Value of information management in a mining operation - experiences of Minera Peñasquito

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GOLDCORP
Minera Peñasquito - Zacatecas

Agenda

- About Goldcorp
- Operational Information System in Peñasquito
- Operations and Maintenance Vision Changes
- Business Challenges
- Developing the Operational PI System Infrastructure
- Conclusions

About Goldcorp

• Goldcorp is a Canadian company headquartered in Vancouver, British Columbia and employs over 19,000 people worldwide.

• The company is one of the world's fastest growing senior gold producers, with operations and development projects located throughout the Americas.

• Goldcorp's operating assets include four (4) mines in Canada, three (3) mines in Mexico, four (4) in Central and South America.

• Goldcorp also has several projects in Ontario, Canada and in Chile (South America) with El Morro project (70% ownership).

GoldCorp - Minera Peñasquito

Peñasquito Mine in facts:

• Peñasquito operations started in 2010, on schedule and budget.
• Is the largest Mexican gold producer; exploiting two pits - Peñasco and Chile Colorado.

| Location	Zacatecas, Mexico	Power demand	147 MW (2014)
Mining type	Open Pit	Milling/Processing capacity	130,000 tpd
Workforce (including contractors)	3,200	2015 gold production estimate	700,000 - 750,000oz
Estimated mine life (reserves)	13 years	(Full-year 2014 gold production totaled 567,800 ounces, plus Silver, lead and Zinc).	
Processing method	Grinding and Flotation		

• Currently, Peñasquito is conducting a set of pre-feasibility studies for the "Concentrate Enrichment Process" and the "Pyrite Leach Process", both projects planned to be in operation in early 2016.

Source: http://www.goldcorp.com

Operational Information System in Peñasquito

- **Duplicated control systems** running in parallel, including two embedded historians, each one storing different information ...

- **Limited access** to production and operations data ...

- **Data stored in different and isolated systems** (Lims, Balance & Reconciliation, downtime, meteorological) ...

- **Production Reports** information is gathered, processed and distributed manually ...

- **Information delivery to plant floor,** utilized applications running on specific hardware to show process data ...

In general, the control and process information system was configured as a very closed system, complex to manage and not well aligned with the operational requirements and its necessities.
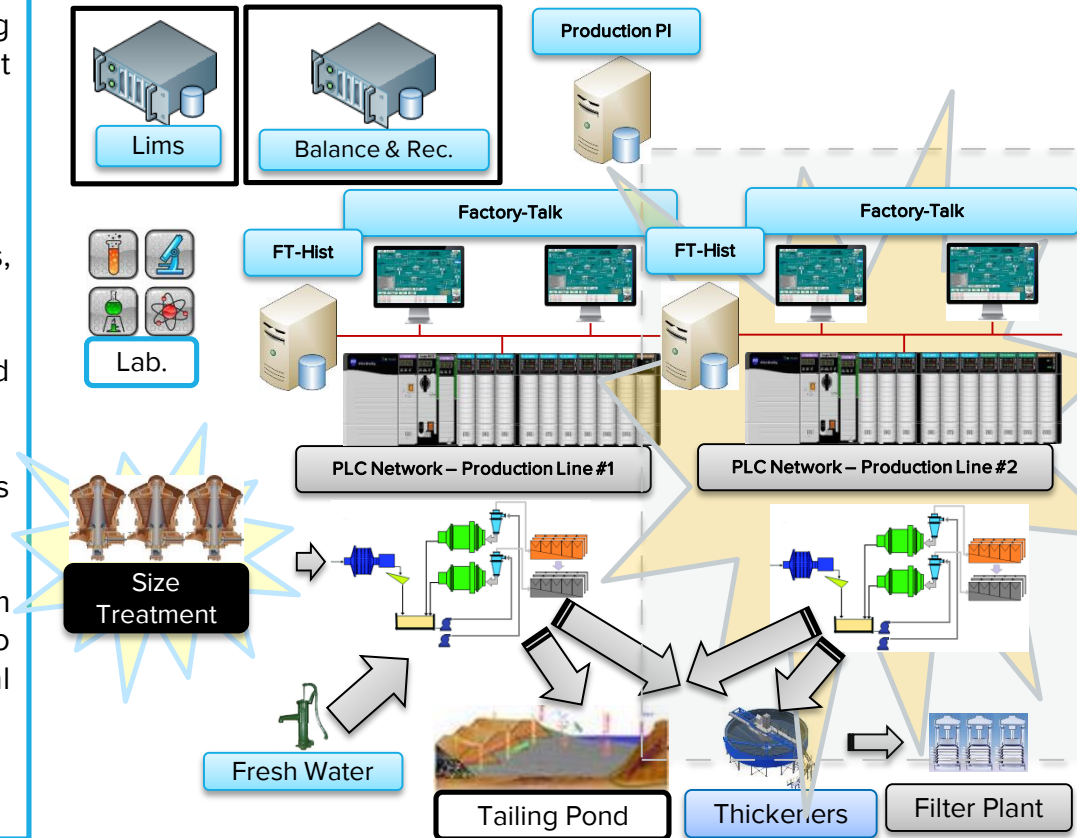
Operations and Maintenance Vision Changes

