IBM Maximo Overview for Power Generation

Chris Murray – IBM Service Management Tiger Team

12th May 2011
Agenda

- Maximo in the Power industry
  - Base Maximo functionality
  - Best Practise Maximo deployment in Power Generation
  - Maximo Extensions
  - Maximo architecture
Maximo in Utilities

350+ IBM Maximo for Utilities Clients worldwide

160 In Generation

17 of 30 Fortune 1000 Utility Companies

Top Reasons for Selecting Maximo

1. **Capabilities** – Functionality for managing Power Generation & Distributed assets plus ease of configuration to customer processes

2. **Technology** – J2EE Certified, Service Oriented Architecture (SOA) platform – standardization, scalability, usability, security

3. **Leadership Position** – In both the Gartner MQ and the Energy insight's Short List

4. **People** – Dedicated, experienced delivery teams for IBM Maximo
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Power Generation Clients Sample

<table>
<thead>
<tr>
<th>Scottish and Southern Energy</th>
<th>Energy Nuclear Northeast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scottish Power</td>
<td>FPL Nuclear Seabrook</td>
</tr>
<tr>
<td>International Power</td>
<td>Guangdong Nuclear Power Group</td>
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<tr>
<td>EON</td>
<td>TXU Nuclear</td>
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<tr>
<td>Keyspan Energy</td>
<td>Dominion Nuclear</td>
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<tr>
<td>Duke Energy</td>
<td>Fortum Heat &amp; Power</td>
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<tr>
<td>Mirant</td>
<td>Electronuclear</td>
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<tr>
<td>New York Power Authority</td>
<td>Magnox Chapelcross</td>
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<td>LCRA</td>
<td>Springfield Fuels</td>
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<tr>
<td>Bureau of Reclamation</td>
<td>Constellation Energy</td>
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<tr>
<td>Chelan County</td>
<td>Southern Company</td>
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<tr>
<td>Arizona Public Service</td>
<td>Infinis</td>
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<tr>
<td>Yalhourn Energy</td>
<td>Acconia</td>
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<td>Calpine</td>
<td>Enesco</td>
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<td>DTE Energy</td>
<td>ESB</td>
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<td>Xcel Energy</td>
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<tr>
<td>Texas Genco (NRG)</td>
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<tr>
<td>TVA</td>
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<tr>
<td>British Energy EPL</td>
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</tbody>
</table>
Values & Benefits The Customer Derives and EAM Maximo Delivers?

**Potential Cost Savings/ROI Benefits**

- Labour Utilization up by **10-20%**
- Asset utilization up by **3-5%**
- Increased planned maintenance by **50-80%**
- Outage management reduced by **3-5%**
- New Equipment purchases down by **3-5%**
- Lost warranty recoveries up by **10-50%**
- On-hand inventory needs down by **20-30%**
- Inventory carrying costs down by **5 - 20%**
- Material costs reduced by **5-10%**
- Purchasing Labour reduced by **10-50%**

<table>
<thead>
<tr>
<th>Manual Operations</th>
<th>Automated Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactive Maintenance</td>
<td>Predictive and Preventive</td>
</tr>
<tr>
<td>Cost Intensive</td>
<td>Cost Controlled</td>
</tr>
<tr>
<td>Stand Alone System</td>
<td>Integrated Solution</td>
</tr>
<tr>
<td>Autonomous Sites</td>
<td>Corporate Standards</td>
</tr>
<tr>
<td>Business as usual</td>
<td>Continuous Improvement</td>
</tr>
</tbody>
</table>

**Other Benefits:**

- Improved warehouse productivity
- Support for Sarbanes-Oxley compliance
- Improved regulatory/safety compliance
- More accurate data for improved decision making
- Improved work planning/coordination
- Sales growth through improved service
## Case Study – Scottish Power

### The Company
- Scottish Power owns, controls and operates over 20 power stations within the UK, covering Coal, Gas, Hydro, and wind
- Generating 6,200 MW of power

### The Challenge
- Growth through acquisition has led to a variety of WAMS/CMMS systems
- Harmonisation of work, asset management and supply chain practices across the whole fleet
- Improve safety practices

### The Solution
- Maximo implemented for work, asset and Supply chain management across all 20 sites
- Standard working practices to “World class best practice” across whole fleet
- Integrated to NiSoft Elipse, Cedar Fianceials, OSISoft PI, MS Project

