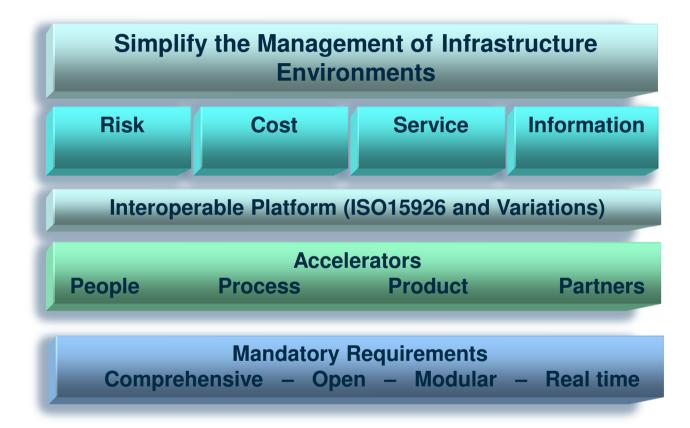


Ensuring Data Quality from Concept to End Of Life: PCA 2011

Brian Middleton– Industry Solutions Director AssetWise



Meeting Oil & Gas Business Requirements?







Bentley's participation in ISO 15926

- Active member of FIATECH and POSC Car
- Co-founder of FIATECH ADI Project
 Steering Committee
- Active part
 Solution and Avalon projects
- Ben 50 Juing participants on ISO 15926
- Ac __inplementing ISO 15926 and providing feedback to improve the standard



Technical Compliance

Technical Modelling & Mapping - PART 7 Semantic Precision			GUIDELINE Axes.	MATURITY CHECKLIST OPTIONS (Brief designation only. Refer to relevant guideline paragraphs.)		
Highest level of 15926:8 compliant AND	Technical	PART 7 Semantic	•			
Implementation - Referencing Technology Part 8 files only carry URI's Implementation - Interface Technology File Exchange and Part 9 SPARQL Compliant			AND			
Part 8 files only carry URI's Implementation - Implementation - Implementation - Interface Technology File Exchange and Part 9 SPARQL Compliant		Representation		f 15926:8 compliant		
Part 8 files only carry URI's AND			AND			
Implementation - Interface Technology File Exchange and Part 9 SPARQL Compliant		Referencing	Part 8 files only carry URI's			
Interface Technogy File Exchange and Part 9 SPARQL Compilant			AND			
AND			File Exchange and Part 9 SPARQL Compliant			
			AND			



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Business Capability

Industrial Standardization Level	4.1.4	OpenPlant is compliant with all levels
	AND	
Domain / Payload Subject atter cope Change Management	BIDG AND	Undefined but Bentley are working to set the standards and will be compliant with the NWR standard
Meta-Data Scope		Undefined : PowerPID would need an AssetWise eB deployment to meet this requirement
	AND	
Change Management Functional Capability	4.1.3	Comprehensive compliance with additional capability when deployed with complimentary Bentley capabilities
	Domain / Payload Subject attent cope Change Management Meta-Data Scope Change Management Functional Capability	AND Domain / Payload Subjec' latter cope Change Management Meta-Data Scope AND Change Management Functional Capability AND 4.1.3





Key Drivers in Oil& Gas

- 1. Faster start-ups for projects = \$\$\$
- 2. Shortage of engineering skills and Ageing workforce
- 3. Remote sites/difficult construction sites
- 4. Smart data handover just starting to take hold
- 5. Access to accurate data, quickly for regulatory compliance

Flexibility and scalability in systems





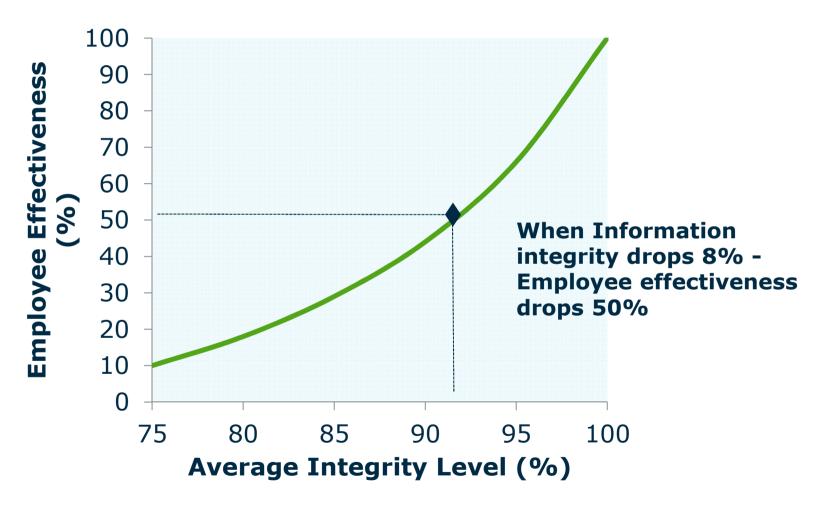
Common Oil and Gas Management Issues

- Accuracy of project and operational information
- Difficulty with communications and collaboration across all participating organisations
- Difficulty in enforcing governance
- Need evidence that processes are in compliance
- Difficult to share experience and best practices
- Schedules are slipping
- Inefficiencies on projects
- Need to reduce rework





Poor Asset Information is Expensive



Source: ICM





U.S. Department of Commerce **Technology Administration** National Institute of Standards and Technology Advanced Technology Program Information Technology and Electronics Office Gaithersburg, Maryland 20899

Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry

40% of engineering time is spent locating & validating information

Poor communications between people and systems wastes 30% of project costs

The delivery of reliable data defining the asset upon completion can deliver a saving in O&M cost of 14% per annum.



