



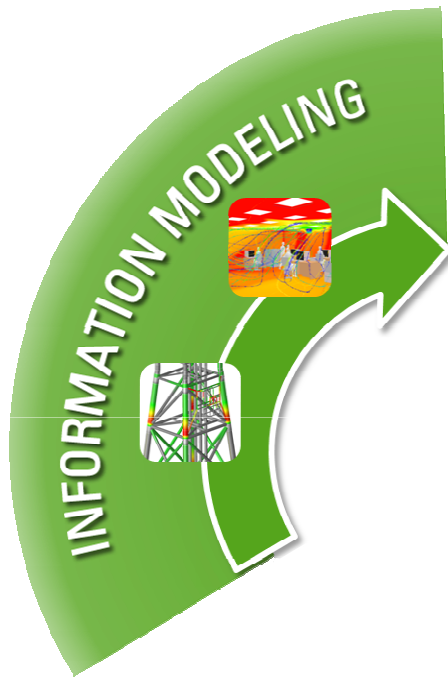
# About Bentley

Bentley provides software and services for the enterprises and professionals who design, build and operate the world's infrastructure.  
(Private, 28 years, \$550m revenue, 3000+ employees, 46 countries)



# Information Modeling through Integrated Projects

for Intelligent Infrastructure



RETURN ON  
INVESTMENT



RETURN ON  
TALENT



# Sustaining Infrastructure

Bentley's Solutions

**MINING**

- STAAD
- OpenPlant
- Raceway and Cable Management
- InRoads
- Bentley Map
- Descartes
- GEOPAK
- gINT
- RAM

**WATER & WASTEWATER**

- WaterGEMS
- SewerGEMS
- AutoPLANT
- OpenPlant

**BUILDINGS**

- AECOsim
- GenerativeComponents
- RAM
- ProStructures
- speedikon
- gINT

**CONSTRUCTION**

- ConstructSim
- ProjectWise
- Navigator
- ProStructures
- MicroStation

**3D CITIES**

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

**NUCLEAR**

- eB
- AutoPIPE
- OpenPlant
- Raceway and Cable Management

**COMMUNICATIONS NETWORKS**

- Bentley Fiber
- Bentley Coax
- Inside Plant

**BRIDGES**

- RM
- LEAP
- SUPERLOAD
- GEOPAK
- InRoads
- gINT
- MX
- ProStructures

**ROADS**

- InRoads
- GEOPAK
- MX
- SUPERLOAD
- LEAP
- RM
- Exor
- gINT

**RAIL & TRANSIT NETWORKS**

- Bentley Rail
- Optram
- InRoads
- MX
- RM
- GEOPAK
- LEAP
- gINT

**SUBSURFACE UTILITIES**

- WaterGEMS
- SewerGEMS
- sisNET
- Exor
- GEOPAK
- gINT
- InRoads
- MX

**POWER PLANTS**

- AutoPLANT
- OpenPlant
- AutoPIPE
- STAAD
- ProStructures
- Raceway and Cable Management
- AECOsim
- RAM
- gINT
- Descartes
- GEOPAK
- InRoads
- Bentley Map

**PROCESS PLANTS**

- OpenPlant
- AutoPLANT
- eB
- Raceway and Cable Management
- promise
- AutoPIPE
- ProStructures
- STAAD

**CAMPUSES**

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

**UTILITY NETWORKS**

- Substation
- sisNET
- Descartes
- GEOPAK
- gINT
- InRoads
- MX
- promise
- STAAD

