



Reducing Water and Specific Energy by Dynamic Performance Monitoring at the Enterprise



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Enterprise Business Executive

METSOC, Sharing Inspiration
and Passion
Montreal, Canada, October 5,
2011



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USERS CONFERENCE 2012

The Power of Data

Agenda



Overview of the Large Industrial Complexes



Sustainability Strategies are good business



Real Time Enterprise Collaboration



Endesa, Southern Peru Copper, CAP Acero, Rio Tinto Kennecott
Utah Copper



Further work and Conclusions

Partial list of M&M Customers



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Large Water and Energy Costs

Ore



Sag Milling



Concentrate



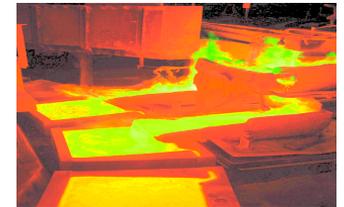
Energy



Water



Products

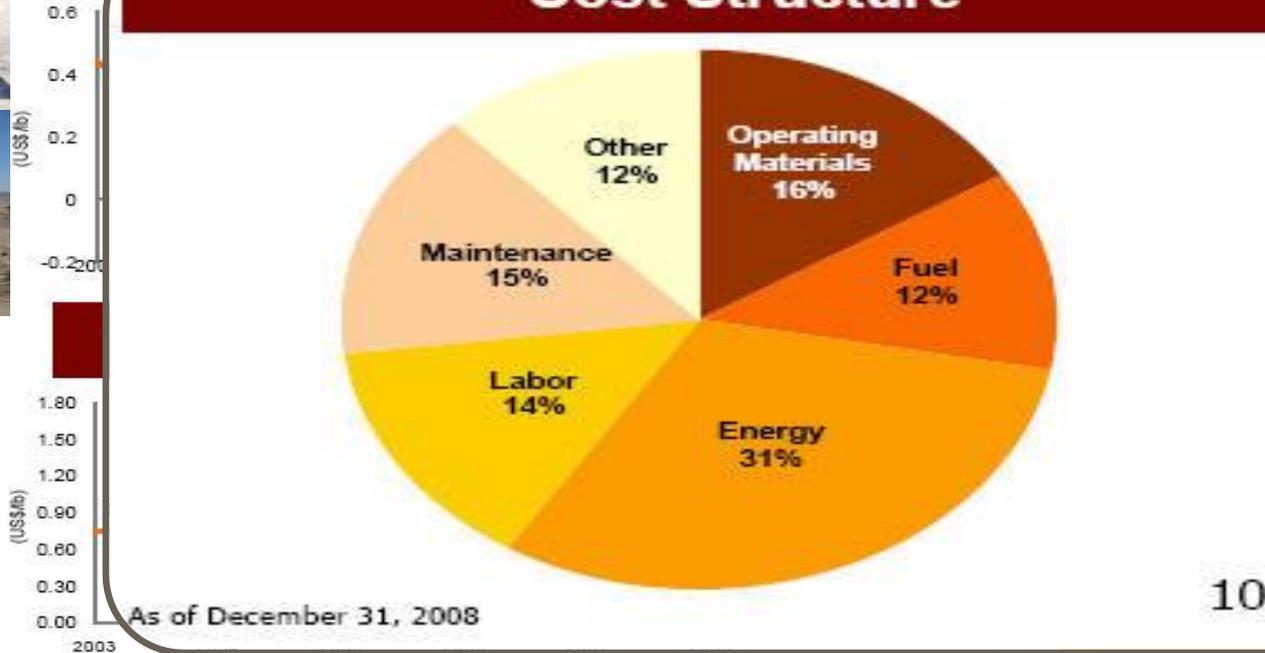


Metal

Mining Costs Example

Cash Costs per pound of Copper

Cost Structure



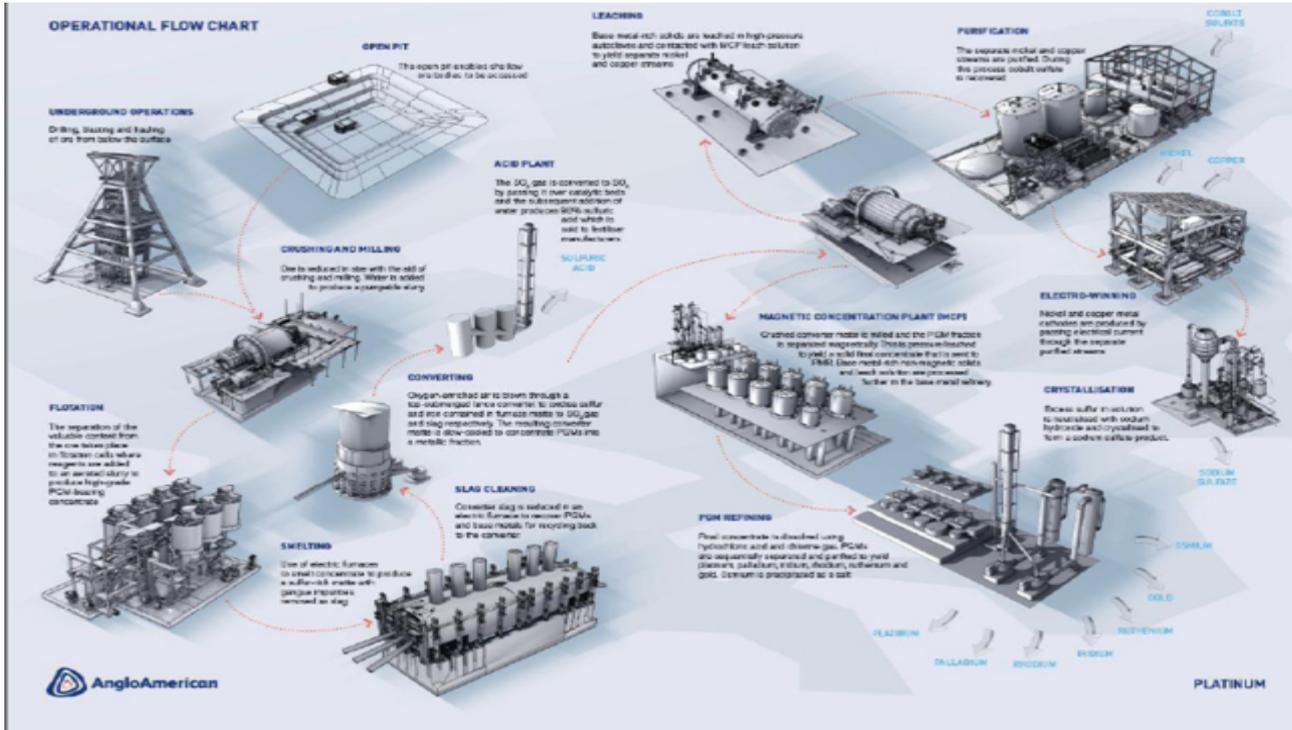
As of December 31, 2008

As of December 31, 2008

10

Doug Fuerstenau, UC Berkeley Study, 2001

Variety of Assets

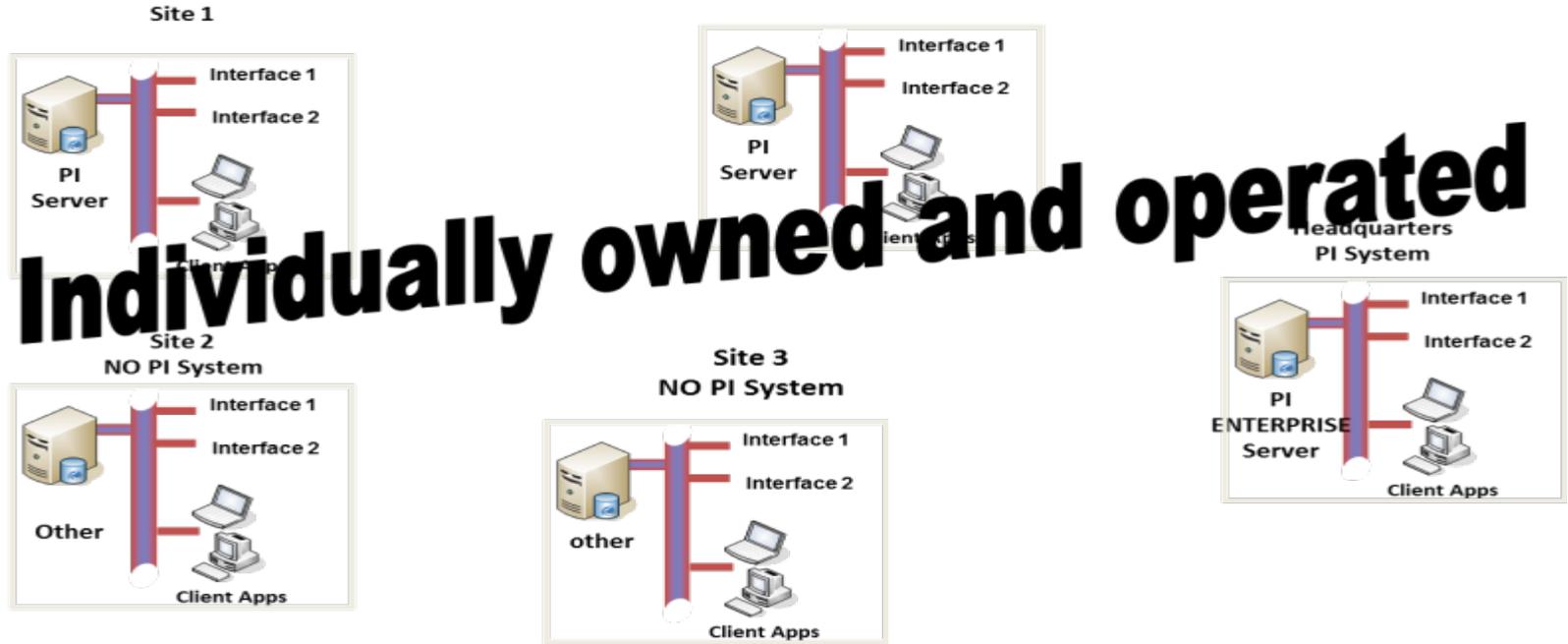


Platinum Process

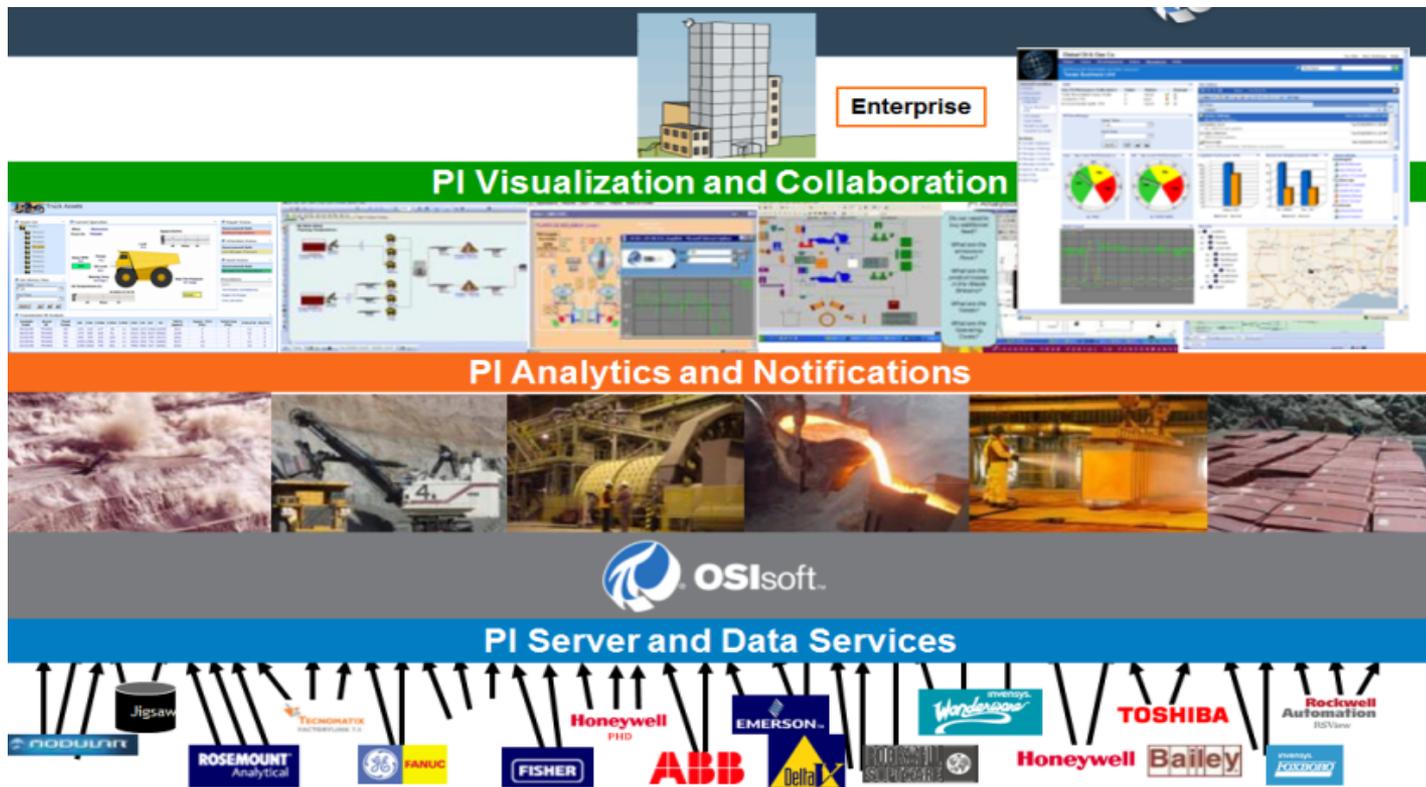
- Long value chain in comparison to most minerals
- Technically complex
- Comparatively low volumes but high value
- A significant material pipe line
- Energy and water intensive