Cost of Deficient Collaboration and Standards

UK



UK Government construction capital expenditure per annum is £60bn. £10-20bn of waste. Target: 10% saving

USA



US Capital Facility construction

wasted \$15.8Bn per annum due to poor interoperability EU



European
Construction
Institute 2003 says
non-quality in
European
construction
represents €80bn of
waste per annum.



Some common causes...

Delivery

- Difficulty locating data
- Incomplete information
- Incorrect version of data
- Design changes / re-work
- Late detection of clashes / anomalies
- Difficult team co-ordination

Operation & Maintenance

- Ownership of asset data
- Incomplete / inaccessible data
 - Physical
 - Contextual





Why This Happens – The Change Factor

- Multiple Systems ERP, WBS, CAD, etc
- Operating in Silos
- Minimal Integration No communication of change between apps





Why This Matters

Deepwater Horizon Oil Spill - Configuration

"... BP engineers tried to activate a piece of safety equipment but failed because the device had been so altered that diagrams BP got from the equipment's owner didn't match the supposedly failsafe device's configuration..."

2008 - Aracoma Coal Company fined \$4.2 million

2009 – Inaccurate calibrating of methane monitors

Only one third of companies involved in major construction projects worldwide delivered 80% of their projects on time,

-KPMG 2008 global construction survey.



What is AssetWise?

AssetWise

is a operations information modeling platform for delivering asset lifecycle information management to operators of infrastructure assets...



a suite of interoperable applications and on-line services to improve the lifecycle management, operational performance, safety and compliance infrastructure assets.



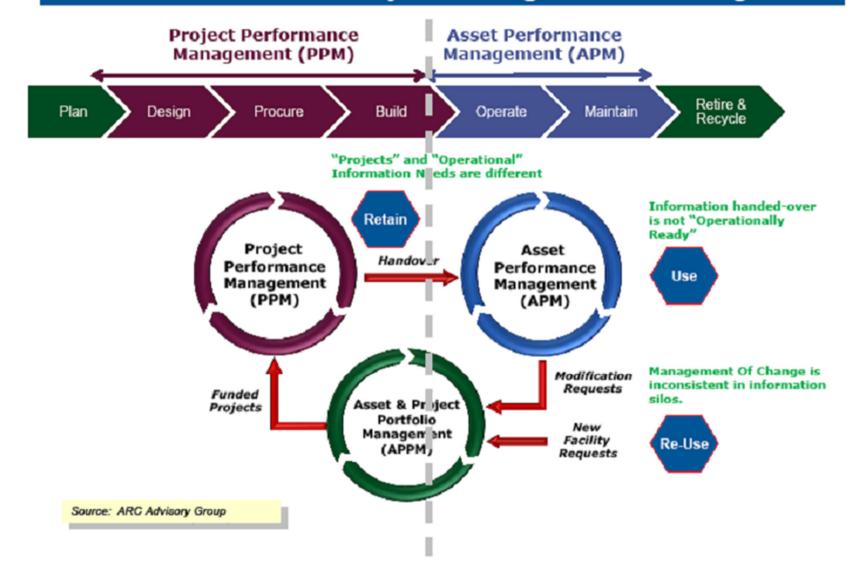
© 2010 Bentley Systems Incornorated

Asset Lifecycle Information Management Maturity

Operational Exellence	Level 1	Level 2	Level 3	Level 4	Level 5
Management Approach	Hands Off Accept what EPC Provides	Projects Define handover requirements	O&M aid Handover requirements	Enforce MoC processes & Audit content	Understand & endorse ALIM Policy
Work Processes	Little of No processes	Partially follow processes	Fully Meet Processes	Continue to Improve Processes	Processes fully Integrated
Content Data & Docs	No Defined ALIM Content	Define ALIM in Standards	Standards are followed	Standards are Fulfilled & Audited	Trusted, Complete and compliant Content
Technology	Paper	Electronic Docs	Intelligent Design Db 2 /3D Models	Cross Ref Tags, Design Data, Docs, MDM	Integrated IAM, Single Access point
Organisation Support Team	Rely on Doc Control in each BU	Supplement Doc Control with Eng Design Team	Form Corporate ALIM Team – O&M Doc C, Projects	ALIM Team perform Audits	Fully integrated ALIM Team
Culture	Happy with Status Quo	Willing to change as required	Embrace Changes	Leadership by example, KPI's defined	Entrench continuous improvement



Asset Information – Life Cycle Management Challenges





Interoperable Information Management Platforms





Analyst Comments – 2010 / 2011

Enterprises seeking ALIM - MDM - EIM - of asset data capabilities:

Gartner

Gartner.

Include Bentley in your evaluations if you seek to govern and manage asset-oriented master data, especially if that data is both structured and unstructured. The industry-oriented focus of this offering offers greater capabilities than other MDM solutions focused on customers or products.

ARC Advisory Group

"With the new release of eB Insight, the market is finally getting what it has been looking for – Asset Lifecycle Information Management software that can address both operational optimization of asset performance and engineering content from modifications and upgrades to existing assets. This puts Bentley in the singular position of being able to improve infrastructure asset operations across the entire lifecycle

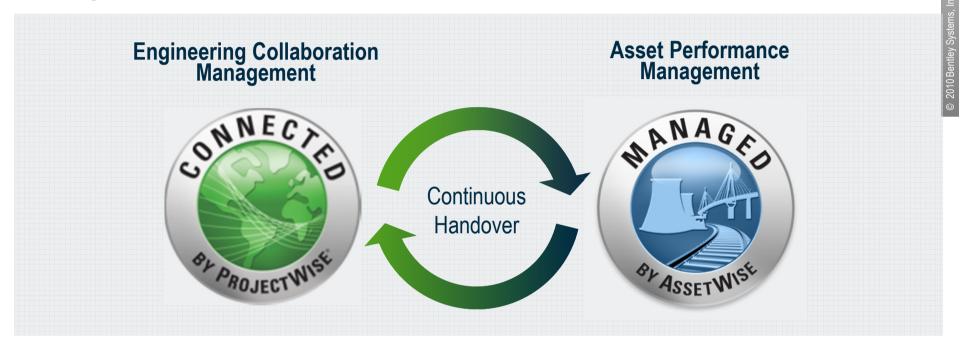
Ovum Butler Group

AssetWise, when combined with the rich product portfolio of Bentley's infrastructure solutions, enables a comprehensive asset information management solution that spans the lifecycle of infrastructure – design, licensing, construction, operations, maintenance, and eventually decommissioning.





