Leveraging an OSIsoft Enterprise Infrastructure to Enable Big Data and Advanced Analytics

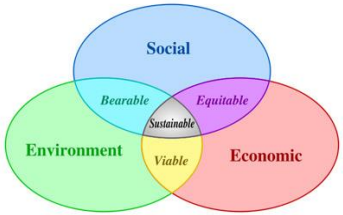
Presented by **Lance Fountaine**
OSIsoft Industry Principle – Metals, Mining and Metallurgy

Introduction

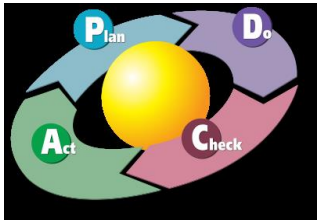
VISION –

Think Big and Leverage Information as a Change Agent

Sustainability, Manufacturing Excellence and Information



- What is Sustainability?



- Manufacturing Excellence – The Heart of a Sustainability Program

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What Could Manufacturers Achieve with Better ‘Information’?

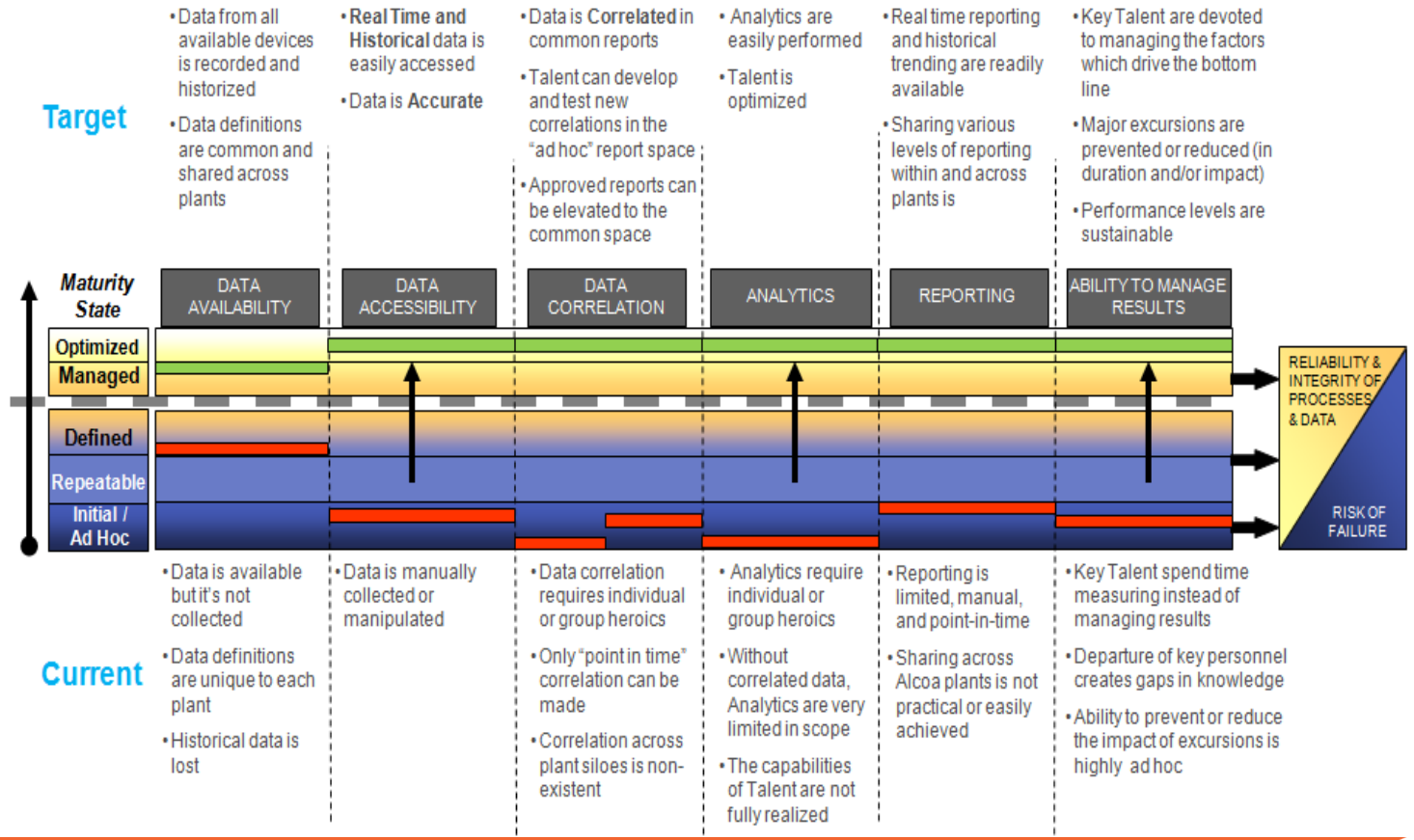
- Financial Value (EBITDA / Working Capital)
  - Process Productivity / OEE
  - Quality Tracking / Product Genealogy
  - Asset Management / Condition Based Monitoring
  - Energy / Raw Material Management

