

Update on PI System Development & Enterprise Agreement experience at Anglo American Copper



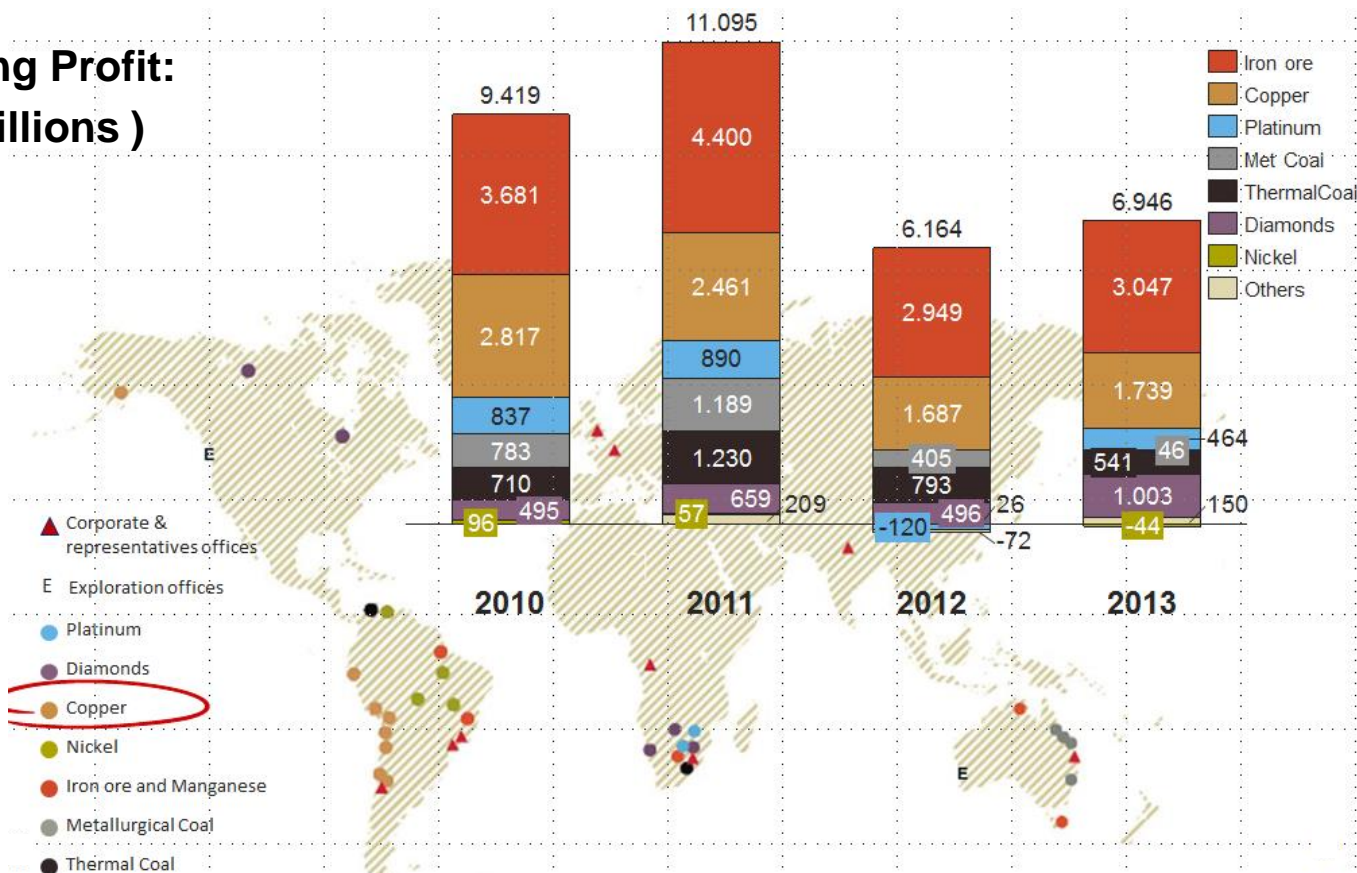
Presented by **Fernando Romero**

AGENDA

- ☐ Anglo American plc. a global mining company.
- ☐ Business strategy.
- ☐ Business challenge.
- ☐ The solution.
- ☐ Project development with an OSIsoft Enterprise Agreement.
- ☐ Conclusions.