Bentley's Solutions Span Project/Infrastructure Asset Operations



Bringing new assets on stream within cost, time, quality constraints

ProjectWise

Optimizing return on assets - ensure they perform safely and profitability

AssetWise





Enterprise Information Modeling

- Manages much more than documents...
- Relates structured and unstructured information
- Focuses relationships
- Records conditions, incidents and actions
- Captures, tracks and facilitates change
- Creates auditable sequences





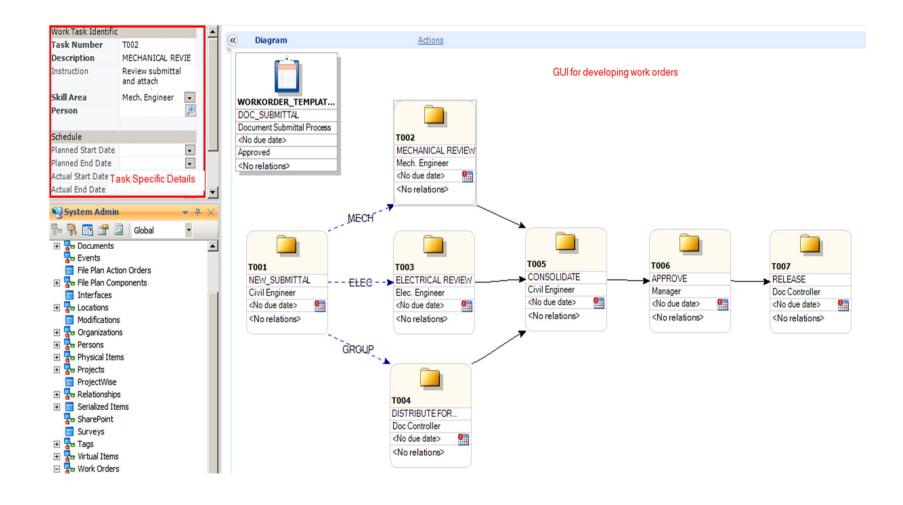
Operations Information Modeling

- Classification
- Relationships
- Information Reach
- Templates
- Behavioral Control
- Presentation