- Improved Environmental, Health and Safety Performance

- Reduced / Eliminated Excursions – Maintain Expected Performance through Early Problem Detection and Recovery

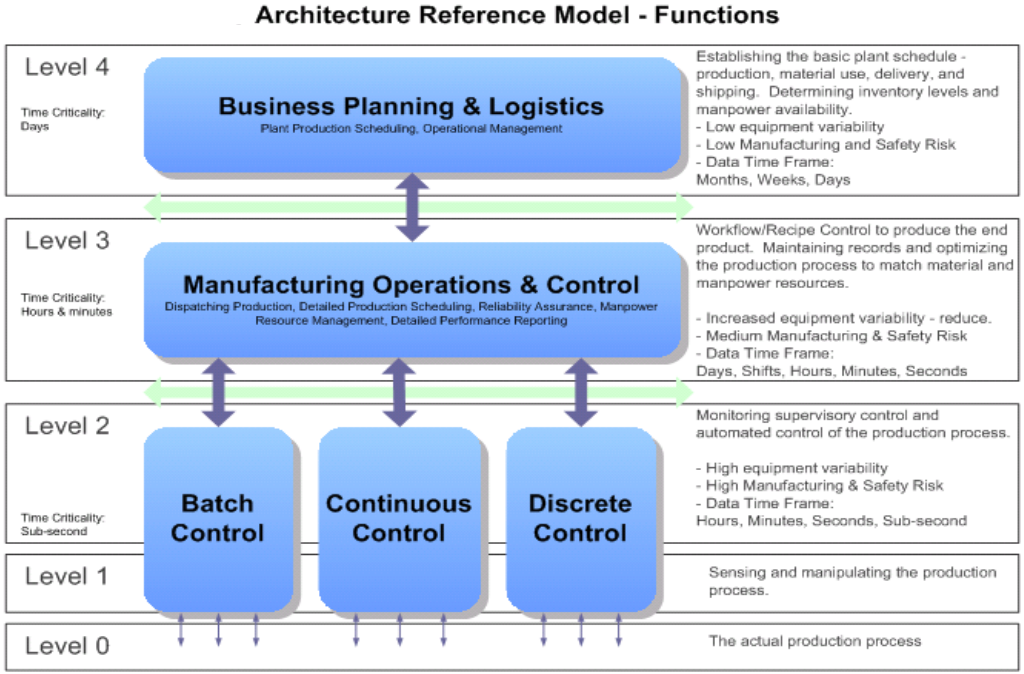
What is the State of ‘ Information’ in Today’s Industries?

The Data Capability and Maturity Model



Contributing Factors to the Current Condition

1. Complexity of Information Sources



External Sources:
Web Services, Partners, Public Exchanges, etc.

Application / DB Examples:
Oracle, SAP, SQL Server, Proprietary Legacy, Access, Excel, etc.

Visual / Analytics Examples:
OSisoft, Honeywell, SAS, etc.

HMI / SCADA Examples:
Factory Talk, Citect, Wonderware, Intellution, Scneider Electric, etc.

PLC / DCS Examples:
Rockwell Automation, Siemens, Honeywell, Square D, Emerson, GE Fanuc, etc.

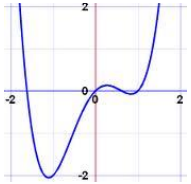
Instrument Examples:
Yokogawa, Rosemont, ABB, etc.

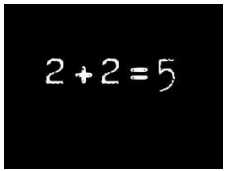
Contributing Factors to the Current Condition

2. Manual Data Entry and Publication of Metrics

- Human Resources are being Used for Data Collection and Aggregation instead of Analysis
- 21st Century Technology Solutions are not being Leveraged to Simplify Shop Floor Operations and Management

3. Enterprise Performance is Sometimes Overshadowed by Site Specific Versions of the Truth





How to Get Started?

Identifying the User Audience and Value Focus
Building Business Support

How is Manufacturing Information Consumed?

Daily/Real-Time Operations	Process Stability/Improvement	Production and Operations Management
Actionable Information Frequency: Real-time to Daily	Analysis Frequency: Daily to Annually	Reporting Frequency: Daily to Monthly

Learnings Applied: Manual or Closed Loop

Visualization Tools	Analysis Tools	Reporting Tools
Audience: • Operators • Craftsmen • Supervisors **Objectives:** • Achieve Daily Targets (DMS) • Resolve Immediate Issues (RCA/Problem Resolution) • Maintain Schedule/Plan • Safe Operations	**Audience:** • Process Engineers (Location) • Production Superintendents • CoE Experts (Regional/Global) **Objectives:** • Detect Excursions (Leading) • Maintain Process Stability • Improve Productivity • Improve Quality	• **Audience:** • Location Managers • Regional/Global Operations • Business Leadership **Objectives**: • Understand/Grade Performance • Adjust Expectations • Establish Plans • Calculate Forecasts