**WIND FARMS**

- SACS
- STAAD
- ProStructures
- Substation

**OFFSHORE**

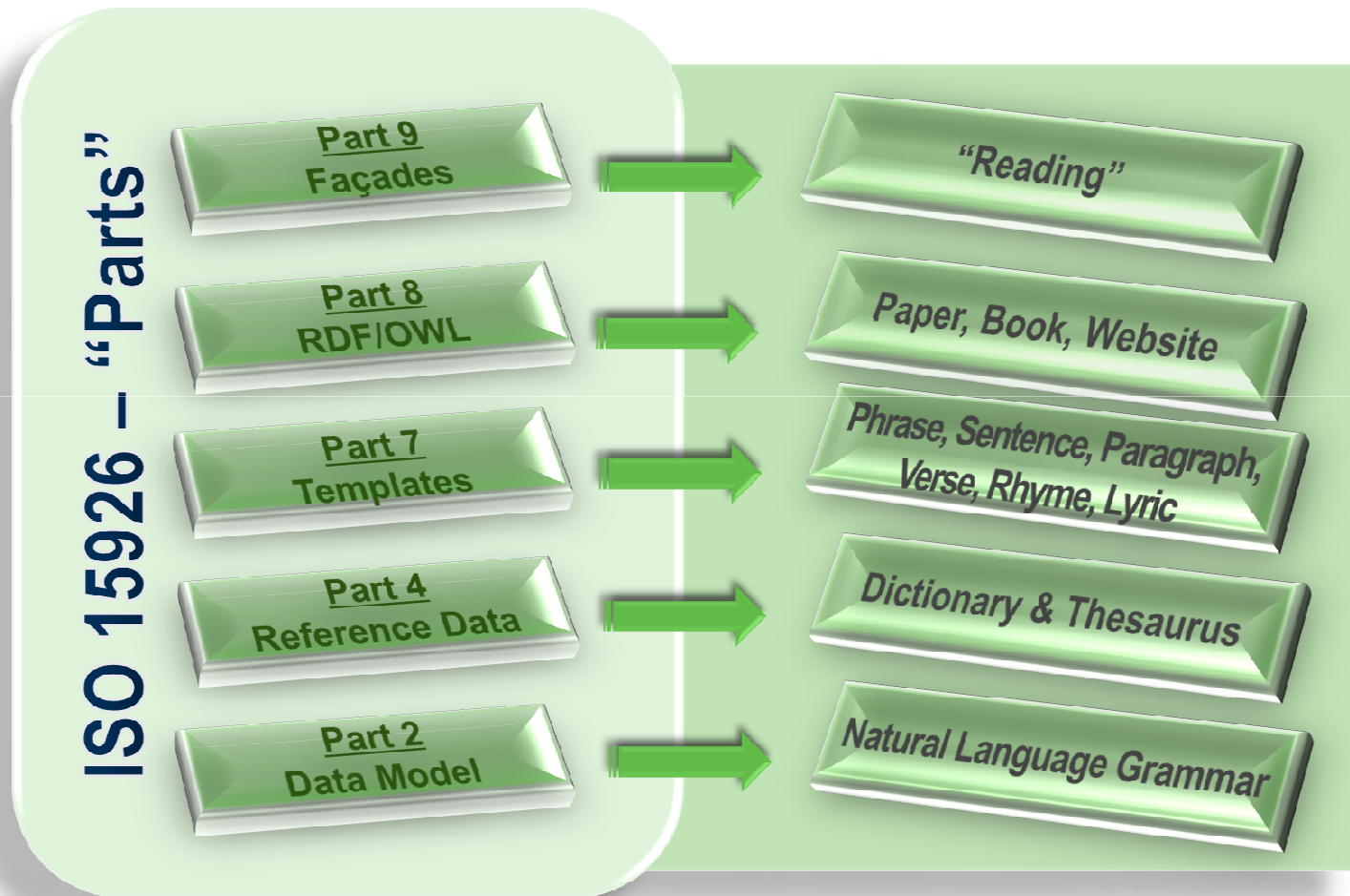
- SACS
- FormSys
- AutoPIPE
- STAAD
- ProStructures
- ConstructSim



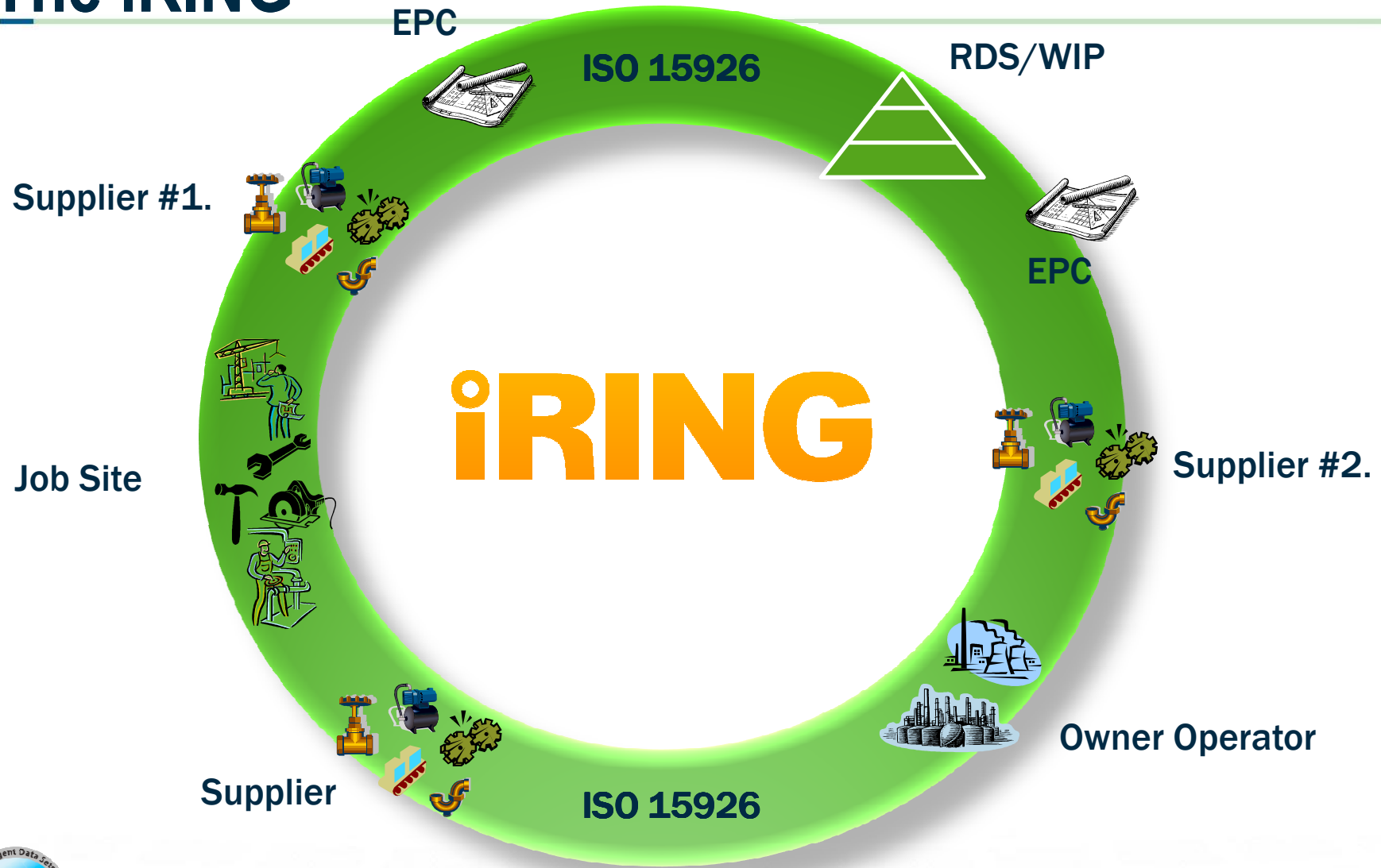
• MicroStation • ProjectWise • AssetWise • Navigator