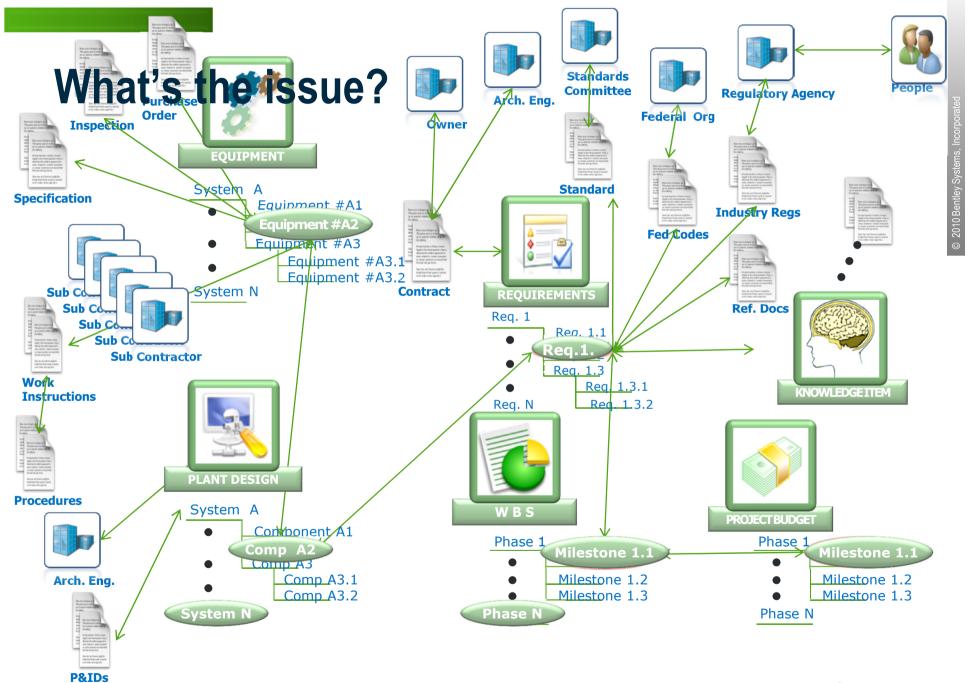




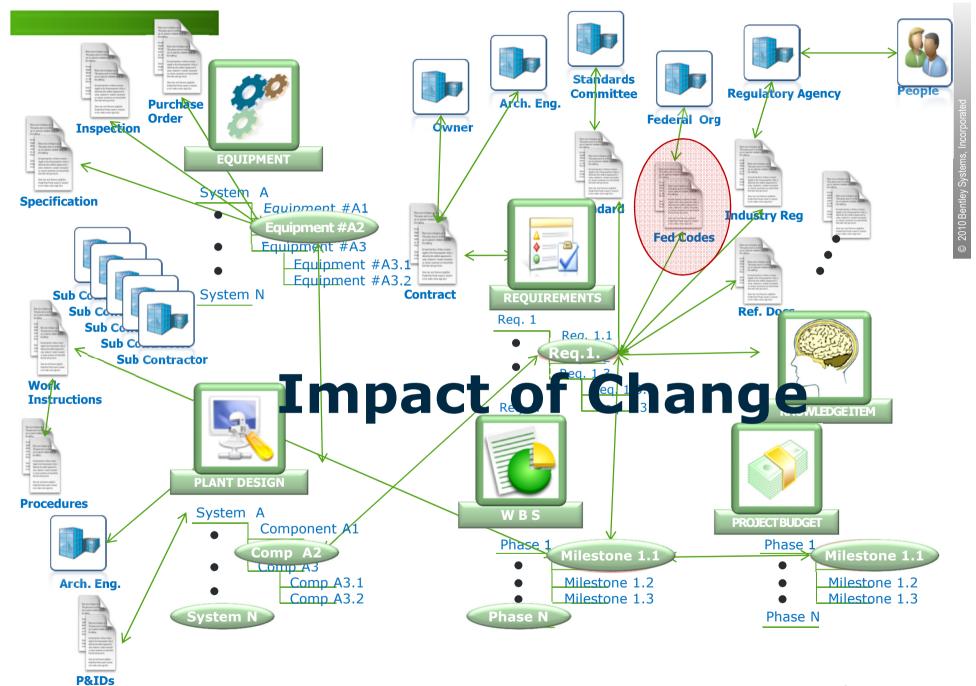
Work Flow for Consistent Processes

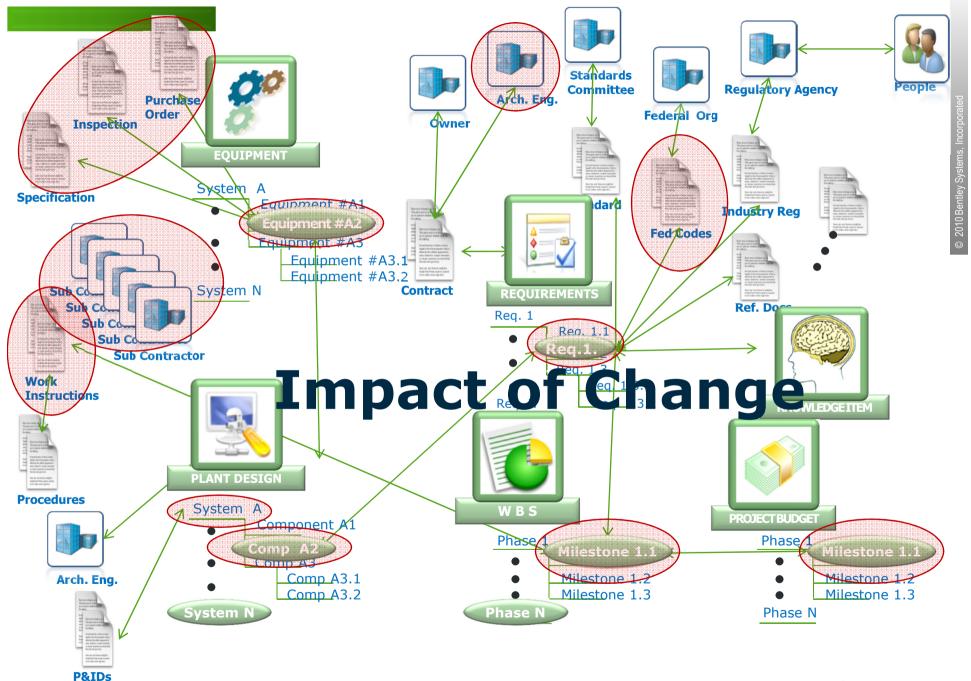














Virtual Item example –Regulations

Department of Energy

§ 1008.3

- (30) Southwestern Power Administration, P.O. Drawer 619, Tulsa, OK 74101.
- (31) Western Area Power Administration, P.O. Box 3402, Golden, CO 80401.
- (d) General Counsel means the General Counsel provided for in section 202(b) of the Department of Energy Organization Act, or any DOE attorney designated by the General Counsel.
- (e) Headquarters means all DOE facilities functioning within the Washington, DC metropolitan area.
- (f) Individual means a citizen of the United States or an alien lawfully admitted for permanent residence, but does not include proprietorships, busir corporations Where appro-

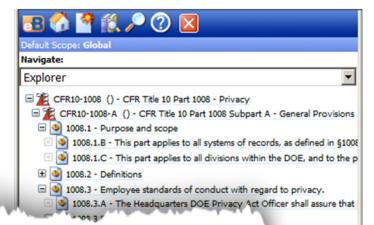
tice of that system of records published by DOE.

(m) System of records means a group of any records under DOE control from which information is retrieved by the name of the individual or by some identifying number, symbol, or other identifying particulars assigned to the individual. See subsection (a)(5) of the

(n) Act means the Privacy Act of 1974, Public Law 93-579; references to subsections of the Act mean subsections of section 3 of the Act.

§ 1008.3 Employee standards of conduct with regard to privacy.

(a) The Headquarters DOE Privacy



Olympic Dam: BHPB Worlds Largest open-cut mine 600 Permits and Licences

ment history, and that contains that individual's name, or other identifying number, symbol, or other identifying particulars assigned to the individual, such as a finger or voice print or photograph. See subsection (a)(4) of the Act.

(j) Routine use means, with respect to the disclosure of a record, the use of such record for a purpose which is compatible with the purpose for which it was collected. See subsection (a)(7) of

(k) Statistical record means a record in a system of records maintained for statistical research or reporting purposes only and not used in whole or in part in making any determination about an identifiable individual, except as provided by 13 U.S.C. 8. See subsection (a)(6) of the Act.

(1) System Manager means the DOE official who is responsible for a system of records as designated in the system no-

tion of a personal natur uals unless relevant and necessary to achieve a purpose or carry out a responsibility of the DOE as required by statute or by Executive Order. See subsection (e)(1) of the Act and §1008,18(a).

