



Mining, Metals & Materials: Shaping Your Journey to Operational Intelligence

Presented by **Lance Fontaine**

Company Visions

The OSIsoft Vision

We believe **People** with **Data** can **Transform** their world

Typical Mining, Metals and Materials Vision

Commodity Production: Low Cost Producer

Sustainability: Eliminate / Minimize Risk

Value-Add Production: Products that Differentiate

An Operational Intelligence Strategy: The Marriage of our Visions

What Challenges / Opportunities Exist within Mining, Metals and Materials?

Challenge – Market Conditions

- Commodity Market Prices
- New or Improved Operations / Known Technology Competition
- New, Competitive Manufacturing Technologies

Challenge – Cost Headwinds

- Energy Costs
- Raw Materials Costs
- Labor Costs
- Logistics / Transportation Costs
- Aging Assets / Sustaining Capital Requirements

Other Challenges

- Geology – Decreasing Yields on Known Mine Reserves
- Environmental Regulations / Reporting Requirements
- Slow Global Economic Recovery

Opportunities

- Commodity Market Growth in Developing Countries
- Market Pull for New Materials / Alloys (Strength, Weight)
- Sustainable Materials

What If Your Company had the Ability to Leverage Its Current Data Assets to...

Improve Enterprise Visibility and Management (Operating System)

- Establish and Automatically Report Standard KPIs to Measure Performance
- Support Operations through Global and Regional CoEs (Centers of Excellence) or Remote Operation Centers
- Drive Real-time Action in Support of Operational Excellence
- Rapidly Identify and Leverage Best Practices
- Increase Employee Engagement with Continuous Improvement Innovation

Improve Awareness and Forecasted Impact of Uncontrollable Factors

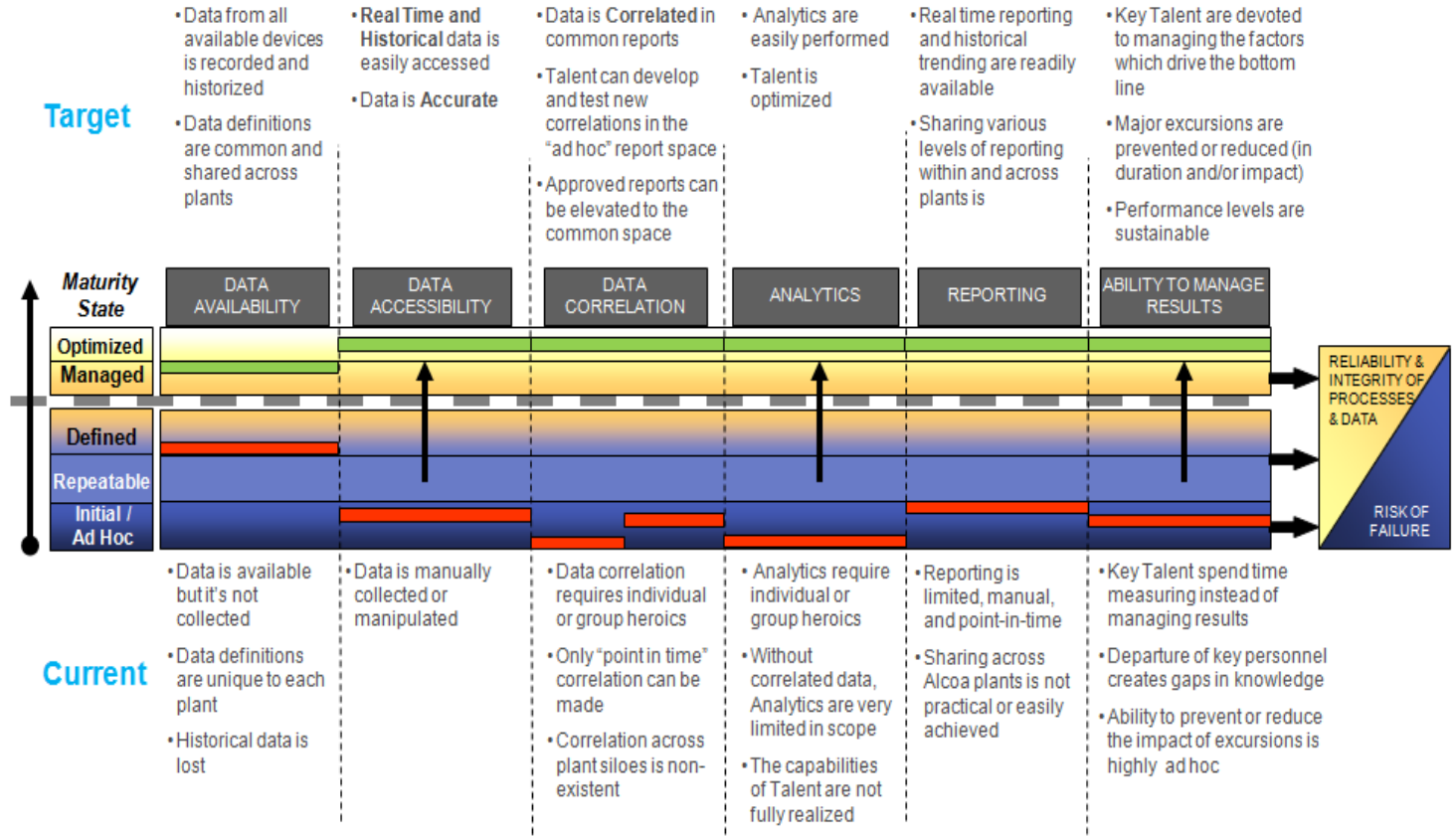
- Rising Energy Rates
- Rising Raw Material Costs, Reduced Raw Material Quality
- Rising Water Rates
- Rising Labor Rates
- Cost of Environmental Regulation / Mandates