# Evolution of Digital Infrastructure

Based on Industry Standards

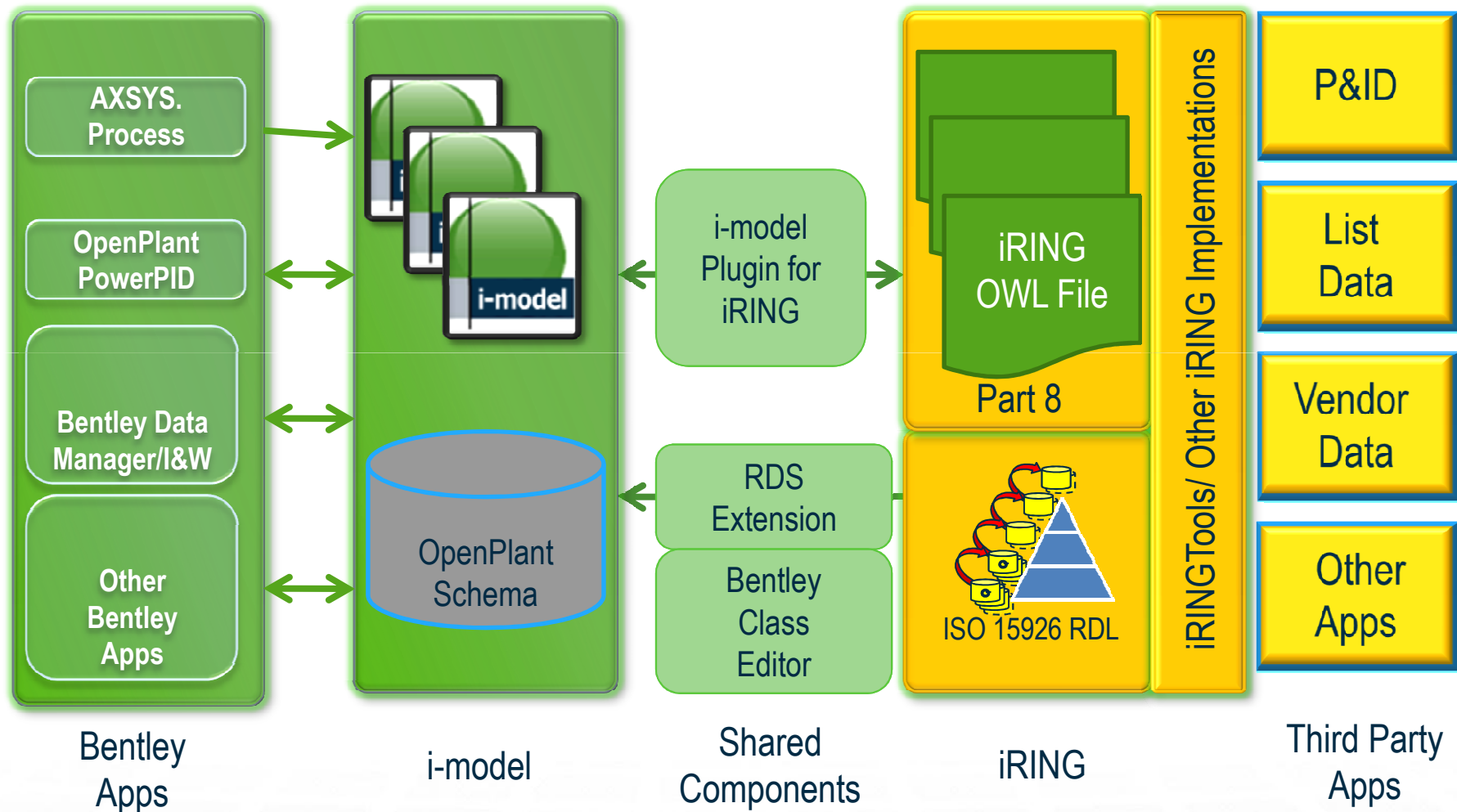


# The iRING



ISO 15926 Realtime Interoperability Network Grid

# Bentley iRING Interoperability Architecture



# Bentley 2011 iRING Activities - Collaboration

- FIATECH iRING Projects
  - iRINGTools Interface Project (IIP)
    - Bechtel, CH2M Hill, Emerson, Hatch, Worley Parsons, DuPONT, Dow, CCC, TCS, etc.
  - Supplier Info Exchange with Design to support Construction
    - CCC, Bechtel, Siemens, NIST, CH2M Hill
  - Harmonizing AEX Pump Schemas with ISO 15926
    - NIST, Intelliequip, Bechtel
- Thought Leadership and Education
  - An industry vision on Interoperability (Fiatech Strategy Paper)
    - Interoperability Position Paper delivered for Members Meeting Review
  - ISO 15926 Introductory Guide
    - Primer published by Fiatech at Members Meeting
  - ISO 15926 Beginner's Guide to support Modelers (Wiki Style)