(2) Collect information, wherever possible, directly from the individual to whom it pertains. See subsection (e)(2) of the Act and §1009.19(a).

(3) Inform individuals from whom information is collected of the authority for collection the principal purposes for which the information will be used. the routine uses that will be made of the information, and the effects of not furnishing the information. See subsection (e)(3) of the Act and §1008.19(b).

(4) Collect, maintain, use or disseminate no information concerning an individual's rights guaranteed by the First Amendment, unless:

(1) The individual has volunteered

OE personnel without oncerning individuals 1008.3.B.9 - Inform the proper DOE auuro...... of any information ma 1008.3.C - Heads of Headquarters Divisions and Offices and heads of th 1008.4 - Procedures for identifying the individual making a request for a 1008.5 - Effect of the Freedom of Information Act (FOIA).



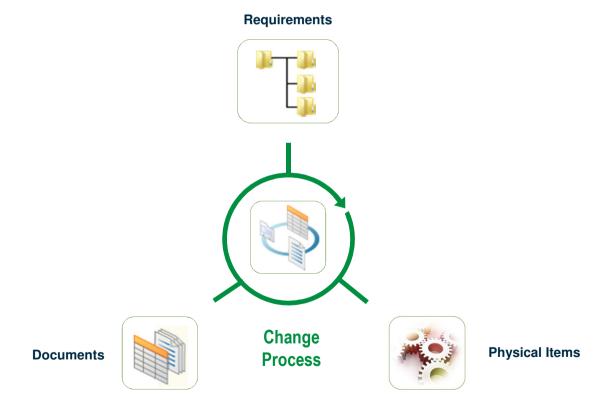
of a personal nature al

sible, directly from the rmation is collected of no information conc

tence or proposal of a cribed form, of all disc

eB Objects and Change Control

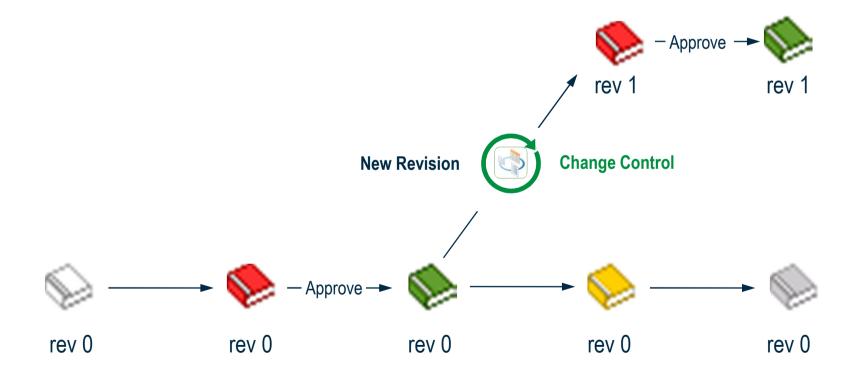
 Changes can be tracked for Documents, Physical Items, and Virtual Items





Document lifecycle & change control

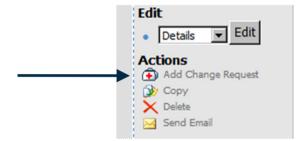
Change control adds traceability to revision changes



