



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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The Power of Data

Agenda



Overview of the Large Industrial Complexes



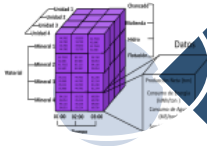
Sustainability Strategies are good business



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



Above Logo's may be Copyrighted or are Trademarks of their respective Companies

Large Water and Energy Costs

Ore



Sag Milling



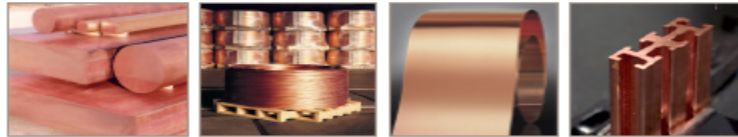
Concentrate



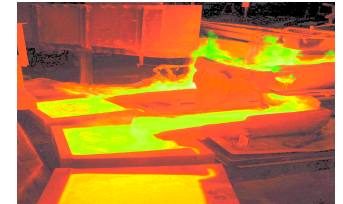
Energy



Water



Products

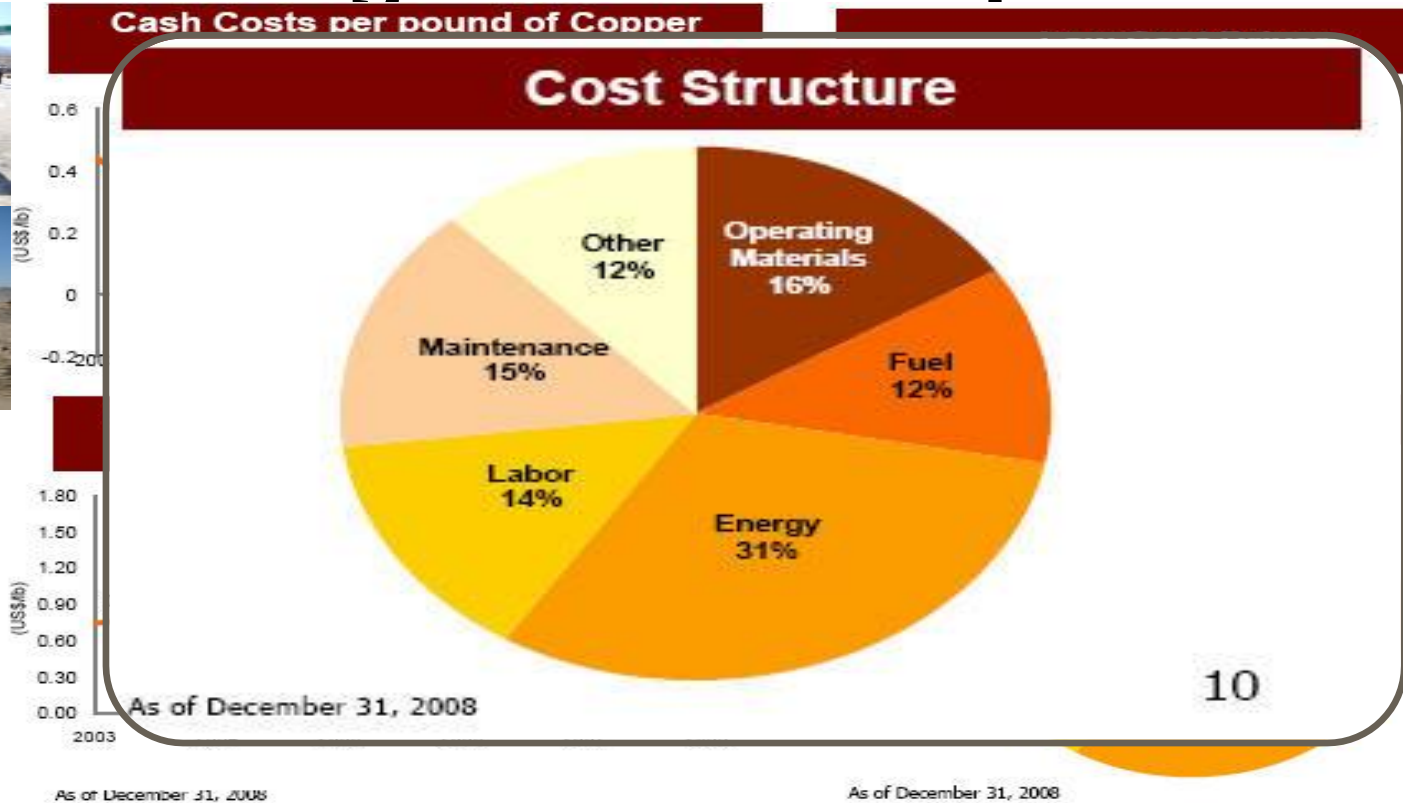


Metal

Mining Costs Example

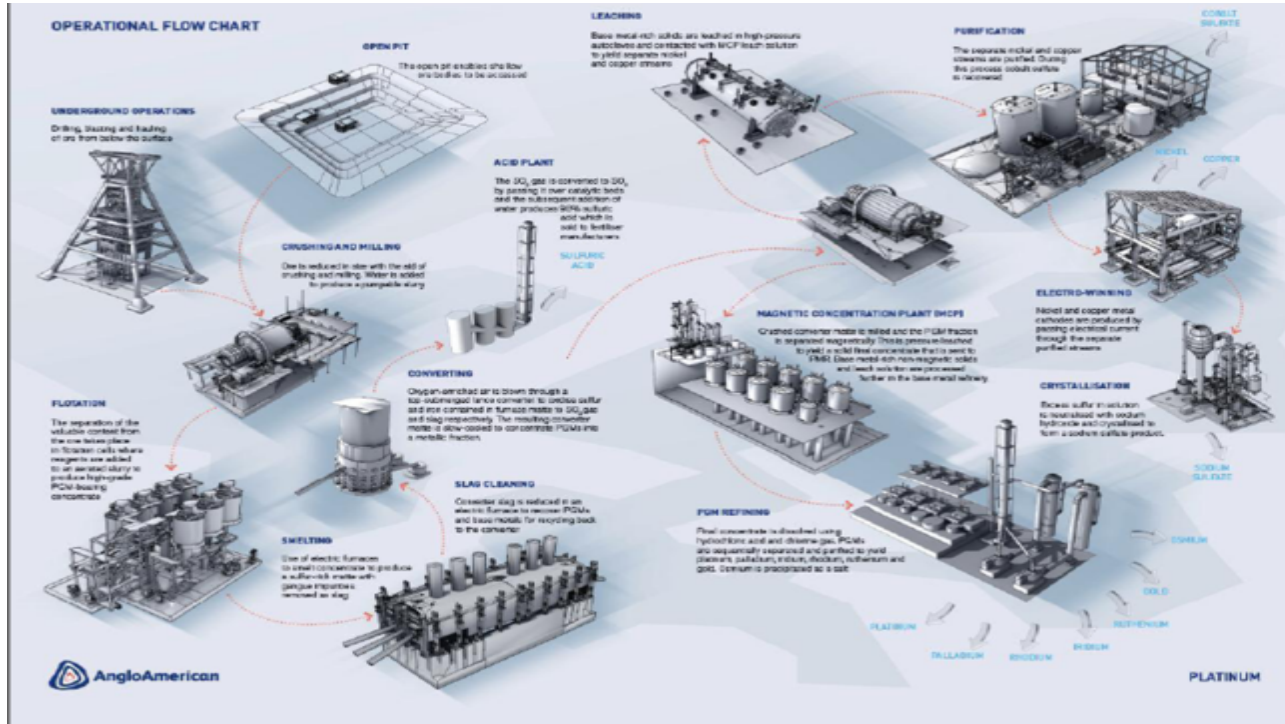


kWh



Doug Fuerstenau, UC Berkeley Study, 2001

Variety of Assets

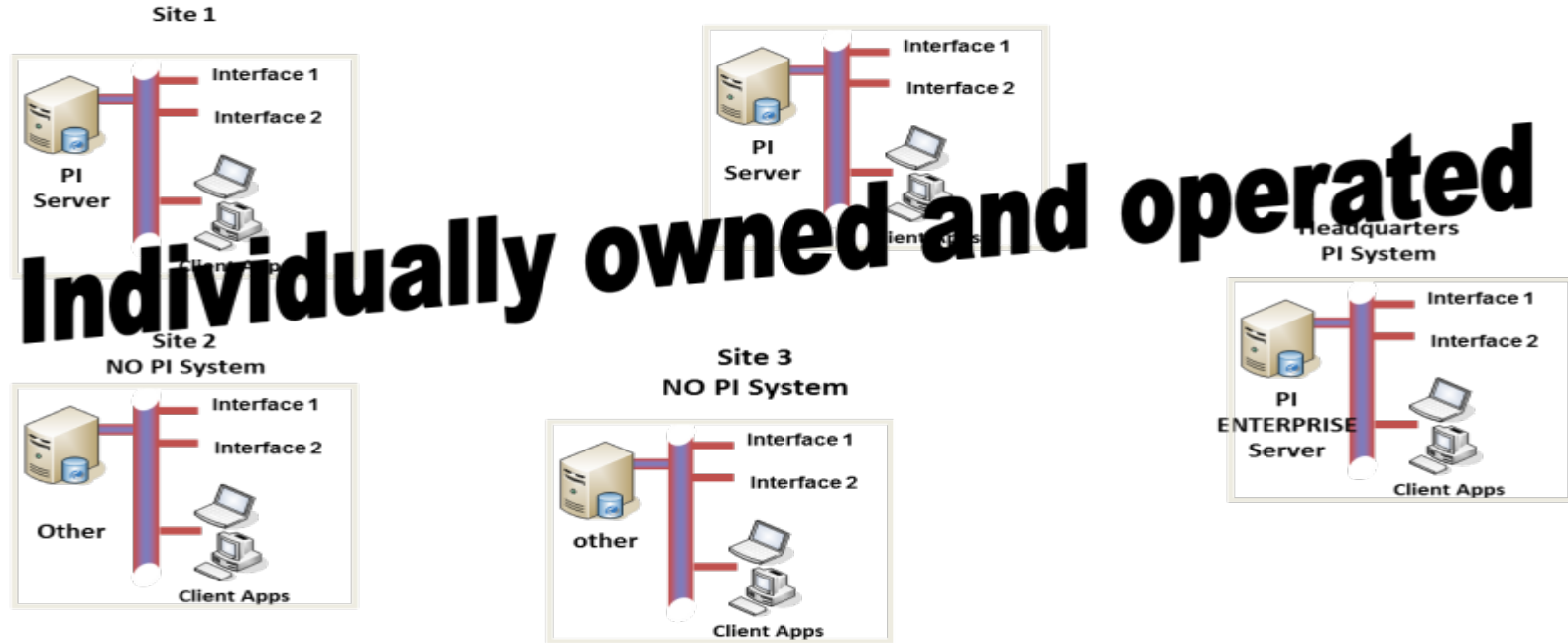


Platinum Process

- 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

