



**MINING**

- OpenPlant
- Raceway and Cable Management
- promise
- Bentley Map
- Descartes
- InRoads
- GEOPAK
- gINT
- topoGRAPH

**WATER & WASTEWATER**

- WaterGEMS
- SewerGEMS
- OpenPlant
- AutoPIPE
- STAAD
- RAM
- gINT

**CONSTRUCTION**

- ProjectWise Navigator
- ConstructSim
- ProStructures
- AECOsim
- MicroStation
- Descartes
- InRoads
- Geospatial Server

**BUILDINGS**

- AECOsim
- Generative Components
- RAM
- STAAD
- ProStructures
- Hevacomp
- speedikon
- gINT
- InRoads
- GEOPAK

**3D CITIES**

- Bentley Map
- Geo Web Publisher
- Descartes
- InRoads
- AECOsim
- Geospatial Server

**COMMUNICATIONS NETWORKS**

- Bentley Fiber
- Bentley Coax
- Bentley Plant
- Bentley Inside Plant

**NUCLEAR**

- AssetWise for Nuclear
- OpenPlant
- AutoPIPE
- STAAD
- Raceway and Cable Management
- Ivara
- AssetWise Manager

**ROADS**

- InRoads
- GEOPAK
- MXROAD
- SUPERLOAD
- LEAP Bridge
- RM Bridge
- Exor
- gINT
- InspectTech
- topoGRAPH

**RAIL & TRANSIT**

- Bentley Rail Track
- Opttram
- InRoads
- MXROAD
- GEOPAK
- RM Bridge
- LEAP Bridge
- gINT
- topoGRAPH

**SUBSURFACE UTILITIES**

- WaterGEMS
- SewerGEMS
- sisNET
- Exor
- GEOPAK
- gINT
- Utilities
- Designer
- MXROAD

**POWER PLANTS**

- OpenPlant
- AutoPIPE
- AutoPIPE
- STAAD
- ProStructures
- Raceway and Cable Management
- AssetWise
- Ivara
- Descartes
- GEOPAK
- InRoads

**BRIDGES**

- InspectTech
- RM Bridge
- LEAP Bridge
- SUPERLOAD
- GEOPAK
- InRoads
- MXROAD
- gINT
- ProStructures

**CAMPUSES**

- Bentley Map
- AECOsim
- Descartes
- Geospatial Server
- RAM
- STAAD
- Raceway and Cable Management
- GEOPAK
- InRoads
- MXROAD
- gINT

**UTILITY NETWORKS**

- Substation
- sisNET
- Utilities
- Designer
- Descartes
- GEOPAK
- InRoads
- Ivara
- Raceway and Cable Management
- STAAD

**PROCESS PLANTS**

- OpenPlant
- AutoPIPE
- Raceway and Cable Management
- promise
- AutoPIPE
- ProStructures
- STAAD
- Ivara
- AssetWise Manager
- gINT

**WIND FARMS**

- SACS
- STAAD
- ProStructures
- Substation
- InRoads
- gINT

**OFFSHORE**

- SACS
- AutoPIPE
- ProStructures
- OpenPlant
- Data Quality Manager
- gINT

**Bentley's Solutions**

- MicroStation
- ProjectWise
- AssetWise

**Bentley**  
Sustaining Infrastructure

# About Bentley



Bentley's mission is to provide innovative software and services for the enterprises and professionals who design, build and operate the world's infrastructure - sustaining the global economy and environment, for improved quality of life.