More Directly Impact Controllable Costs / Performance

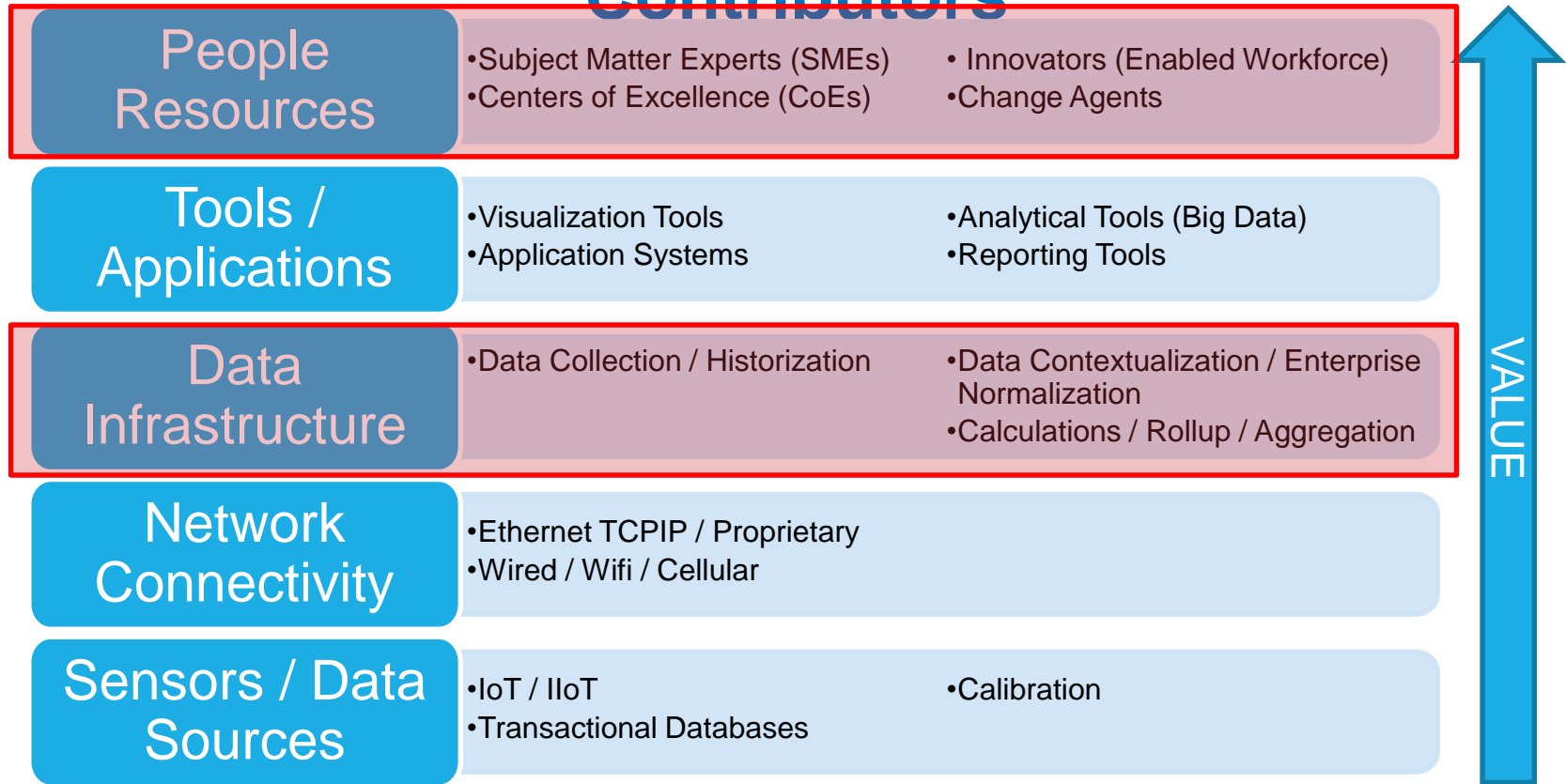
- Continuously Improve **Process Productivity / OEE**
- Better Control **Product Quality** / Improve **Genealogy Tracking**
- Extend **Life of Critical Assets** / **Reduce Maintenance Costs**
- Reduce **Energy / Raw Material / Natural Resource Consumption**
- Continuously Improved **Environmental Performance** to Meet **Regulatory Compliance and Reporting** Requirements

Why the Need to Re-Evaluate Your Information Platform?