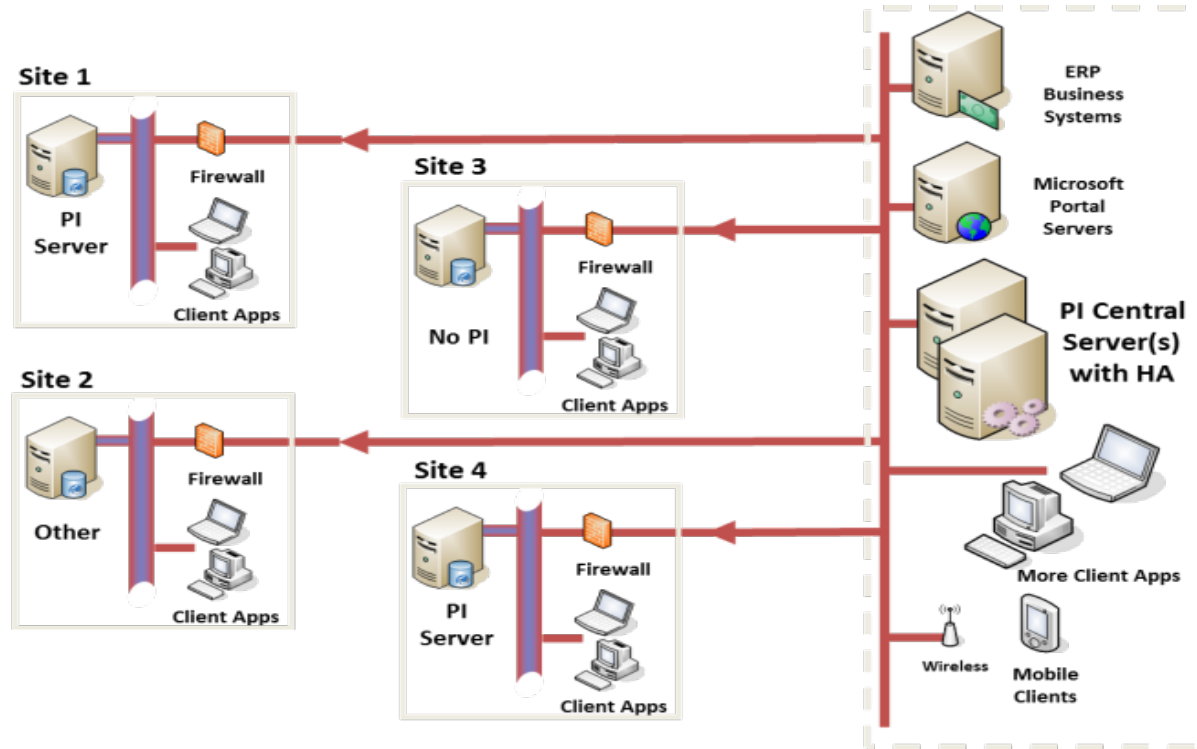
Islands of Best Practices



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



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

endesachile
E

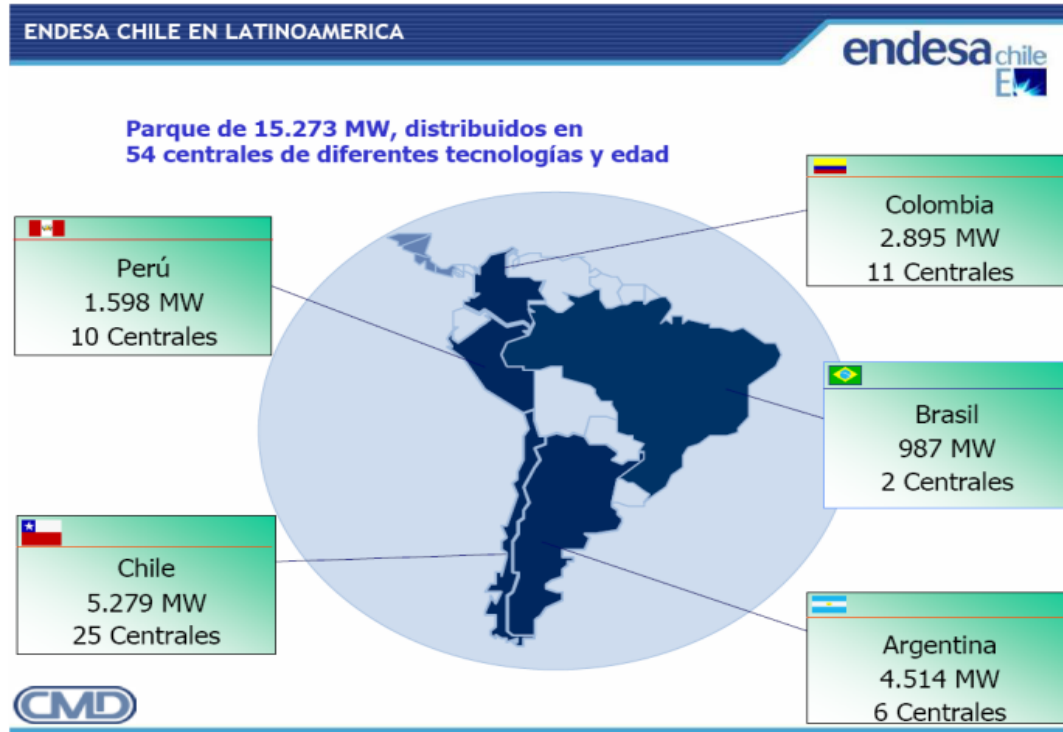
RODRIGO PAREDES
Jefe CMD

CMD **endesa**chile
Centro de Monitoreo y Diagnóstico

SEPTIEMBRE de 2008

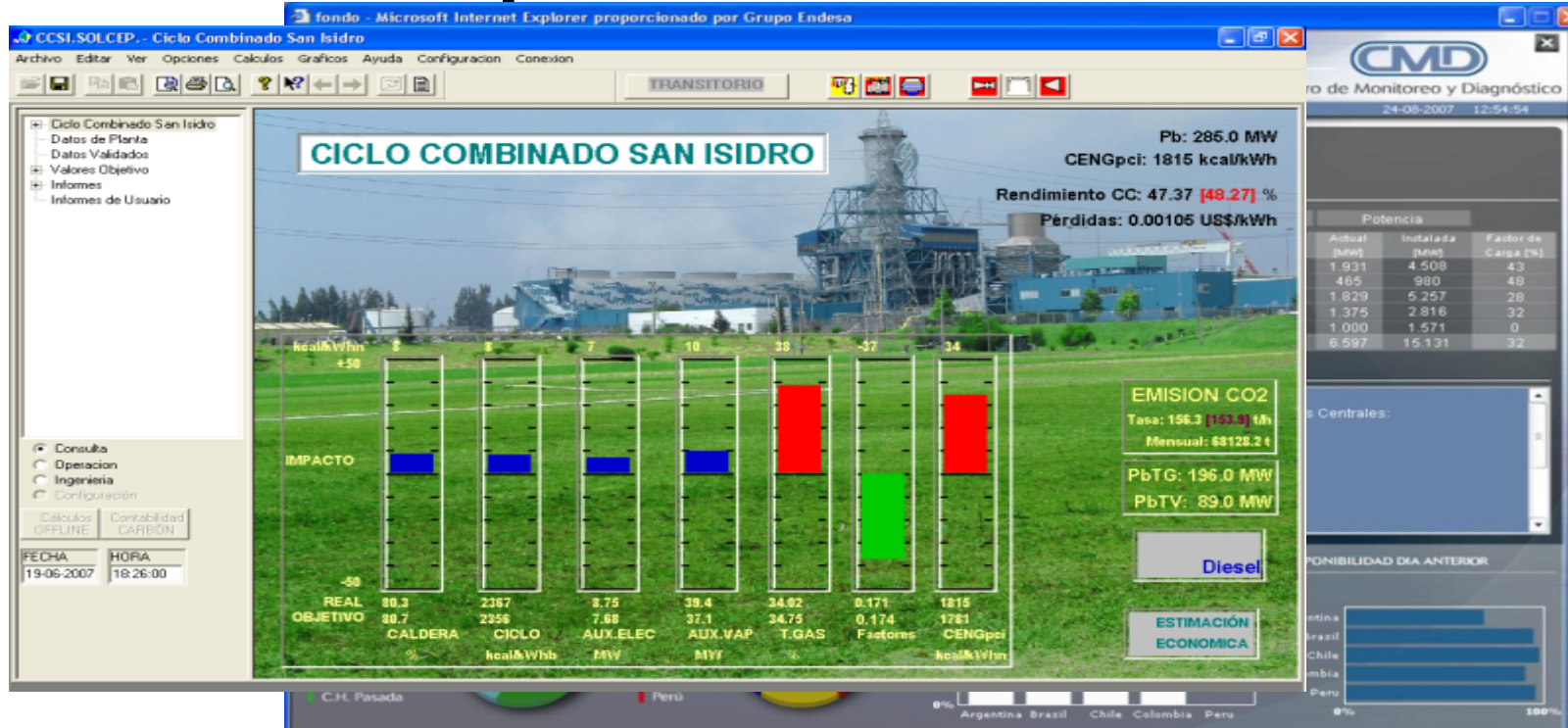
Dow Jones
Sustainability Indexes
Member since 2007