STRATEGIC COMMODITIES WORLDWIDE

Operating Profit:
(US\$ millions)



Copper belongs to **Base Metals BU** of AA plc.

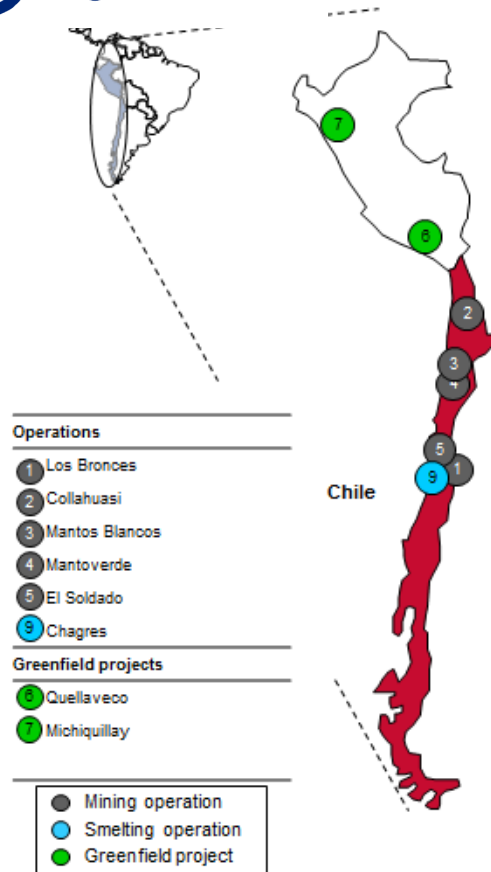
Chile (6 Operations) & **Peru** (2 Greenfield Projects)

2013 results:

- Operating profit: **US\$ 1,739 millions (26%)**
- EBITDA: US\$ 2,402 millions, ROCE: 25%
- Production Cu fine: **775 [kton]**
- Average number of own Employees: 4,200



COPPER CURRENT PORTFOLIO: OPERATIONS



Los Bronces

- Open pit mine in Central Chile producing concentrate & cathodes.
- Production **416 kt Cu** plus Mo & Ag in 2013.
- Mine life > 30 years.
- Significant upside potential at San Enrique Monolito and Los Sulfatos.



Collahuasi

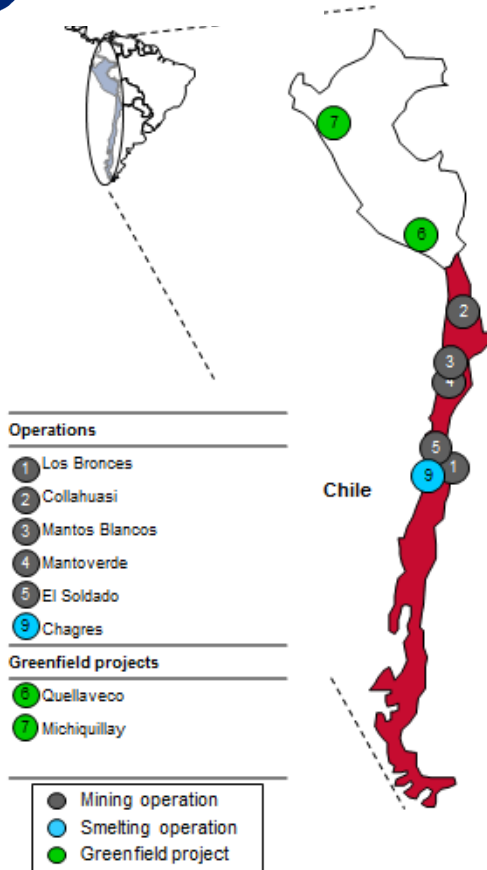
- Non-managed open pit mine in Northern Chile producing concentrate & cathodes.
- Production **196 kt Cu (44%)** plus Mo & Ag in 2013.
- Mine life > 30 years.
- Significant potential for further expansions.