Common Tools
- Data Model: Meta Data Tools (OSIsoft AF – Asset Framework & EF – Event Frames, Honeywell PhD & BusinessFlex)
- Databases: Relational and Historian (Microsoft SQL Server, OSIsoft PI, Honeywell PhD)

Building the Business Case – Overview ‘Achieving Value from the Vision’

- Eight (8) Steps for Building the Enterprise Infrastructure Business Case
  - ✓ Select a Pilot Location within the Business – CoE Concept
  - ✓ Engage Plant Resources in Value Brainstorming and Prioritization Activities – Identify Project Champions
  - ✓ Introduce Plant Leadership to Prioritized Opportunities and Gain Support to Proceed to Pilot Phase
  - ✓ Develop Detailed Use Cases for Identified Opportunities including both a Focus on Process Value and a Focus on Financial Benefit – Gain Process and Finance Support
  - ✓ Verify Use Cases with Plant Leadership – Gain Site Support for the SMART Manufacturing Concept
  - ✓ Deliver Pilot Successes
  - ✓ Estimate Value Potential of an Enterprise Wide Deployment
  - ✓ Present Enterprise Wide Value Potential – Gain Enterprise Wide Support for the Concept (EA Approach)

Building the Business Case
Example – Value Brainstorming and Prioritization

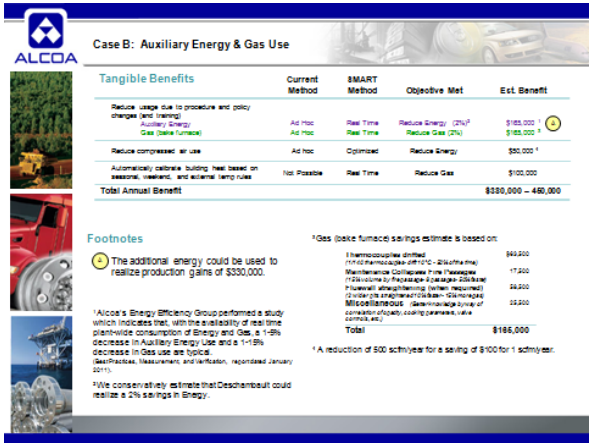
- Support the Process with People Engagement
  - ✓ Onboard Resources in the SMART Manufacturing Vision
  - ✓ Dedicate 'Brainstorming' Sessions within each Functional Area
  - ✓ Develop Rough Estimates of Value, Cost and Ease of Deployment for each Identified Opportunity
  - ✓ Prioritize Opportunities for Initial Pilot Focus