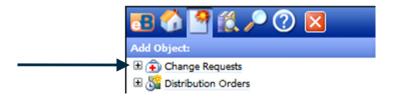


Initiating a Change Request

From a specified document, virtual item group, or physical item

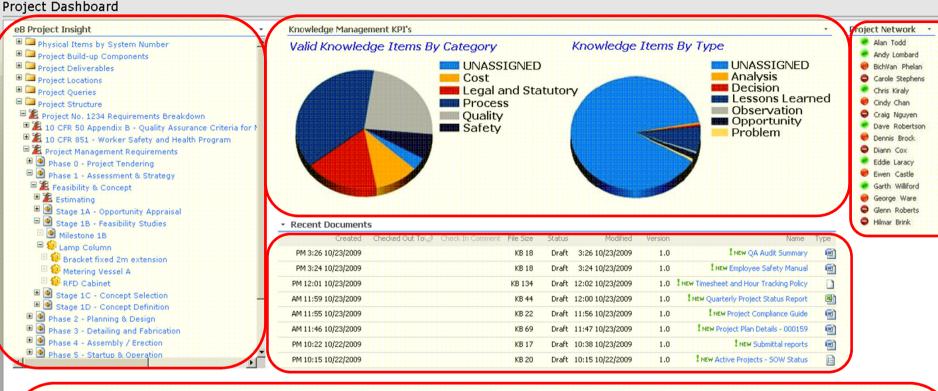


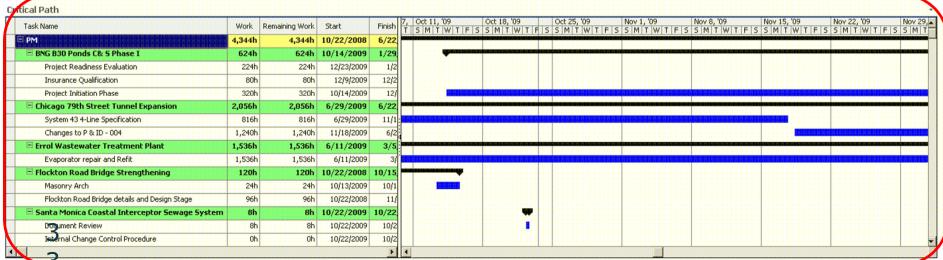
Directly create the Change Request

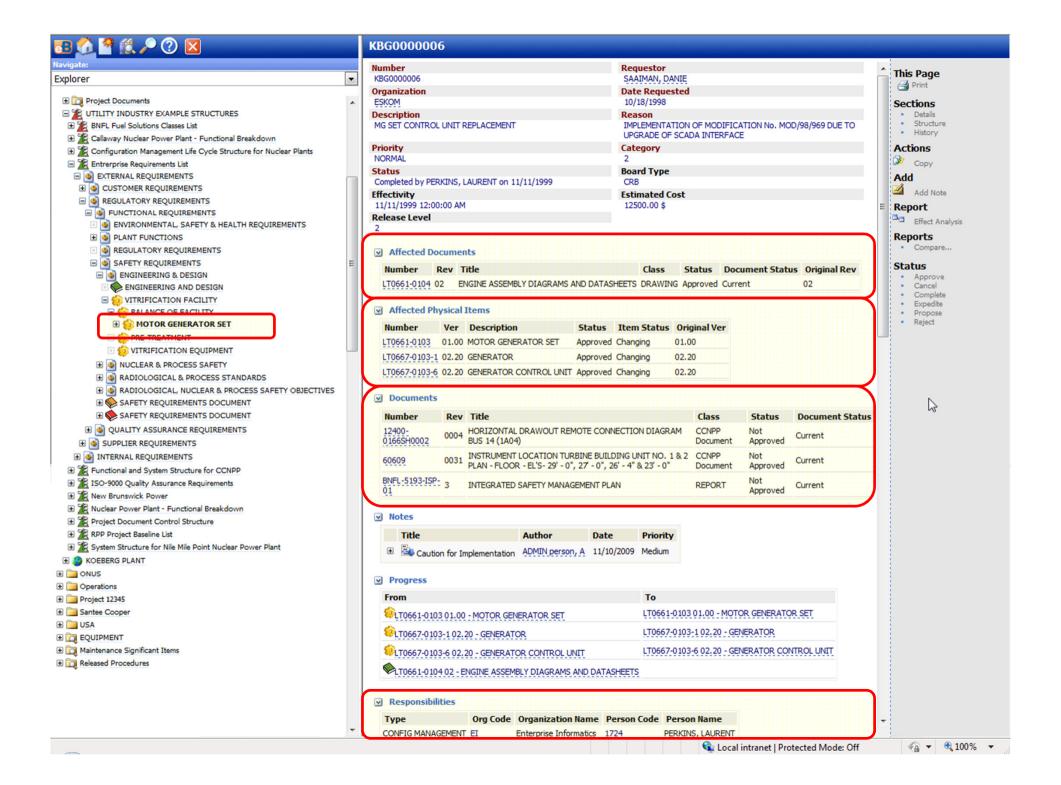




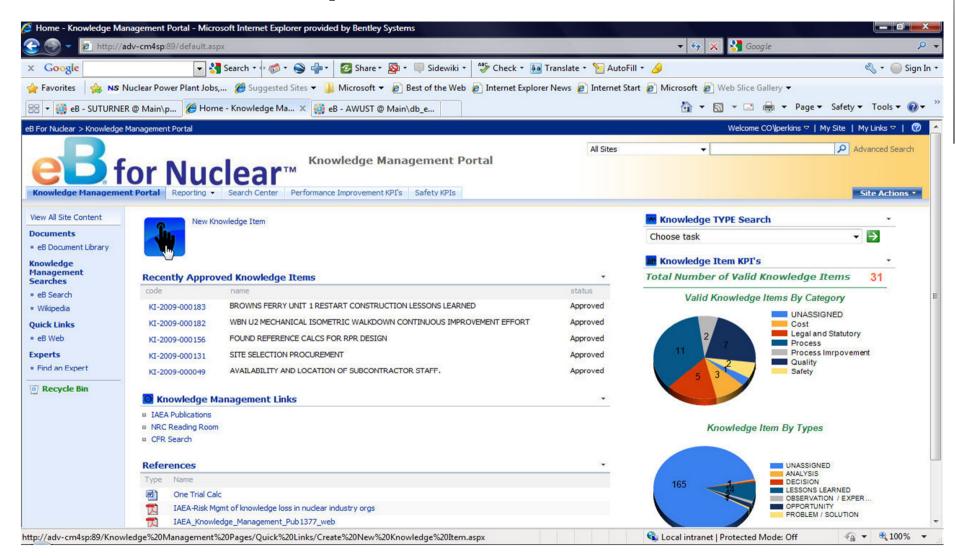






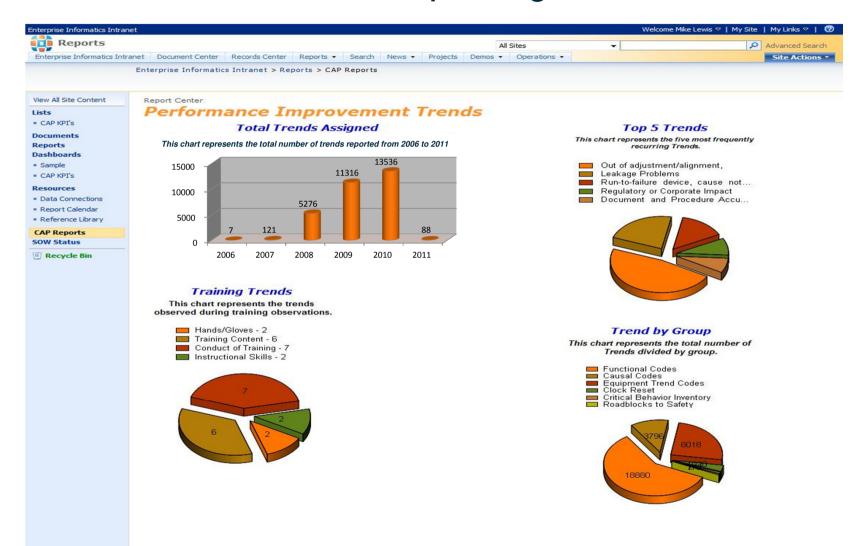


Dashboard Reports





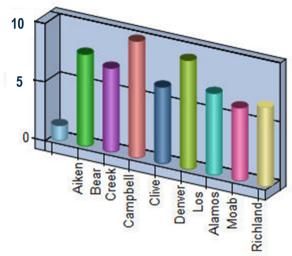
KPI Dashboard - Reporting





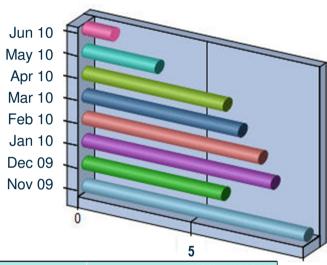
KPI Dashboard - Reporting

AVERAGE DAYS OVERDUE BY LOCATION



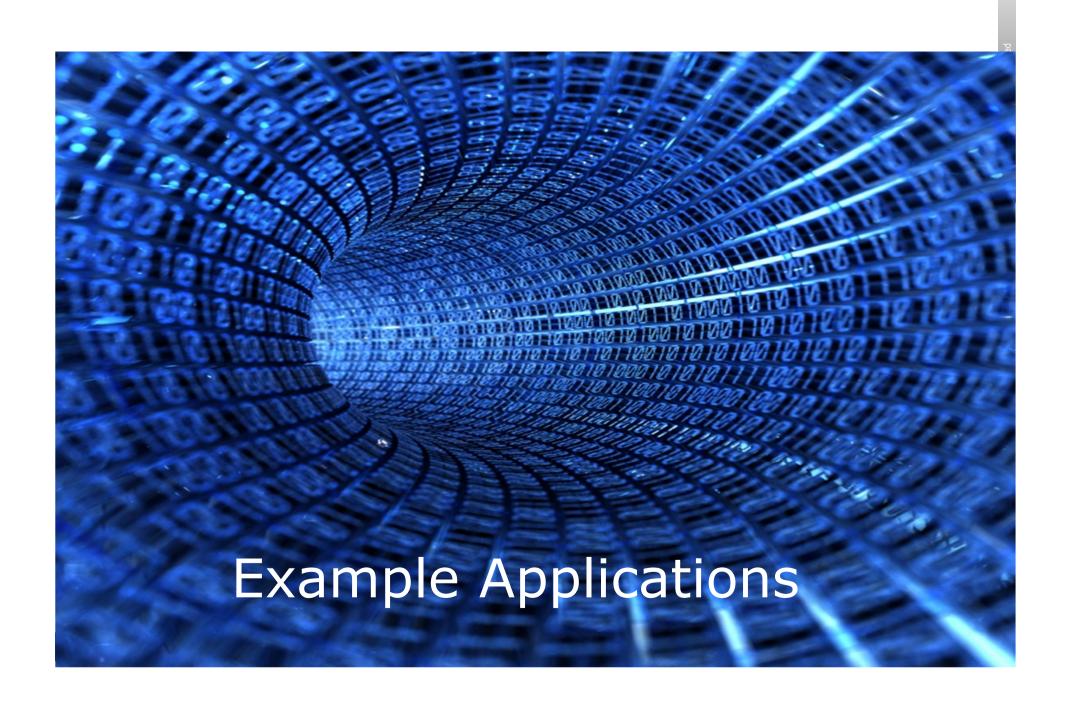
Barrier Report			7/27/2010 10:36:39 A				
Order Question Question Name		Question Name	Section	Barrier Name			
B0.5	230	Timeout	Human Performance Improvement	Time Pressure - time constraints, hurry, priority, poor job coordination			
B1.4	238	Line of Fire	Body Use / Ergonomics	Training or Unfamiliar - never trained, unqualified, too long since training, unusual task			
B1.4	238	Line of Fire	Body Use / Ergonomics	Apathy Insignificant - don't care, unimportant			
B1.10	244	Lifting Technique	Body Use / Ergonomics	Training or Unfamiliar - never trained, unqualified, too long since training, unusual task			
B2.3	253	Hand Protection	Personal Protective Equipment	Facility & Equipment Condition – design, modification or deterioration contribute to at-risk condition or behavior			
B2.6	256	Protective Clothing	Personal Protective Equipment	Facility & Equipment Condition – design, modification or deterioration contribute to at-risk condition or behavior			