Optimizing Latin American Energy Generation Management



Endesa Dynamic Performance Diagnostics Competence Center

Hydro
Gas
Fuel
Wind
Solar





Perú



Colombia



Chile



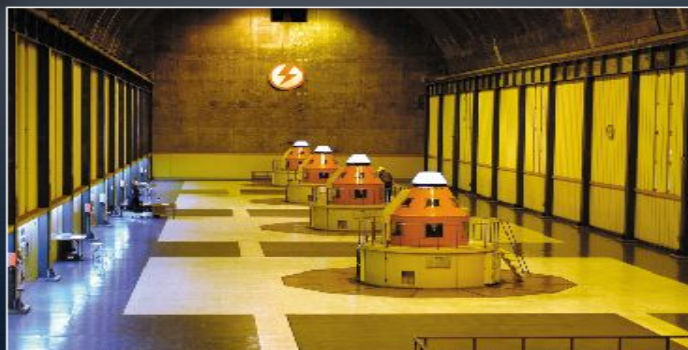
Argentina



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

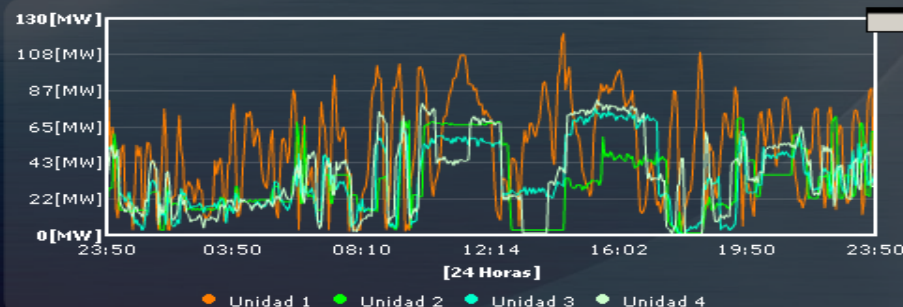
Unidad	Tipo	Potencia Activa [MW]	Potencia Nominal [MW]	Disponibilidad Día Anterior %	Estado Interruptor
Unidad 1	Pelton	17	113	100	<input type="checkbox"/>
Unidad 2	Pelton	23	113	100	<input type="checkbox"/>
Unidad 3	Pelton	35	113	100	<input type="checkbox"/>
Unidad 4	Pelton	33	113	100	<input type="checkbox"/>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



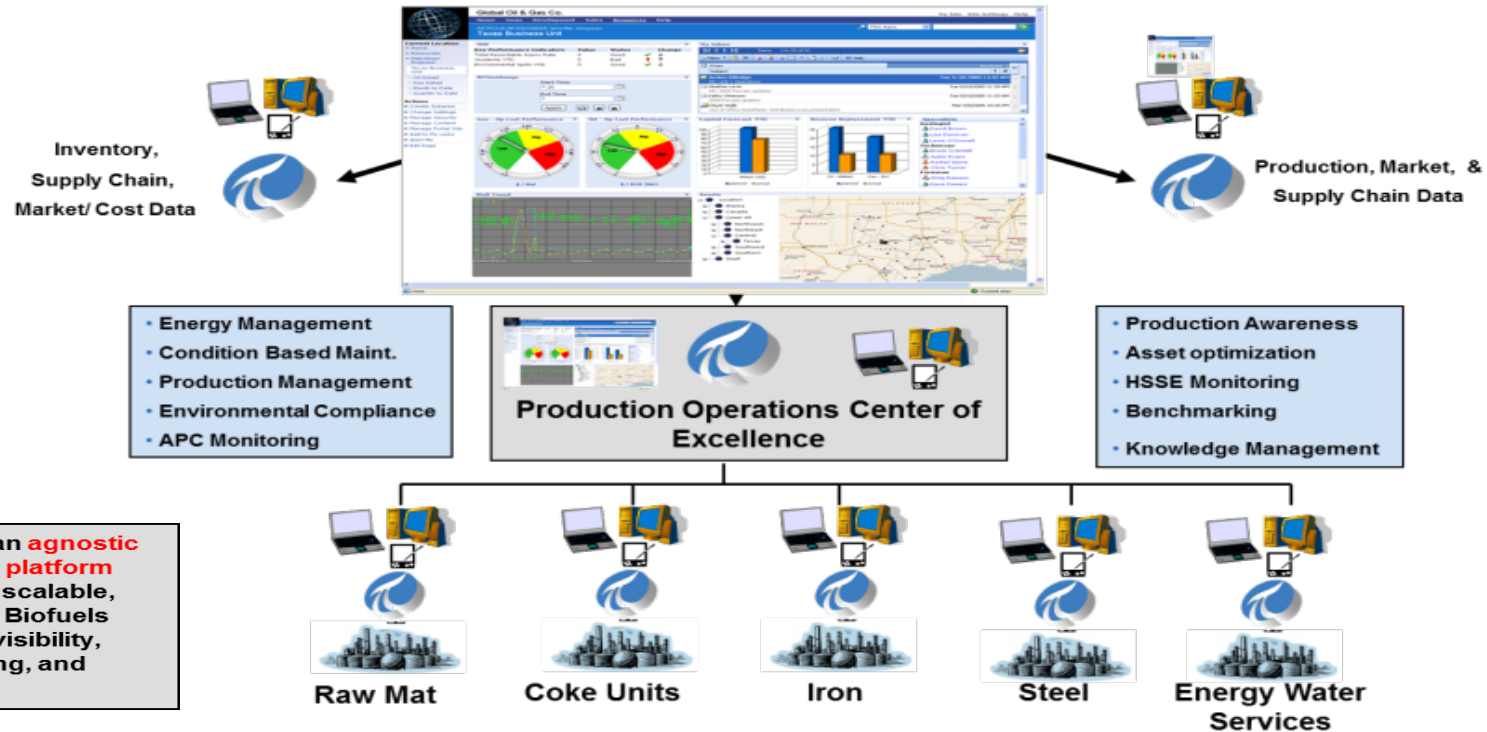
CAP Acero Steel Mill

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.