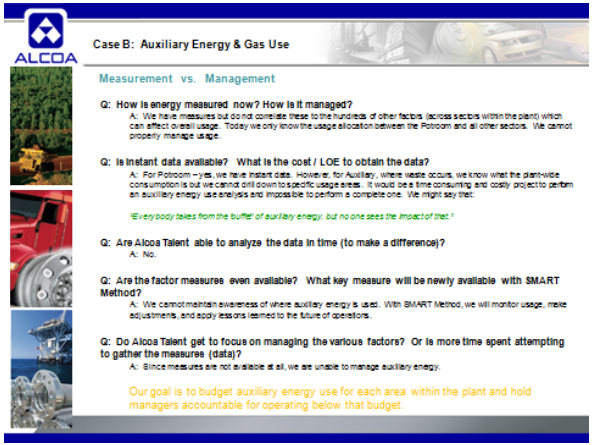
Smart Mfg Brainstorming Ideas

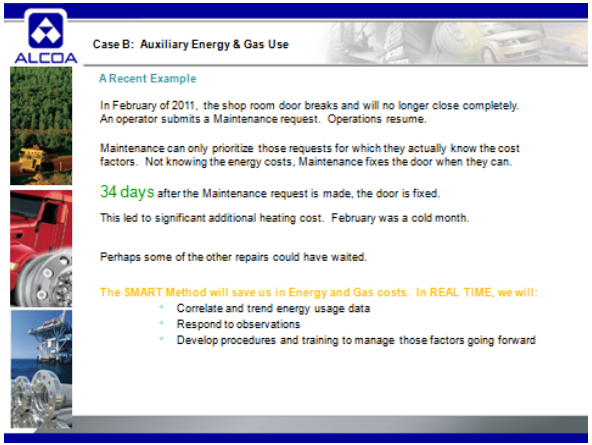
Dept	Energy Cost reduction	Production increase	Control Envir Costs/ Compliance	Maintenance cost reduction	Operation Stability	Raw Material Consumption Reduction	Asset Life	Sustain Performance	Man power Optimization	Opportunity Details	Priorit	Potential Svgs	SPA
Energy	x									Overall Energy Management system for compressed air, natural gas, steam, power	H		
Energy	x			x						Complete Compressed Air Data collection system (generation distribution, leaks, equipment on/off, loaded/unloaded, dew point, flow meters)	H		
Electrode		x				x	x	x		Obtain Green Mill OEE target to hit anode production for Modernized Massena	H		
Electrode		x								Install Sieve curve (aggregate) simulation and Flue wall system to support MMP	H		
Electrode		x		x	x		x			Full Electrode Flowpath kaizen to prioritize MES/Smart opportunities (Mosjoen utilizes KeyOps?)	H		
Environment			x							Air monitoring, provide ability to react in FTC	H		
Environment			x							Investigate solution for all remote outfall monitoring to improve collection and review of data (include WWT, Chem lab); process data first priority & flow data is second priority (this solution enables WWT checksheets to be eliminated and data go directly into a system)	H	$200,000	D. Chin
Environment			x							Parametric data access with Smart Dashboard (data resides in PLC-alumina feed, air flow, etc)	H		J. Engstrom
Environment			x						x	Use Smart for WWT checksheets to develop dashboard/trends	H		
Maint/Rel'y										Overall Asset Hierarchy system (one stop shop),asset health, failure modes, BOMs, WO's data, Top 5, etc.	H		Mike Tremper

Building the Business Case
Example – Use Case with Process Detail

- Initial Use Case Development is Focused in Process Detail Onboard Resources in the SMART Manufacturing Concept
  - ✓ Development is Completed with Area Assigned Process Engineers
  - ✓ General Approach is to Focus on Production / Process Improvement

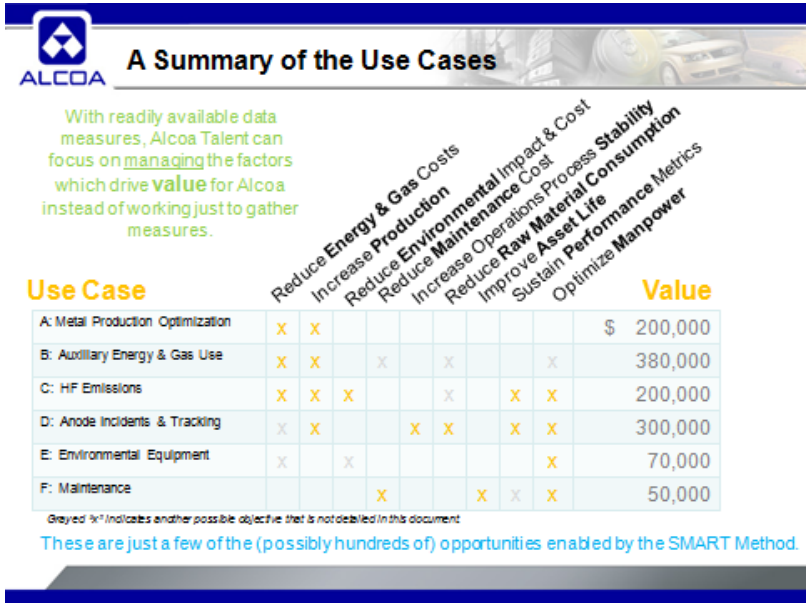






Building the Business Case
Example – Use Cases with Finance Detail

- Later Efforts are Focused on Re-Packaging for Finance Onboarding
  - ✓ Aligned with Enterprise Level Objectives (ELOs)
  - ✓ General Approach is on Value / Savings to the Bottom Line ($$$)



A Summary of the Use Cases

With readily available data measures, Alcoa Talent can focus on managing the factors which drive **value** for Alcoa instead of working just to gather measures.

Use Case	Reduce **Energy & Gas** Costs	Increase **Production**	Reduce **Environmental** Impact & Cost	Reduce **Maintenance** Cost	Increase Operations Process **Stability**	Reduce **Raw Material Consumption**	Improve **Asset Life**	Sustain **Performance** Metrics	Optimize **Manpower**	Value
A: Metal Production Optimization	x	x								$ 200,000
B: Auxiliary Energy & Gas Use	x	x		x		x			x	380,000
C: HF Emissions	x	x	x			x		x	x	200,000
D: Anode Incidents & Tracking	x	x			x	x		x	x	300,000
E: Environmental Equipment	x		x						x	70,000
F: Maintenance				x			x	x	x	50,000

Greyed 'x' Indicates another possible objective that is not detailed in this document

These are just a few of the (possibly hundreds of) opportunities enabled by the SMART Method.