### The Benefits
- ‘Best practice’ shared across all business units
- Deployed on time at Crauchan, Windfarms, Cathcart, Shoreham, Daldowie, Cockenzie, Longannet
# Case Study – Scottish and Southern Energy

| The Company | One of the UK’s largest energy companies  
|            | 9.7 GW of power generation capacity  
|            | Broad portfolio of CCGT, Fossil and Renewable plant  
|            | Recently acquired Scottish and Southern Gas Networks |

| The Challenge | Replace its existing WAMS system Maincontroller across is power generation portfolio.  
|              | Harmonisation of its work and asset management and procurement practices across the generation fleet |

| The Solution | Maximo implemented for work and asset management across all of SSE’s generation fleet  
|             | Current project in progress to upgrade entire Maximo 4 portfolio to Maximo 6 common process instance integrated to Oracle Financials |

| The Benefits | ‘Best practice’ shared across all business units.  
|             | Outages shortened due to better visibility of resources, plant and inventory. |
## Case Study – International Power Plc

<table>
<thead>
<tr>
<th>The Company</th>
<th>International Power owns, controls or operates more than 16,000 MW of generating capacity worldwide</th>
</tr>
</thead>
</table>
| The Challenge | - ‘Off the shelf’ Work and Asset Management system required for best practice template  
- Ability to rapidly deploy solution on various asset profiles, coal, gas, hydro. |
| The Solution | - MAXIMO used as a standard template for WAMS  
- Deployed on site by site basis from as few as 5 users to 500 users  
- Now deployed within 3 months at new sites |
| The Benefits | - Benchmarking of Asset O&M costs  
- Global Standard Working Practices  
- Low cost of deployment and ownership  
- Scalable across all types of Generation Assets |
# Case Study – Infinis

## The Company
- UK’S largest purely renewable Energy Generator
- Produce 10% of UK renewable energy 306MW
- 80 sites across UK
- Now employee over 250 People

## The Challenge
- Dispersed sites across the UK
- Wanted a Single solution to manage WAMS and supply chain remotely
- Harmonisation of its work and asset management and procurement practices across the sites

## The Solution
- Maximo implemented for work and asset management and now supply chain
- All workers work remotely via laptops
- Integrated to Microlise vehicle management

## The Benefits
- Manage, Compare and contrast performance at each site
- Full visibility of all assets
- Low overheads
- Rapid deployment of new sites
Agenda

- Maximo in the Power industry
  - Base Maximo functionality
  - Best Practise Maximo deployment in Power Generation
  - Maximo architecture
IBM Maximo 7 – Best Practice UK Generation Asset Management

- **Advanced Asset Management** functions in relation to classification of assets, move/modify assets, and provision of asset status. Support of multiple meters and condition based maintenance.

- **Work Management and Scheduling** functions supporting ‘Engineer Diary’ scheduling, with integration to MS Project and P3e for outage management. Advanced planned maintenance capabilities and work package creation.

- **Mobile Maximo** providing Work Order and storeroom functions in the palm of the hand. Providing asset history, work and safety procedures at the point of execution. Ability to raise ad-hoc and follow-on work in the field.

- **Workflow and Escalation** – drive business process electronically against any business object in Maximo (Assets, Work, Safety, and Inventory). Use Escalations to monitor asset and work data in Maximo and alert users of issues or alarms.

- **Service Management** functionality to support the provision of Service Level Agreements with operational departments.

- **People and Skills** Management are provided, with advanced functional groups, skills and qualifications. These skill levels are linked to the Work scheduling and assignment process.

- **Inventory and Procurement** – supply chain linked to assets and work orders.

- **Contract Management** – control schedule of rates, warranty and purchasing contracts
### IBM Maximo 7 Base Functional Modules

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Locations</td>
<td>• Job Plans</td>
<td>• Item Master</td>
<td>• Request for Quotation</td>
<td>• Purchase Contracts</td>
<td>• Service Catalogs</td>
</tr>
<tr>
<td>• Asset</td>
<td>• Routes</td>
<td>• Storerooms</td>
<td>• Receiving</td>
<td>• Master Contracts</td>
<td>• SLA Management</td>
</tr>
<tr>
<td>• Failure Codes</td>
<td>• Service Requests</td>
<td>• Inventory</td>
<td>• Receiving Inspections</td>
<td>• Warranty Contracts</td>
<td>• Incidents</td>
</tr>
<tr>
<td>• Conditioning Monitoring</td>
<td>• Work Order Tracking</td>
<td>• Lot Management</td>
<td>• Purchase Requisitions</td>
<td>• Lease / Rental Contracts</td>
<td>• Problems</td>
</tr>
<tr>
<td>• Meters</td>
<td>• Safety</td>
<td>• Kitting</td>
<td>• Invoices</td>
<td>• Labor Rate Contracts</td>
<td>• Changes</td>
</tr>
<tr>
<td>• Meter Groups</td>
<td>• Quick Reporting</td>
<td>• Issues &amp; Transfers</td>
<td>• Purchase Orders</td>
<td>• Payment Schedules</td>
<td>• Releases</td>
</tr>
</tbody>
</table>