Mantos Blancos

- Open pit mine in Northern Chile producing concentrate & cathodes.
- Production **55 kt Cu** plus Ag in 2013.
- Mine life 10 years with potential for extension.

COPPER CURRENT PORTFOLIO: OPERATIONS



Mantoverde

- Open pit, heap leach mine in Northern Chile producing cathodes.
- Production **57 kt Cu** in 2013.
- Mine life 6 years with potential for life extension through sulphide processing.



El Soldado

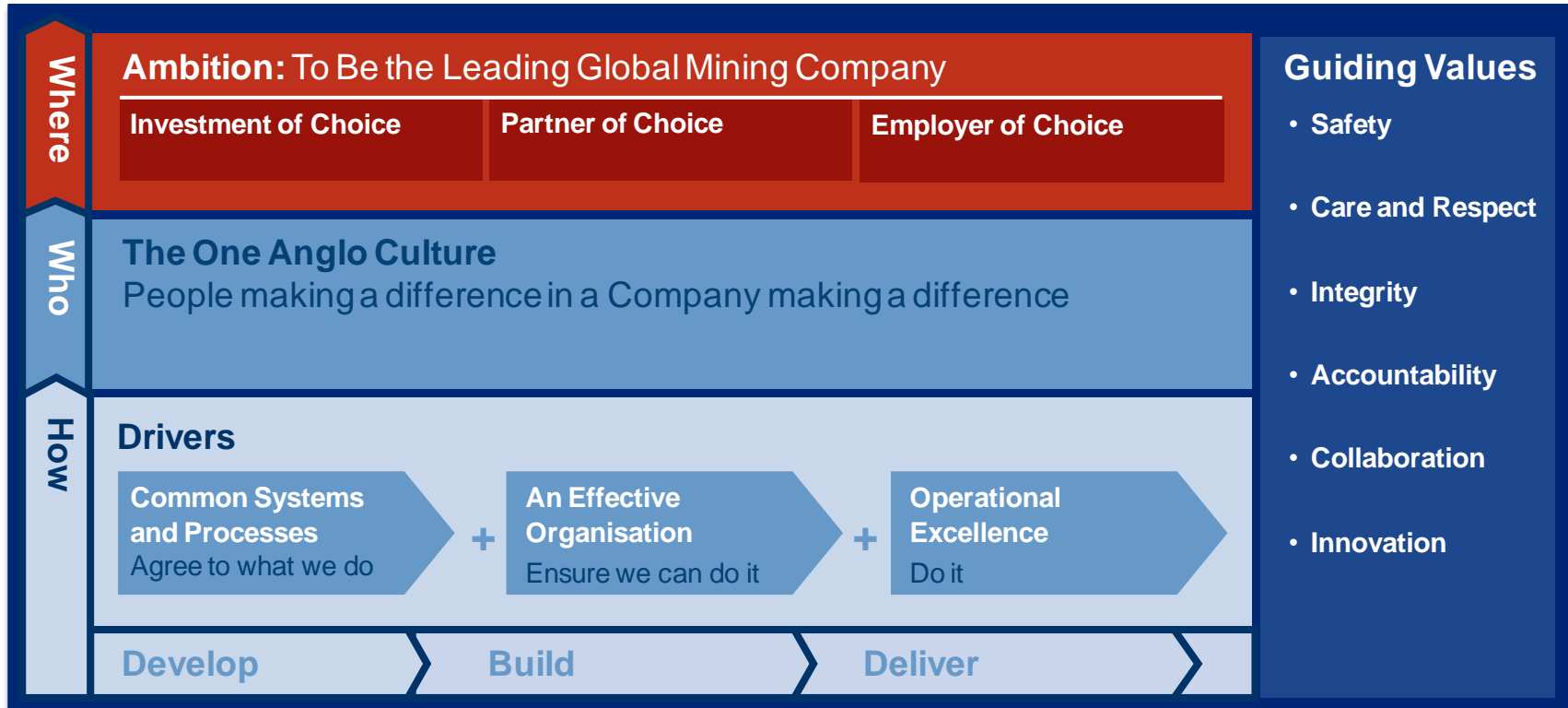
- Open pit mine in Central Chile producing concentrate & cathodes.
- Production **52 kt Cu** plus Ag in 2013.
- Mine life 20 years.



