21st Century Manufacturing Excellence: Securing a Sustainable Future through an Enterprise Architecture

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The Power of Data
Alcoa’s Keys to Sustainability

Leadership, Scorecards, Roadmaps, Compensation, Transparency & DATA

“One of the things we saw when we went after our CO2 goals, is we used technology to give the people on the shop floor better data and faster data so they could make real-time changes to the processes. This gave us lower energy costs, lower carbon footprint and typically, a higher output.”
21st Century Manufacturing Excellence

Securing a Sustainable Future through an Enterprise Architecture

April 16th, 2013
What is an Enterprise Architecture?

Initial Focus of Enterprise Architecture

Site 1
- Business App 1
- Business App 2
- Business App n

Site 2
- Business App 1
- Business App 2
- Business App n

Site 3
- Business App 1
- Business App 2
- Business App n

Migrating To

Enterprise Business Model

Integrated Enterprise Business and Manufacturing Intelligence / Analytics

Evolving Focus...

Site 1
- Custom Manufacturing Reporting
- Custom ShopFloor Applications
- Custom Process Data Interfaces and Storage

Site 2
- Custom Manufacturing Reporting
- Custom ShopFloor Applications
- Custom Process Data Interfaces and Storage

Site 3
- Custom Manufacturing Reporting
- Custom ShopFloor Applications
- Custom Process Data Interfaces and Storage

Migrating To

Site Instance of Common Manf Reports
Site Instance of Common ShopFloor Apps
Common Process Data Interface and Storage
Establishing the Enterprise Architecture (EA) Vision

- Develop an Overall Enterprise Architecture Model that Delivers All Required Technical Capabilities
- Align Business Leadership with the Benefits of Leveraging Information into the Business Operating System
The Alcoa GPM ‘SMART Manufacturing’ Solution

Infrastructure Architecture – Leveraging the CMI Model
The Alcoa GPM ‘SMART Manufacturing’ Solution

The Data and Visualization Toolset

SharePoint 2010 – Enterprise
Plant SMART SharePoint Portal
(Data publication, DMS Dashboard, Excel reports, etc...)

Adhoc data consumption (EXCEL)

Real Time Data
Visualisation and
Analysis (PB)

Data Analysis and
Mining Tools
(MS SSRS, SSIS &
SSAS)

SMART Data
Warehouse

Data Consumption
(FACTS)

Manufacturing Intelligence

MES Data
Transfer to
Historan

Historian Databases

MES and LIMS
databases

Process equipment/systems

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The Alcoa GPM ‘SMART Manufacturing’ Solution

The Data Model Concept

SMART Manufacturing AF Templates Hierarchy

Assets

Plant Templates (Location)

Technology Templates (If necessary)

Equipment Type Templates

Basic Templates (Root level)

All assets (equipments) inherit from predefined templates.
- Gray: Equipment are based on plant templates.
- Green: Plant specifics needs include in the plant templates.
- Purple: Periodic aggregated values (KPIs...)
- Orange: MES System templates
- Dark Blue: When a technology is required a template level is created.
- Blue: Global templates managed by SMART Team.
The Alcoa GPM ‘SMART Manufacturing’ Solution

Extending the Common Data Model to the Enterprise
The Alcoa GPM ‘SMART Manufacturing’ Solution

Manufacturing Application Portfolio

- Manufacturing and Business Intelligence
- EHS
- Services and Utilities
- Laboratory
- Maintenance and Reliability

GPM Manufacturing ‘3 Key Pillars’

- Electrode
- Potrooms
- Casthouse
Recognize the criticality of ‘Change Management’ within the Business Operating System

- Clearly Define Roles and Responsibilities

- Identify Value as the Key Deliverable – Not the Technology
- Identify People as the Critical Component to Delivering Results
The ‘Enterprise Architecture’ serves as a foundation for competitive advantage through:

**People Engagement & Best Practice**
- With common data, talent across the globe will engage in **collective innovation** and the pursuit and sharing of best practices.
- The SMART architecture allows for the rapid deployment of ‘Best Practices’ through leverage of a common computing infrastructure.

**Who Derives the Benefit:**
- **Operators** leverage critical information when and where it is needed.
- **Process Engineers** develop ad-hoc analysis and ‘Best Practice’ process visualization standards to improve location production management and performance.
- **Supervisors and Area Managers** review real time KPI and have drill down capability for root cause analysis and problem resolution.
- **Business Leadership** is ensured of timely, accurate and consistent information for evaluating performance and driving decisions.

**Process Measurement (KPI)**
- Sharing a common language with other plants will allow us to truly realize Enterprise Advantage.
- A discovery in one plant can result in procedure, training, and policy changes in the other plants.
- SMART measures will become common measures. They will allow us to share best practices from one plant to another.
- Conventional manual data entry / transfers will be reduced.

**Continuous Improvement**
- **Targeted Training**
- **Optimized Procedures**
- **Managed Processes**
- **Relevant Policies**

**Better Results**
The Project Methodology – Ensuring Complete Success

**After Project Deployment**

**Primary Roles:**
- Value Identification
- Value Opportunity
- Progress Tracking
- DI Creation
- Value Reporting / Dashboard

**Primary Roles:**
- Maintain / Upgrade Infrastructure
- Maintain Data Model
- Deploy / Maintain Identified Best Practices

**ALCOA GPM SMART USERS GROUP**

- Site Role
  - Value Opportunity Leader
- Site Role
  - Value Opportunity Leader
- Site Role
  - Value Opportunity Leader
- Site Role
  - Technical Solution Leader
- Site Role
  - Technical Solution Leader
- Site Role
  - Technical Solution Leader
- TICoE / BU SMEs
  - Energy Environmental
  - M&R Electrode
  - Potroom Casthouse
- SMART Core Team
  - GPM CMI Team
  - OSIsoft EA Services