Critical Risks and Recommendations

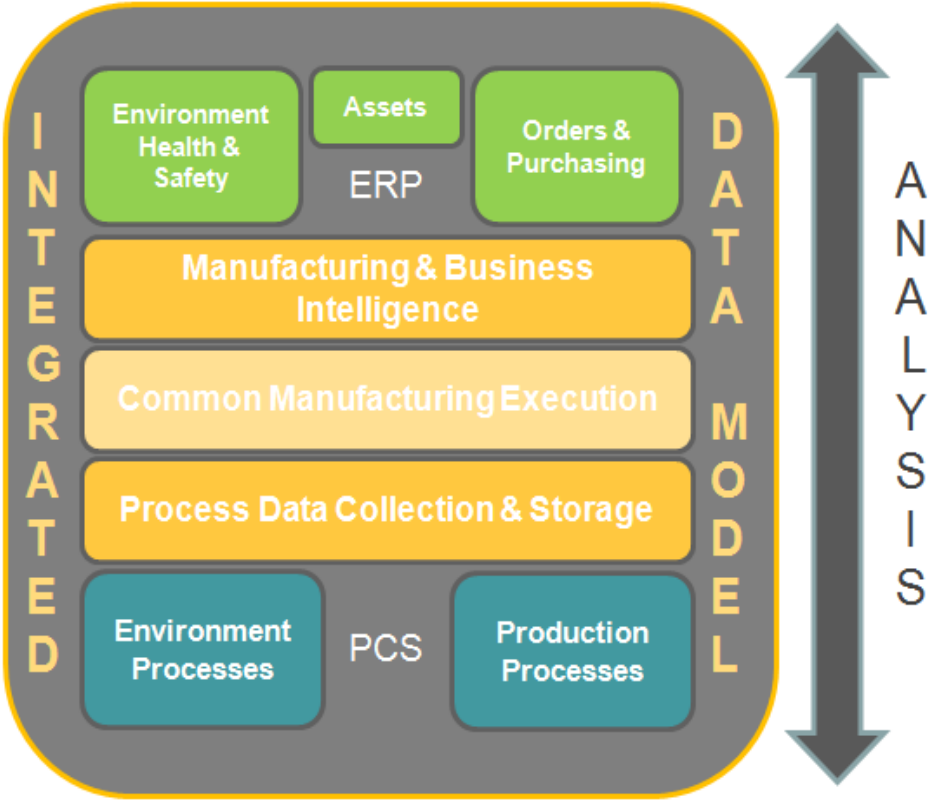
1. Don’t Let Best Forsake Better
2. Scope Pilot Focus to Highest Value / Least Effort

Developing the Technical Solution?

Designing and Deploying the Enterprise Infrastructure

Establishing an Enterprise Vision for Information

Transactions
Business



Action
Operation

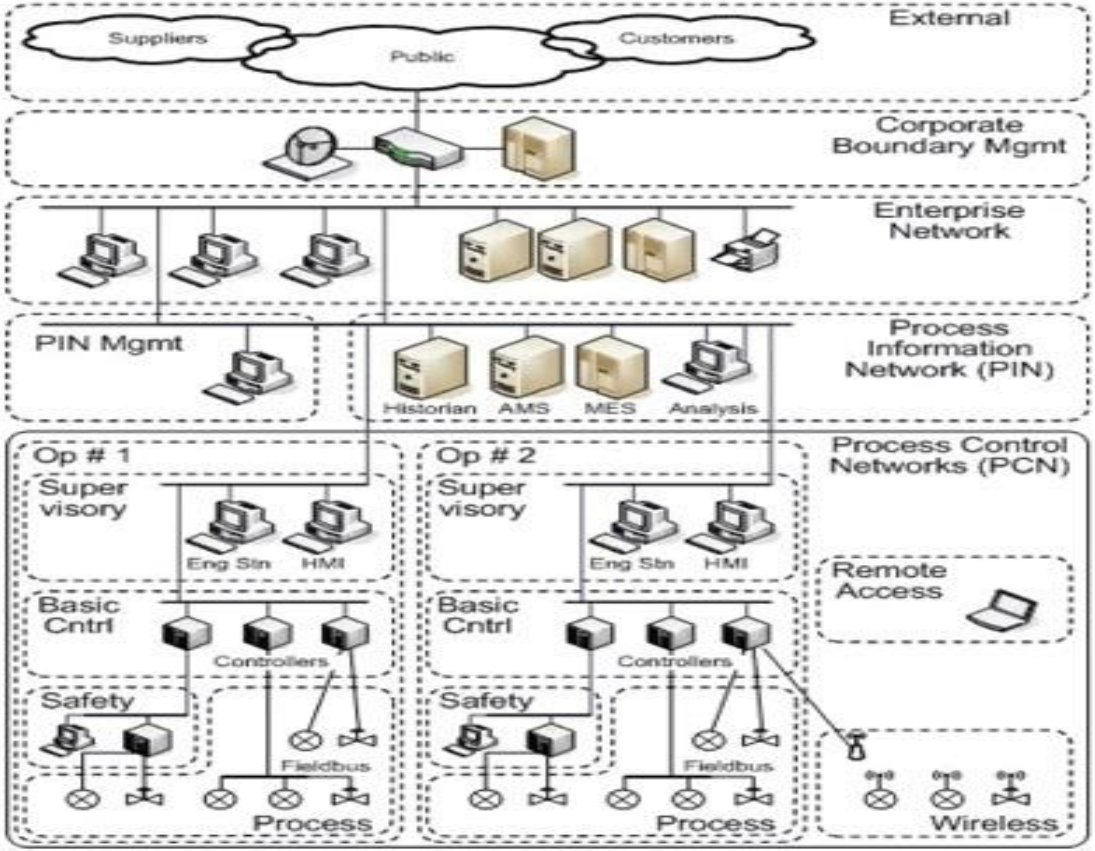
Objective:
Integrate data for the process experts so as to enable proactive and intelligent manufacturing decisions in dynamic environments

