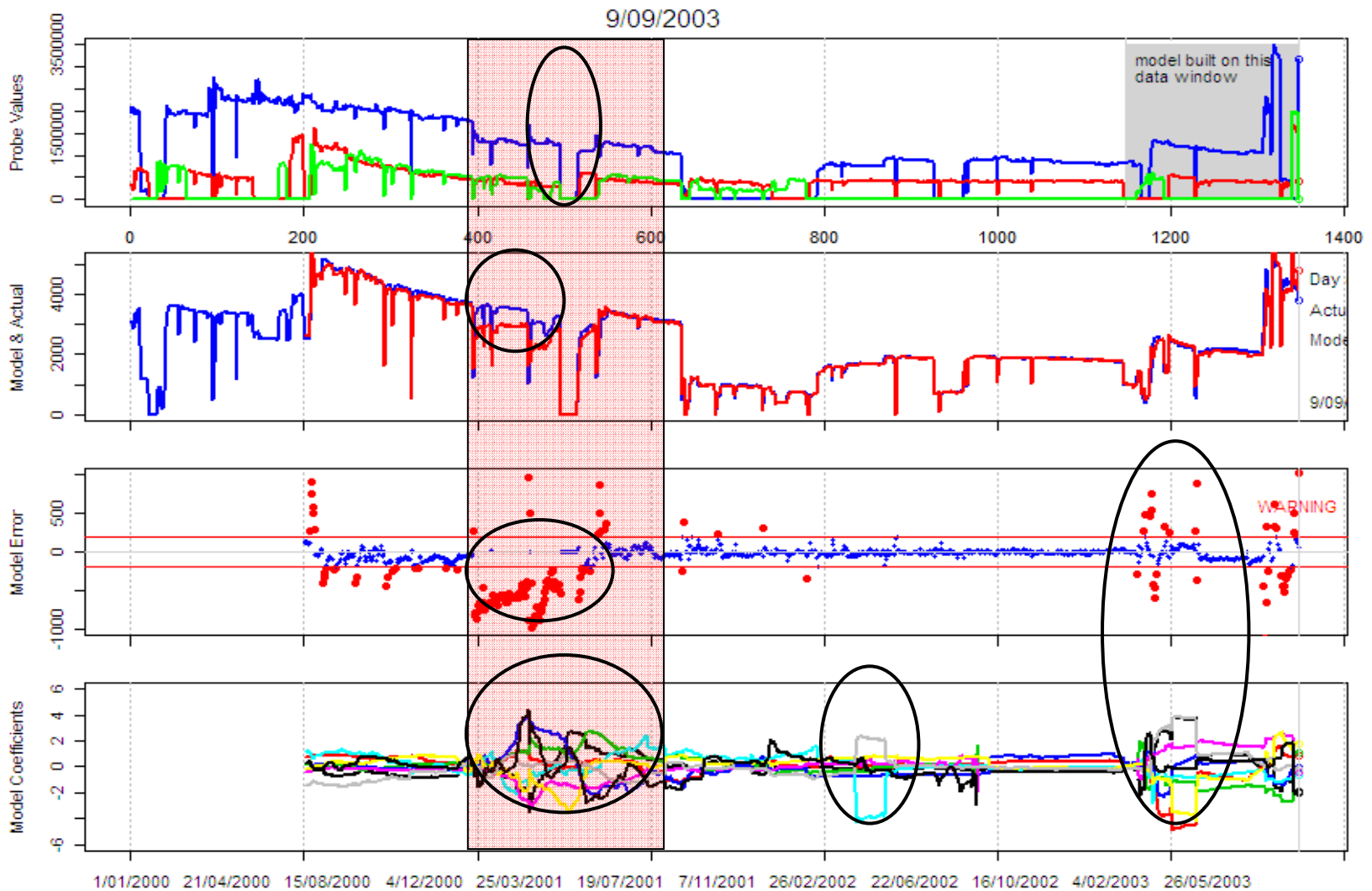
# Current Initiatives – Data Driven Model Based Predictive Analysis (a window on Real Time Analytics)