Typical Situation NO Integration

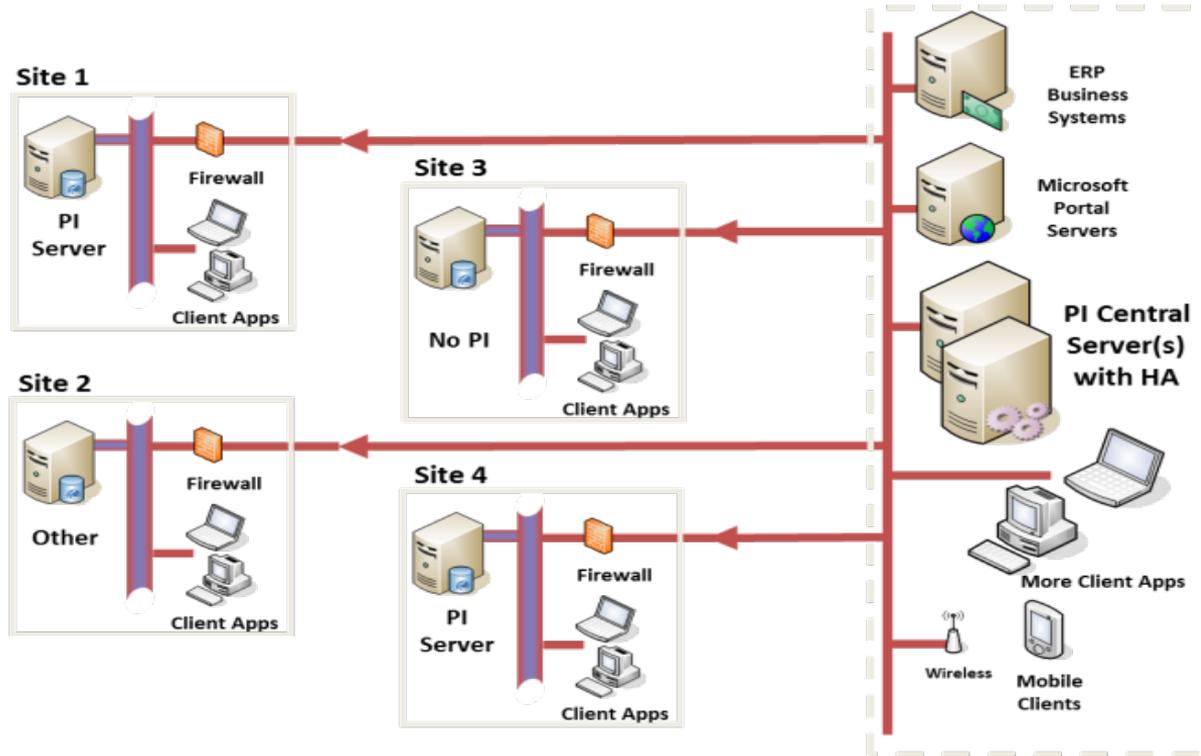
Islands of Best Practices
Site 4



Strategy: Business Value Chain Integration



Strategy: Enterprise Driven Standards



Implementation Examples



The President of Spain
at Red Electrica

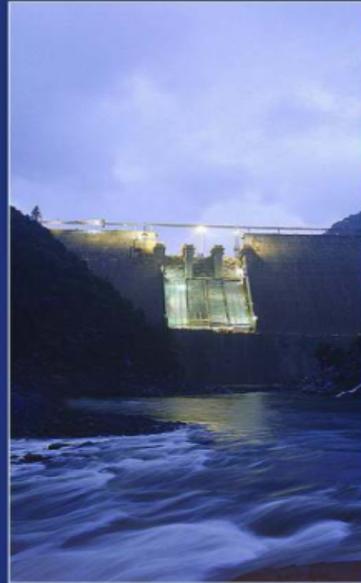
Business Strategy Value Proposition

- Business Process (Production vs Availability vs Resources)
- People Collaboration (Water Management, Energy Management, Equipment Availability)
- Dynamic Diagnostics Competence Center
- (or Manufacturing Services for the Enterprise)

ENDESA Competence Center

endesa chile
E

**MONITOREO AVANZADO DE EQUIPOS PARA
CENTRALES GENERADORAS DE ENERGÍA**



RODRIGO PAREDES
Jefe CMD

CMD endesa chile
E
Centro de Monitoreo y Diagnóstico

SEPTIEMBRE de 2008

 Dow Jones
Sustainability Indexes
Member since 2007

Optimizing Latin American Energy Generation Management

ENDESA CHILE EN LATINOAMERICA

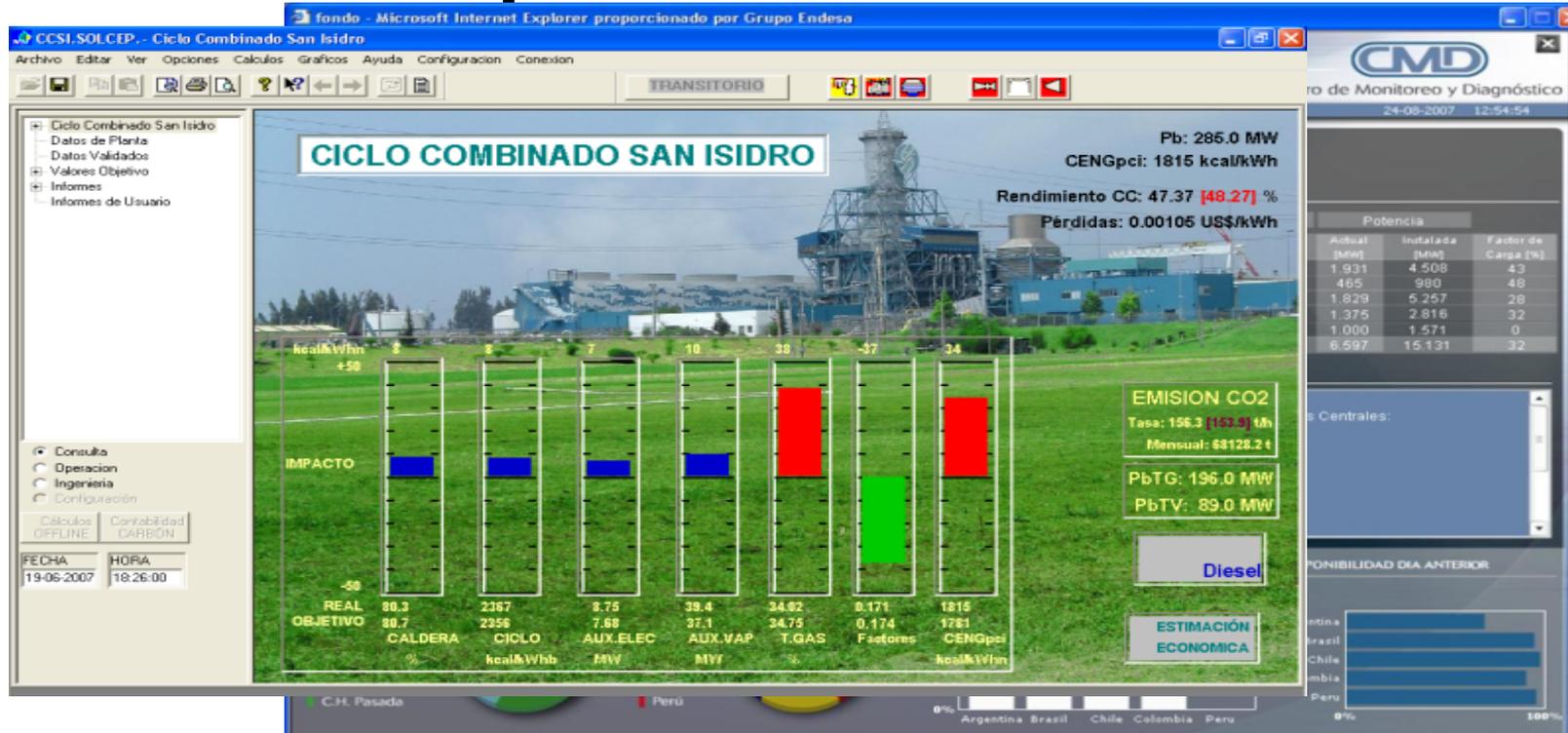


Parque de 15.273 MW, distribuidos en 54 centrales de diferentes tecnologías y edad



Endesa Dynamic Performance Diagnostics Competence Center

Hydro
Gas
Fuel
Wind
Solar





Perú



Colombia



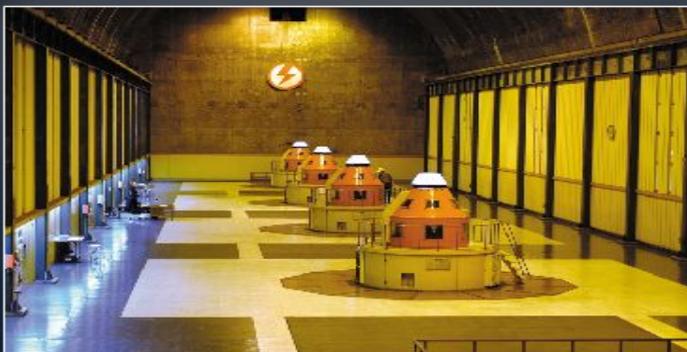
Chile



Argentina



Brasil


Central El Toro
**Central El Toro**

Características Generales

Ubicación: 90 km. al oriente de Los Angeles, VIII Región

Tipo: Hidráulica de embalse. Utiliza las aguas del lago Laja y los recursos del río Polcura, que son desviados hacia dicho lago mediante la captación Alto Polcura