# Platform for Sustaining Infrastructure

ProjectWise

Integrated Projects



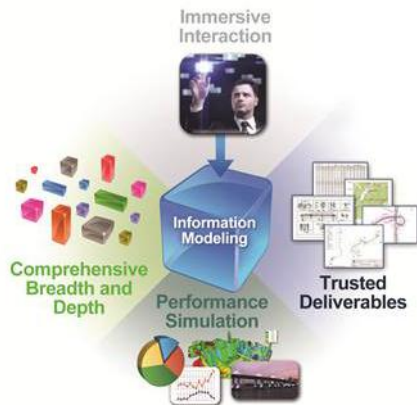
Bentley APM

Intelligent Infrastructure

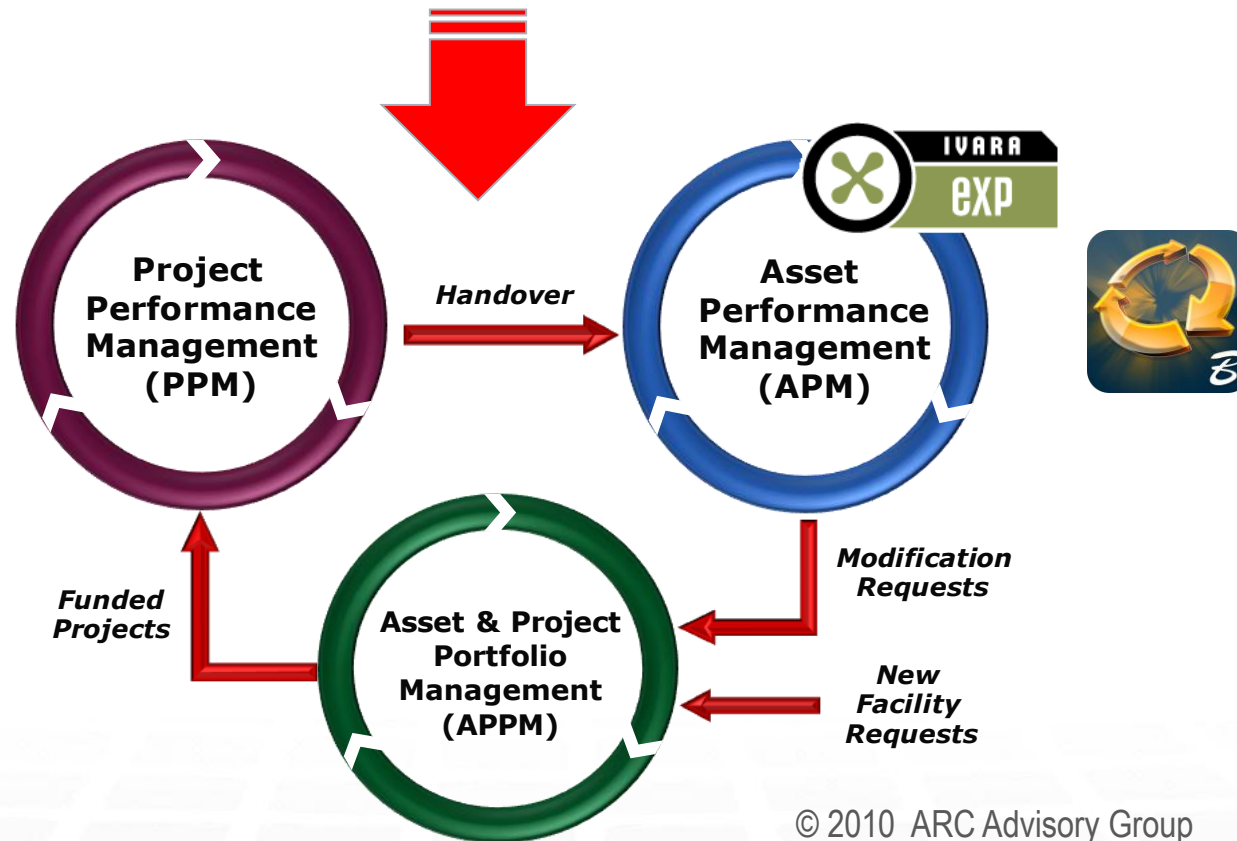


MicroStation

Information Modeling

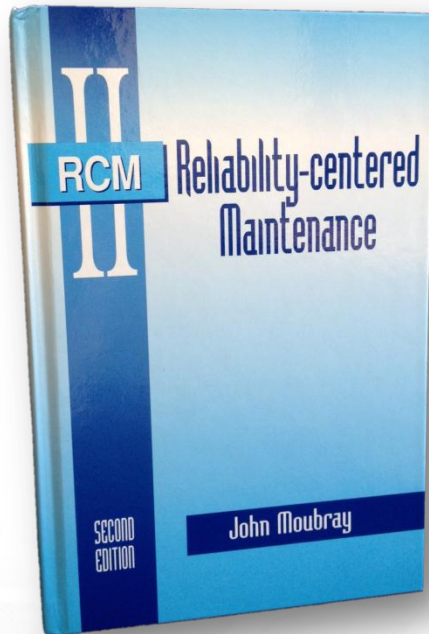


# The ARC Business View



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# APM - Asset Performance Management



News Release

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Follow us on Twitter:

[@BentleySystems](https://twitter.com/BentleySystems)

## **Bentley's Acquisition of Ivारा Redefines Asset Performance Management: Integrating OPEX with CAPEX!**

*Uniquely Enables Owner-Operators to Improve the Performance and Safety of Infrastructure Assets Through Information Mobility Between Engineering and Operations*

EXTON, Pa., U.S.A. – Sept. 18, 2012 – Bentley Systems, Incorporated, the leading company dedicated to providing comprehensive software solutions for *sustaining infrastructure*, today announced that it has acquired Ontario, Canada-based [Ivारा Corporation](#), the leader in asset performance management (APM) software solutions for organizations in asset-intensive industries, including mining and metals, power generation and utilities, oil and gas, and petrochemical. The *Ivारा EXP* solution – a core system mission critical to operations and maintenance, combined with a proven implementation methodology and the [Aladon Network's](#) seasoned reliability practitioners – helps owner-operators to obtain the best performance from their assets. APM software supplements and leverages value in transaction-oriented enterprise asset management systems such as IBM Maximo and SAP EAM by helping to build and implement asset-specific reliability strategies. *Ivारा* is an IBM Member-Level Partner with Certified Ready for Tivoli integration as well as an SAP Software Solution Partner with SAP Certified - Powered by NetWeaver integration.

# Ivara History



- Founded 1996
- Headquartered near Toronto, Canada
- Leader in asset performance management software
- Pioneer in reliability process, practices, technology, methodology
- Global network of reliability experts (The Aladon Network)
- Strong relationships with industry and academia



**Preventing equipment failure and delivering operational excellence to industries around the world.**

# Asset Performance - Challenges

Performance data  
overloading and  
paralyzing operators

Aging workforce and  
aging assets

Restricted  
maintenance budgets

Reactive maintenance  
strategies

Unplanned downtime

Emergency repairs

Service level failures

And much worse ...