The Data Capability and Maturity Model

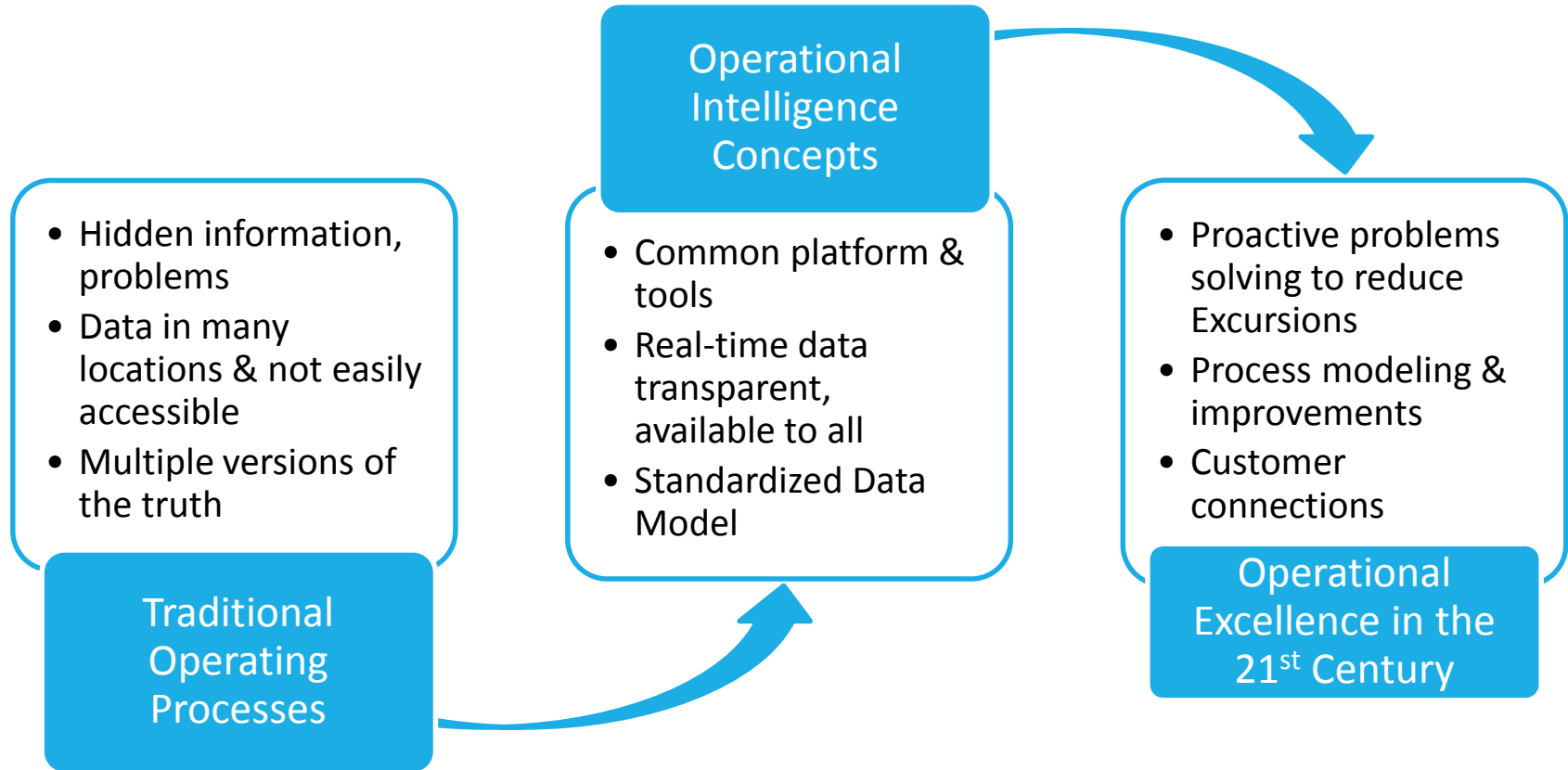


Data to Value: Recognizing the Critical Contributors



VALUE

Information and the Operational Intelligence Concept



How Does Operational Intelligence Drive Results?

Daily/Real-Time Operations

Intelligent Action

Frequency: Real-time to Daily

Process Stability/Improvement

Intelligent Analysis

Frequency: Any

Production and Operations Management

Intelligent Reporting / Integration

Frequency: Daily to Monthly

Learnings Applied: Manual or Closed Loop

Visual Information / Notification

Audience:

- Operators
- Craftsmen
- Supervisors

Objectives:

- Achieve Daily Targets (DMS)
- Situational Awareness
- Resolve Immediate Issues (RCA/Problem Resolution)
- Maintain Schedule/Plan

Learning / Knowledge Expansion

Audience:

- Process Engineers (Location)
- Production Superintendents
- CoE Experts (Regional/Global)

Objectives:

- Detect Excursions (Leading)
- Maintain Process Stability
- Improve Productivity
- Improve Quality

Evaluation / Decision Support

Audience:

- Location Managers
- Regional/Global Operations
- Business Leadership

Objectives:

- Understand/Grade Performance
- Adjust Expectations
- Establish Plans
- Calculate Forecasts

OSIsoft PI Data Infrastructure

21st Century Operational Excellence: Leveraging Information as a Key Enabler

Common Operations Programs

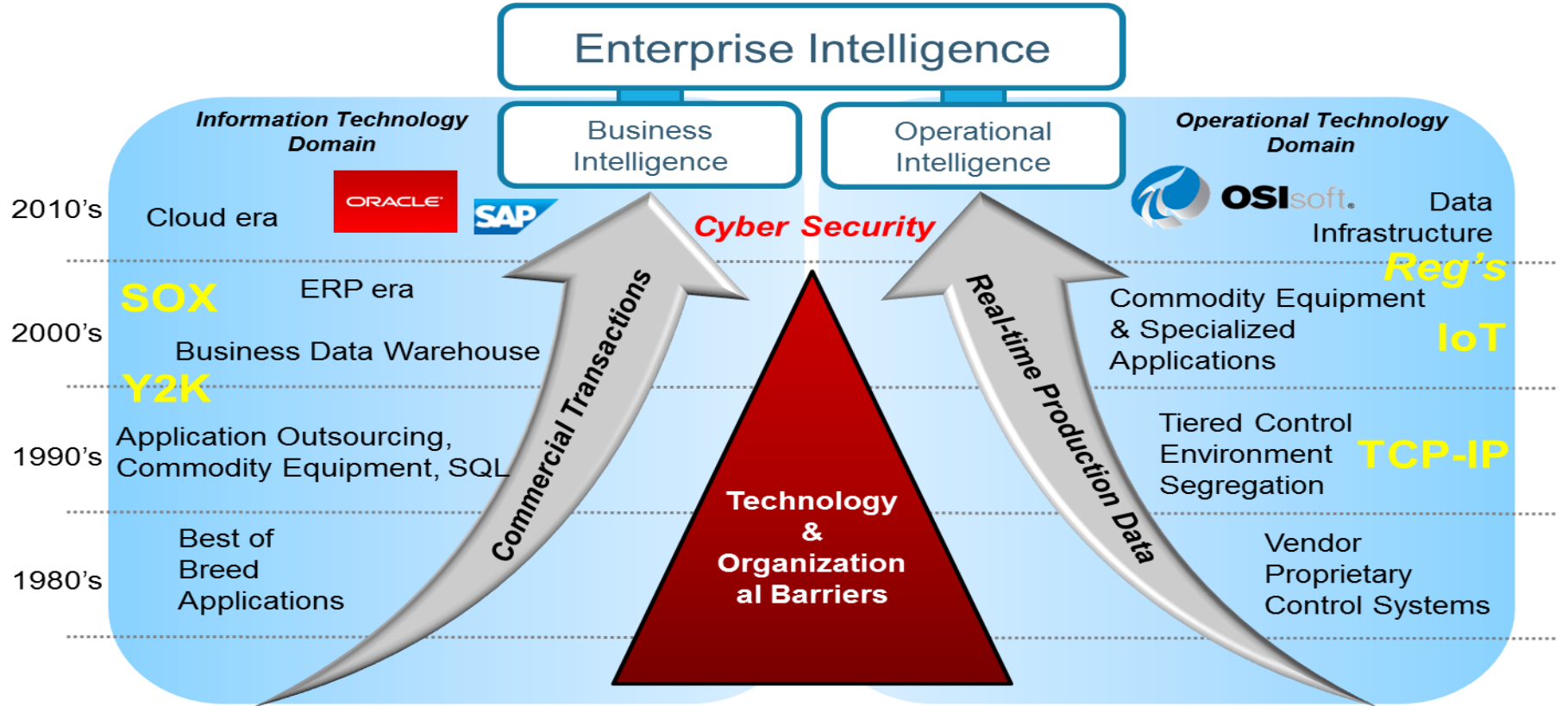
- SPC (Statistical Process Control)
- Lean Manufacturing / Six Sigma
- TPS (Toyota Production System)
- Continuous Improvement / Deming Cycle