Chagres

- Cu smelter in Central Chile, primarily treating concentrate from Los Bronces and El Soldado.
- Production **145 kt anodes/blister Cu** plus **503 kt sulphuric acid** in 2013.
- Potential to expand production.

AngloAmerican Strategy: “One Anglo” model



Anglo American **Copper** Strategy





Business Challenge:

The need of **real-time information management** for
Operational Excellence, Safety & Sustainability



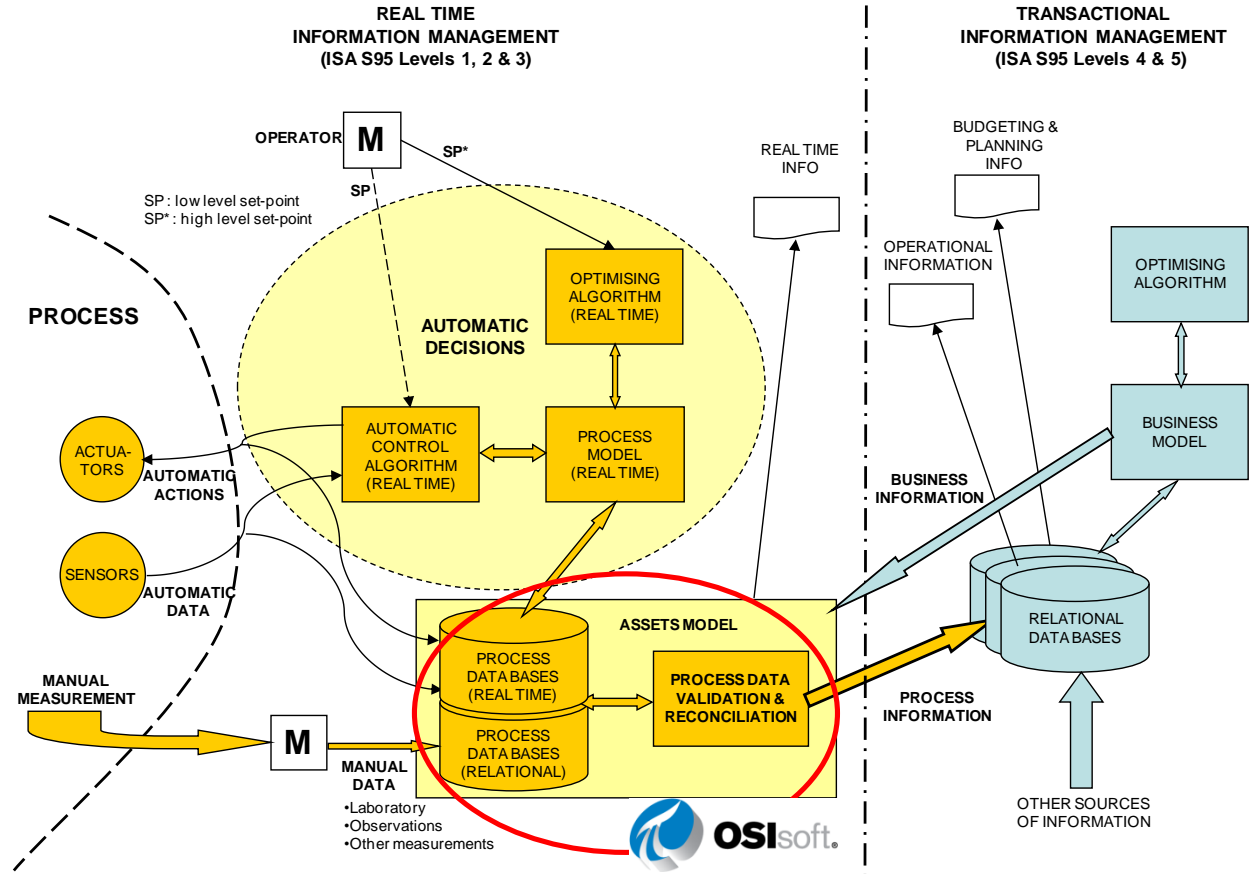
Technical solution:

An integrated approach considering
Process Control & Automation (PC&A) plus Information Technologies (IT)
for **Assets Optimisation and Business Improvement**



**It is necessary to define
a model and architecture for
information integration in real-time.**

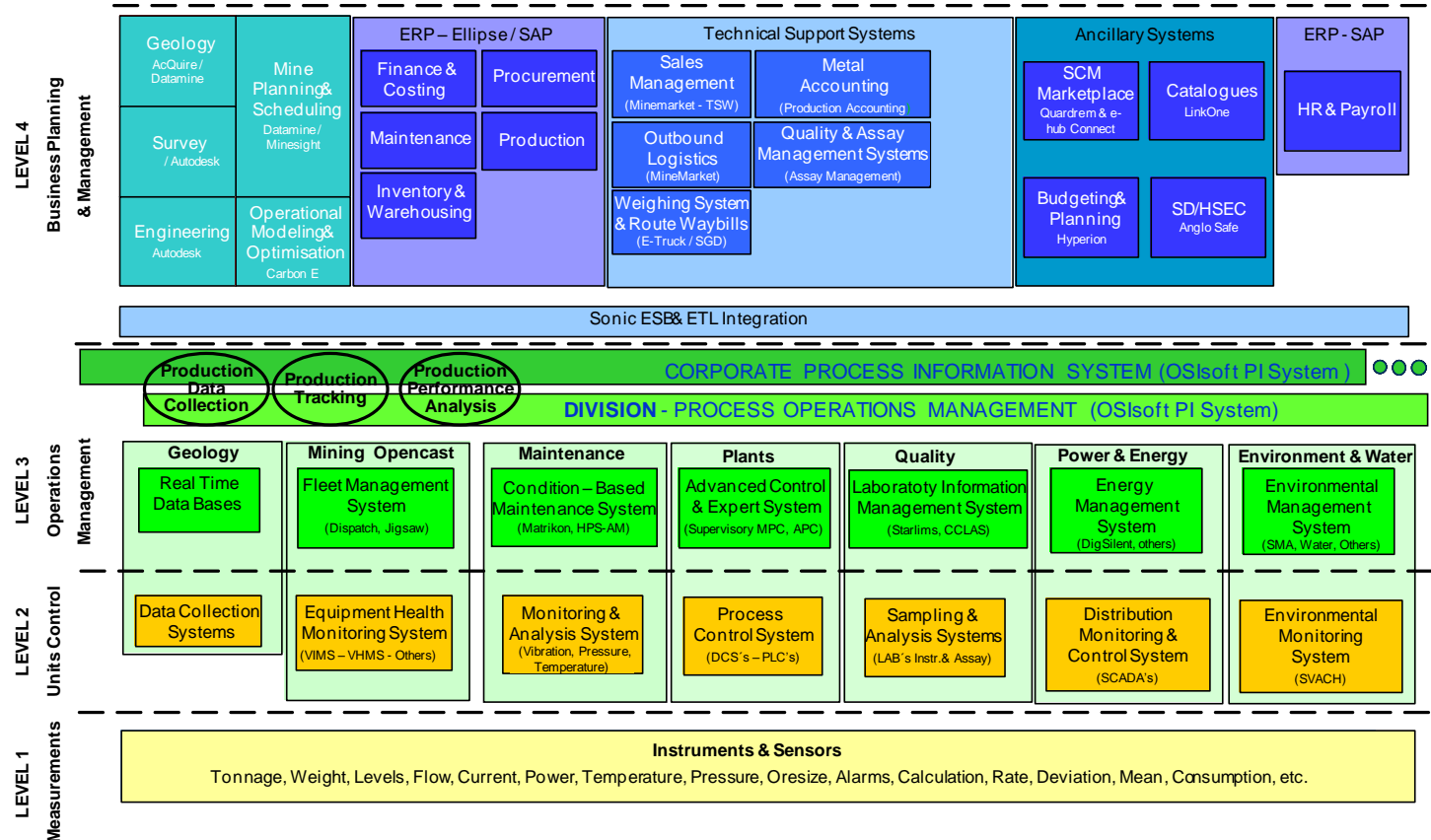
From Data to Information



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Information Integration Model