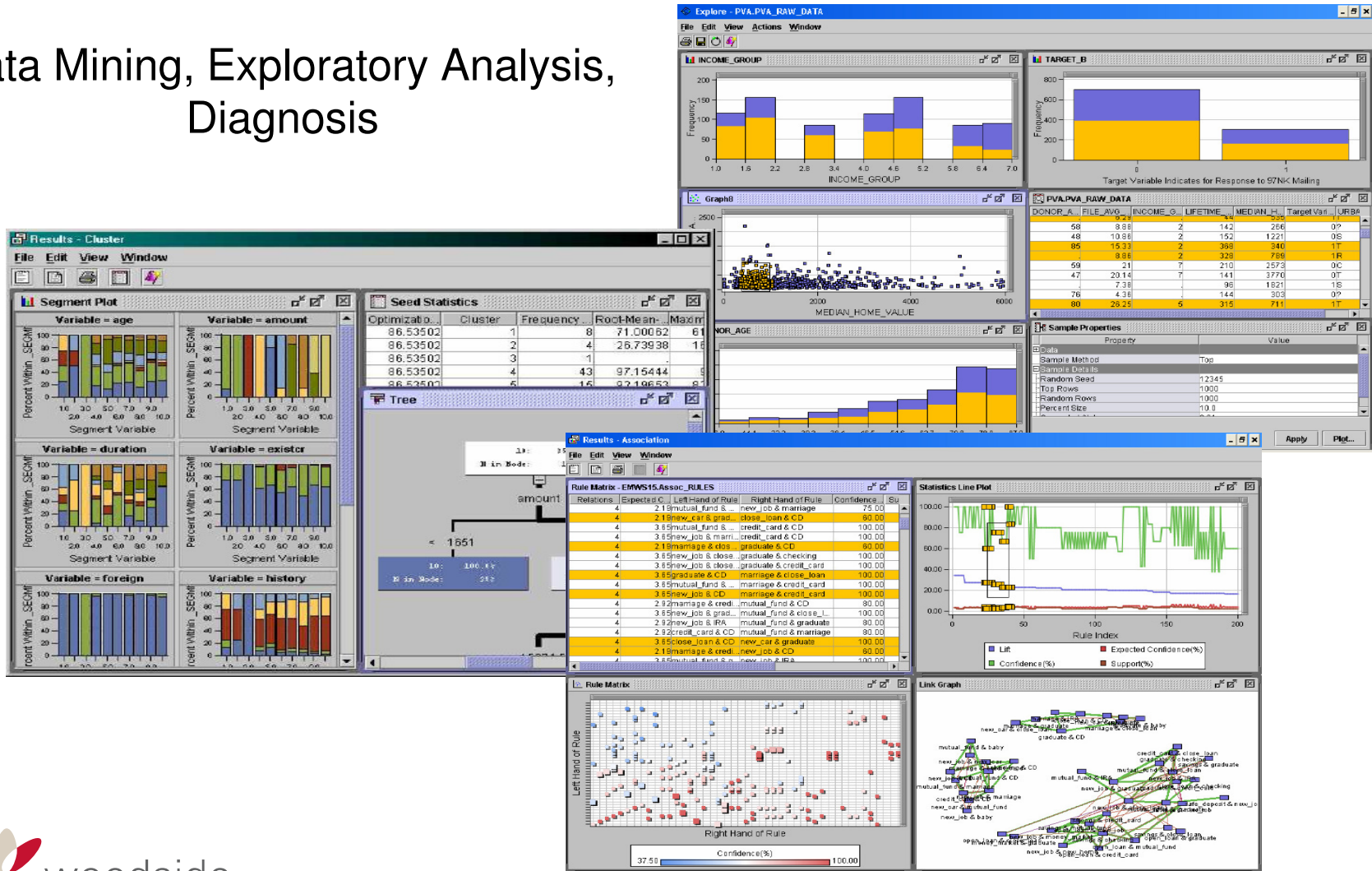


# Current Initiatives – Data Driven Model Based Predictive Analysis (what it tells us) Historical View