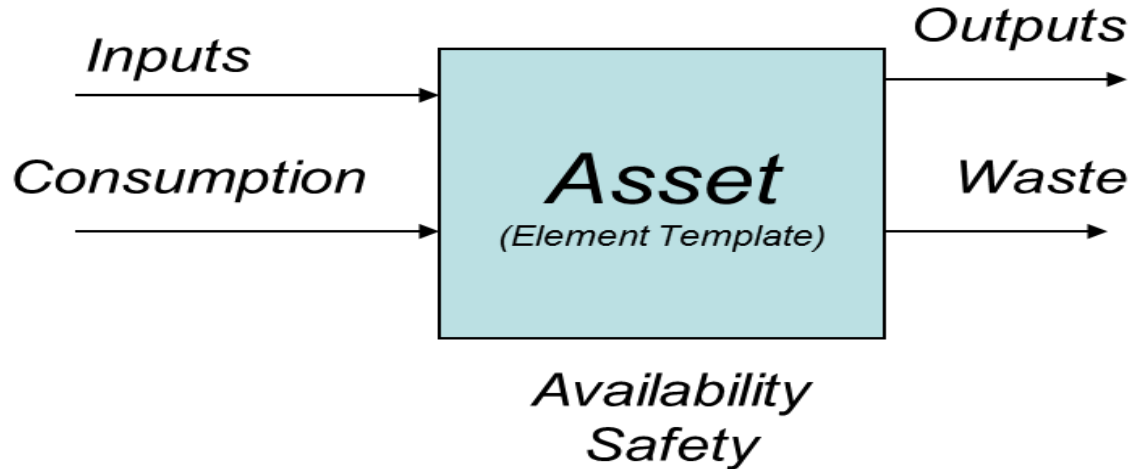


Real Time Enterprise Competence Center



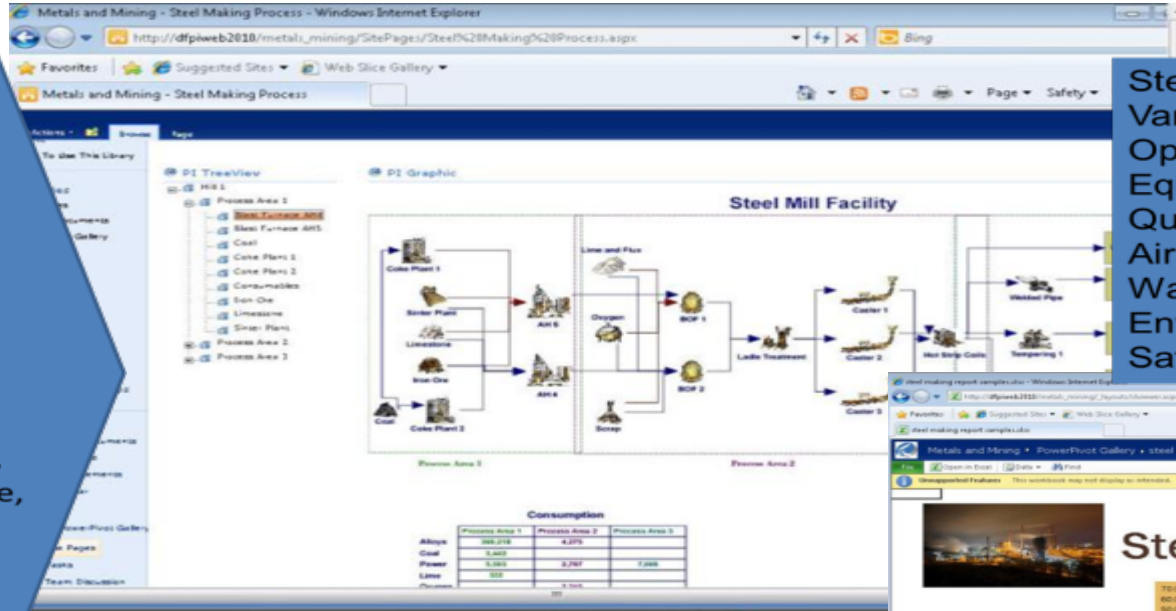
Enterprise Standard Asset Definition

- Strategic Block Diagram



Iron and Steel Metallurgical Complex

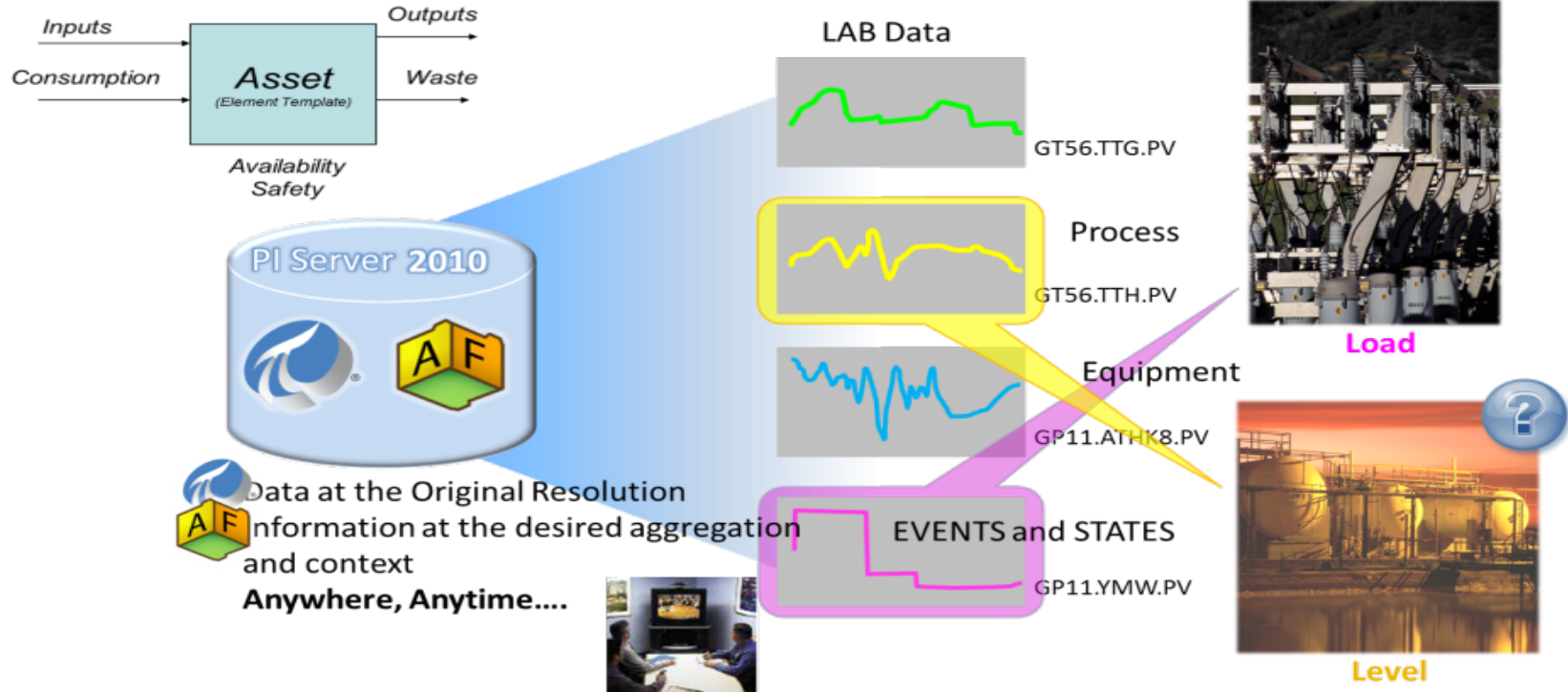
Iron
Limestone
Oxygen
Coal
Air
Fuel
Energy
Water
Alloys (Zinc,
Moly, Chrome,
etc)
Scraps