# Bentley 2011 iRING Activities (Contd.)

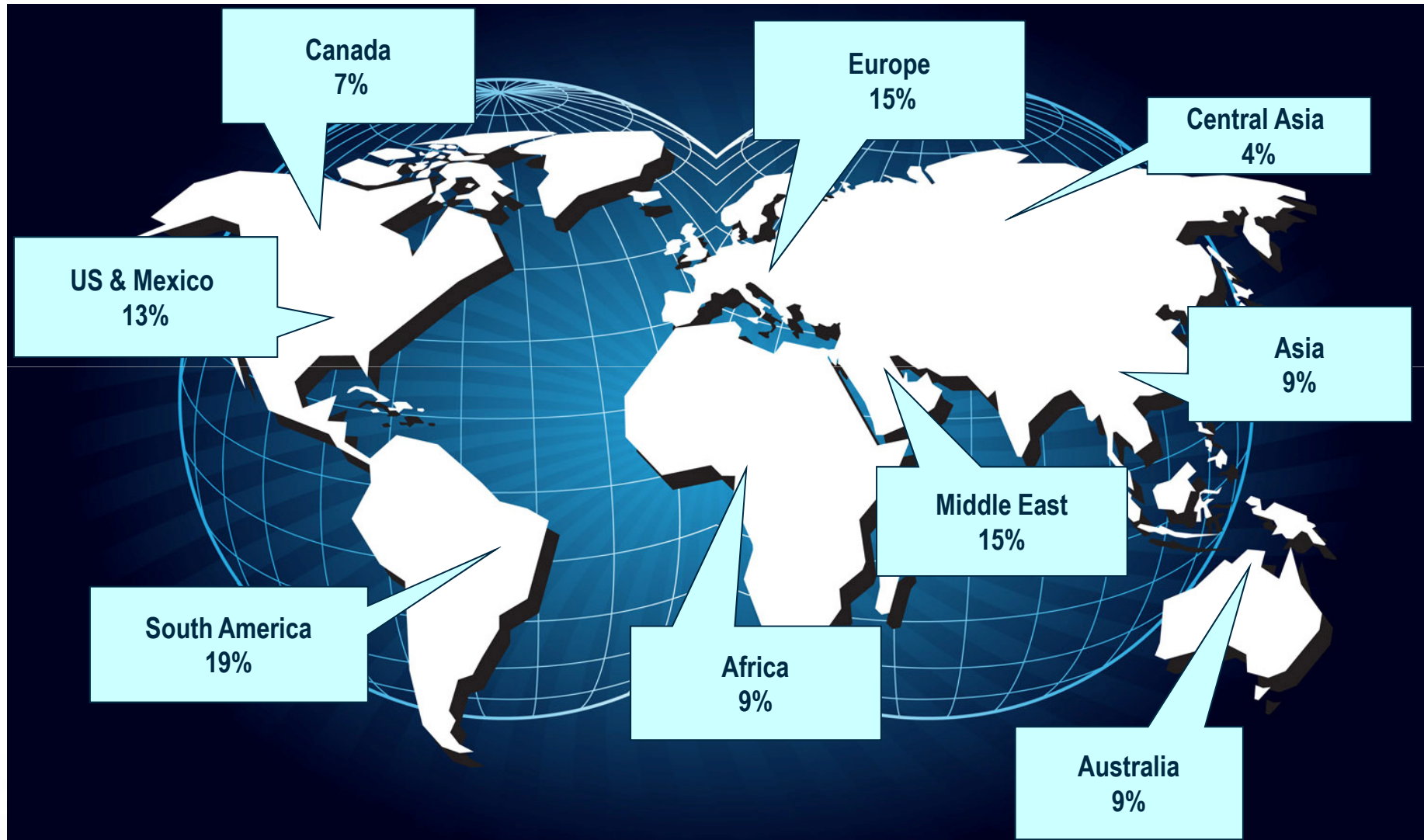
- ISO 15926 Standard Review and Enhancement
  - Active participation in Special Interest Groups (SIGs)
    - Geometry SIG Chaired by Bentley Colleague
    - Active Participation in Open O&M SIG
    - Active participation in Modeling, Methodology, and Technology SIG
  - ISO 15926 Part 9 co-authored by Bentley Colleague
    - Initial Draft released in Q3 2011
  - Part 6 – Reference Data Maintenance Methodology
    - US Ballot review by Bentley, NIST, and Bechtel on behalf of Fiatech
- FIATECH STAR Award for Bentley Colleague
- ISO 15926 on Bentley Communities and Facebook

# Why Interoperability is Important

1. Accuracy of project and operational information
2. Collaboration across stakeholders
3. Guaranteeing governance
4. Evidence that processes are in compliance
5. Share experience and best practices