Características Generales

Potencia: 452 MW

Centrales Térmicas

Centrales Hidráulicas Centro

Centrales Hidráulicas Sur

Datos de Generación

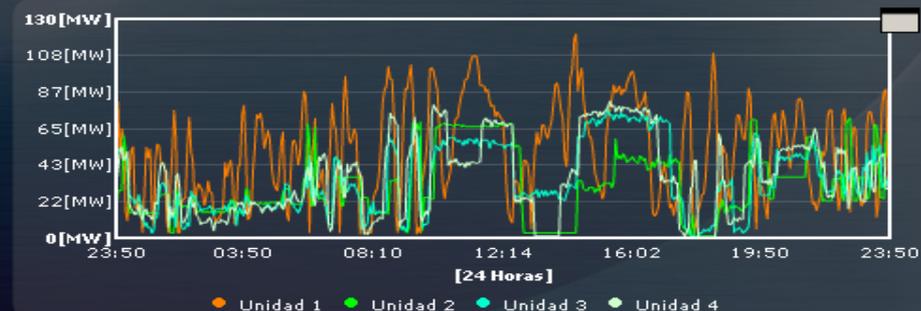
| Unidad | Tipo | Potencia Activa [MW] | Potencia Nominal [MW] | Disponibilidad Dia Anterior % | Estado Interruptor |
|----------|--------|----------------------|-----------------------|-------------------------------|--------------------------|
| Unidad 1 | Pelton | 17 | 113 | 100 | <input type="checkbox"/> |
| Unidad 2 | Pelton | 23 | 113 | 100 | <input type="checkbox"/> |
| Unidad 3 | Pelton | 35 | 113 | 100 | <input type="checkbox"/> |
| Unidad 4 | Pelton | 33 | 113 | 100 | <input type="checkbox"/> |
| Total | | 108 | 452 | 100 | |

INFORMACIÓN TÉCNICA

Nota:

Información provisoriamente no disponible de las Centrales:

- Betania, en Colombia
- Cartagena, en Colombia
- Diego de Almagro, Chile
- Ventanilla unidad 5 (TV), Perú
- Detalle por unidad en Chocón, Argentina



Endesa Dynamic Performance and Diagnostics Competence Center



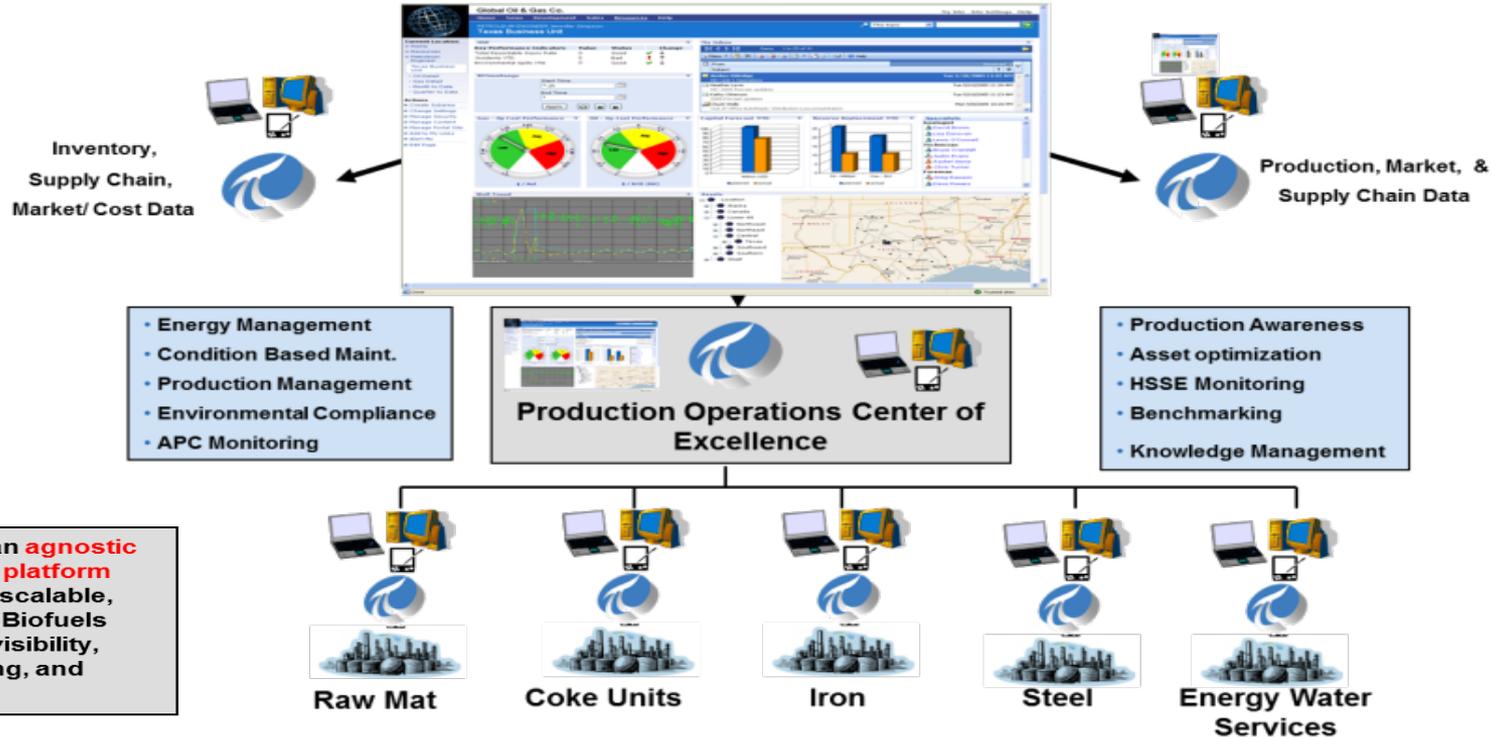
CAP Acero Steel Mill

PI System Seminar Y2009

- Fully Integrated Steel Company
- Reduction of Pellets in Blast Furnaces to produce Iron
- Steel produced in BOF then casted into Slabs
- 1.2 Tones of Steel per Year.