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



Integration of Data, Metrics and Events

[illegible]

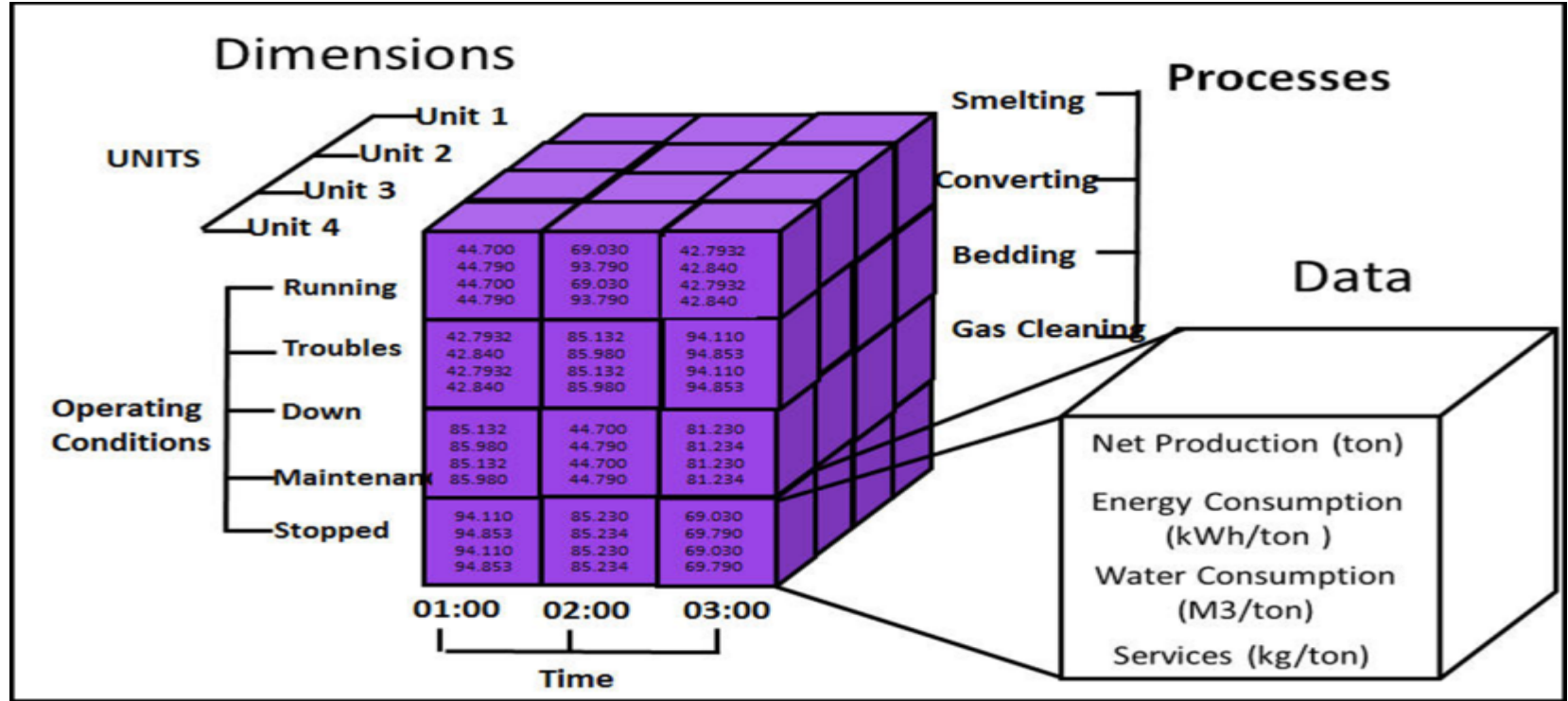
Report Based on Enterprise Driven Standards

		Performance (% time during last shift)						
		Running	Stopped	Down	Maintenance	Problems		
Process Units		%	%	%	%	%		
Batch Annealing		0.0	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		
Hot-Dip Galvenizing		13.3	25.4	20.4	29.8	11.0		
Ladle Treatment		61.9	28.8	.2	1.3	7.9		
Pickling		61.9	28.8	.2	1.3	7.9		
Sinter Plant		13.3	25.4	20.4	29.8	11.0		
Tempering Hot		61.9	28.8	.2	1.3	7.9		
Tin Plating		18.5	18.8	10.2	41.0	11.5		
Welded Pipe		13.3	25.4	20.4	29.8	11.0		