Improving Plant / Enterprise Performance Management

- Established / Managed KPIs
- Visibility into Uncontrollable Impacts (e.g., Energy Rate, Raw Material Rate, Metal Prices, etc.)
- Engaged Workforce driving Collective Innovation
- Enabling Platform for Process CoEs (Centers of Excellence)
- Leverage / Adoption of Best Practice

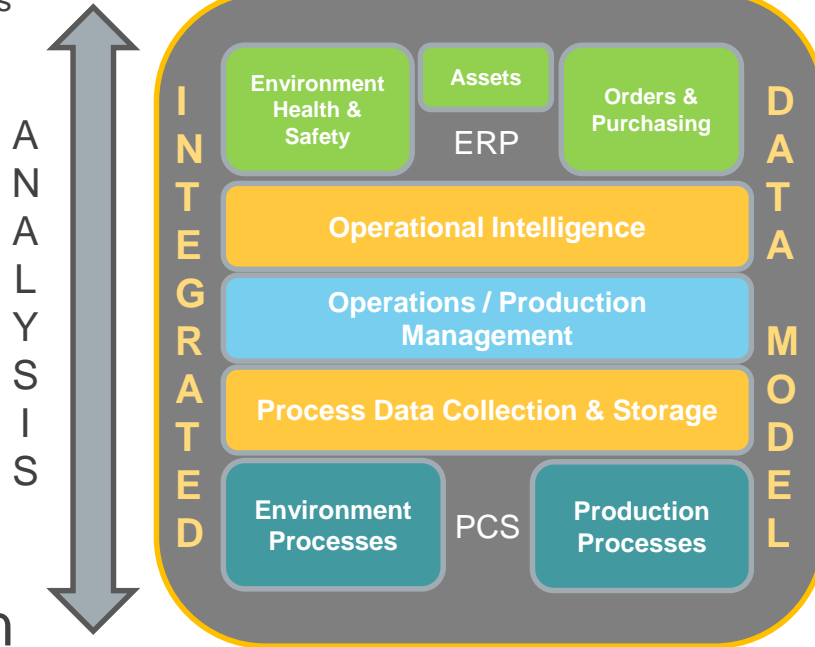
Meeting the Technical Requirements: Recognizing IT / OT Convergence

Recognizing IT/OT Convergence



Defining a Standard Technical Architecture

Transactions
Business



Action
Operations

Definition:

The integration of data with process expertise to enable proactive and intelligent manufacturing decisions in dynamic environments

Key Components:

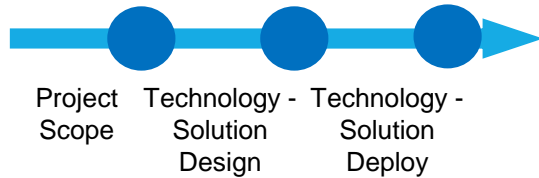
1. REAL TIME and HISTORICAL process data capabilities
2. Network / Data integration from shop floor to the enterprise
3. Comprehensive analysis toolset(s)

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

Adopting a Project or Program Approach

Project Based Approach

Project #1



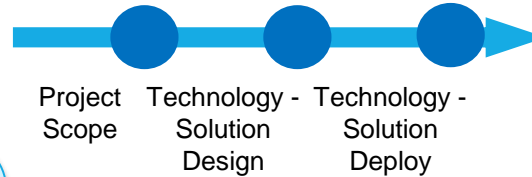
Typical Scenario:

- Limited Technical Scope (Sources of Information / Tags)
- Fixed Project Timeline
- Working Group: Location Operations Resources working with IT / OT Resources

Pros (often):

- Well Defined, Limited Scope
- Single Design / Deployment
- More Manageable Initial Cost

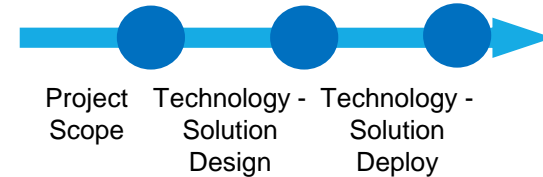
Project #2



Cons (often):