**Enhanced Workflow in SLAs and Escalation Manager**
- Configuration – UI, Database Fields, and Applications; Context Based Screens
- KPIs / Reporting / Analysis
- Security & Administration

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IBM Maximo for Power Generation

Industry Solutions

Maximo Scheduler

Maximo Archiving with IBM Optim

- Oil & Gas 7.1.1
  - Reliability & Availability Analysis

- Transportation 7.1.1
  - Consist Management (Rail)

- Nuclear Power 7.1.1
  - Permitting, Config. Change Mgmt

- Utilities 7.1.1
  - Reliability & Availability Analysis

- Spatial Asset Management
  - Polygon selection, Usability enh.

- Asset Configuration Mgmt 7.1.1
  - Service Data Management

- Primavera 7.1.1
  - Import Task Resources

- Maximo Scheduler
  - Gantt chart control
  - Drag and Drop WO/tasks
  - View resource requirements
  - Manage task dependencies
  - Perform a CPM schedule

- Maximo Archiving with IBM Optim
  - Segregate Data & Move to Archive
  - Reduce database size prior to upgrade
  - Reduce Infrastructure Costs
  - Deploy Tiered Storage Strategies
  - Simplify Infrastructure
  - Improve Compliance
  - Retain Data According to Value
Maximo for Oil and Gas – Capability Summary

Release 7.1.0
GA: Sep 28, 2008
- ISO14224 Asset Classifications
- ISO14224 Failure Codes
- Location and Work Details
- Prioritization Matrix
- Condition for Work
- Regulations
- Incidents
- Defects
- Investigations
- Solutions
- Improvements
- Benefits and Losses
- Management of Change
- Action Tracking
- Standard Actions

Release 7.1.1
GA: Dec 2009
- Control of Work
- Permit and Certificate Types
- Risk Analysis
- Risk Matrices
- Operator’s Log
- Standard Action Groups
- Maximo Spatial Integration
- IIF Integration
- Miscellaneous enhancements
  - Hazards
  - MOC Risks and Projects
  - Target Availability
  - Legacy Tag
  - Bad Actor Dialog
  - Service Request (Oil)

Release 7.1.2
GA: Nov. 2010
- Operating Policies
- Operating Procedures
- Operator Tasks
- Cause Analysis/FMECA
- Drilling and Completion
- Run Log
- Material Inspection
- Operator Log Enhancements
- Scheduler integration
- MOC enhancements
- Miscellaneous enhancements
  - Extra failure fields
  - Incident impact
  - Regulations extra where used

Maximo 7.1

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Integrated process – changes for 7.1.2 shown in Red

Maximo Oil & Gas

Projects
- Engineering System
- Plant Control Systems
- Condition Monitoring
- Service Request
- Defect
- Incident
- PMs
- Investigate & Improve
- Manage Assets
- Compliance
- Operations
- Log
- Manage Supply Chain
- Control of Work
- Change Management
- Work Management
- Investigation
- Locations
- Regulatory Compliance
- Operator Log
- Knowledge Management
- Solution Search
- Inventory
- Hazards
- MOC Request
- Prioritization Matrix
- Investigation
- Improvement
- Assets
- Persons
- Benefits & Losses
- Investigation (Lessons Learned)
- Purchasing
- Risk Matrix
- MOC
- Condition for Work
- Improvement
- Job Plan
- Configuration Items
- Operator Tasks
- Operating Procedure
- Operating Policy
- Asset Lists
- Standard Actions
- Drilling and Completion
- Run Log

- Solutions
- Contracts
- Risk Assessment
- Permit & Certificate Types
- Work Orders
- Quick Reporting
- Scheduler
- Spatial
- Linear Assets
- Standard Actions
- HR
- Finance
- Reporting and Analytics Layer

Maximo Process
External Process
Oil and Gas Apps supporting process
Core and add on Maximo applications supporting process
Not part of oil and gas must be purchased separately

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Development Themes

- Organizational learning and knowledge management
- Asset integrity management
- Asset performance
- Integrated operations
- Planning and Scheduling
Asset Integrity Management

- Prioritization matrix
- Regulatory compliance
- Locations details – Safety Critical, Hazardous Area Classification
- Incidents
- Investigations
- Control of Work
- Risk Assessment
- Risk Matrices
- Management of Change
- Management of Change Request
- Authorisations (People Oil)
- Action Tracking (Compliance tracking)
- Standard Actions
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IBM Maximo for Power Generation

Agile standards based Service Orientated Architecture

Coal Process  Gas...  Hydro....

