Interoperability in the Energy Industry

Glen Worrall
Bentley Systems
About Bentley

Bentley is the global leader dedicated to providing architects, engineers, constructors, and owner-operators with comprehensive software solutions for sustaining infrastructure.
About Bentley

Bentley Subscribers are the ENR Top Design Firms:

• 20 of the Top 20 in:
  – General Building
  – Transportation
  – Power
  – Manufacturing
  – Water
  – Sewer/Waste

• 19 of the Top 20 in:
  – Industrial Process/Petroleum
  – Telecommunications
  – Hazardous Waste

• 47 of the Top 50 Designers in International
• 97 of the Top 100 Pure Design Firms

Global Business:
• Nearly 3,000 colleagues in 45 countries
• $500 million in annual revenues

Bentley is:
• #1 in Plant Operations
• #1 in Structural Engineering
• #1 in Water Modeling
• #1 in Roads and Transit Design
• #1 in Bridge Engineering
• #1 in Building Performance

47 out of 50 U.S. State DOTs use Bentley
Fiatech

http://www.fiatech.org

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What exactly is Fiatech?

- It is a consortium of industries, companies and organizations, private and public, that are stakeholders in the capital projects industry.

- FIA TECH was created in 2000 by the leadership of owner companies and organizations and has grown and expanded.

- Owner members of FIA TECH include representatives that build large assets such as refineries, power plants, health care facilities, large commercial and public buildings, infrastructure and manufacturing facilities.
What exactly is Fiatech?

• It includes the leading providers of engineering, design, procurement and construction

• It also encompasses technology providers in the fields of:
  – Software solutions
  – Nanotechnology
  – New emerging materials
  – Lasers
  – GPS
  – RFID
  – Robotics
  – Remote sensing capabilities
What exactly is Fiatech?

• All in the consortium are united by one goal:

“……to make a step change improvement in the design, engineering, construction, and maintenance of large capital assets.”
Collaborating with a Neutral 3D Model

• Today's integrated project environments, where multiple parties are responsible for design, construction, and commissioning of the final facility turnover to the client, require close collaboration and integration of design deliverables without compromising intellectual property (IP), forcing changes in individual company work-processes, or incurring data loss.

• The current business model foresees the 3D graphic exchanged once or twice during the life of the project to ensure interference-free design; otherwise, the constructor must perform manual take-offs or remodel the entire scope to ensure all installable components are accounted for in installation plans and estimates.
Energy Challenges
#1 Extending Life of existing power units

Business Drivers
- Reduce Capital Costs
- Global / National slow down stunts new investment

Technical Requirements
- Model AS IS
- Remove the phrase “legacy”
- No data left behind
- Blend multiple graphic / data sources

Jacobs to extend life of Nottingham coal power station

16 August, 2011 | By NCE Editorial

Jacobs has won a framework contract from Eon to provide engineering services and construction management support as part of its ongoing plant life extension program at the 2,000MW coal fired Ratcliffe-on-Soar Power Station near Nottingham.

EDF in talks to extend life of UK nuclear power stations

Electricity giant EDF is in talks with the nuclear regulator about extending the life of its power stations.
#1 Extending Life of existing power units

Lethabo Power Station
Thousands of existing documents linked to tags and 3D Models
Ensure consistent reporting for management purposes
#2 Decrease Energy Costs

**Business Drivers**
- Reduce Operational Costs
- Decrease reliance on “imported” resources
- Decrease high cost of harnessing “free” resources

**Technical Requirements**
- Increase “enter once” capability
- Provide enterprise interoperability for management visibility
- Insight into full lifecycle of asset
- Common platform for portfolio management

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**CIVITAS**

Electricity Costs: The folly of wind-power
#2 Decrease Energy Costs

**Intergen**
Energy provider
Upto $180,000 per day to make up shortages
Online access for contractors to all documents
#3 Cross Border Opportunities

Business Drivers
• Large energy providers extending beyond their national market
• High transport costs of raw resource
• Government restrictions on energy production (CO2 / Nuclear)
• Desire for free market economics

Technical Requirements
• New efficient transmission mechanism
• Conformance to multiple design regulations

Interconnectors

France
The England-France Interconnector is a 2,000MW high voltage direct current (HVDC) link between the French and British transmission systems with ownership shared between National Grid and Réseau de Transport d'Electricité (RTE). The UK landing point is at Baker's Gap, near Folkestone from where the interconnector is cabled underground to Sellindge converter station and connected to the transmission system. The interconnector is approximately 70km in length with 45km of subsea cable. The availability has consistently exceeded 93% per year.