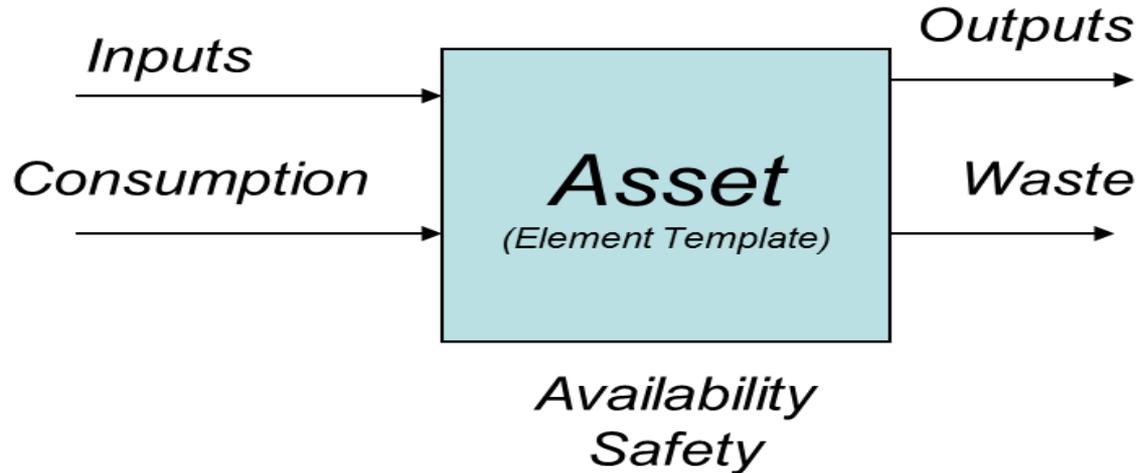


Real Time Enterprise Competence Center



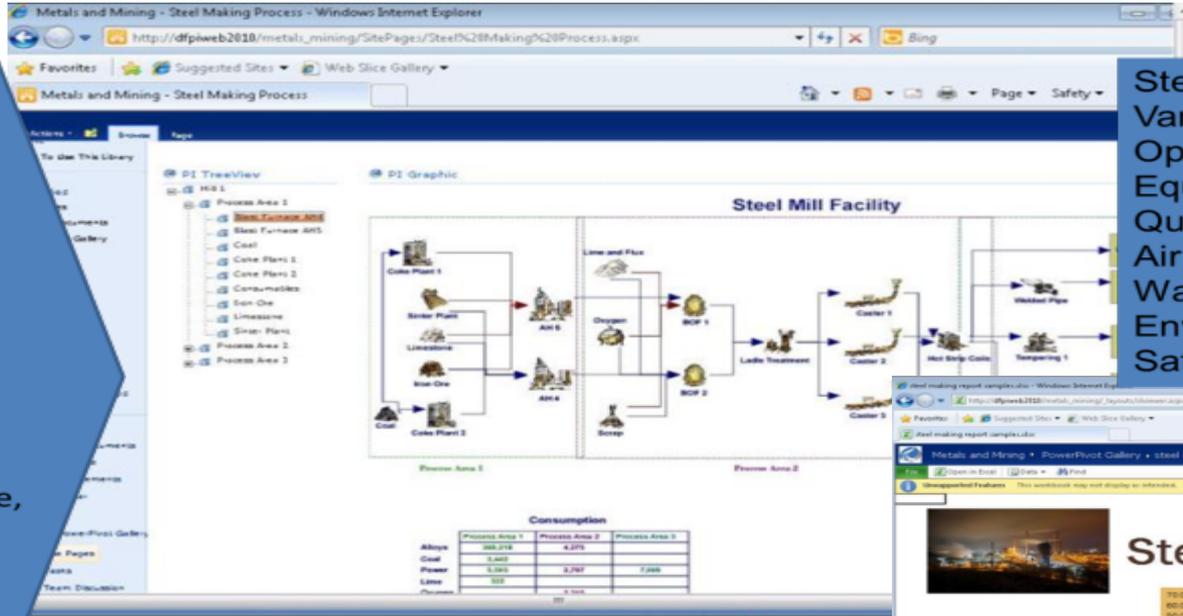
Enterprise Standard Asset Definition

- Strategic Block Diagram



Iron and Steel Metallurgical Complex

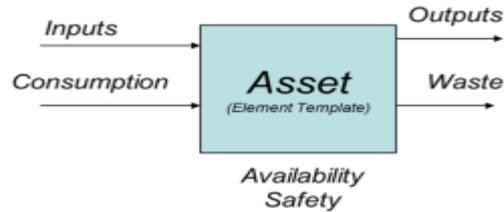
Iron
Limestone
Oxygen
Coal
Air
Fuel
Energy
Water
Alloys (Zinc,
Moly, Chrome,
etc)
Scraps



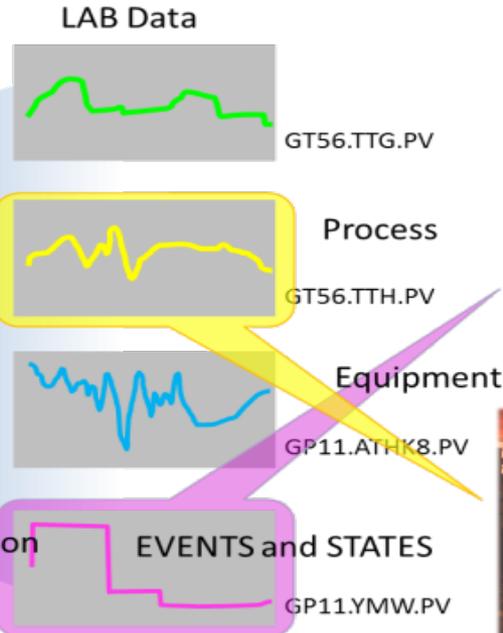
Steel Production
Variances
Operational Time Wasted
Equipment Availability
Quality
Air Quality Emissions
Water Discharge Emissions
Environmental
Safety Incidents



Strategy: Standardization of Assets and with Dynamic Contextual Information



Data at the Original Resolution
Information at the desired aggregation
and context
Anywhere, Anytime....



Load



Level



Integration of Data, Metrics and Events

The screenshot displays the 'Corporate Steel KPIs - PI System Explorer' interface. On the left, a tree view shows 'Elements' including Blast Furnace AH4, BOF 1, Casters 1-3, Coal, and Mill 1. A yellow 'AF' icon is overlaid on the tree. The main window shows a table for 'Mill 1' with columns for Name and Value. The table lists various metrics such as Hydrogen Consumption Summary (0 t/h), Alloy Consumption Summary (389186.863769531 kg/h), Coal Consumption Summary (3487.72912597656 t/h), and Power Consumption Summary (17588.4567346191 kWh). A blue callout box points to the 'Duration' section of the table, containing a list of time intervals: 1 Day, 1 Hour, 1 Month, and 1 Week. The text inside the callout reads 'Duration For Consolidation Of Data'. On the right side, a vertical stack of blue buttons is shown: 'Operational Data', 'EVENTS Status ST, ET', 'METRICS', 'Aggregated Information', 'By Area By Group By Region', and 'Hour Shift, Week'. Each button has a circular logo to its right. Further to the right, a 'Slicers' button is shown with a callout pointing to the 'EVENTS Status ST, ET' button. Another 'Slicers' button is shown with a callout pointing to the 'By Area By Group By Region' button. A third 'Slicers' button is shown with a callout pointing to the 'Hour Shift, Week' button.

Operational Data

EVENTS Status ST, ET

METRICS

Aggregated Information

By Area By Group By Region

Hour Shift, Week

Slicers

Slicers

Slicers

Duration For Consolidation Of Data

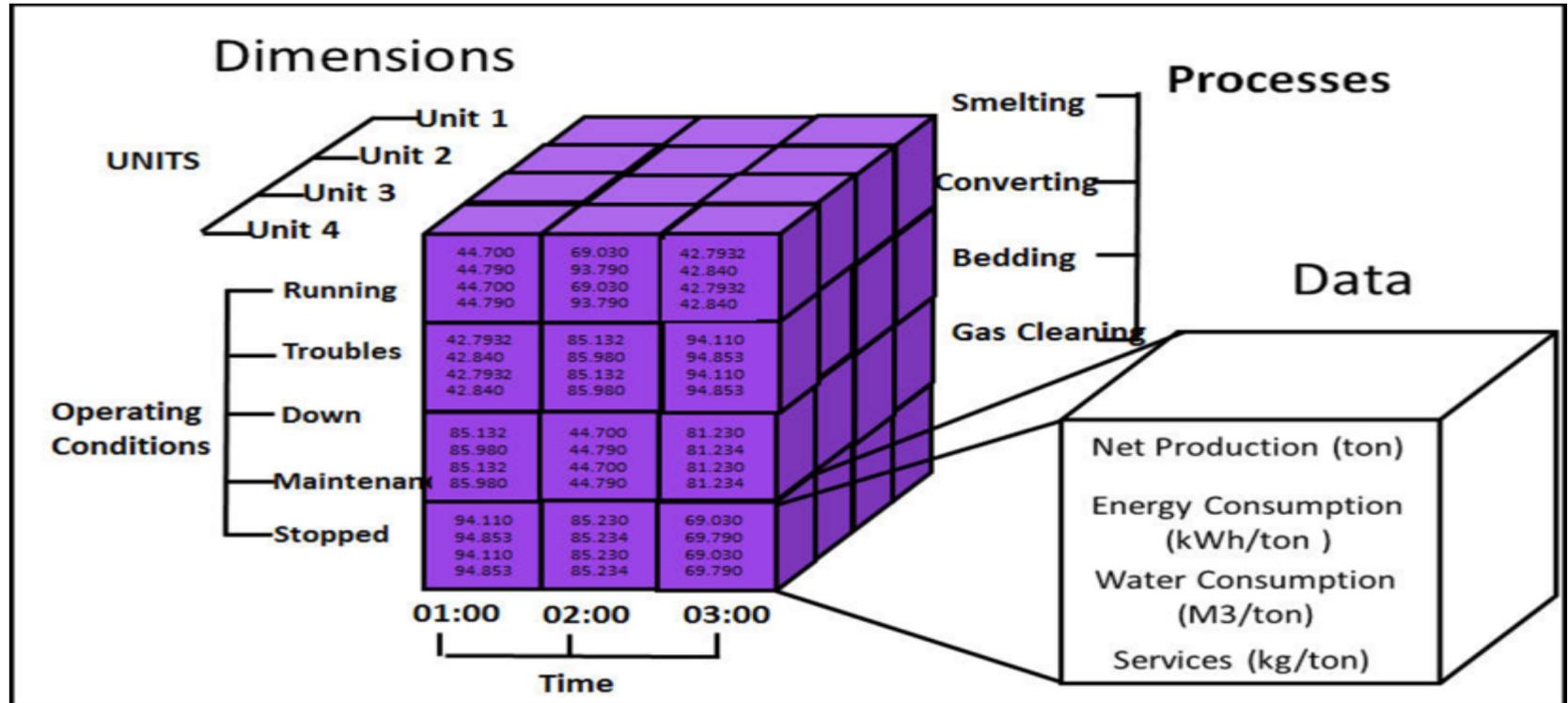
Report Based on Enterprise Driven Standards