Based on
ISA S95 &
ISA S88
standards



PI System in AA Copper



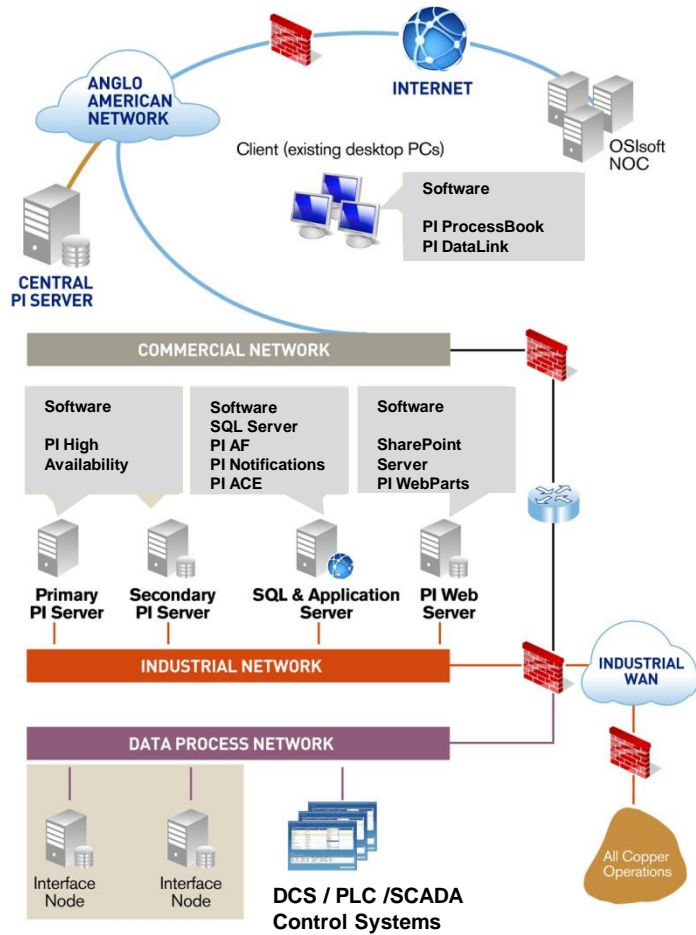
OSIsoft PI System:

- Single platform to **integrate all data** from the Operations Value Chain.
- Enabling infrastructure to develop **value applications** in real-time.

Real-time Operations Management

Project Development (from 2011): Key facts

- Multidisciplinary team:
Owner (PC&A + IM + Operations) + System Integrator (Contac Ingenieros) + OSIsoft.
- Standardized and robust design in H/W & S/W.
- Availability of communications networks ([three tiers architecture](#)):
 - Process networks (Control)
 - Industrial networks (IIT)
 - Commercial network (Corporate)
- Connection to all process & equipment data sources.
- Real-time Data Base (RTDB) modeling **based on assets: PI Asset Framework (PI AF)**.
- **OSIsoft Enterprise Agreement:**
Unlimited licensing, EPM assigned to the Project, CoE consultancy, NOC support



PI System in AA Copper

Three tiers
networks
architecture

Project Development: Original situation in 2010

- **Mantos Blancos:**
No PI System, no IIT network.
- **Mantoverde:**
No PI System, no IIT network.
- **El Soldado:**
Small PI System (2,000 tags), 15 Clients, no IIT network.
- **Chagres Smelter:**
PI System (15,000 tags), 9 Clients, no IIT network.
- **Los Bronces:**
Small PI System, 3 Servers (5,000; 2,000; 2,000 tags), 36 Clients (concurrent), no IIT network.
- **Santiago (Head Offices)**
No PI System, no IIT network.