B2.7	257	Hearing Protection	Personal Protective Equipment	Facility & Equipment Condition – design, modification or deterioration contribute to at-risk condition or behavior			
B2.8	258	Respiratory Protection	Personal Protective Equipment	Facility & Equipment Condition - design, modification or deterioration contribute to at-risk condition or behavior			
B5.3	285	Lockouts / Tagouts	Process Hazards	Facility & Equipment Condition - design, modification or deterioration contribute to at-risk condition or behavior			

AVERAGE DAYS OVERDUE BY MONTH



Order	Section	Question Name	Safe Amt	Risk Amt	Safe Pct	Marked	Marked Pct	Num Obs	Person Obs	Quest
0.9	Human Performance Improvement	Diann's Question - Are we having fun yet?	6	0	100.00	0	0.00	5	1202	222
B1.1	Body Use / Ergonomics	System / Component Design	107	6	94.69	2	40.00	5	1202	235
B1.2	Body Use / Ergonomics	Data Entry	203	1	99.51	2	40.00	5	1202	236
B1.3	Body Use / Ergonomics	Work Surface	69	0	100.00	2	40.00	5	1202	237
B1.4	Body Use / Ergonomics	Line of Fire	111	24	82.22	2	40.00	5	1202	238
B1.5	Body Use / Ergonomics	Pinch Points	112	0	100.00	2	40.00	5	1202	239
B1.6	Body Use / Ergonomics	Eyes on Surroundings	232	0	100.00	2	40.00	5	1202	240
B1.7	Body Use / Ergonomics	Eyes on Hands / Concentration	121	2	98.37	2	40.00	5	1202	241
B1.8	Body Use / Ergonomics	Eyes on Path / Walking	278	5	98.23	2	40.00	5	1202	242
B1.9	Body Use / Ergonomics	Ascending /	246	5	98.01	2	40.00	5	1202	243