| | | Performance (% time during last shift) | | | | | | |
|---------------|---------------------------|--|---------|------|-------------|----------|--|--|
| | | Running | Stopped | Down | Maintenance | Problems | | |
| Process Units | | % | % | % | % | % | | |
| | Batch Annealing | 0 | 25.0 | 32.1 | 5.6 | 37.3 | | |
| | Blast Furnace AH4 | 61.9 | 28.8 | .2 | 1.3 | 7.9 | | |
| | Blast Furnace AH5 | 18.5 | 18.8 | 10.2 | 41.0 | 11.5 | | |
| | BOF 1 | 13.3 | 25.4 | 20.4 | 29.8 | 11.0 | | |
| | BOF 2 | .0 | 25.0 | 32.1 | 5.6 | 37.3 | | |
| | Caster 1 | 61.9 | 28.8 | .2 | 1.3 | 7.9 | | |
| | Caster 2 | 18.5 | 18.8 | 10.2 | 41.0 | 11.5 | | |
| | Caster 3 | 13.3 | 25.4 | 20.4 | 29.8 | 11.0 | | |
| | Coke Plant 1 | 61.9 | 28.8 | .2 | 1.3 | 7.9 | | |
| | Coke Plant 2 | 18.5 | 18.8 | 10.2 | 41.0 | 11.5 | | |
| | Cold Reducing | 13.3 | 25.4 | 20.4 | 29.8 | 11.0 | | |
| | Electrogalvanizing Line 1 | .0 | 25.0 | 32.1 | 5.6 | 37.3 | | |
| | Electrogalvanizing Line 2 | 61.9 | 28.8 | .2 | 1.3 | 7.9 | | |
| | Hot Strip Coils | 18.5 | 18.8 | 10.2 | 41.0 | 11.5 | | |
| | Cold Reducing | 13.3 | 25.4 | 20.4 | 29.8 | 11.0 | | |
| | Electrogalvanizing Line 1 | 61.9 | 28.8 | .2 | 1.3 | 7.9 | | |
| | Electrogalvanizing Line 2 | 61.9 | 28.8 | .2 | 1.3 | 7.9 | | |
| | Hot Strip Coils | 61.9 | 28.8 | .2 | 1.3 | 7.9 | | |
| | Hot-Dip Galvenizing | 61.9 | 28.8 | .2 | 1.3 | 7.9 | | |
| | Ladle Treatment | 13.3 | 25.4 | 20.4 | 29.8 | 11.0 | | |
| | Pickling | 61.9 | 28.8 | .2 | 1.3 | 7.9 | | |
| | Sinter Plant | 13.3 | 25.4 | 20.4 | 29.8 | 11.0 | | |
| | Ladle Treatment | 61.9 | 28.8 | .2 | 1.3 | 7.9 | | |
| | Pickling | 18.5 | 18.8 | 10.2 | 41.0 | 11.5 | | |
| | Sinter Plant | 18.5 | 18.8 | 10.2 | 41.0 | 11.5 | | |
| | Tempering Hot | 13.3 | 25.4 | 20.4 | 29.8 | 11.0 | | |
| | Tin Plating | 13.3 | 25.4 | 20.4 | 29.8 | 11.0 | | |
| | Welded Pipe | 13.3 | 25.4 | 20.4 | 29.8 | 11.0 | | |

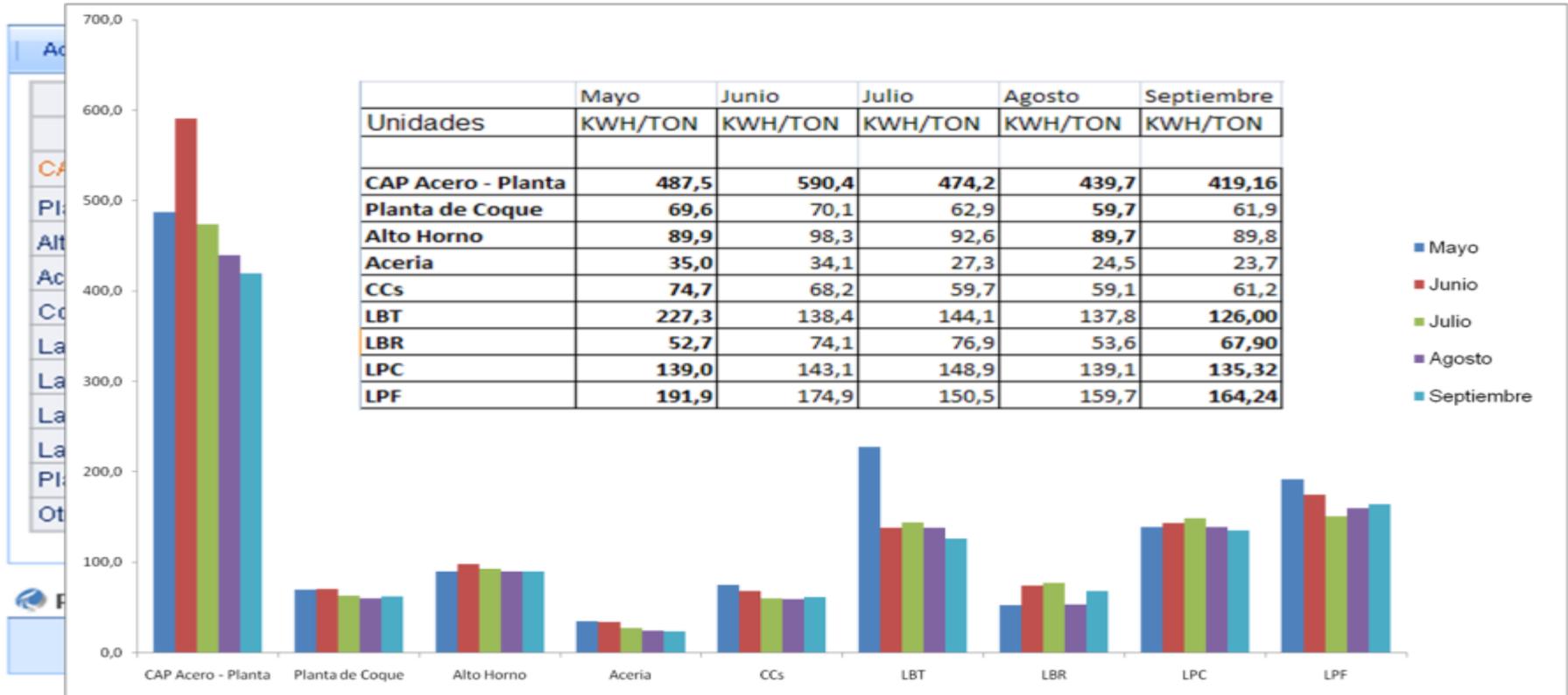
| Water | | Max | Min |
|-------|--|---------|---------|
| | | 300.4 | 295.6 |
| | | 294.5 | 289.7 |
| | | 298.2 | 293.1 |
| | | 4,999.3 | 4,200.8 |
| | | 3,999.8 | 3,000.2 |
| | | 100.0 | .0 |
| | | 100.0 | .0 |
| | | 21.3 | 21.1 |
| | | 93.6 | 2.8 |
| | | 85.2 | 84.8 |
| | | 350.0 | 50.0 |
| | | 93.6 | 2.8 |
| | | 53.3 | 47.6 |
| | | 187.0 | 54.4 |
| | | 249.3 | 122.4 |
| | | 26.5 | 21.8 |
| | | 16.2 | 16.0 |
| | | 298.1 | 293.6 |
| | | 75.5 | 74.4 |
| | | 36.8 | 16.5 |

Operational Multidimensional Analysis

PI Enterprise OLEDB (PI SDK and PI AF SDK)



Tangible benefits: Instant Power CAP ACERO



Tangible benefits: Web Based Air Quality Management for Authorities



US \$ 5.0 million per year



Tangible benefits: Advanced Mine to Mill Integration

UC 2010

Production Benefits:

- Increase of ore milling: 4.6%
- Decrease of mil power: 3.9%
- Decrease of fresh water consumption: 6.8%

Economic Benefits:

- Net profit: US\$ 31.8 million (period: 2009/04/04 to 2009/12/31)
- PI System contribution: US\$ 7.95 million (same period)

Integration of Mine Feed Knowledge with Milling, Flotation and Dewatering.