Key Components:

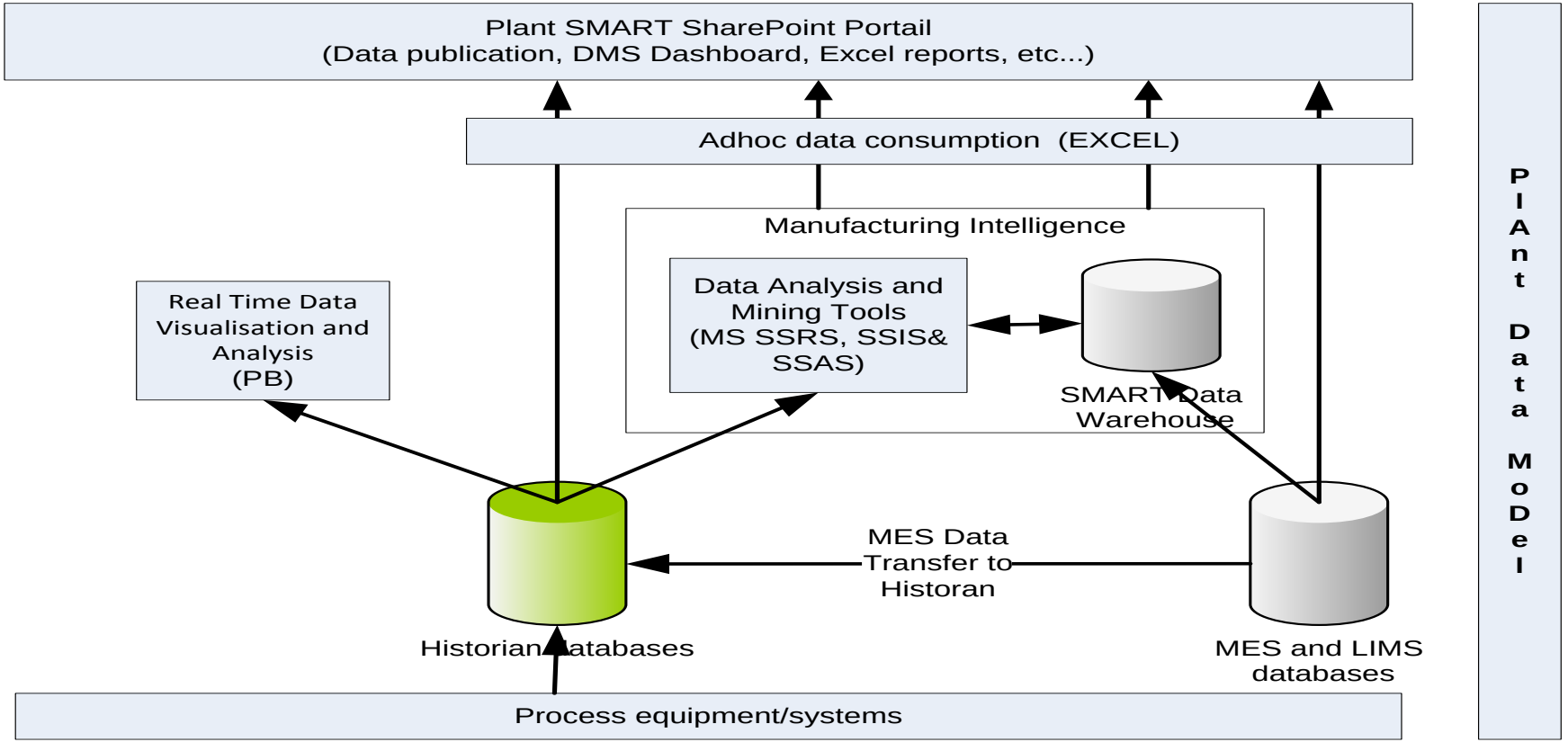
1. Common Applications for Manufacturing Execution (MES)
2. REAL TIME and HISTORICAL data capabilities
3. Network / Data integration from shop floor to the enterprise
4. Comprehensive analysis toolset

The Enterprise Architecture Ties Together Information from All Sources within a Plant and Across the Enterprise