- In Peñasquito the operation and maintenance is evolving to a more efficient scheme.
    - **Maintenance is not only about preserving physical assets** ➜ is about preserving the functions for an efficient and safe operation process.

    - **Preventive/Predictive over Corrective Maintenance** ➜ is not only preventing failures, is about avoiding, reducing or eliminating the failure consequences to ensure an economical, safe & reliable plant operations.

    - **Operations & Maintenance affects all aspects of business effectiveness** and risk–safety.

    - **Operational reliability** at minimum cost + environmental integrity + energy efficiency + product quality, not just plant availability and cost.

    - **Move the attention point from Corrective maintenance to Preventive and Predictive** ➜ use of information to refresh the problem analysis and change the way people think to prevent the process and equipment's failures.

    - **Condition based monitoring based on the "time to failure".**

Operation and Maintenance information

Operations

- Metrics to control an efficient, safe and reliable production operation.
- Evaluate production variables and equipment status and performance.
- Resources, inventory and personnel.

Maintenance

- Optimum performance and reliability → Preventive Maintenance.
- Condition monitoring and trends over critical variables.
- Maintenance resources and spares.

Engineering

- System and equipment modifications to avoid process constrains (bottlenecks).
- Evaluate continuous system and equipment performance.
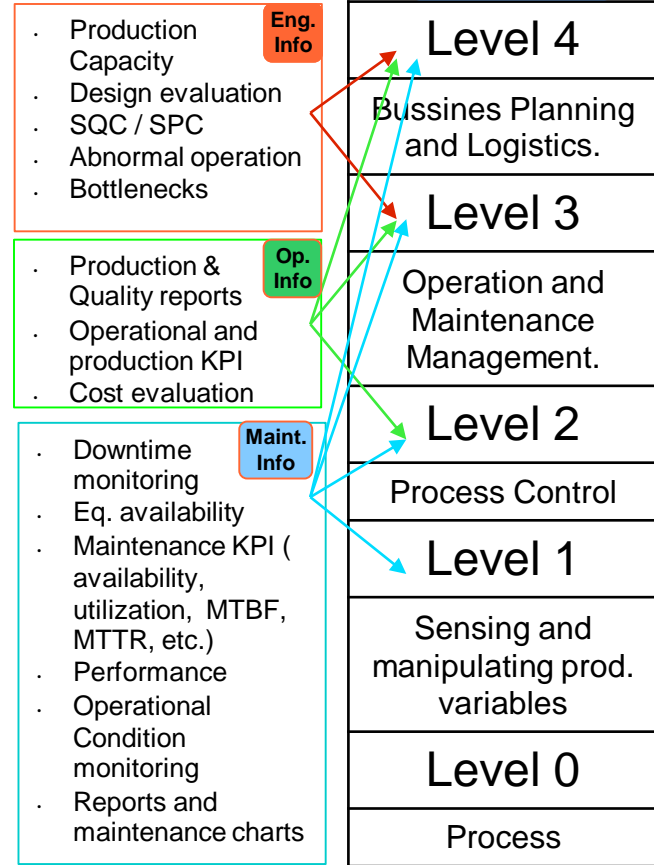- System and equipment safe operation.

Training

O&M Information System

- Collecting and maintaining production data.
- Must work with real time and historical
  - Production data
  - Parametric data
  - Equipment statuses
- Integrate Quality data (lab tests, stream analyzers).
- Integrate Off-Line analysis tools.
- Easy to use tools for information access and data distribution.
- Integration to corporate information systems.
- Reliable, modular, interoperable, correctness …

Eng. Info
- Production Capacity
- Design evaluation
- SQC / SPC
- Abnormal operation
- Bottlenecks

Op. Info
- Production & Quality reports
- Operational and production KPI
- Cost evaluation

Maint. Info
- Downtime monitoring
- Eq. availability
- Maintenance KPI (availability, utilization, MTBF, MTTR, etc.)
- Performance
- Operational Condition monitoring
- Reports and maintenance charts

Functional Hierarchy

| Level 4 |
| Bussines Planning and Logistics. |
| Level 3 |
| Operation and Maintenance Management. |
| Level 2 |
| Process Control |
| Level 1 |
| Sensing and manipulating prod. variables |
| Level 0 |
| Process |

Challenges ...