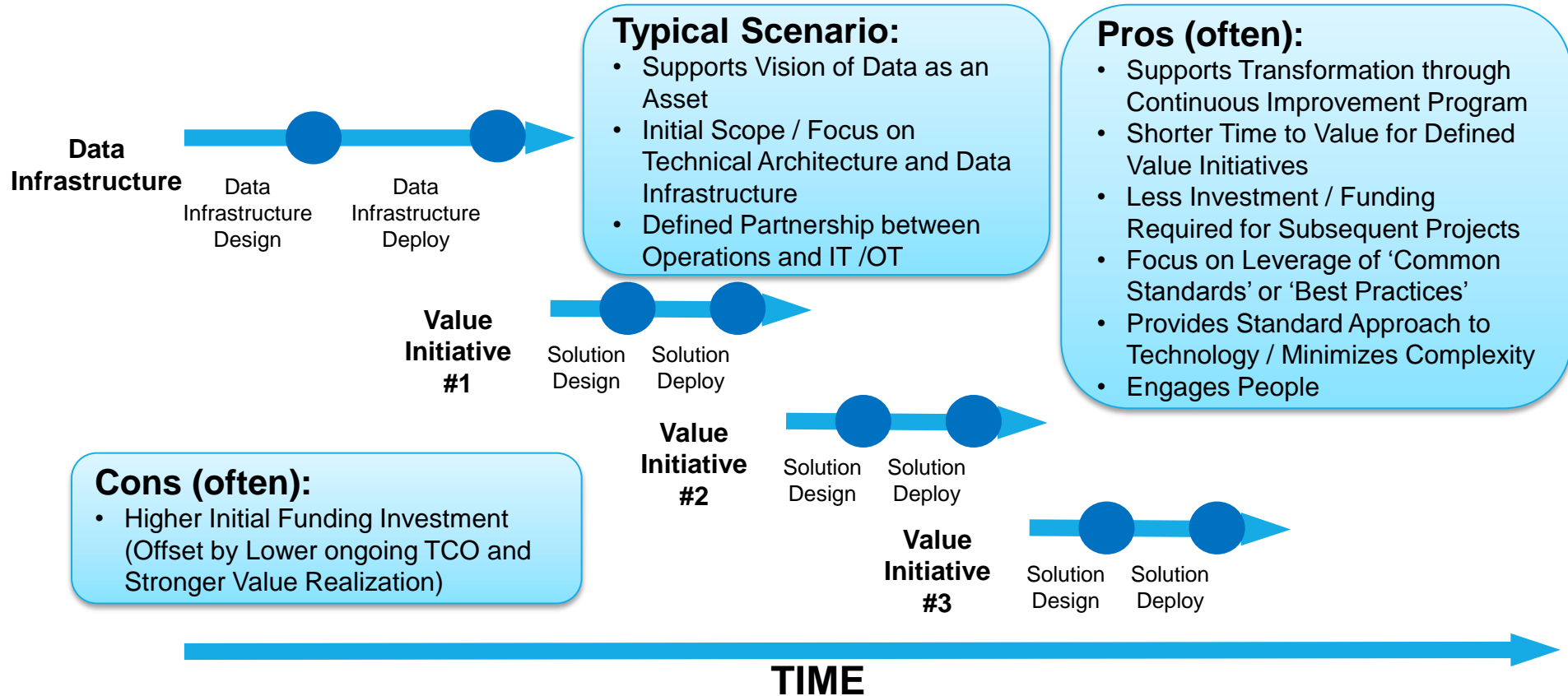
- Site Based, One Off Solutions
- Not Easy to Leverage / Deploy 'Best Practices' or 'Standards' across Multiple Sites
- New Projects Require New Software / New Solutions / New Funding / **New Start**
- Cost / Complexity Increase Over Time

Project #3

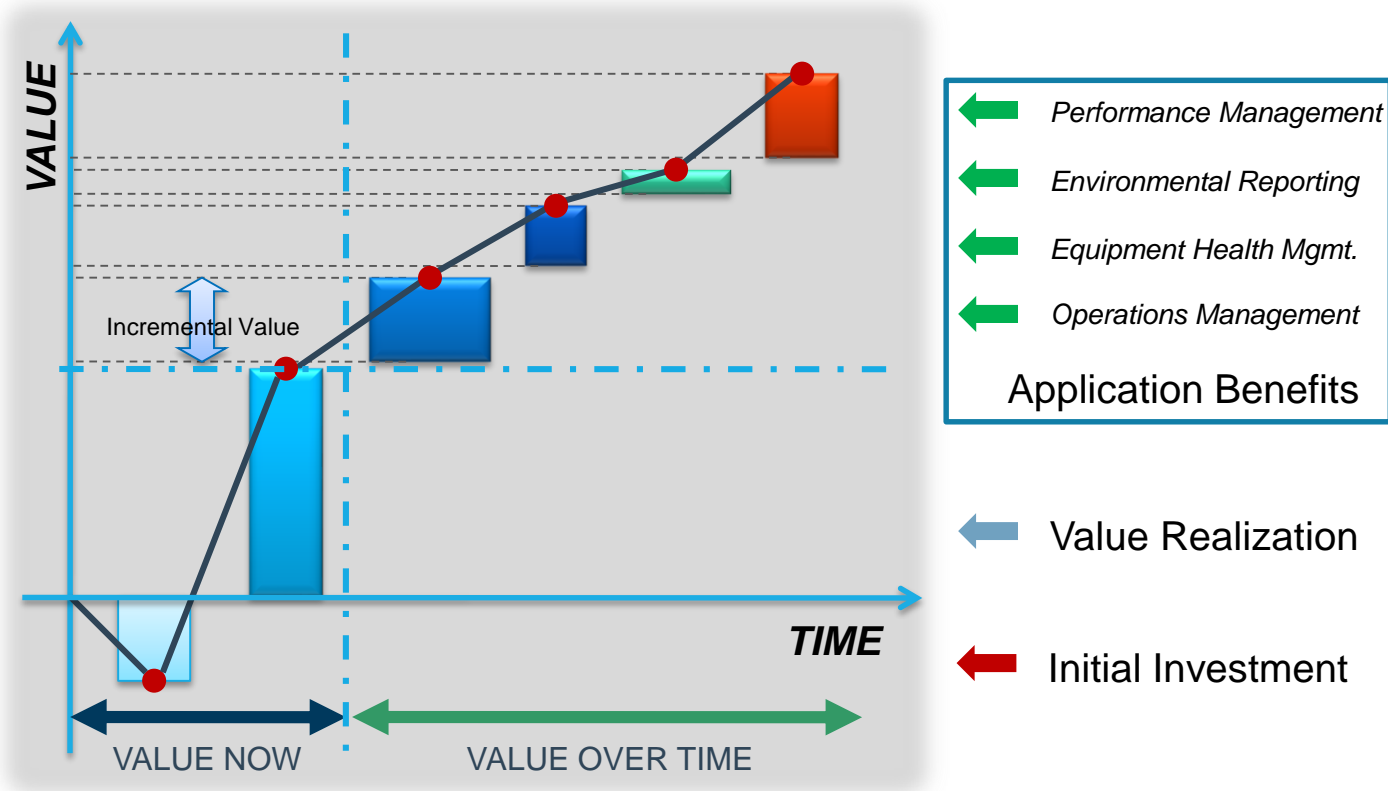


TIME

Program Based Approach



Value Creation – The Project vs. Program Approach



Examples of Success

Enterprise Operational Intelligence

Barrick Gold

“With Data, you are NOT just another person with an opinion.”