Rio Tinto Kennecott Utah Copper

- KUC Process Overview

- Mine

- Ore body of ~0.6% copper

- Mill/Concentrator

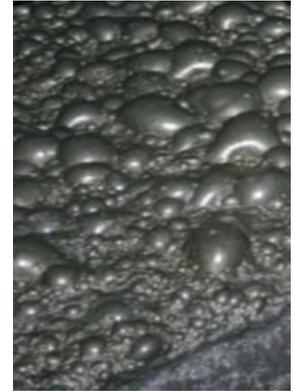
- Grind and float ore to get ~25% copper concentrate

- Smelter

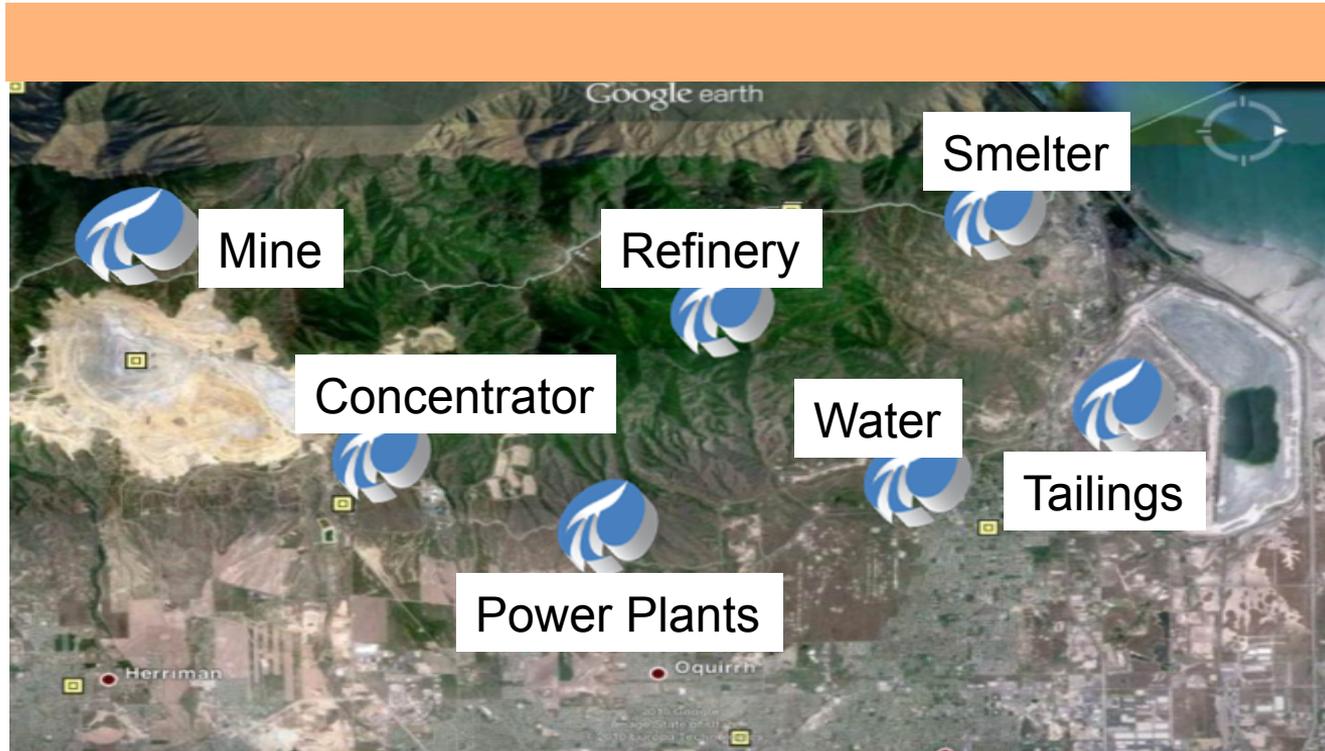
- Smelt and convert concentrate to get ~99.5% copper anodes

- Refinery

- Refine anodes to get ~99.99% copper cathodes



Integration: Rio Tinto Kennecott Utah Copper



Rio Tinto Kennecott Utah Copper



Energy and Water Tracking



Integrated Dynamic Performance Management of:

Energy

Assets

Reagents

Environmental

Local Dynamic Performance Management of:

Production, Availability, Recovery and Grade

Results

- **3 Clear References**
- **Full Integration for Reduction of Energy, Water and Environmental Reporting**
 - Gained data visibility across all operations
 - Gather data from multiple systems & sites,
 - Leverage opportunities to reduce
 - Identify and promote best practices

References

- Anglo American Platinum, Michael Halhead, Data Validation with PI AF, UC 2011
- Anglo American Platinum, Michael Halhead, Energy Monitoring, OSIsoft Region Seminar South Africa, Y2011
- Anglo American Platinum, Warren Armstrong, Downtime Reporting, OSIsoft Regional EMEA Seminar, Y2011
- Southern Peru Copper, Nelver Benavides, Development and Implementation of the PI System at the Southern Peru Copper Cuajone Concentrator and Mine. UC2010
- Endesa Latam, Jose Lobo, PI System Seminar Santiago, Chile, Y2007
- Endesa Latam, Rodrigo Paredes, PI System Seminar Santiago, Chile, Y2009.
- Enel, Pestonesi, D., Scapecchia, Costarelli, and Franceschini, L, Remote Supervision Center for Enel Combined Cycle Plants, In Book, Modeling, Control, Simulation and Diagnosis of Complex Industrial and Energy Systems, Ferrarini L and Veber C. Editors. ISA, Y
- Cap Acero, Mario Flores y Rene Aroqui, Implementacion de PI en CAP Acero, Compania Siderurgica Huachipato, PI System Seminar Santiago, Chile, Y2009.
- Rio Tinto, Roger Roth, Kennecott Utah Copper Company PI Server, UC2007
- DTE Energy, John Kapron and Sumanth Makunur, Fleet Optimization through PI, UC 2007
- Iberdrola, Maria Martin, Miguel Chavero, Ignacio Perez, UC 2005, UC2011

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Email: osvaldo@osisoft.com



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- See below for a list of OSIsoft product names. If you use a product that is listed below and don't know its official name, please contact your local OSIsoft representative: **Kumar Bangalore** at (440) 720-3696 or kumar@osisoft.com
- Please note the use of upper/lower case and spaces
- Please note: Refer to the overall PI System, or the PI System in general, as “the PI System” and not just as “PI”
 - MDUS (Meter Data Unification System)
 - OSIsoft
 - OSIsoft vCampus
 - PI ACE (Advanced Computing Engine)
 - PI ActiveView
 - PI AF or PI Asset Framework
 - PI AlarmView
 - PI API
 - PI AutoPointSync (PI APS)
 - PI Batch
 - PI BatchView
 - PI Collective Manager

(Continued on next slide)

OSIsoft Product Names (Contd.)