# APM in the Asset Management Landscape

## Bentley APM

### Strategy Domain



### Re-Strategize

### Evaluation Domain

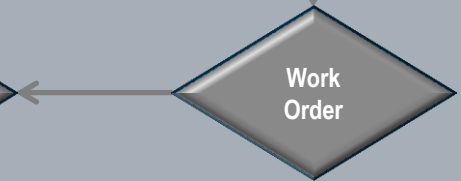
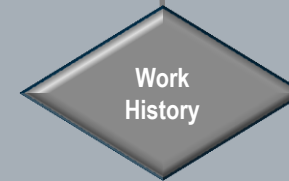
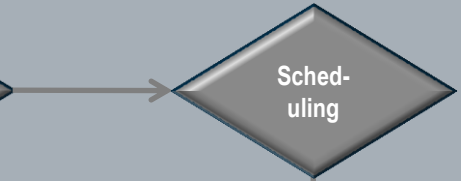
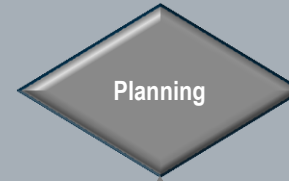
- Root Cause Analyses
- Statistical Reliability
- RAM Modeling
- etc.

### Measuring Domain

- Scorecards
- Dashboards
- KPIs/AHI

## Execution Domain

### CMMS (SAP, MAXIMO, INFOR)



Condition Monitoring

Vibration Monitoring

Data Historians

Inspection Systems / Handheld devices

3rd party software (ODBC, OPC compliant)

# Asset Management Framework

## *Asset Context*

What and where is the asset?

## *Management Strategy*

What are the business and performance requirements?

## *Asset Performance*

What is the asset's condition and how is it performing?

## *Risk Assessment*

How can failure occur? What is the likelihood?  
What are the consequences?

## *Risk Mitigation*

How are scheduled & unscheduled maintenance and incidents managed?