Network / Server Infrastructure



The Data Infrastructure and Visualization Toolset



Critical Risks and Recommendations

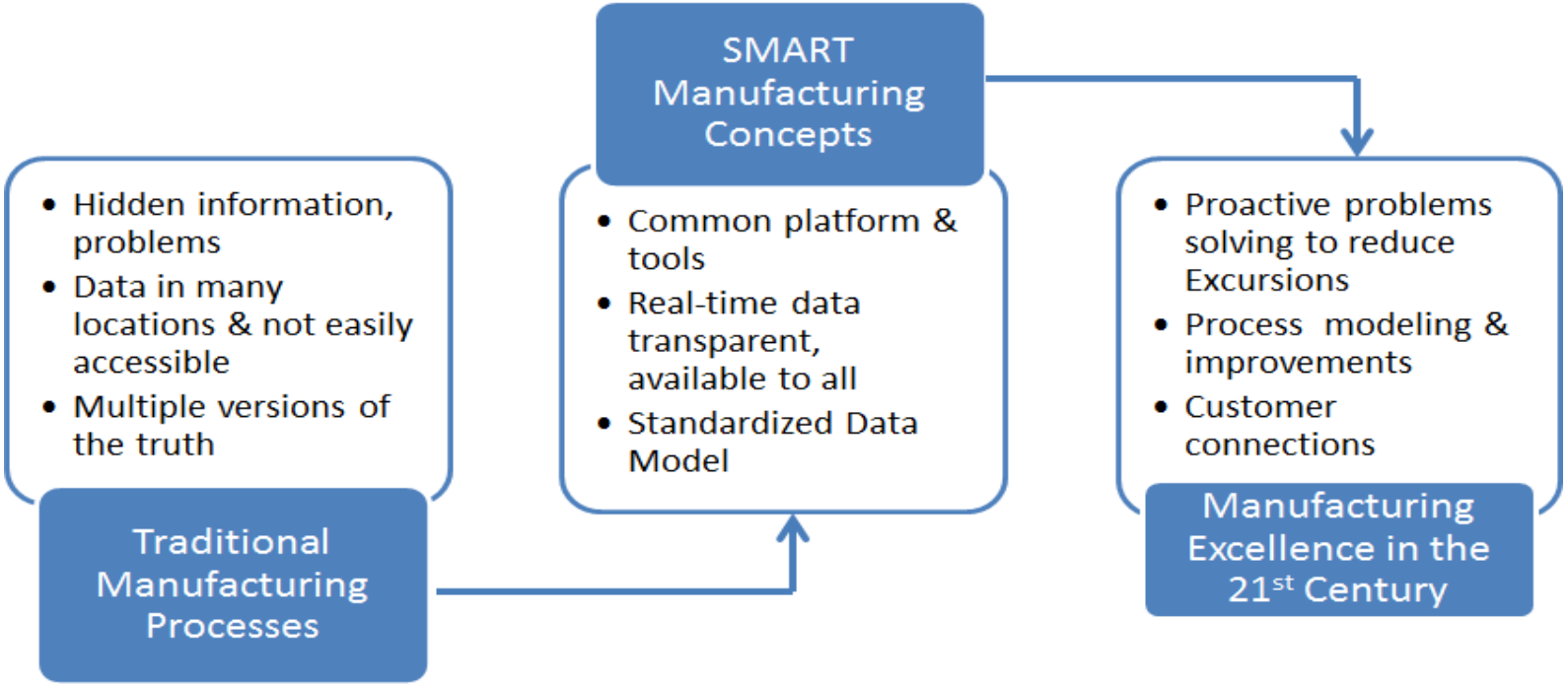
1. Technical Environment Roles / Responsibilities
   a. IT Accountabilities
   b. OT Accountabilities
2. Primary Focus on Applications in lieu of a Foundation Enterprise Infrastructure
   a. Data Design and Integration in Re-Invented for Specific Projects
   b. Business ***not*** Well Positioned for Future Challenges
3. Introduce New Tools / Functionality where appropriate (Mobility, Dynamic Web Based Reporting, etc.)

How to Ensure Full Potential and Ongoing Success?

Information Enabling the Business Operating System and Working the Needed Culture Change

Information – A Key Enabler for Manufacturing Excellence

New Technology Enables Improved Productivity through Employee Engagement and Enhanced Functionality to the Business Operating System



Information as an Enabler for the Business Operating System

The Infrastructure 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

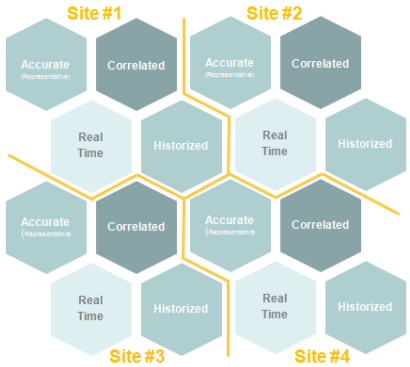
-***Supervisors and Area Managers*** review real time KPI and have drill down capability for root cause analysis and problem resolution