- PI COM Connector
- PI Coresight
- PI DataLink
- PI DataLink Server
- PI Event Frames
- PI IT Monitor (now part of PI Server 2010)
- PI JDBC Driver
- PI Manual Logger
- PI MCN Health Monitor
- PI Module Database
- PI Notifications
- PI ODBC Client
- PI OLEDB Enterprise
- PI OLEDB Provider
- PI OPC Alarms & Events Interface
- PI OPC DA/HDA Server
- PI OPC HDA Interface
- PI ProcessBook
- PI Profile View
- PI SDK
- PI Server
- PI SQC Client
- PI System Management Tools (PI SMT)
- PI Tag Configurator
- PI to PI Interface
- PI Web Services
- PI WebParts (formerly RtWebParts)
- RtReports



PLEASE
PAUSE
FOR
DEMO

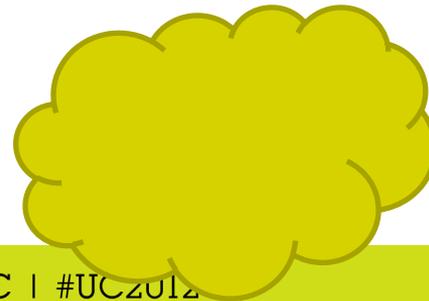
Text specifications

- **Subtitles are bold** – Text should AutoFit for size
 - **Second-level** – Text, **bold**, **Dark Yellow highlights**
(If needed, the dark yellow can be found under Font Color > More Colors > Custom> Red:204, Green:204, Blue:0)
 - **Third-level** – Try not to use this level; multiple-level lists complicate PowerPoint presentations and make them difficult to read

Never cover up the footer

- If you insert an image or text, never cover up the footer below.

UNACCEPTABLE



Blank Layout

(Delete this box)



Adding Images and Video

Inserting Images

- Full-page photo: Use “**Photo – full-page**” layout. Image must be high resolution.
- With caption - “**Photo – full-page w/ caption**”
- Uncropped/irregular images: Use “**Blank**” or “**Title only**” layout



Good full-page photo:
Insert your caption here. This text
box will automatically adjust to
the size of your caption.



OSIsoft

Bad full-page photo.
Low resolution, too horizontal.

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2. Click on the “**Insert Media Clip**” icon below

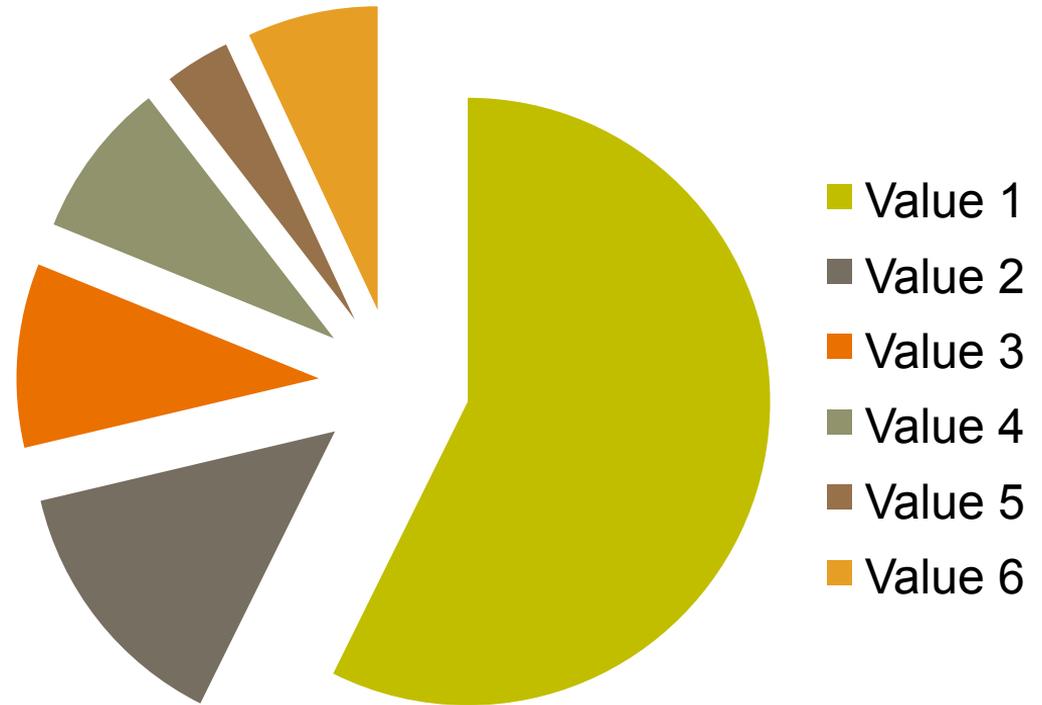
3. Select your video file
4. Videos should be in .wmv formats and backup files should be submitted with presentations



Charts, Tables and Graphics

Sample Chart

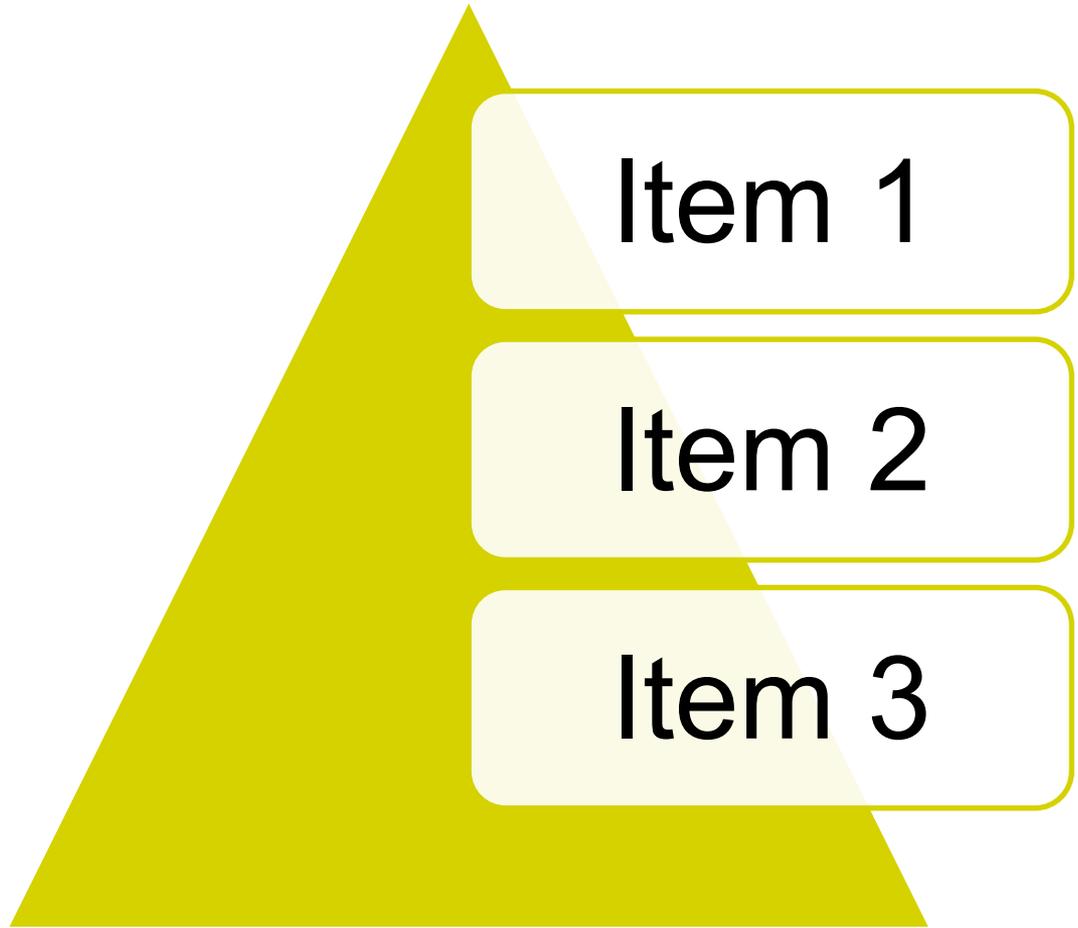
Sales



- Value 1
- Value 2
- Value 3
- Value 4
- Value 5
- Value 6

Sample Infographic

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