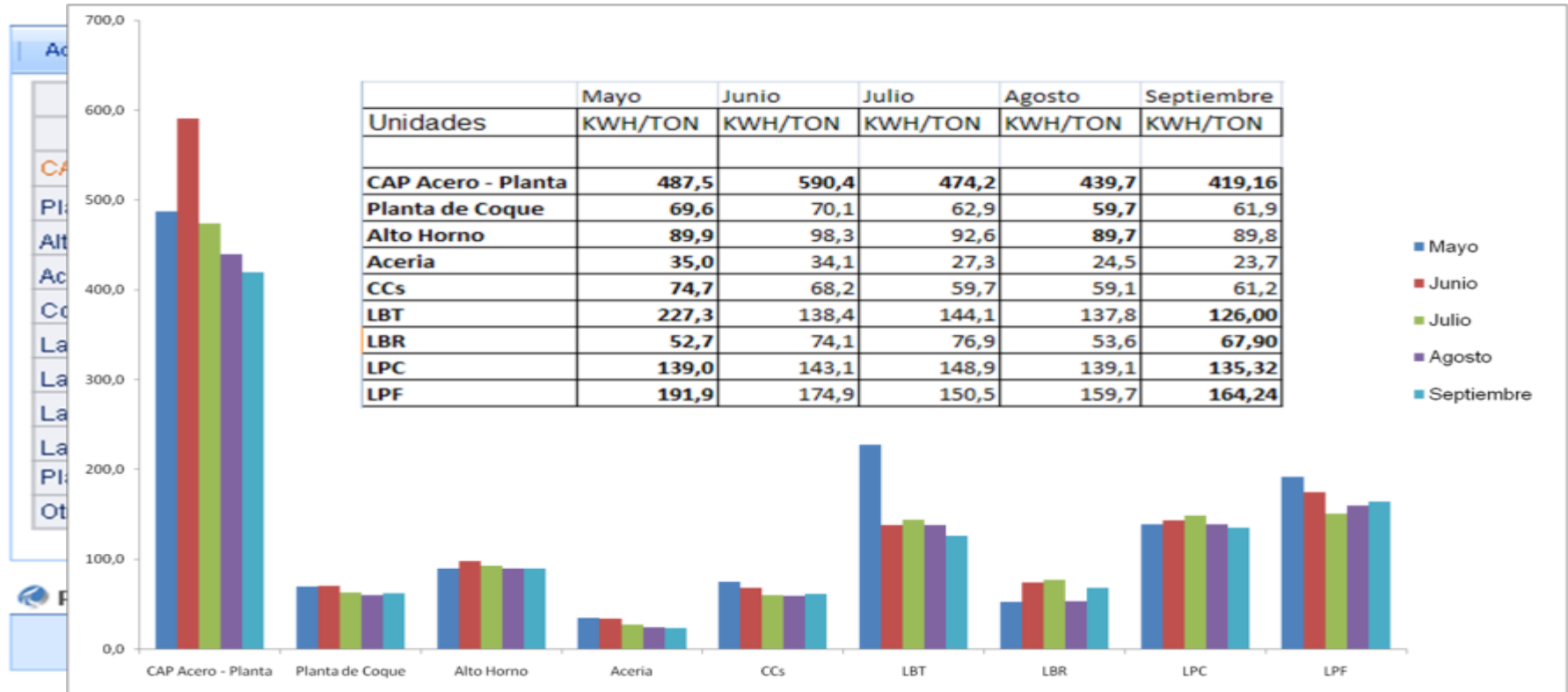
Water		Max	Min
		300.4	295.6
		294.5	289.7
		298.2	293.1
		4,999.3	4,200.8
		3,999.8	3,000.2
		100.0	.0
		100.0	.0
		21.3	21.1
		93.6	2.8
		85.2	84.8
		350.0	50.0
		93.6	2.8
		53.3	47.6
		187.0	54.4
		249.3	122.4
		26.5	21.8
		16.2	16.0
		298.1	293.6
		75.5	74.4
		36.8	16.5

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

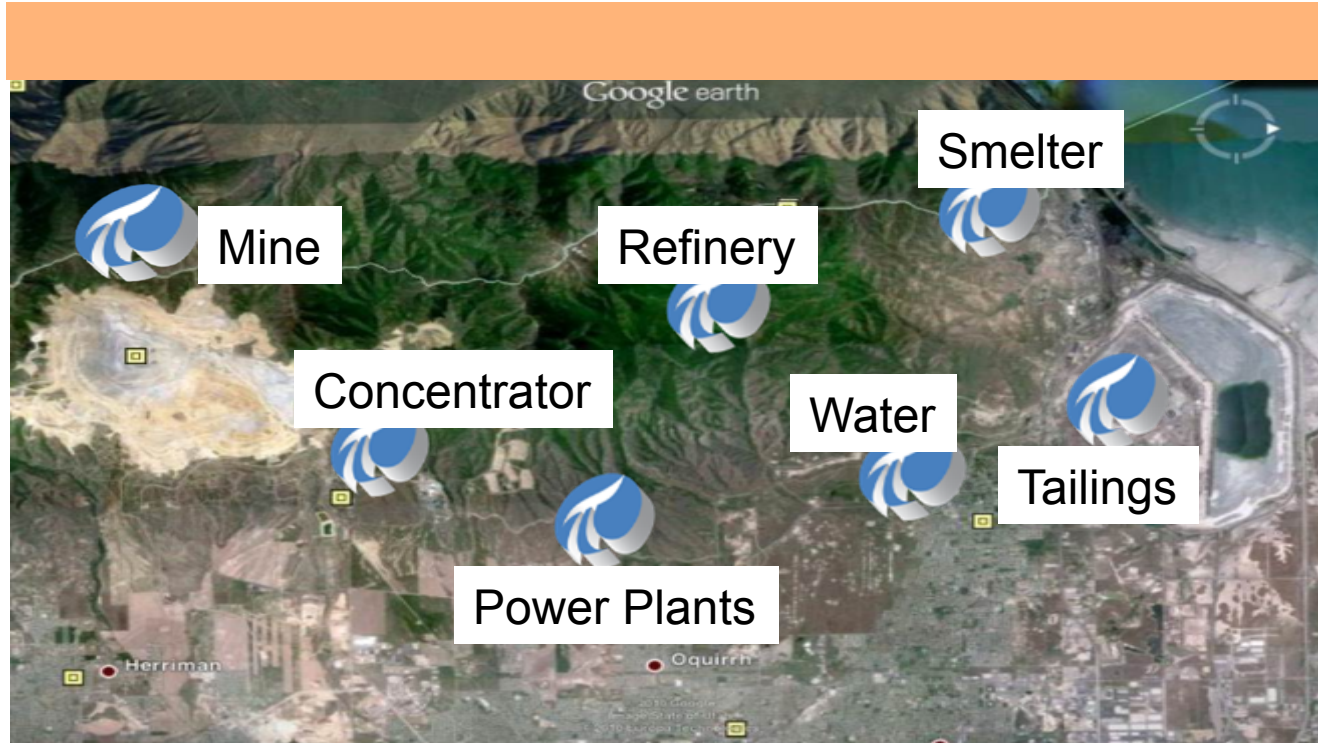
- Smelt and convert concentrate to get ~99.5% copper anodes

- Refinery

- Refine anodes to get ~99.99% copper cathodes



Integration: Rio Tinto Kennecott Utah Copper



Rio Tinto Kennecott Utah Copper



Energy and Water Tracking



Mining



Mineral Processing



Metallurgical



Products

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

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- 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.