# Geographical Distribution of Megaprojects



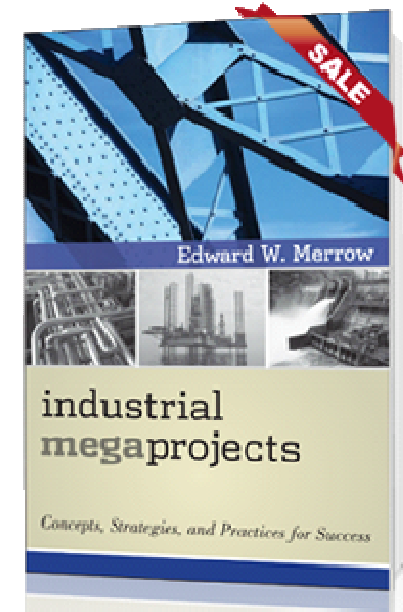
# Industrial Megaprojects



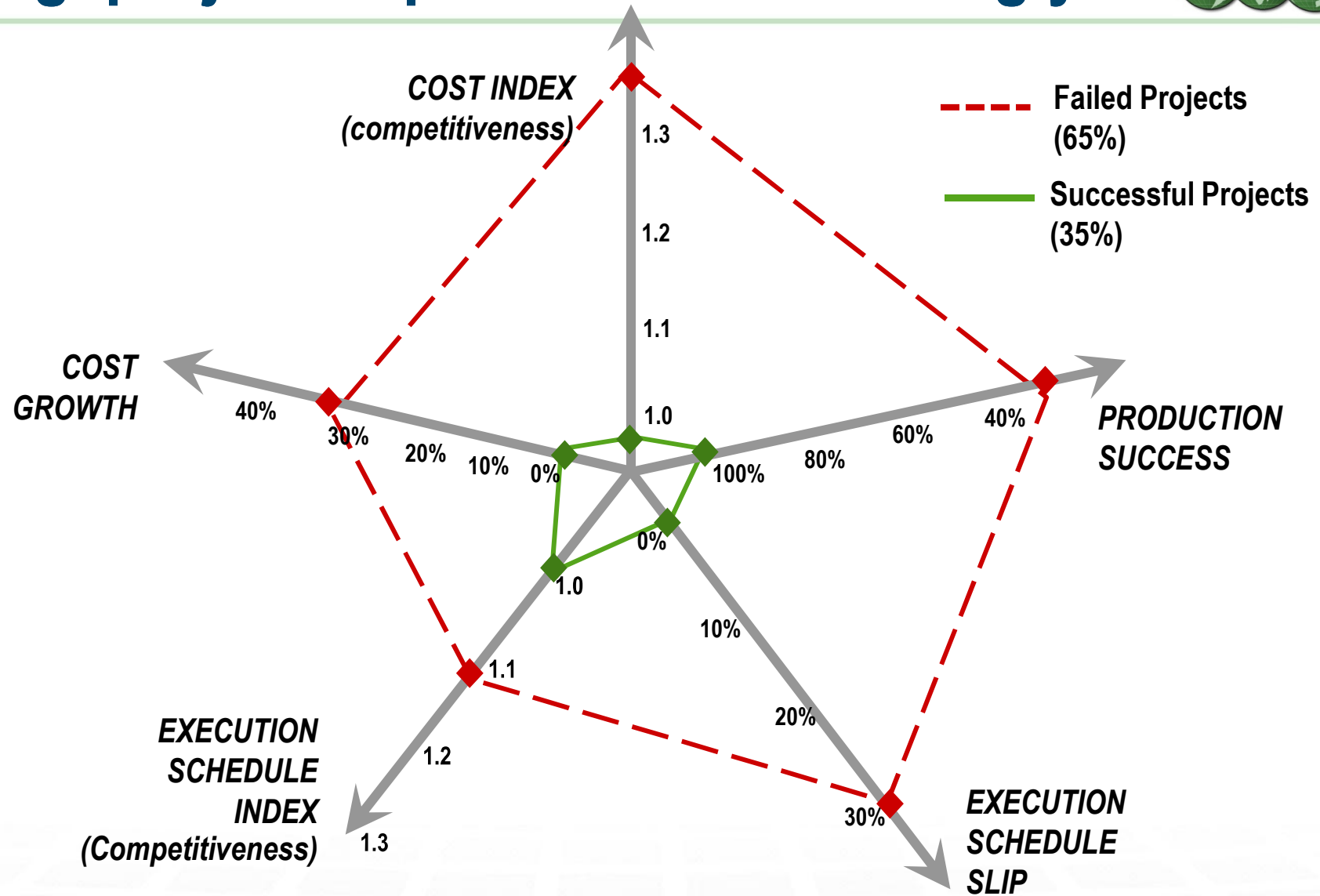
## Independent Project Analysis - (IPA)

Ed Merrow – Foreword & co editor Jim Porter (DuPont)

- 318 Project Studied (today's value \$2bn +)
  - Average Project Cost ~ \$3.4bn
  - Average Project Schedule ~ 66 months
- Failure defined as:
  - >25% cost overrun
  - >25% schedule slip
  - After 2 years production - well below planned, significant operability problems (biggest issue)
- **Study Findings:**
  - 65% of projects failed ~ 40% average overrun
  - Failed projects: Oil & Gas ~ 78%
  - Minerals and Metals ~ 70%