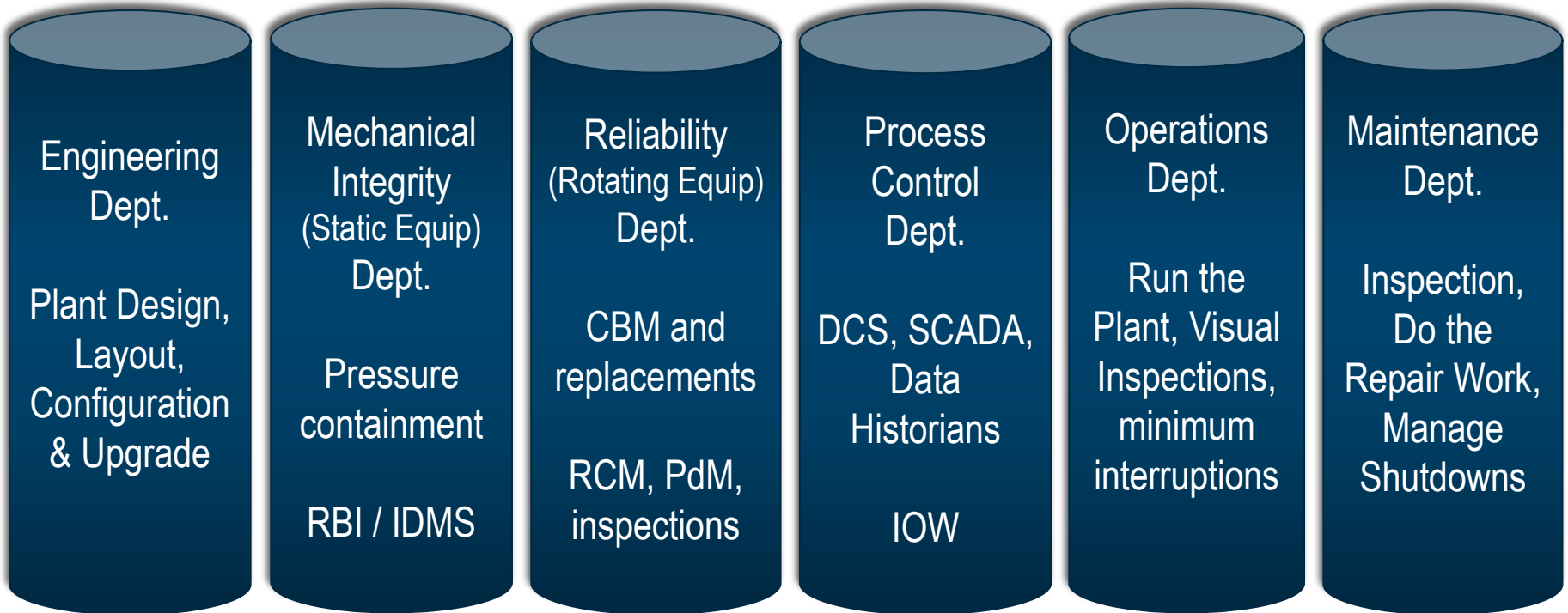
# Challenges

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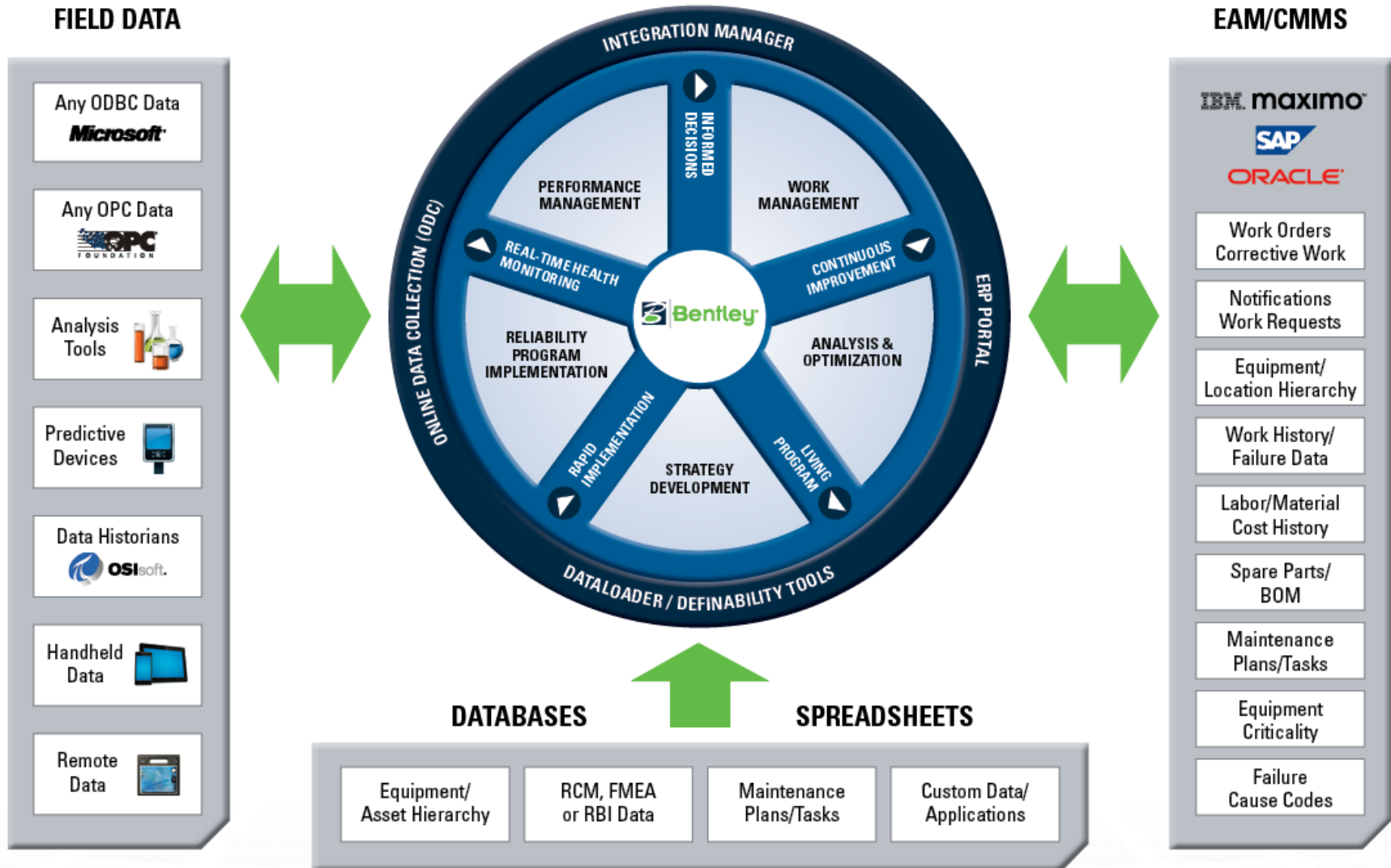
- Safety and risk
- Compliance with regulations
- Aging assets
- Loss of knowledge due to retiring workforce
- Need to reduce costs
- Inefficient processes