-***TICoE Resources*** leverage 'Best Practices' visualization standards across the business for 'Power of Comparison', root cause analysis and improved performance

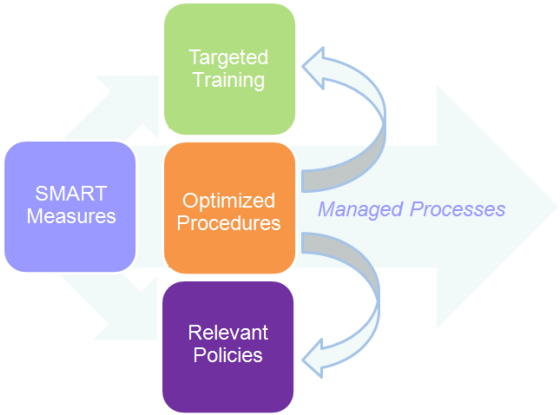
-***Business Leadership*** is ensured of timely, accurate and consistent information for evaluating performance and driving decisions

✓ 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

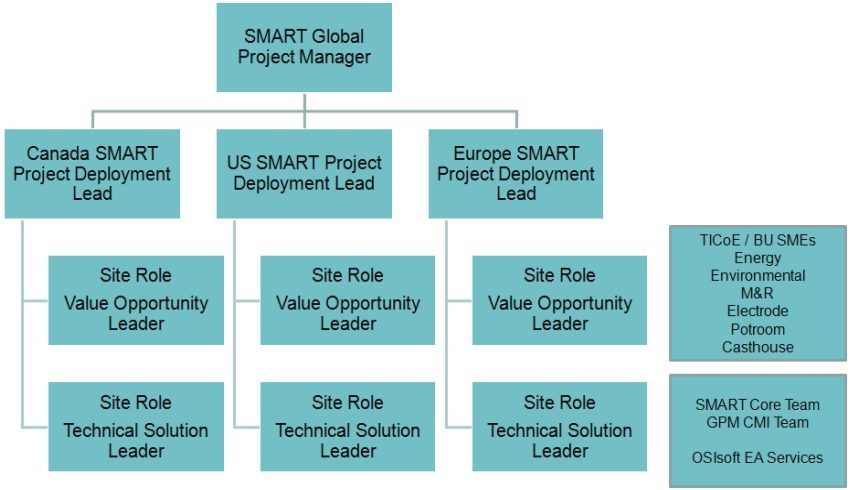


Better Results

The Deming Cycle

Turning the Vision into an Enterprise Strategy

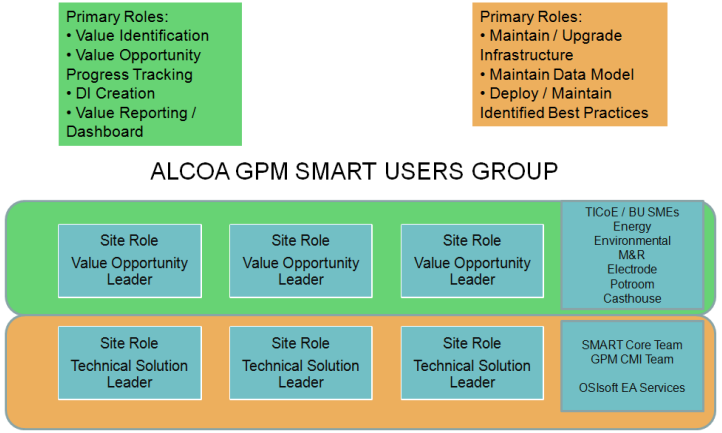
- In Addition to Technology – Also Recognize the Criticality of 'Change Management' within the Business Operating System
  - Clearly Define Roles and Responsibilities



  - Identify Value as the Key Deliverable – Technology is the Enabler
  - Identify People as the Critical Component to Delivering Results

Ensuring Continued Success

- Maintain Focus on Delivering Value through the Operating System
  - Enterprise Level Objectives (ELOs)
  - Internal Users Groups
  - Best Practices
  - Enabler to other key initiatives



- Enhance Functionality and Manage Total Cost of Ownership
  - Life Cycle Management of Enterprise Architecture
  - Solution Support Model (CoE) / Leveraged Expertise
- Improve Cyber Security

Critical Risks and Recommendations

1. Technical Solution is Deployed with Limited Resource Engagement
   a. Business Decision to Limit Resource Involvement or Inadequate Onboarding / Buy-In
   b. Risk: Value Realization Does Not Meet Business Expectations
   c. Risk: Solutions are Not Leveraged Across Enterprise

In Conclusion

What are the Key Take Aways?

Key Take Aways…

- It Starts with a Vision – Think Big!
- Develop User and Technical Strategy to Ensure Success!
- Execute as part of your Business Operating System!
- Information is a Key Enabler for 21st Century Manufacturing Excellence

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