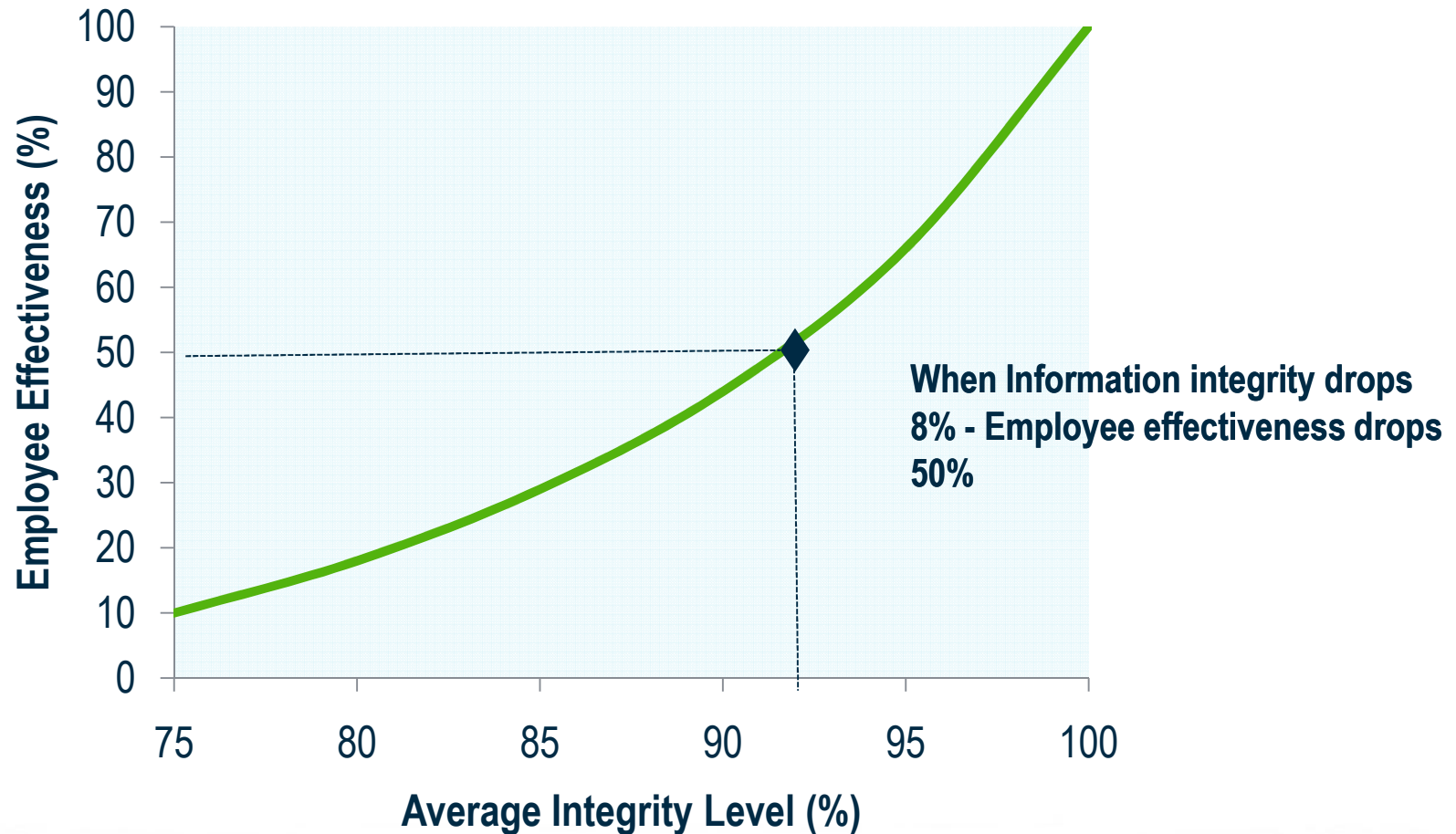


# Megaprojects Split Into Good and Ugly



Source: Independent Project Analysis - (IPA)

# Poor Asset Lifecycle Information is Expensive



Source: ICM - Based on 8 data sets used in series and each data set at an integrity level varying from 75% to 100%

# Why This Matters

Operator



Asset (Object)		
Attribute	Value	Note
ID	P-300-27	
Type	CPump	
DFlow	<b>200</b>	CFM
PR-MAX	3.5	
Material	Ni-222	Internal

Engineer



Asset (Object)		
Attribute	Value	Note
ID	P-300-27	
Type	CPump	
DFlow	<b>150</b>	CFM
PR-MAX	3.5	
Material	Ni-222	Internal

Maintenance Technician



Asset (Object)		
Attribute	Value	Note
ID	P-300-27	
Type	CPump	
DFlow	<b>250</b>	CFM
PR-MAX	3.5	
Material	Ni-222	Internal

**Unmanaged Duplication => Many Versions of the Truth!**

# Causes of Failures

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- 1** Skimping on the front-end definition  
Lack of sound project economics

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- 2** Large project functional integration

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- 3** Lack of cohesive and trusted project information