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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.



osiso

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

(Delete these instructional boxes)

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3. Select your video file
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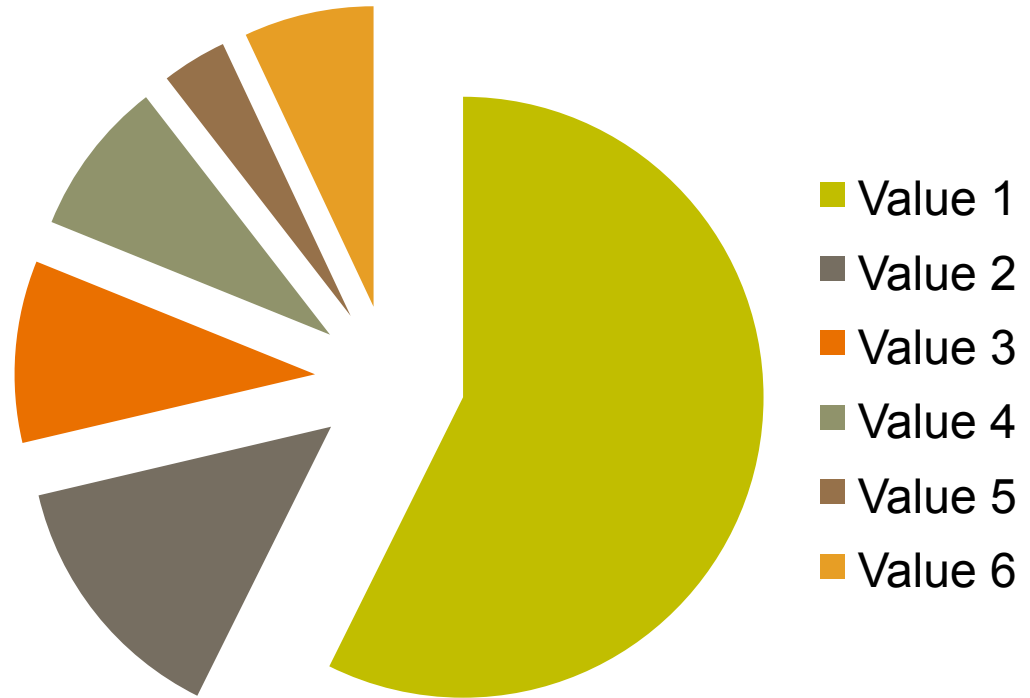
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 2. Click on the “**Insert Media Clip**” icon below
-
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Charts, Tables and Graphics

Sample Chart

Sales

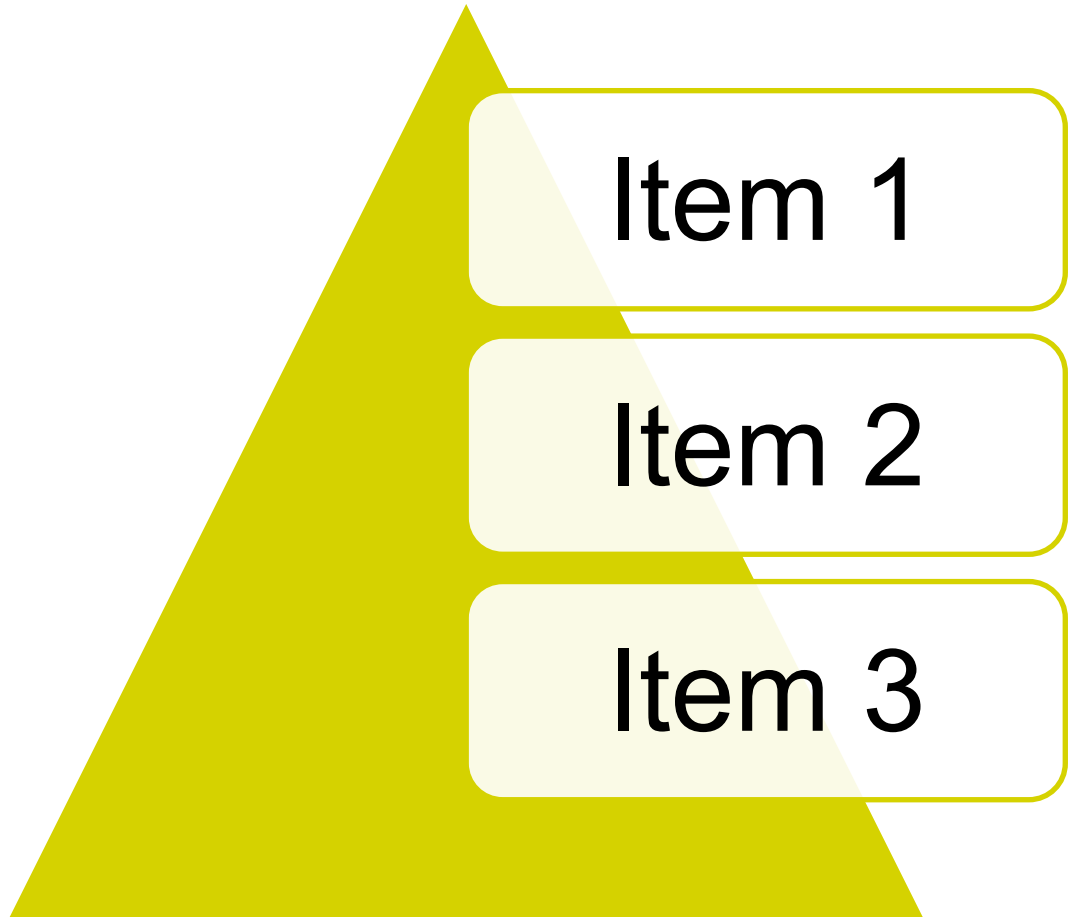


Sample Table

Column A	Column B	Column C	Column D
Item 1	Item 2	Item 3	Item 4

Sample Infographic

- Don't add fancy effects



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