“If you do measure it, you can manage it.”



Ian Allen, Senior Manager, Mining Information Technology

CHALLENGES

Meet the challenge of Operational Excellence
Respond to cost savings and efficiency needs of the business

Request a significant capital expenditure for this program in a time of strict fiscal austerity

SOLUTION

Justify an Operation Intelligence program based on PI.
Concentrate effort with the greatest value – Energy & Water

Maximize training and the use of the OSIsoft CoE and Mining Industry Experts

RESULTS

Enterprise Agreement that gives Barrick the opportunity to use PI System across its mines

Significant savings in Energy costs, better water management and reporting

Enterprise Data Access Solution

Freeport-McMoran

“We have real time monitoring in place to prevent catastrophic failure. For example, If a haul truck engine cylinder kit failure is not addressed, it can cause catastrophic failure of the engine resulting in a \$180,000 core value loss.”



Robert Catron, Program Manager/Business Solutions Architect

CHALLENGES

Constant pressure to decrease maintenance costs

Increase their equipment health

15+ data historians across the globe, managed independently

SOLUTION

Asset-based analytics for looking at the operational data and notice of problems in real-time

Publishing displays on the web and mobile devices for more timely and easier response

RESULTS

Data-based platform for improving asset management

Real-time analytic capabilities via the web and mobile devices

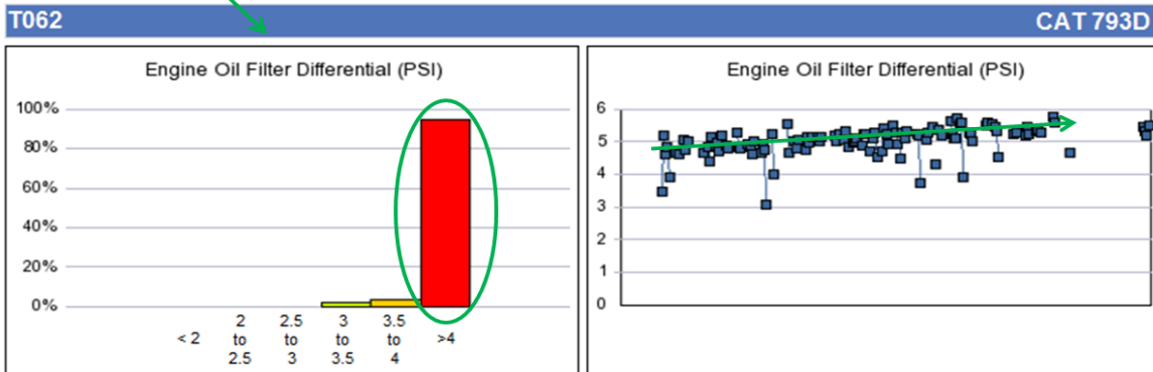
How Did Freeport-McMoRan Deliver a Solution?

- Solution: Using Business Objects, connected to our machine data, we created a daily report that prioritizes trucks by their cylinder health.

FREEPORT-McMORAN **Sierrita Engine Oil Filter Differential Pressure** 12/9/13 8:55 AM
COPPER & GOLD 12/7/2013 12:00:00 PM - 12/8/2013 12:00:00 PM 057353

Truck	Fleet	Max Eng Oil Filter Differential Pressure	Avg Eng Oil Filter Differential Pressure	Average Engine Oil Pressure	Sample Count
T062	CAT 793D	5.76	5.01	64.21	114
T063	CAT 793D	5.44	2.69	60.49	7
T036	CAT 793B	4.81	3.81	70.14	85
T034	CAT 793B	4.49	3.6	65.11	90
T073	CAT 793D	3.92	3.1	62.0	107

This is a summary of all Haul Trucks sorted by Engine Oil Pressure descending, allowing us to quickly identify equipment with a possible cylinder problem.



Supporting the summary with detail, I can see the sample distribution and trend...validating the issue and indicating action should be taken

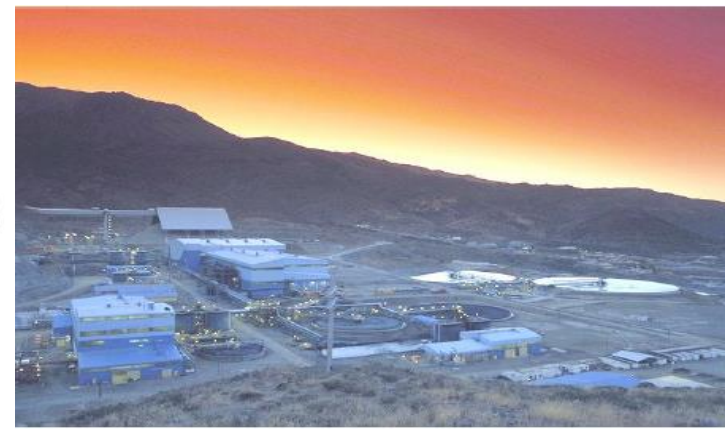
Based on the above maintenance would be scheduled and the Cylinder Kit replaced.

Sample Count: 114

Drive to Operational Intelligence

Antofagasta Minerals, CONTAC Engineering

“This is an excellent case for the precise evaluation of the multiple possibilities for remote operations management – and process improvements in mining.”



Luis Yacher, CONTAC Engineering

CHALLENGES

Improve equipment performance and operations productivity

Minimize safety & environmental risks including energy and water management

Tighter regulatory laws

SOLUTION

Implemented a common data platform for analysis using PI System

Developed advanced process control applications for a variety of operational analysis

Deliver in-time relevant KPI's and statistics to decision makers

RESULTS

1st line operations, engineers and analysts can add value right at point of decisions.

Remote Operations Center (ROC) can work but requires people, process and technology changes

Data Supports Real-Time Decisions

Cemex

“We now have a reliable operational data platform, with automatic data in real-time, where we can drive improvements in areas such as equipment downtime, energy consumption and inventory management.”