# Problem: Information Mortality

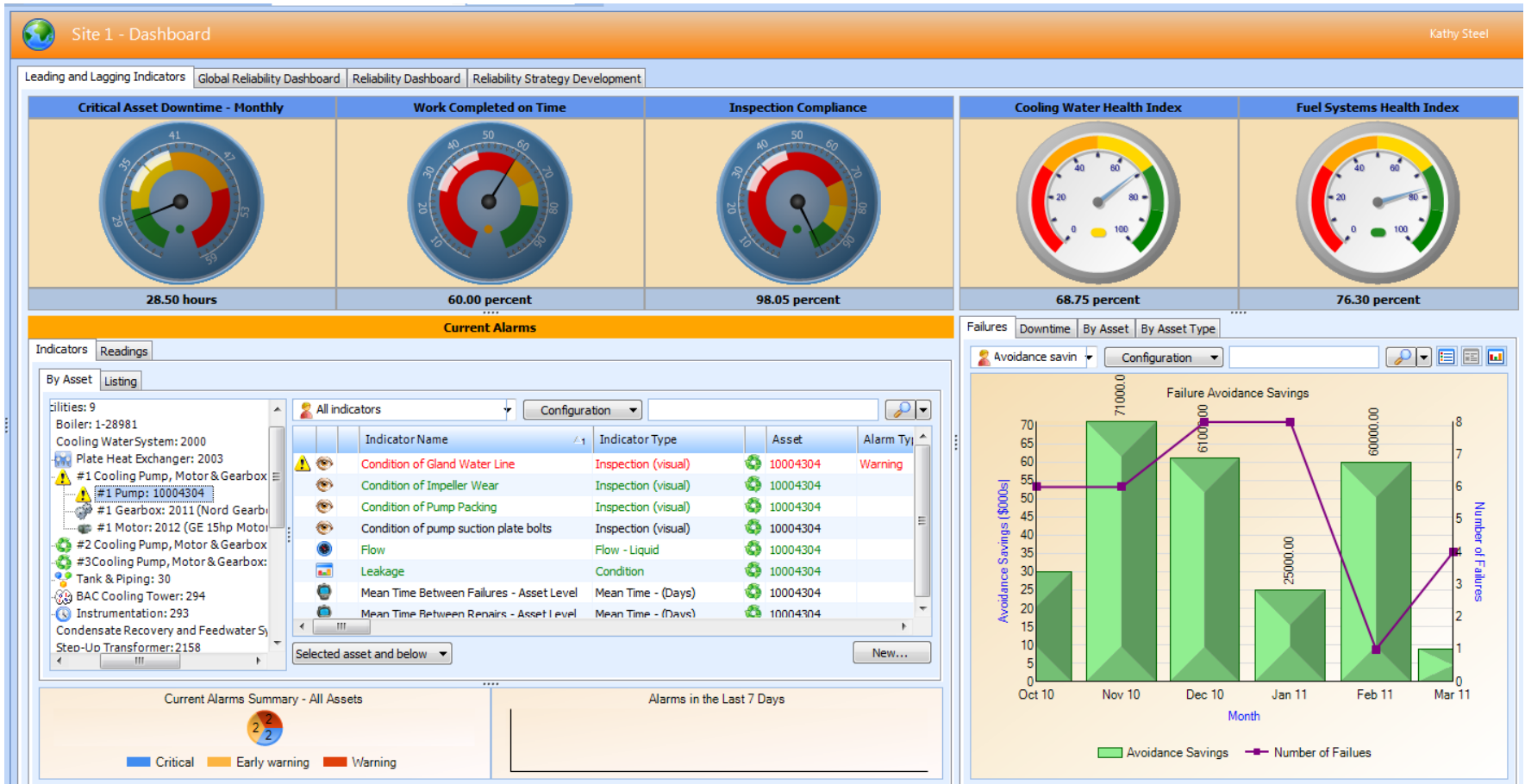
Overcome the silos...



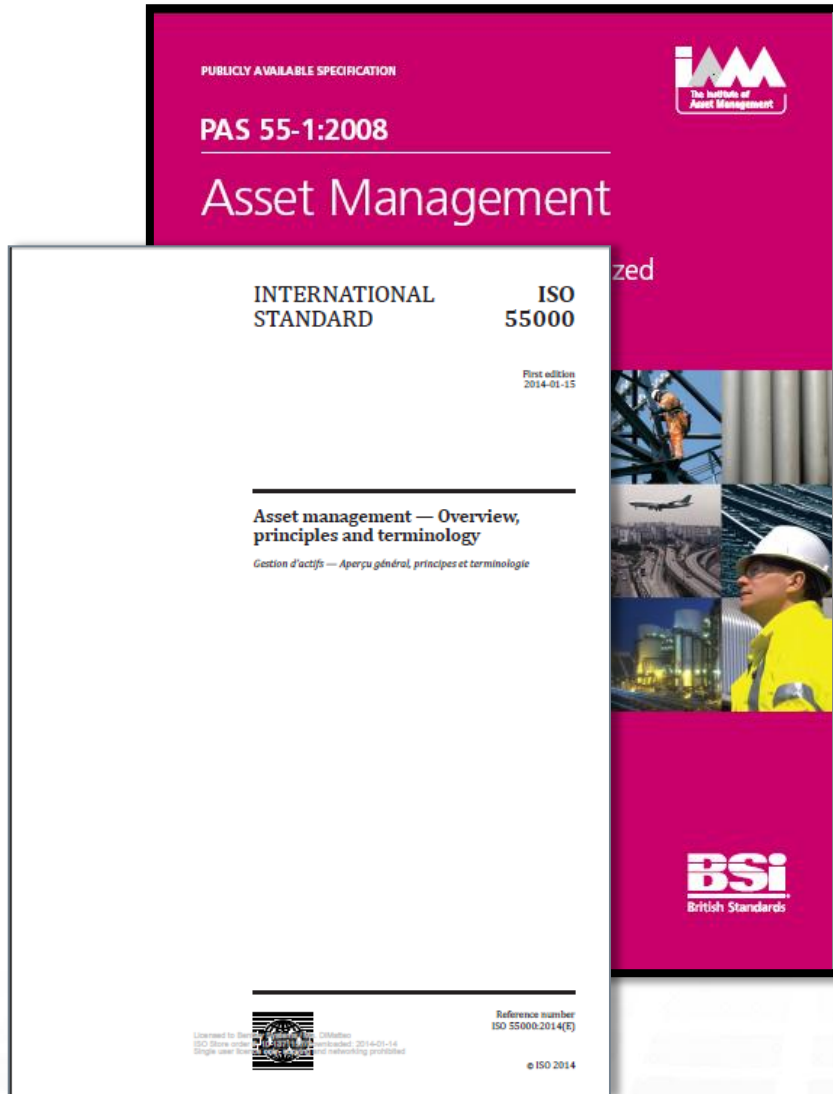
# Asset Intelligence from Consolidated Data Sources