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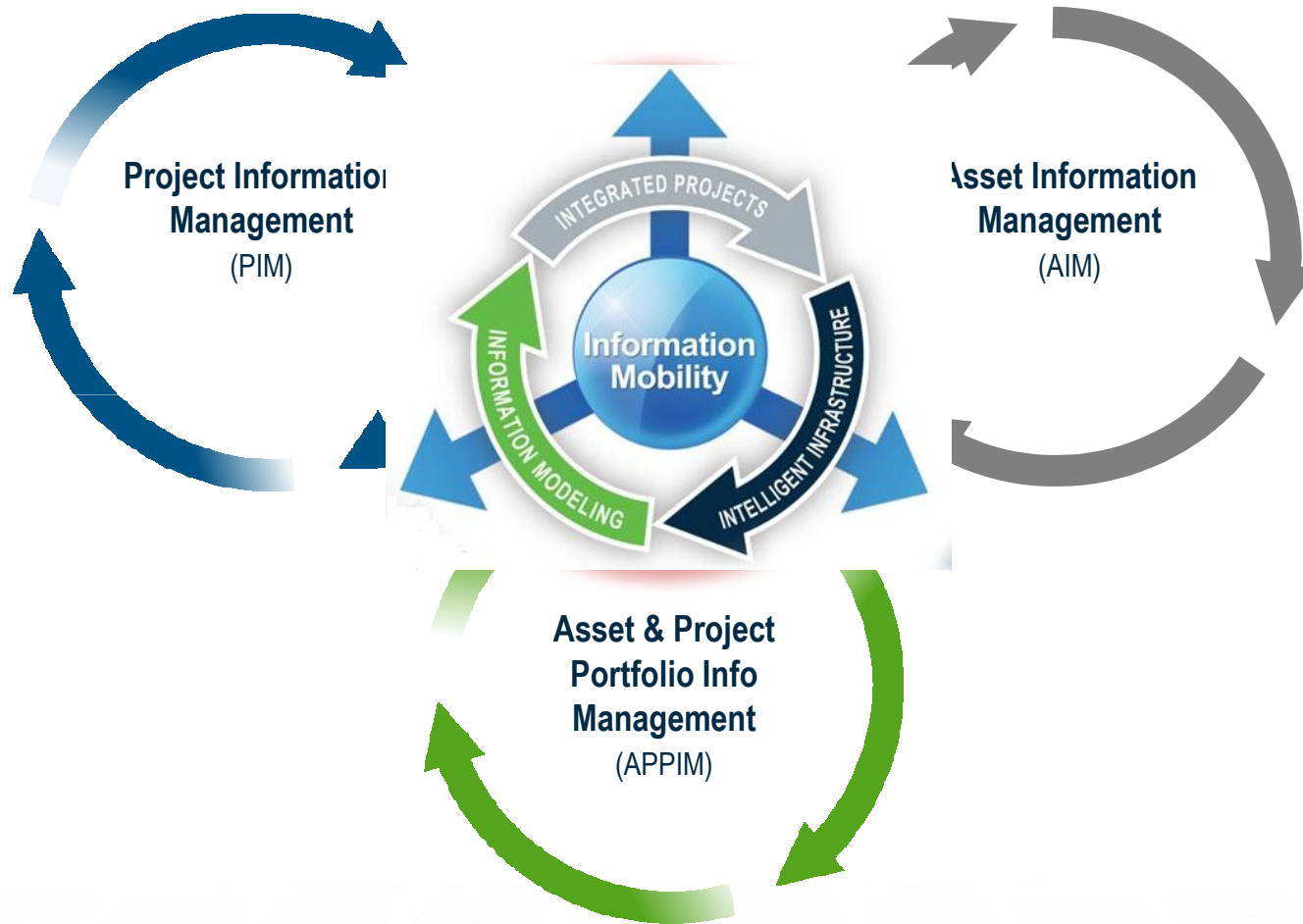


# Asset Lifecycle Information Management



Source: ARC Advisory Group  
Information Management Strategies for Asset Lifecycle Management  
© 2010 ARC Advisory Group

# Delivering Asset Lifecycle Information Management (ALIM)



# Announcement

## Big data meets big infrastructure as Bentley acquires Ivara

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

Bentley Systems, Incorporated, a provider of asset performance management (APM) software solutions for organizations in asset-intensive industries, including metals, power generation and utilities, oil and gas, and petrochemical. Bentley will integrate Ivara's existing AssetWise portfolio. This deal gives Bentley new hooks into aspects of enterprise IT like engineering and operations, linking engineering data and as-built data with the rest of the organization's infrastructure.

September 18, 2012  
Source: Bentley Systems, Inc.



Bentley will use Ivara technology to bring new analytic opportunities to the mass of data collected in plant utilities.

Bentley says Ivara's EXP solution helps owner-operators obtain the best performance, reliability, and life from their assets. APM software works with transaction-oriented enterprise asset management systems like IBM Maximo and SAP EAM by helping to build and implement asset-specific reliability strategies. Ivara is an IBM Member-Level Partner with Certified Ready for Tivoli integration and an SAP Software Solution Partner with SAP Certified—Powered by NetWeaver integration. Terms of the deal were not disclosed, both companies are privately held.

Bentley Systems, Incorporated, the leading company dedicated to providing comprehensive software solutions for sustaining infrastructure, today announced that it has acquired Ontario, Canada-based Ivara Corporation, a leading provider of 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 Ivara 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 obtain the best performance, reliability, and safety 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. Ivara 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.

Business benefits of Ivara EXP include maximized availability and utilization; reduced operational costs; extended asset life; structured compliance with safety, environmental, and other regulations; and the systematic capture and application of asset performance knowledge and industry best practices. Ivara EXP also provides dashboards for asset health monitoring, allows organizations to understand and manage the risks associated with equipment failures, and turns the volumes of operational data into actionable information, enabling timely and accurate maintenance decisions.