Raul Roel Garza, Process Center of Excellence Advisor, Cemex

CHALLENGES

20 year old operational data platform

Manual data collection

Growing business with numerous acquisitions and divestitures

SOLUTION

Implement a single operational data platform/infrastructure across cement based on PI System

Availability of automatic, real-time data for decision-making and analysis

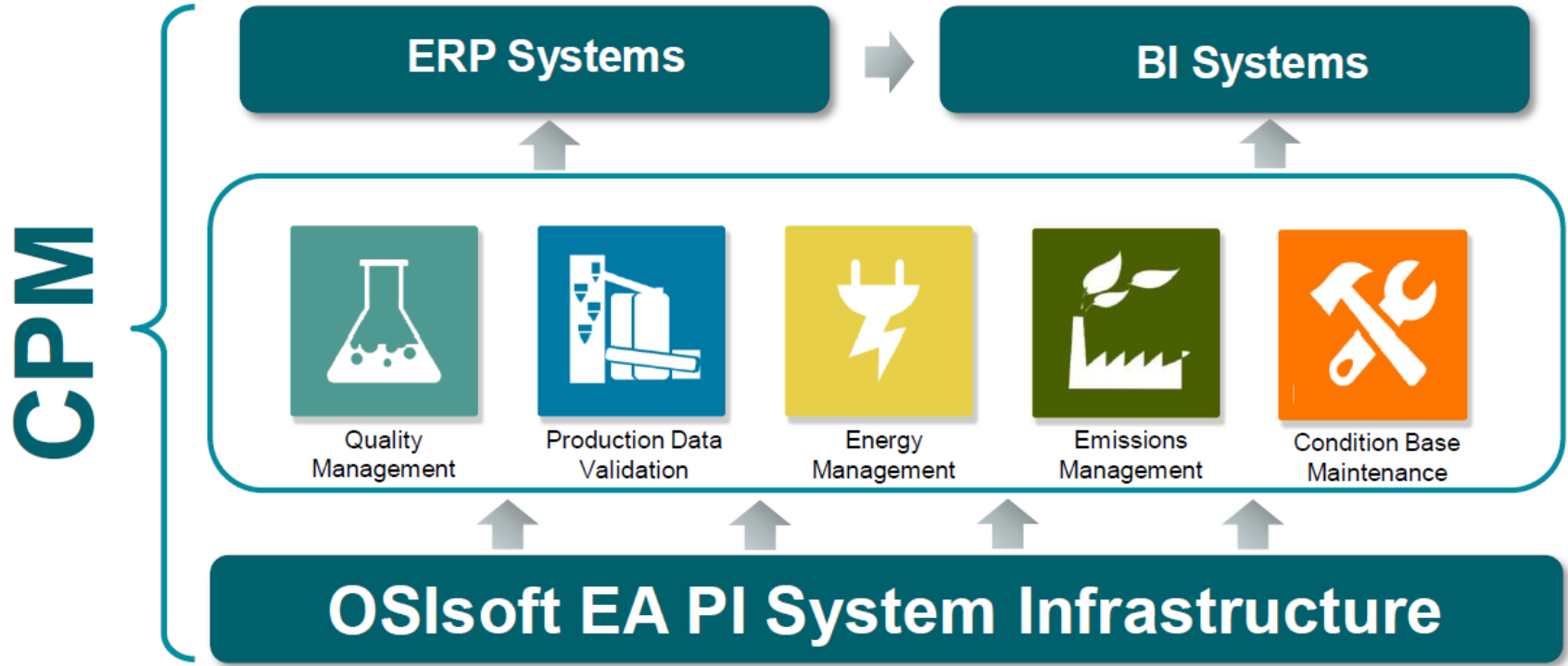
RESULTS

Real-time data validated for decision makers

Easier way for plants to review operational data

Maintain evidence and references for future audits

How is CEMEX Using PI System to Impact Operational Results?



Energy Management

Anglo American Platinum

“Using the power of the PI System, Anglo Plats has been able to provide detailed visibility to power consumption at all levels of the operation. This enables us to start monitoring and reducing our power consumption.”



Michael Halhead, Lead Process Control Engineer

CHALLENGES

Company-wide integrated approach to energy saving

Target 15% reduction in electricity consumption 2008 to 2014

Electricity getting more expensive, South Africa electrical system is constrained

SOLUTION

Implement a data-based system using PI

Visibility of the power use at every level

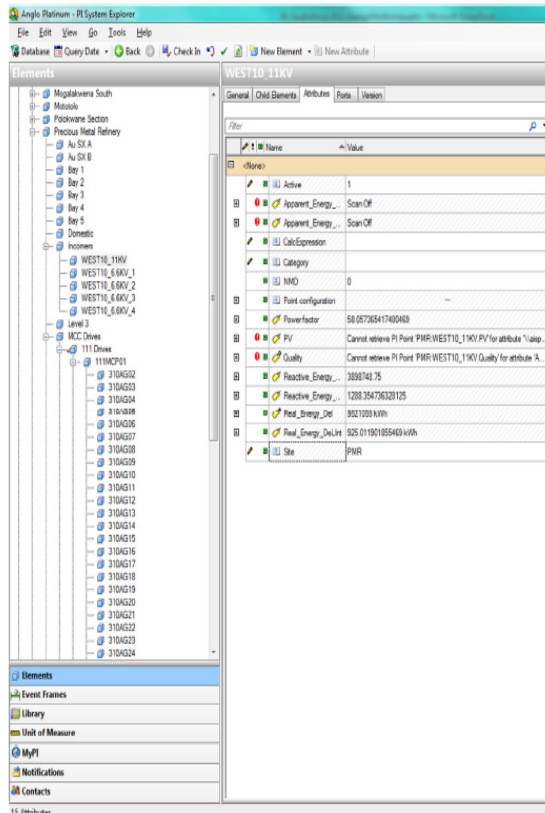
Develop high level KPIs, reporting and drill down capabilities