User Interface - Web / Portal / Mobile

Workflow – Generic business process

Work Management  Service Management

Asset Management  Inventory

Purchasing  Contract Management

Maximo Integration Framework / SOA model

Generation generic data model

Reports – Run-time; ad-hoc and KPI

Scottish Power One Way project

Asset Reliability

RCM2

NiSoft eclipse

Isolations  Permits

Documentum

Documents

OsiSoft Pi

Process  Data History

Accounts Payable

General Ledger

CRM / Billing  Payroll

Business Objects

Management Reporting
Example UK Power Generation – Work Order Status Flow (In safety system)
### Example UK Power Generation – Work Order Status Flow (Outside safety system)

<table>
<thead>
<tr>
<th>Core MXES WO Status</th>
<th>SP WO Status</th>
<th>WO Status Cycle for Corrective Work In System = 'N', 'WTSR'</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAPPR</td>
<td>RECD (Recorded) WOUT</td>
<td>1.1 Work Capture</td>
</tr>
<tr>
<td></td>
<td>VALD (Validated) PRIO (Prioritised)</td>
<td>1.2 Work Approval and Prioritisation</td>
</tr>
<tr>
<td></td>
<td>WPACK</td>
<td>1.3 Create &quot;Work Pack&quot;</td>
</tr>
<tr>
<td>APPR</td>
<td>WSCHED</td>
<td>Insufficient Detail on Work Order - RECD</td>
</tr>
<tr>
<td>WMATL</td>
<td>WOUT</td>
<td>1.4 Work Scheduling</td>
</tr>
<tr>
<td>APPR</td>
<td>READY</td>
<td>READY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.7 Apply Safe System of Work</td>
</tr>
<tr>
<td>INPRG</td>
<td>INPRG</td>
<td>Suspended – work for re-scheduling - SUSP</td>
</tr>
<tr>
<td>COMP</td>
<td>SUSP (Suspended) COMP</td>
<td>1.8 Do Work</td>
</tr>
<tr>
<td>CLOSE</td>
<td>CLOSE</td>
<td></td>
</tr>
</tbody>
</table>

- **RECD**: Recorded
- **VALD**: Validated
- **PRIO**: Prioritised
- **WPACK**: Work Pack
- **WSCHED**: Work Scheduling
- **WOUT**: Work Outage
- **APPR**: Approved
- **WMATL**: Work Material
- **INPRG**: In Progress
- **CLOSE**: Closed
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  - Best Practise Maximo deployment in Power Generation
  - Maximo architecture
Architecture Matters

- **Built from the ground up in a true Web Architecture**
  - Evolution of technology since 1997; stable on platform 2015+
  - Non-proprietary standards based technology framework
  - Modern next generation architecture today;

- **All applications built in a J2EE, n-tiered component architecture**
  - Java 2 Enterprise Edition
  - Standard for developing multi-tier enterprise applications
  - Natively supports global security models

- **Maximo one of the few major applications J2EE certified**
  - SAP and Oracle will ditch proprietary architectures for J2EE
  - Major technology jumps for vendors not on full J2EE or .NET platform

- **J2EE and Web Services provide ideal model for integration**
  - Truly delivers Services Oriented Architecture (SOA) concept
  - Integration built directly into Maximo business processes
  - Compliant with Web Services-Interoperability Organization (WS-I)

- **Database led deployment and configuration suite**
  - Screens, business process and integration settings deployed on database
  - Upgrade paths delivered for data model, screens, Workflow and Integration
Configurable Database and Screens
Maximo 7 Report Strategy Summary

- IT Report Developer
- Power
- Manager
- Business

Ad-hoc Reporting Tool
Dashboard KPIs and Result Sets
Run-time reports (150+ standard)
External Reporting – Crystal / Cognos Integration
Benefits of using Maximo

- **Proven Track Record** - Maximo has a proven track record in supporting the Power Generation Industry business processes, therefore a low risk option.

- **Extensive Product Investment** – Committed investment from IBM to maintain number 1 market position

- **Power Generation User Community** – Large global user base to share experiences.

- **Proven Delivery** - Our delivery teams have a vast amount of valuable experience around data transfer, integrations, cultural change and understanding the business processes

- **Total Cost Of Ownership** – One technology, reduces the cost of upgrading

- **Flexibility** – Maximo allows you to capture business changes for the front office without the need to change the back office

- **User friendly** - Accepted by Engineers as easy to use

- **Web Architecture** – Maximo is the only Enterprise Asset Management system to be truly web architected from the ground up

- **SOA** – Truly delivers Services Oriented Architecture (SOA), Compliant with Web Services-Interoperability Organization (WS-I)

- **Stable platform until 2015** - Non-proprietary standards based technology framework

- **Existing partnership** – Hardware, software and services existing partnerships in place