# Living, Breathing Reliability/Integrity Program

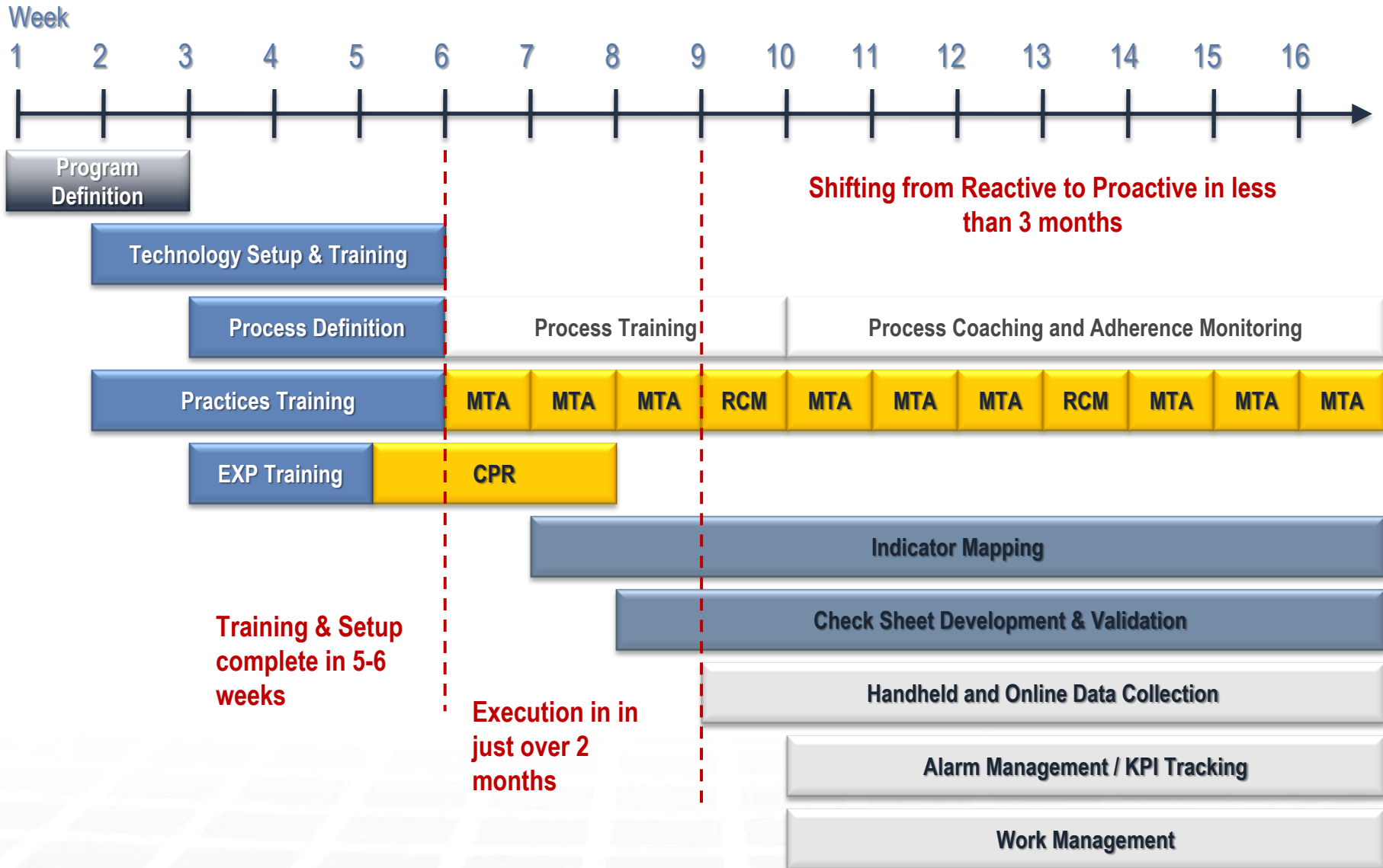


# Business Drivers – PAS 55



- Internationally recognized Asset Management Standards
- PAS 55 / ISO 55000
- Guidelines for best practice in planning and implementation of an Asset Management system

# Timeline From Implementation to Results





# Bentley APM Users are in Capital-Intensive Industries

## Electric Utilities



## Metals



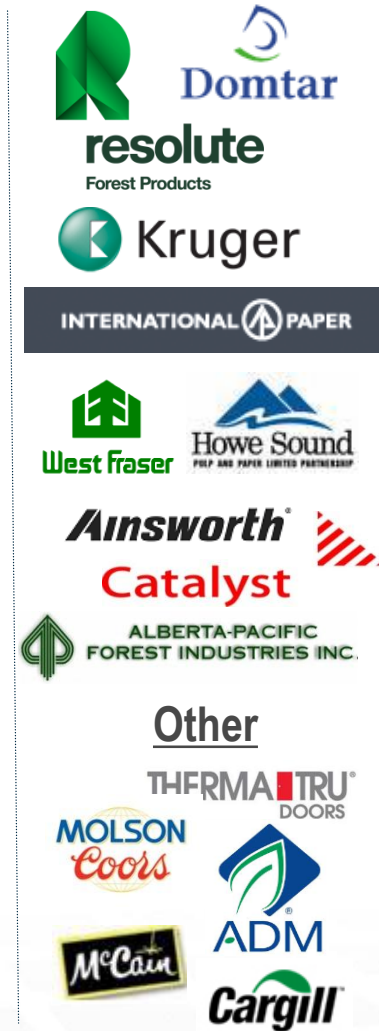
## Mining



## Oil / Gas / Chemical



## Forestry



# Case Study: ScottishPower

- Integrated Operations and Maintenance
  - Journey to becoming a high reliability organisation