With this acquisition, Bentley uniquely extends its AssetWise asset lifecycle information management software and services to comprehensively improve asset performance, providing new value-adding opportunities not only for owner-operators, but also for the engineering/procurement/construction firms who design, build, and commission their infrastructure. The compelling ROI driver of enhanced performance for existing assets is underscored by the Bentley Infrastructure 500 tabulation of Top Owners – whose net infrastructure investment is cumulatively valued at over 14 trillion dollars!

For additional information about Bentley's AssetWise asset lifecycle information management offerings, visit [www.bentley.com/AssetWise](http://www.bentley.com/AssetWise). For additional information about Bentley's new Ivara EXP asset performance management solution, visit [www.bentley.com/ivara](http://www.bentley.com/ivara)

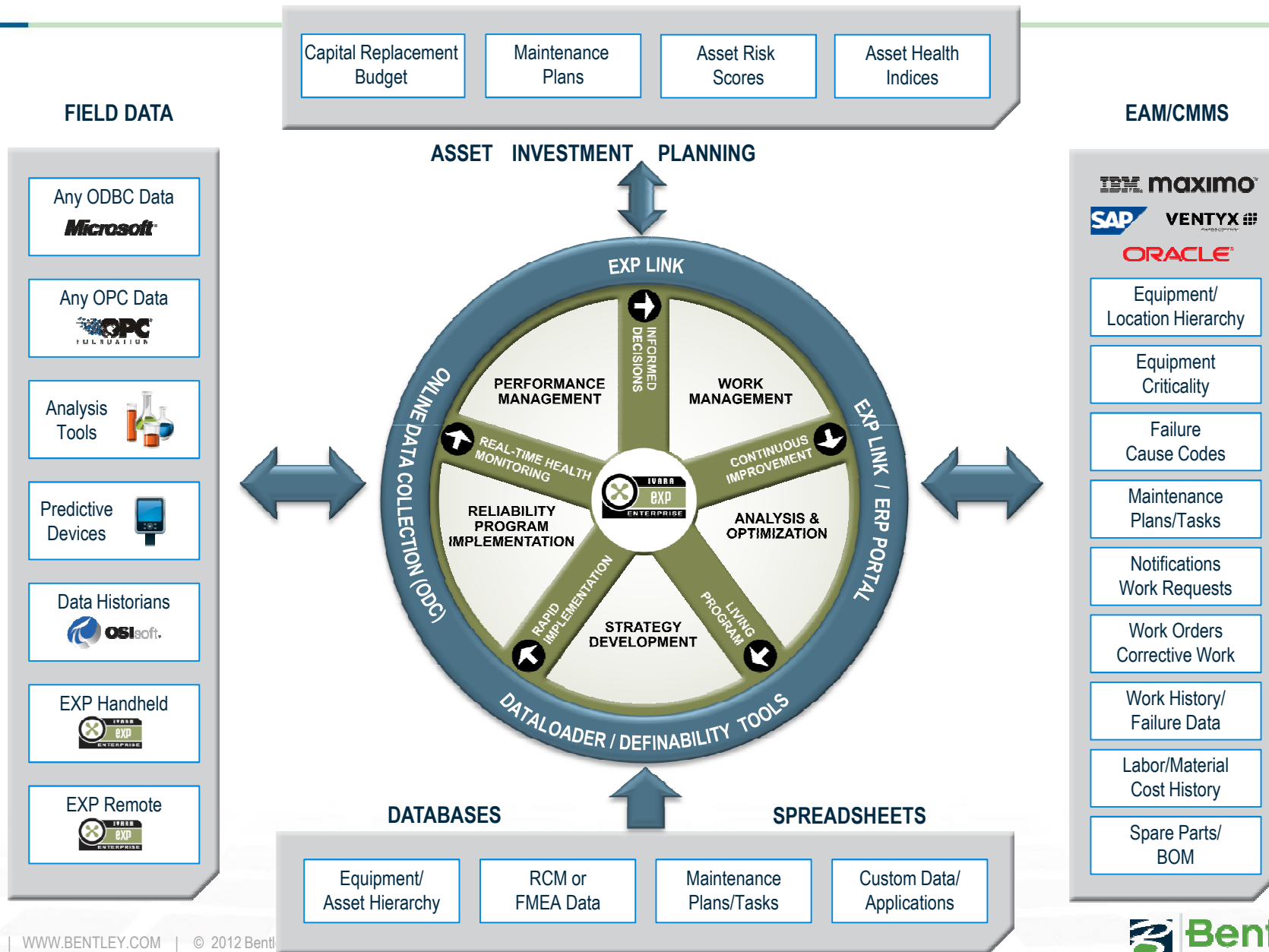


# What is RCM2 ?

- An established and respected process within the maintenance community
- Frames what must be done to ensure a physical asset, system or process meets performance objectives
- Bentley owns the IP for RCM2



# Asset Intelligence from Consolidated Data Sources



And finally ...

Have a look at our four-part ARC series:

## **Asset Information Management: AIM Technology Solutions**

At:

[www.Bentley.com/ARCeSeminars](http://www.Bentley.com/ARCeSeminars)

THANK YOU