RESULTS

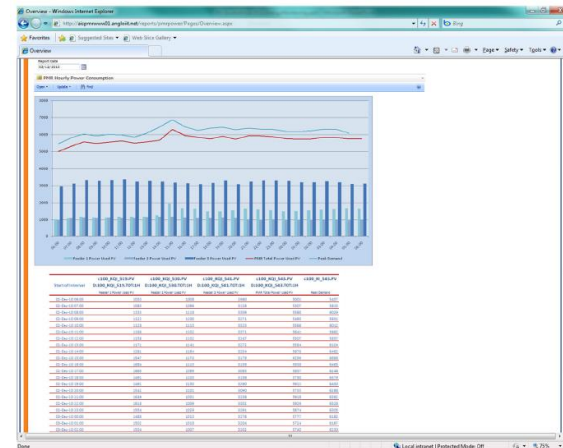
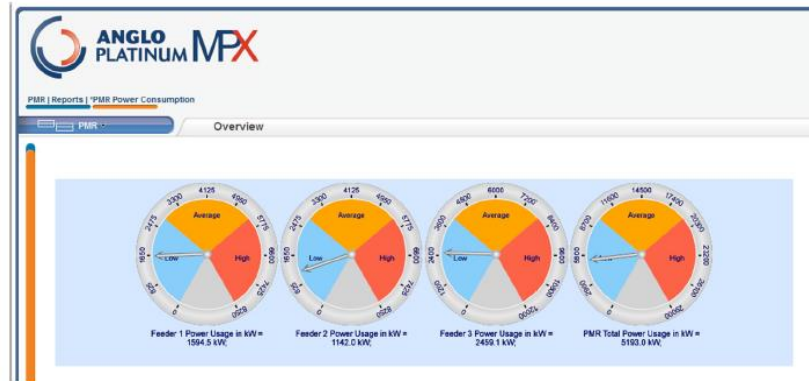
Enterprise visibility of all electrical consumption - resulted in a 1% reduction in electrical power use

Significant time reduction for collecting the data and performing roll-ups and analysis

How is Anglo American Platinum Using PI to Monitor and Manage Energy?



- The raw tag based data needs to be brought into context
- Anglo Platinum is using OSIsoft's AF (Asset Framework) to provide this contextualisation
- Calculations are performed using a combination of Totalisers, Performance Equations and ACE.
- Totalisers and Performance Equations are configured through the AF Element Templates
- The AF-Link facilitates ACE
- Once the AF model is built the data can be analysed in multiple ways. Think of a real-time OLAP cube



Improving Pot Health Analysis

Alcoa

“We’ve standardized the data and turned a massive amount of it into exactly the information that our operators want to see, sometimes summarizing it down to one or two numbers for very quick decision-making.”



GeffWood, Director, Manufacturing Systems and Process Control, Alcoa

CHALLENGES

Silos of data/information
Lack of time to do analysis

Large number of pots (more than 300). The real challenge is to minimize pot to pot variability

SOLUTION

Implemented a single data infrastructure based on PI System for use in the Smelter

Developed standards for data and usage.
Implemented tools for analysis and improvement

RESULTS

Improve OEE
Improve control of the process

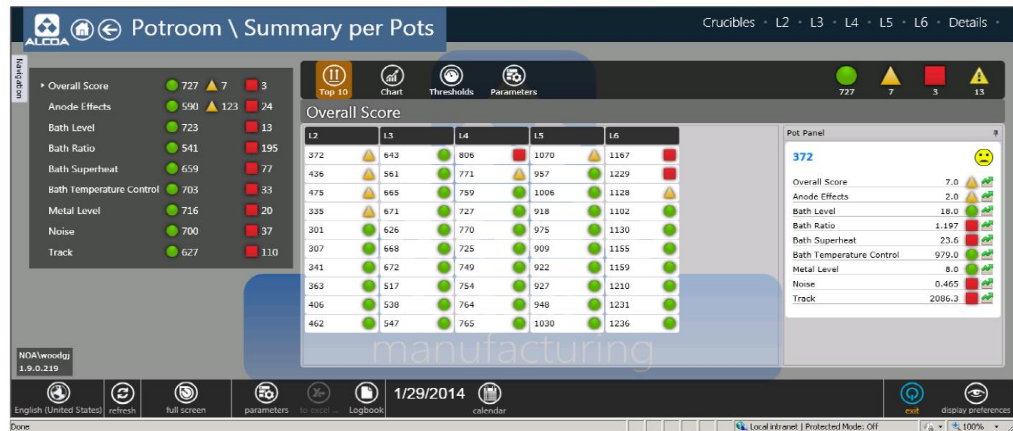
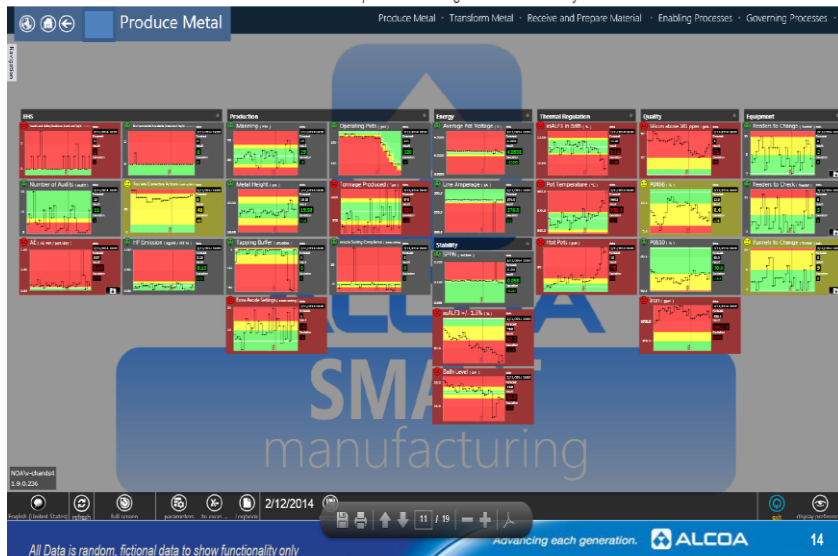
All plants using same data model as base



Examples of How Alcoa is Managing to Improve Pot Health



Drill Downs same format for all plants enforcing Alcoa Business Systems standards



Conclusion

Key Considerations for Today's Session

- What is your vision for the use of information within your company / division?
- What role does OSIsoft PI System play as an enabling technology?
- How can OSIsoft help you establish and execute your strategy for success?

Lance Fontaine

LFontaine@osisoft.com

Industry Principal, Mining, Metals and Materials
OSIsoft, LLC

Questions

Please wait for the **microphone** before asking your questions

State your **name & company**





THANK
YOU