<p><b>Longannet</b></p>  <p>2,304 MW coal</p> <p>Operational 1970</p> <p>Fife</p>	<p><b>Cockenzie</b></p>  <p>1,152 MW coal</p> <p>Operational 1967</p> <p>Near Edinburgh</p>	<p><b>Shoreham</b></p>  <p>400 MW CCGT</p> <p>Operational 2000</p> <p>Sussex</p>	<p><b>Rye House</b></p>  <p>715 MW CCGT</p> <p>Operational 1993</p> <p>Hertfordshire</p>
<p><b>Damhead Creek</b></p>  <p>800 MW CCGT</p> <p>Operational 2000</p> <p>Kent</p>	<p><b>Cruachan</b></p>  <p>440 MW pump storage</p> <p>Operational 1965</p> <p>Argyll &amp; Bute</p>	<p><b>Hydros</b></p>  <p>123 MW hydro</p> <p>Operational 1920/30s</p> <p>Lanark, Galloway</p>	<p><b>Daldowie</b></p>  <p>WDF Process Plant</p> <p>Operational 2002</p> <p>Glasgow</p>

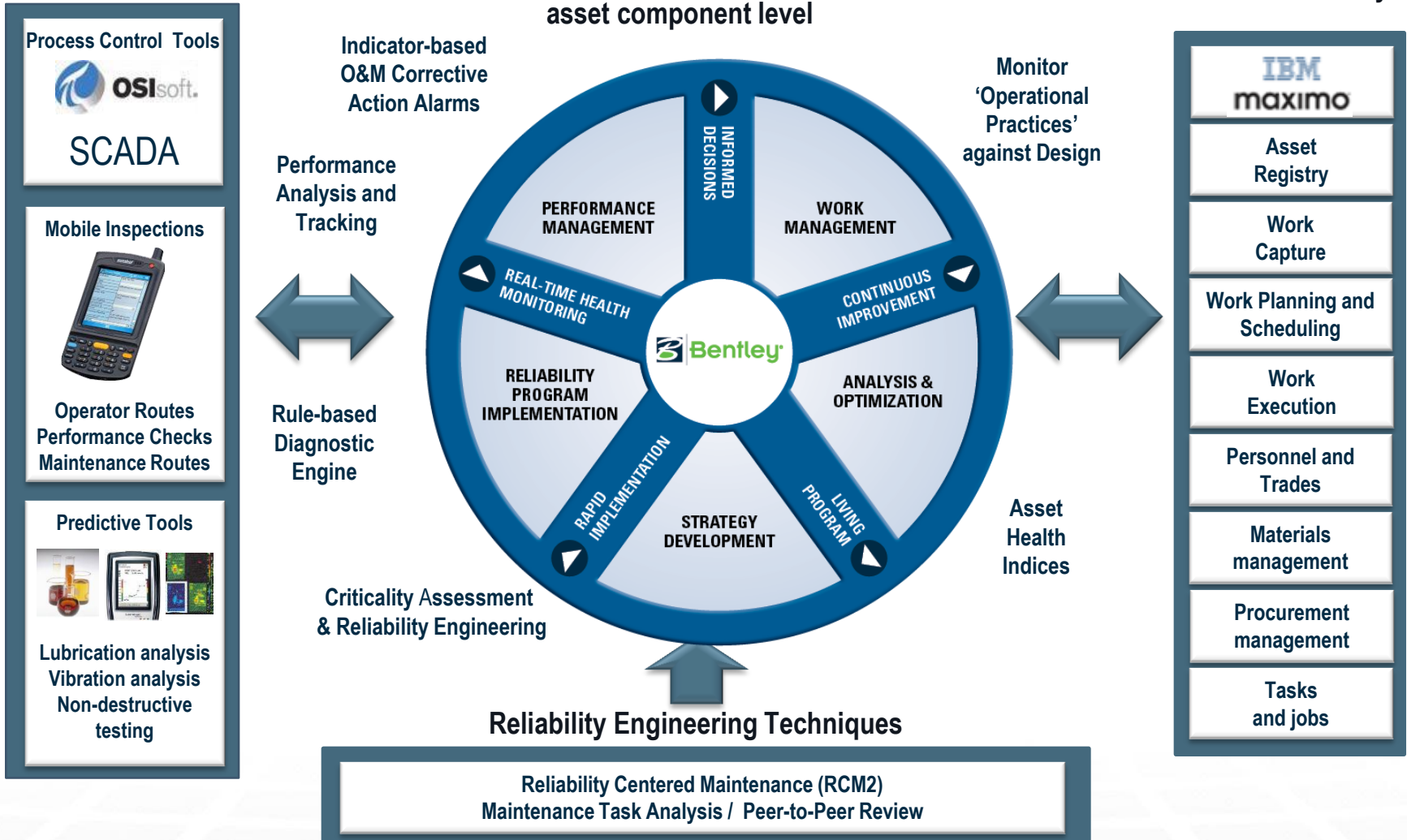
# Integrated O&M Process Model at



Determine Asset Condition/Performance

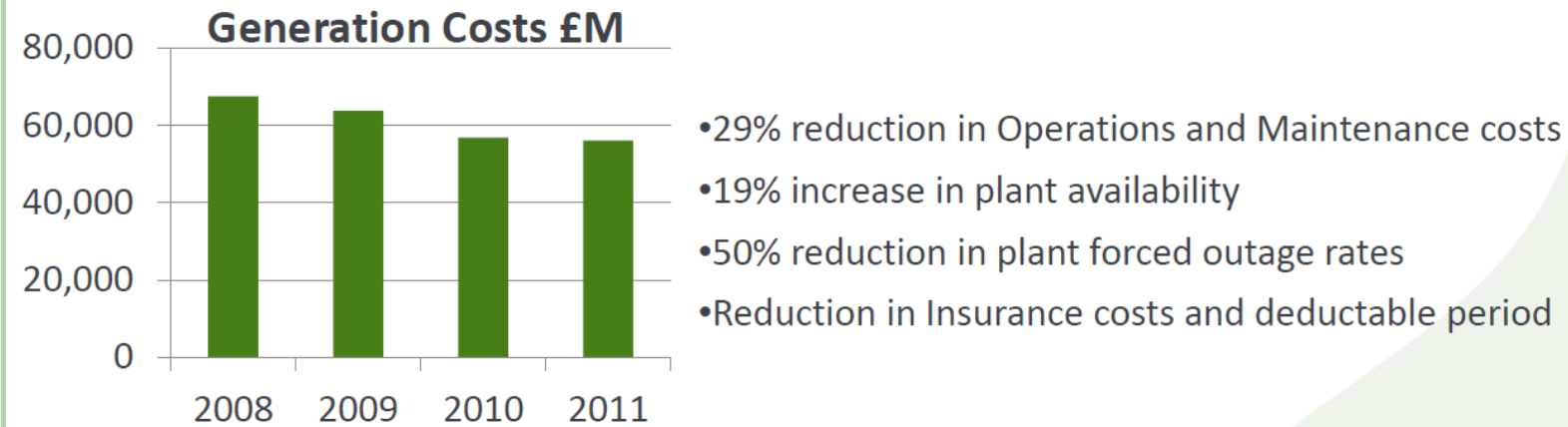
Compare actual with design criteria  
Trigger corrective action at correct asset component level

Execute the right work at the right time based on asset criticality



# Benefits

## Improved Asset Performance



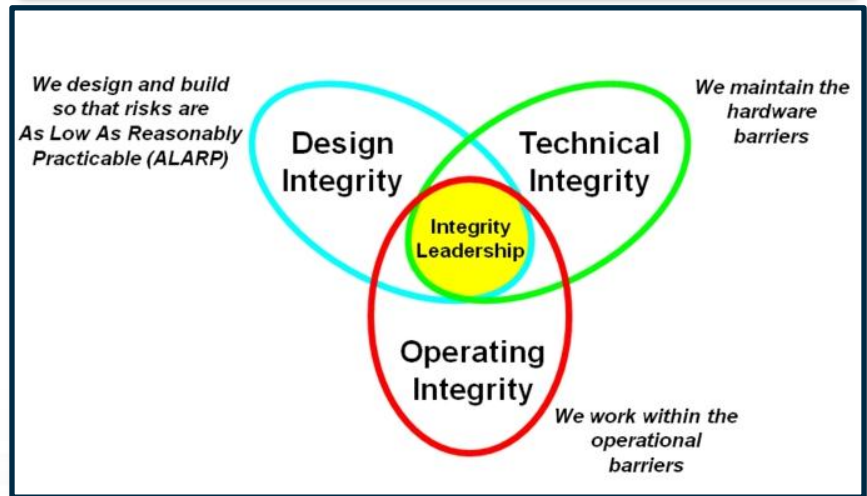
## PAS 55 Certification

- Scottish Power among the first power utilities to achieve PAS 55
- Recognised among its peers as leader for Infrastructure Asset Management
- Tangible and intangible benefits

# Case Study: Shell



## We must keep our assets safe



“Our assets are safe and we can prove it.”

Vision – A single integrated corrosion and inspection

Objective – To deliver simple, standardised, commercial

## Global Rollout

- Deployment at Kashagan and rolling out globally
