An OSIsoft EA For Barrick Gold Money Well Spent?

Iain Allen, Senior Manager, Digital Mining

October 4th, 2016

Agenda

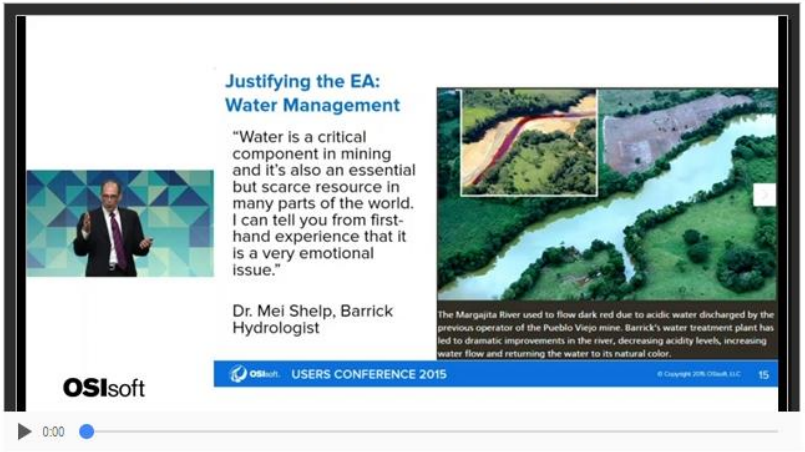
- The gold mining industry and Barrick Gold
- Why did we want an EA
- The Digitization of Barrick and the PI System
- How PI is integral to the Digitization evolution at Barrick
- Conclusion

The Barrick EA – The Full Story

PRESENTATION

2015 - Users Conference - San Francisco

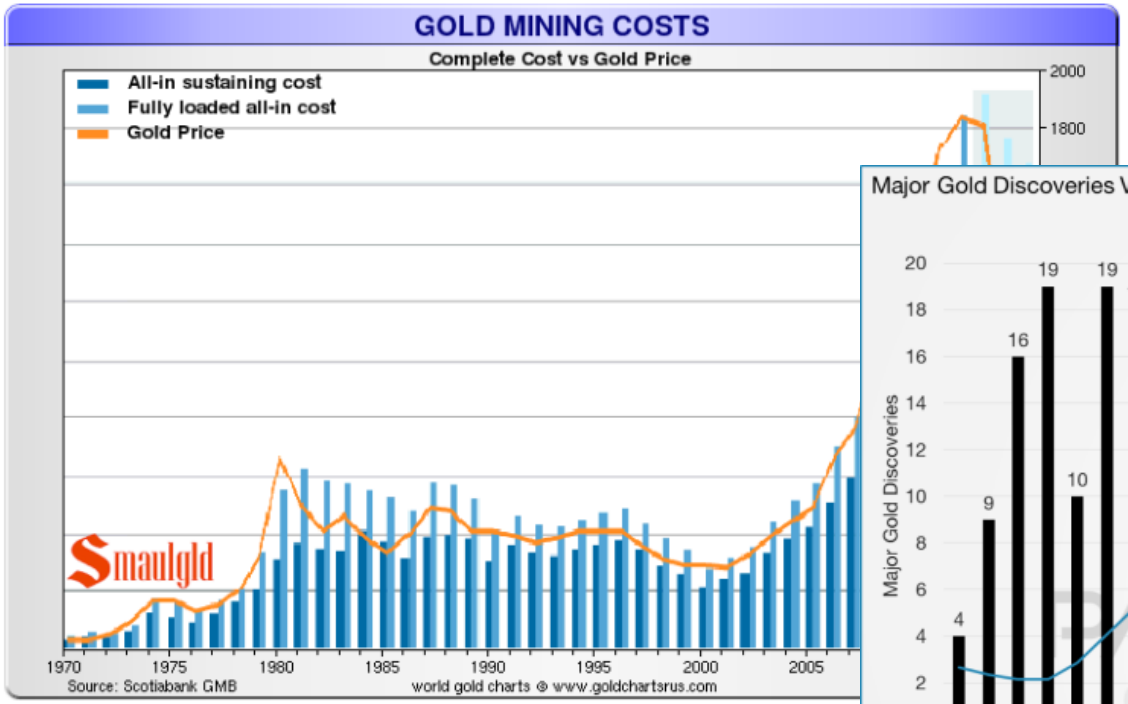
An Enterprise Agreement (EA) For Barrick Gold: Timing Is Everything