Project Development: 2011 - 2012

- ✓ Platform (H/W & S/W) procurement, installation and commissioning in all sites except Santiago. Remote software installations from NOC.
- ✓ IIT network engineering, project approval, procurement and start of construction in all sites.
- ✓ PI System database configuration in all sites. **All tags** from Process Control Networks (PLCs, DCSs), Laboratory Systems, SCADAs, other relational databases.
- ✓ **Operational Portals and Reports** in each site. Design, configuration and roll-out by Contac Ingenieros Ltda. (Systems Integrator).

Project Development: 2011 - 2012

- ✓ On-site training for administrators and key users including PI AF.
- ✓ Continuous support from EPM: periodic meetings (weekly status calls).
- ✓ Modeling based on assets using PI AF (design under review).
- ✓ Three Workshops with CoE in Santiago: PI AF, Sustainability (Energy Management), Conditions Based Maintenance (CBM).
- ✓ Platform monitoring services from NOC.
- ✓ Several custom applications developed by users: «*information democracy*».

Project Development: 2013 - 2014

- 2013: start-up of IIT networks in all sites.
- 2014: Corporate PI System (Headquarters).
- Value Applications based in PI AF
 - Local and Global Energy Management System.
 - CBM Center of Excellence.
 - Improved Reportability and Business Intelligence.
- Large-scale training (empowering people).
- Operational Information Delivery (OID) standardized among Copper Operations.

PI System in AA Copper

Economic Benefits (as Project estimation):

- Increase in the availability of processes and equipments: **0.2%**
- Increase in Energy Efficiency: **1%**
- Decrease of Maintenance Costs: **1%**



Other Benefits:

- Process analysis.
- Unique reporting (one version of the truth).
- Lower complexity in applications management.
- Easy access to information.
- Sharing best practices among different operations.
- Value applications development.
- **Key enabler** for Integrated Operations Management Centres (IOMC).



Conclusions

- ✓ Alignment with Company Strategy.
- ✓ It's all about people.
- ✓ Multidisciplinary Project.
- ✓ Broad scope: from technical issues to change management (cultural change).
- ✓ Democracy and standardization of information across processes.
- ✓ OSIsoft EA to keep pace on development, help to define the roadmap and provide the infrastructure: *strategic partner*.

Information for collaboration and decision making.

- ... collaboration and decision making for **Operational Excellence**.
- ... Operational Excellence to be the **Investment of Choice**.
- ... Investment of Choice to be the **Leading Global Mining Company**.

“People making a difference in a Company making a difference”

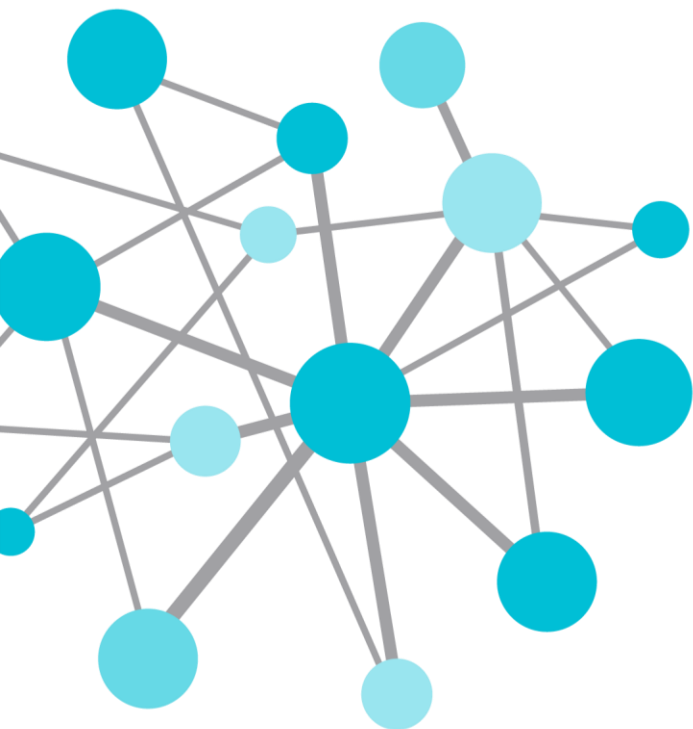
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Manager Process Control

Anglo American Copper

Chile



THANK
YOU

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