ESE is built on Bentley AssetWise

Engineering Functions **Project** O&M >> AssetWise Conceptualization DOM: Helps maintain & control engineering Design Abandonment data Find, **Provides cross** references to the use, document link and management system Lifecycle maintain of choice data & Of Construction **Populates** documents Decommissioning **Information** operational systems **Facilitates** management of (Lifecycle engineering change **Information** Operations & Commissioning **Management** Maintenance **Project)**

Data cleansing/Data preparation for Maximo

Executive Brief / Summary

Project Status

- Initial phase rolled out during Execute on May 20, 2009
- Ready for all components to go to OPERATE phase on Friday (4/23/2010)
- Under budget and on schedule

System (main deliverable) Usage Information

- 550 monthly users (from server performance statistics)
- 70% Aware of AssetWise, 61% of those aware of AssetWise Used it (1Q10 Survey)
- 95% of those who have used AssetWise, like it (1Q10 Survey)

Business Case / Financial Information

•	End of Proje	ect	4/23/2010
---	---------------------	-----	-----------

- Project costs (as of 4/23/2010) \$2.7M
- Project-to-date benefits \$2.8M (savings)
- ROI is 11.5 months (3/15/2010)
- Projected annual benefits \$6.5M (savings)



User Comments

NOTE: These are verbatim comments, spelling or sentence structures are not corrected. Only vulgarities have been changed or omitted.

Good tool, it actually works, do not let it go away.

This was great invention. Wish we had it years ago when learning this place.

This is the best tool that has come out it worked better than advertised and before they said it would. Wish all the tools and processes that are pushed on us were the same.

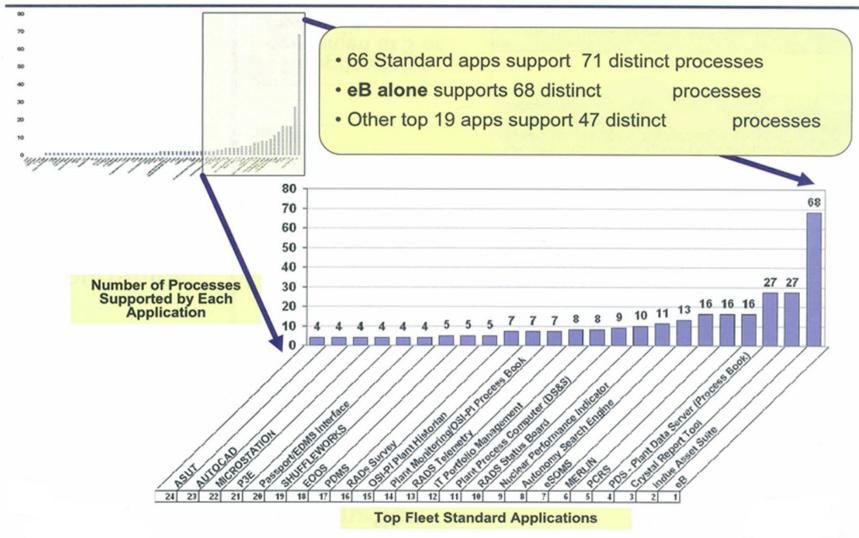
This thing is the most awesome tool for our work that exists. It is so cool. Please don't try to make it better and ruin it in the process.

No improvements, its a great tool to reference for writing work requests!! Great tool!

I'm certainly liking everything I see. This is absolutely great! Puts us light years ahead. Thank you.



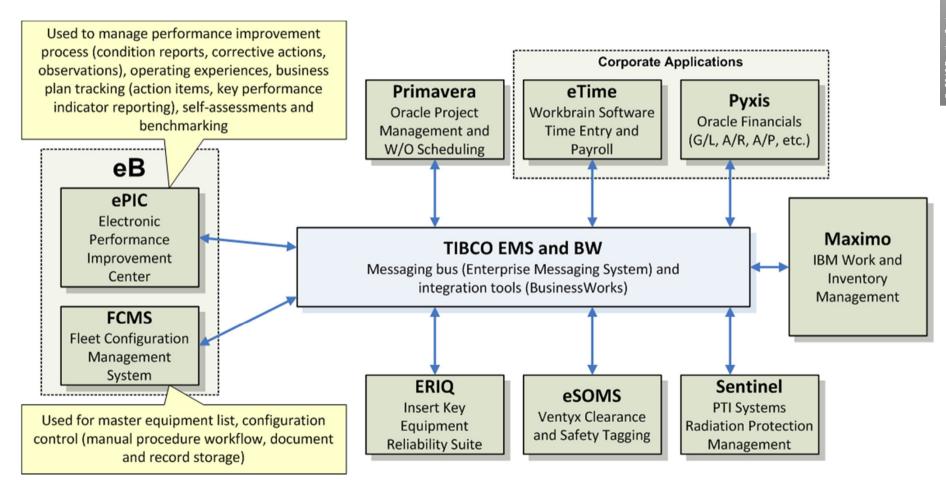
AssetWise Footprint across Operations





eB: An Enterprise Citizen

Implementation and integration of a number of fleet-wide applications:





Why?



Reduced Costs

- Extend the useful life of the asset
- Accurate project and operational information
- Optimize OPEX as <u>investment</u>

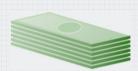






Reduced Risk

- Meet regulatory compliance requirements
- Improves Plant safety
- Ensure access to "trusted" information



Improve Service Operational Performance

- Increase level of service & knowledge for reuse
- Shorten major rehabs and planned outages
- Improve maintenance efficiency (wrench time)