- 250,000 assets and 4500 inspections templates based on Shell asset types
- Role specific interfaces



# Case Study: Pacific Gas & Electric

## San Francisco, California, USA



- Background

- In excess of 900 electric substations across CA
- Maintained by approximately 220 electricians
- More than 1400 substation transformer banks
- Nearly 8000 circuit breakers

- Pressure to demonstrate compliance (NERC)

- Need to redefine asset replacement strategy



# Pacific Gas and Electric Company

## San Francisco, California, USA



### Solution

- RCM2-based work planning with AssetWise Ivara Performance Management
- Digital substation inspections, central asset health dashboard, condition-based alerts, work planning via EAM

### Results

- Higher quality substation inspections producing more actionable reports
- Automated maintenance planning based on up-to-date condition assessments of critical assets
- Simplified, consistent, and adaptable compliance reporting to regulators

## Ensuring the Right Work is Done at the Right Time



# Summary and Next Steps

- Bentley's risk-based approach to asset management will:
  - Ensure a safe, reliable and compliant operation
  - Improve asset availability while reducing operating costs
  - Extend the life of aging assets
  - Solve the problem of islands of data
  - Capture the asset knowledge of retiring workforce
- Sustainable business strategy for operational excellence
- Next steps...

# Bentley APM – Contacts:

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Thank you!

[www.bentley.com](http://www.bentley.com)