Original Operation Information System...

- Key operational data in different and not interconnected systems

- Manually gathered data and time demanding process

- More than one TAGs identification systems

- Lack of consistency in metric calculations (several Excel Spreadsheets)

- Data is not readily auditable

- Information distribution (diffusion) complex and hard to support and manage

... must evolve to ...

New operational requirements...

- ✓ One data source using simplified identification and access of process TAGs

- ✓ Automate report generation

- ✓ Standardize and centralize metrics and formulas computation

- ✓ Improve visibility and accessibility to operational data

- ✓ Interoperability to integrate production and equipment usage data to corporate information systems (ERP, ScoreCard, WEB Pages, etc.)

Developing the Operational PI System Infrastructure...

• **Create a team:** the control system team was created to develop and support the Control System and PI System Infrastructure.

• **Training**: the team training was a key activity to refresh and update the knowledge in PI System's tools, also to create the sense of teamwork.

• **Update / Complete the platform**
  – Reactivate the SRP (Software Reliance Program)
  – Update PI System Infrastructure to the latest version
  – PI System products were available in Peñasquito from the start-up phase – but not completely used.

Developing the Operational PI System Infrastructure… (cont.)

- ## One official data Source:

  – Data consolidation, integrating and synchronizing two **Embedded Historians** available in process plant (FT Historians), in a single Production-PI, exposing the process information to the organization..

  – Chemical and Metallurgical Laboratory system LIMS is integrated to PI using **RDBMS.** The "Metallurgical Balance & Reconciliation" software is also integrated to the Production PI Server.

  – Mine and Plant data integration is done using **RDBMS** that moves data from the Production PI to a Mine SQL-Server (and vice-versa) used by the Mine Dispatch system.
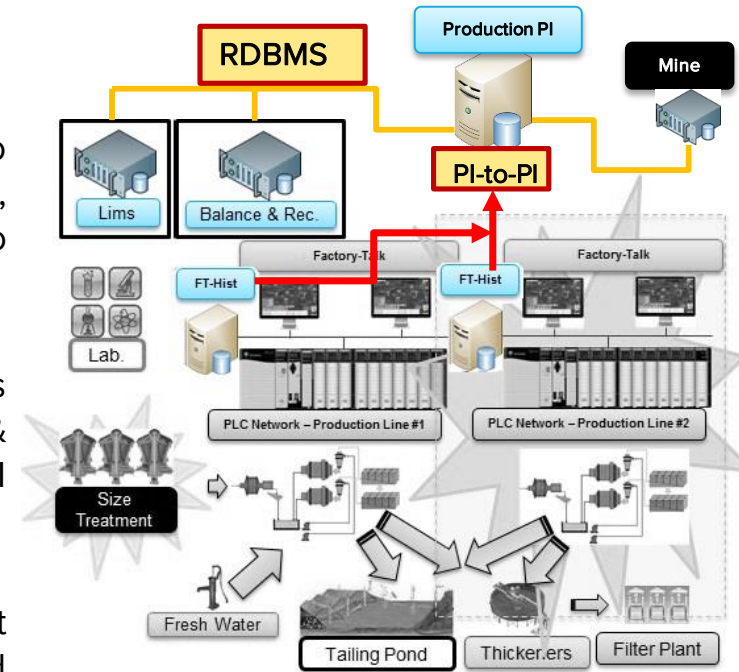
Developing the Operational PI System Infrastructure (cont.)

- **Asset Framework (AF)**, this powerful tool helps us with the following issues:

  – **TAG name standardization**, facilitating the access to data to planners, operators, maintainers, supervisors.

  – **Ease access to plant information**, the process is organized in a tree with assets grouped by areas, that uses templates to ensures a consistent set of attributes for each equipment type, offering an easy way to look for and select the right information.

  – **Standardized calculations** using scheduled models to fill the everyday report (plus 800 equations).