# Current Initiatives – Predictive Integration of Real Time Data

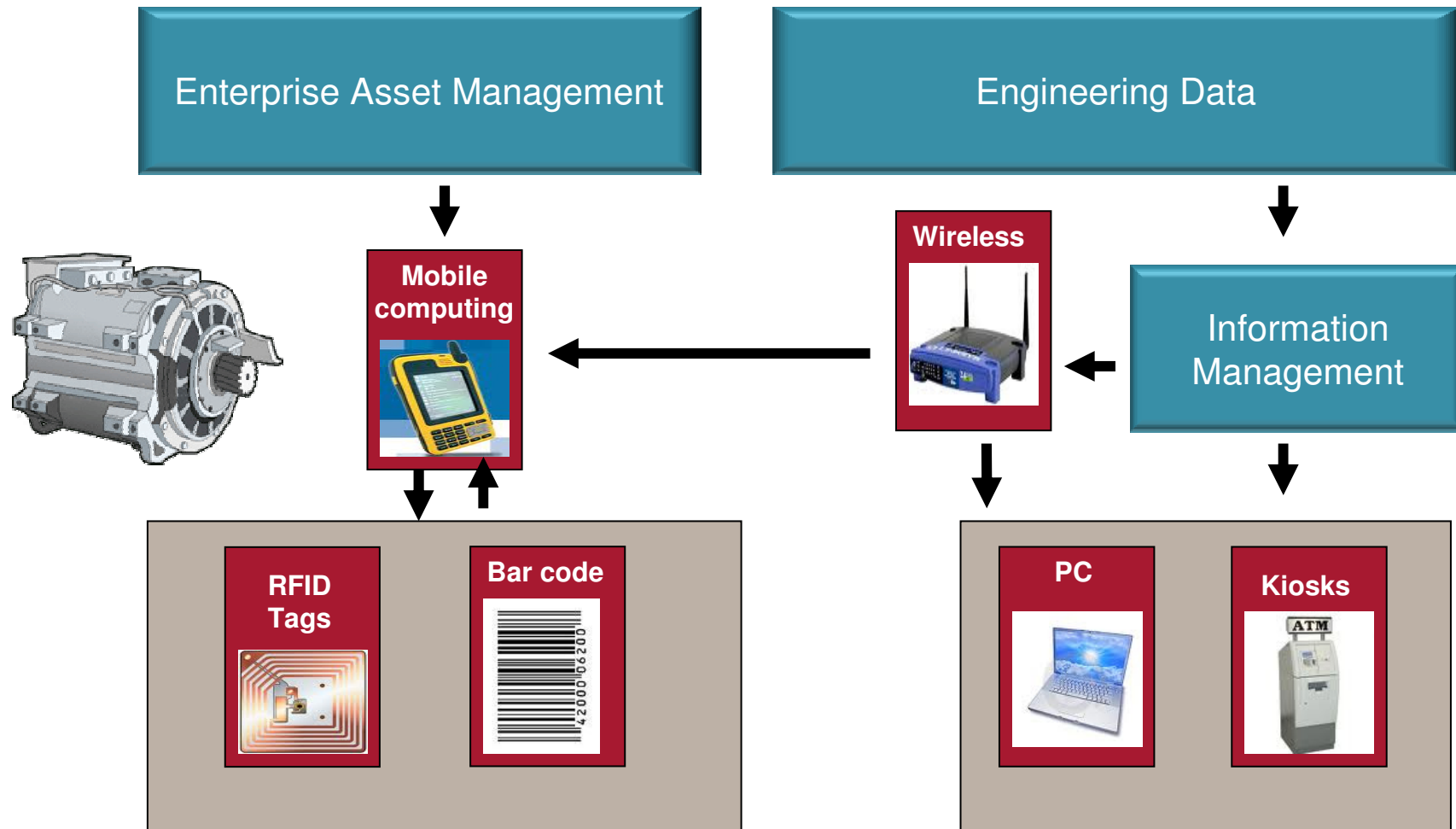
## Data Mining, Exploratory Analysis, Diagnosis