National Grid Interconnectors Limited has been established and incorporated as a wholly owned subsidiary of National Grid Plc to receive an interconnector licence as a consequence of the Energy Act 2004 and taking effect on Monday 14 August 2006.

National Grid Interconnectors Ltd will jointly own and operate the Interconnexion France Angleterre (IF) with RTE SA (the French transmission system operator).
#3 Cross Border Opportunities

**Engineering Design:**  
Energoprojekt Gliwice  
**Project:** Central Solar PS20 Power Plant  
**Location:** Seville, Spain
#4 Fleet Management

### Business Drivers
- Consolidation of energy providers
- Legislation for “energy mix”

### Technical Requirements
- Multiple production mix
- Enhanced visibility / feedback capabilities
- Enhanced Interoperability

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**Most states have Renewable Portfolio Standards**

*States with Renewable Portfolio Standards (mandatory) or Goals (voluntary), January 2012*

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**Consolidation Among U.S. Energy Service Companies Will Continue**

**June 20, 2012**

The Energy Service Company (ESCO) market, which comprises companies that provide end-to-end efficiency measures through the use of performance-based contracts, exceeded $5 billion in revenues in 2011. Driven by public policies that encourage a greater emphasis on energy efficiency, this market is expected to continue growing at a pace that exceeds general economic growth. According to a new report from Pike Research, consolidation among ESCOs will continue through the remainder of this decade, as highly competitive players aim to increase market share, resulting in an industry structure concentrated to a large extent in a group of very large companies focused on serving the federal government.
#4 Fleet Management

The R.E. Ginna Nuclear Power Plant in Ontario, N.Y., is one of five nuclear plants within the Constellation Energy Nuclear Energy Group. Commissioned in 1970, it is one of the oldest U.S. nuclear plants still in operation. As Constellation Energy began aligning business processes and integrating information systems across its fleet, Ginna became the first plant to implement a centralized electronic Performance Improvement Center (ePIC) to replace its existing paper-based corrective action program.
#5 New / Standard Designs

### Business Drivers
- Consolidation of energy providers
- Legislation for “energy mix”

### Technical Requirements
- Multiple production mix
- Enhanced visibility / feedback capabilities
- Enhanced Interoperability

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*Station to station: the new power generation*

The architecture of Britain's latest wave of energy plants is the finest since Bankside in the 1940s
#5 New / Standard Designs

Two power plants share designs

Utility Engineering Corporation
Simultaneously Designed 2 power plants
Georgia
Florida
Interoperability

http://www.fiatech.org/interoperability
Interoperability

Capability to communicate, execute programs, or transfer data among various functional units in a manner that requires the user to have little or no knowledge of the unique characteristics of those units.
Challenges to Interoperability

Sources of Difference

Data formats
Semantics
Relationships
Scope
Level of Detail
Interoperability is happening

But how much is it costing ....
And who is paying the price ...

*NIST Study*
How often do you pay ....

Quality → Quality & Mobility
Quality & Mobility → Quality & Access
Quality & Access → Unlimited
Unlimited → On-line Access

Transportable
ISO 15926 is the Spotify for data

15926 Store

- Online access to Vendor Data
- Local Copy of Vendor Data
- Application specific access to Vendor data
- Role specific access to Vendor data
- Security specific access to Vendor data

User defined format (XML / OWL / PDF)
An Open Solution (ISO 15926)
How can I use it

CLOUD
How can I use it
Internet Results

Little focus

No data on specific instance

Suppliers as well as Manufacturers returned

What can be trusted?
Intranet Results

Company Focus

Potential for “role” search

Requires “apps” to expose data

More trusted source of information
iRing Search

Specific focus

Role search

Business logic can be applied

Only trusted sources of information
Challenges

- Trusted End Points
- Presentation Layers
How can I use it?
eB - Operations

eB visual reporting enables i-model to be re-published with additional data specific to the task.
Embedded or External

Data can either be embedded into the model or enabled via a hyperlink back to the corporate trusted source.
JT Challenge

• 3D Visualisation
• Technologies to link to enterprise repositories
• Technologies to link to cloud repositories
Thank You!!

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