  – **Easy access to historical or calculated** data using Excel or ProcessBook

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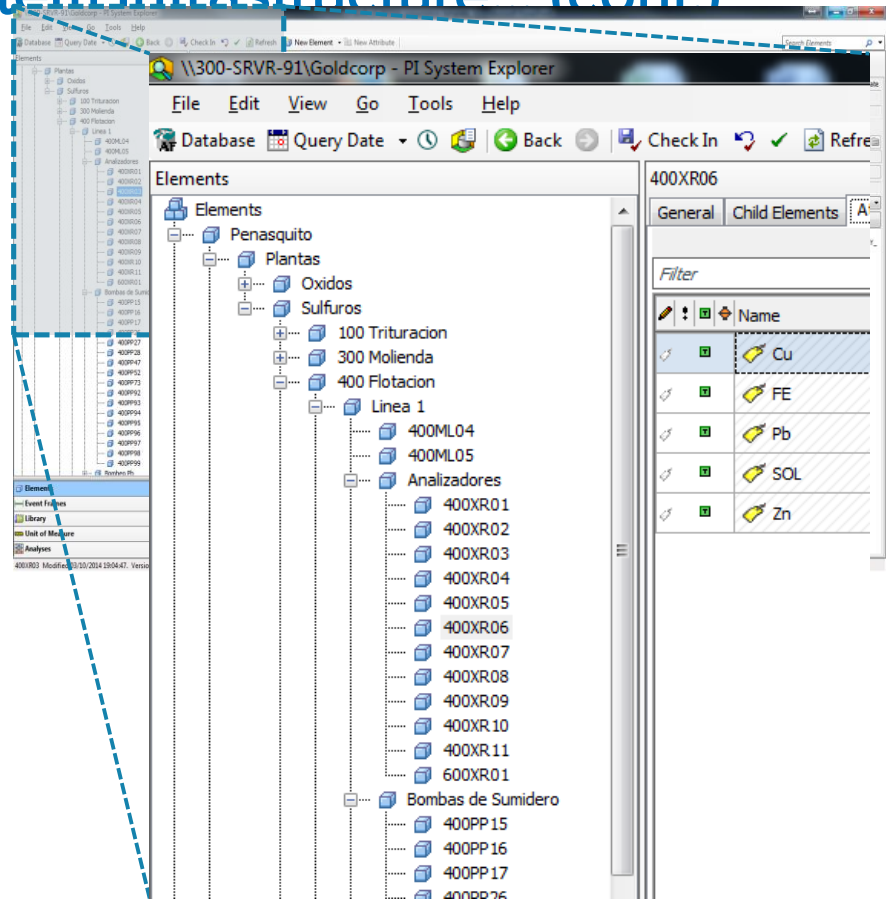
Developing the Operational PI System Infrastructure... (cont.)

- Accessibility and visualization of operational and production data:
- PI Datalink
  - PI DataLink facilitate end-user data access to the Production-PI to compute basic statistics and trends, using Excel facilitating offline analysis, with none o low training using a tools which they normally use.
  - Operator and maintenance users can easily predefine templates that automate the data access, calculations and displays for repetitive work.
  - Increase and facilitate the dissemination and use of information along the organization and departments (Operations, Maintenance, Metallurgy, etc.).

- PI ProcessBook
  - Our insignia tool to create and show up dynamic displays with online data, using an easy, flexible and powerful development environment.
  - Integration to PI Coresight facilitates the access to trends and dynamic displays using standard WEB browsers from anywhere inside the company, reducing and standardize mechanisms to visualize production information just using the tools available in any computer.

- PI Coresight
  - It has been accepted as the Facto tools for quick analysis of process variable behavior, widely used in meetings and operational / maintenance presentations.

Developing the Operational PI System Infrastructure... (cont.)

Corporate interoperability:

- Using standard interfaces provided by the PI System Infrastructure is easy to share data with ERP (SAP) and other systems.

- ERP can get information automatically from the same data source used in the operations, eliminating duplicated data and the effort to update information manually.

- Using standard interfaces and a unique source of data, the ability to evaluate and shoot maintenance plans based on operating conditions is enhanced.

- All the corporate information systems see the same information available in the site.

Summary

Weakness	Successes

Weakness

- Weak integration of control and process information.
- Coordination between Operations and Maintenance was (still is) strongly oriented to the equipment failure.
- Deep obsolescence of information systems and process control systems.
- Several operational silos need to work together.
- Weak utilization and poor quality of available operational information.
- The production information does not generate action plans involving the operation or maintenance.

Successes

- Consolidation of the control system and process team.
- Consolidation of multiple production data sources in a Single PI System, called "Production-PI"
- Consolidation and automation of report generation from a single Source (PI-AF).
- Great improvement in production information visibility and accessibility.
- Wide end user acceptance of new tools to access operational information from the operation team, maintenance, metallurgy and process control.
- Operational information is being used to generate action plans and support the decision making process & maintenance operations.

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Questions

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

State your
name & company