# Current Initiatives - 3D Plant walkthrough for Operator Training



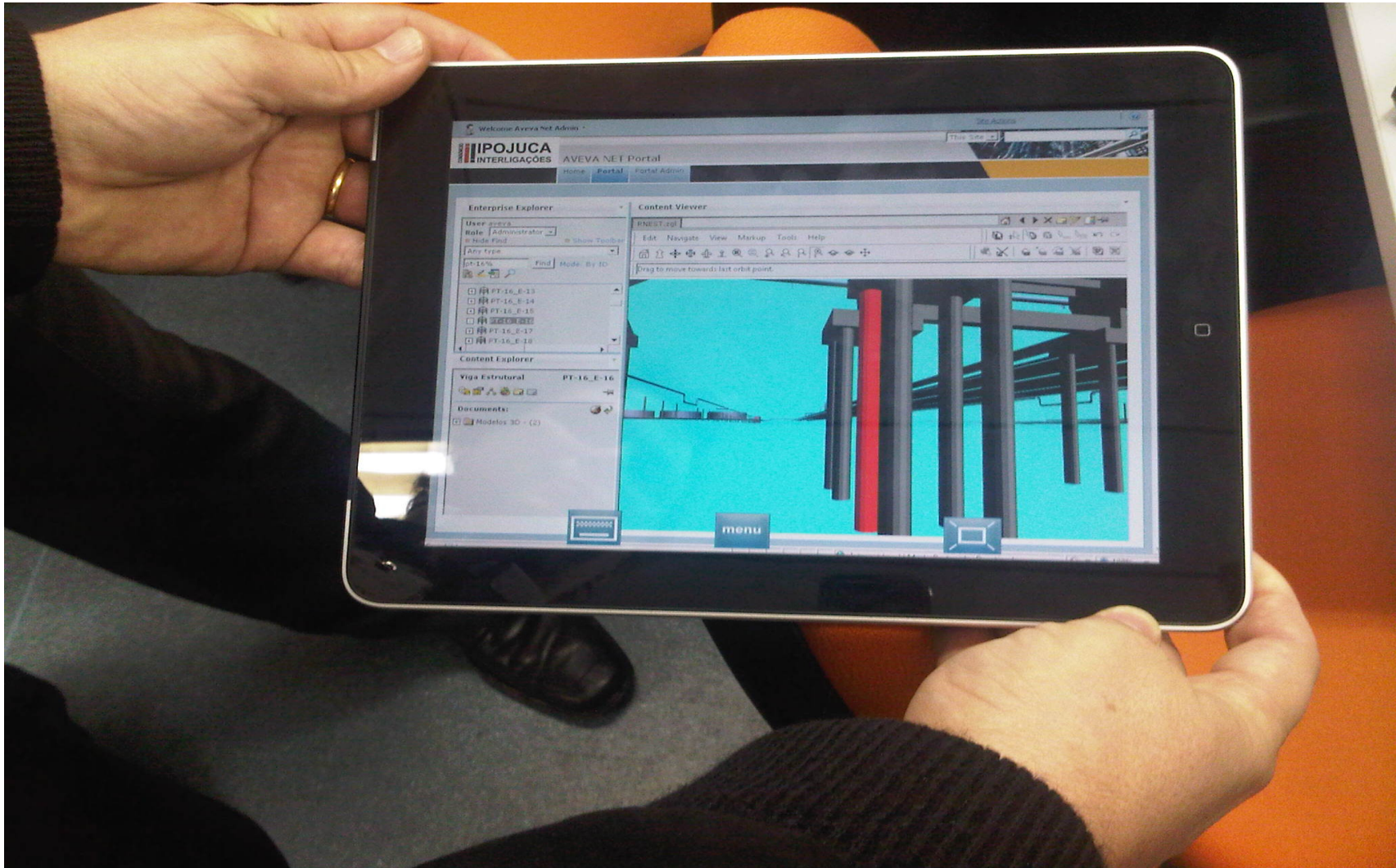
# Current initiatives - Mobile computing on the move







It does work today





But we want more





# Building a sustainable, fully digital operational plant utilising ISO 15926

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## Questions!