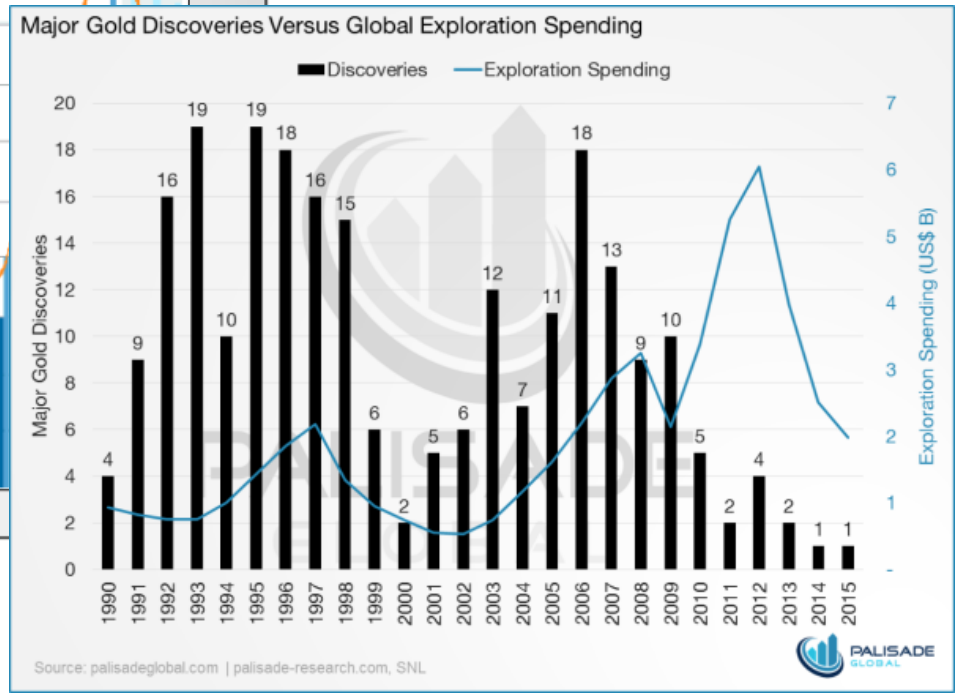
Barrick Gold recently signed an Enterprise Agreement (EA) with OSIsoft for the PI System real-time data infrastructure. In this talk Mr. Allen will briefly review the gold mining industry, currently undergoing a major downturn, and show how the downturn is affecting Barrick Gold. He will discuss the need for an EA within Barrick and how it was justified and approved, despite being a significant unbudgeted item requested at the end of the fiscal year in a period of fiscal austerity. The rest of the talk will describe plans to use the EA, covering Training, Infrastructure deployment, Energy and Water management, Process Plant optimization, and mobile equipment.

Download Presentation

The Gold Mining Business

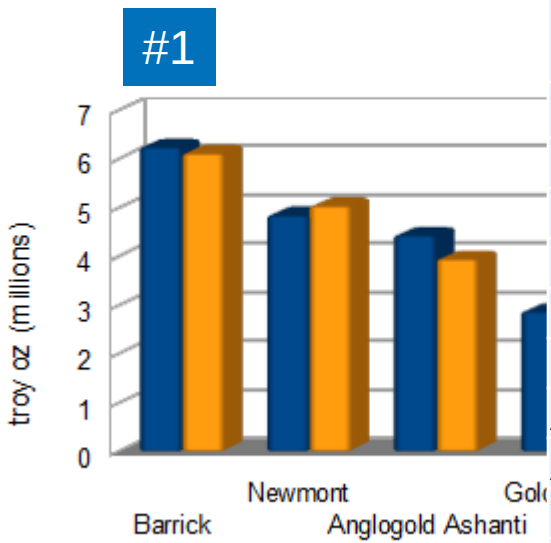


Less and less bang
for the Exploration buck!



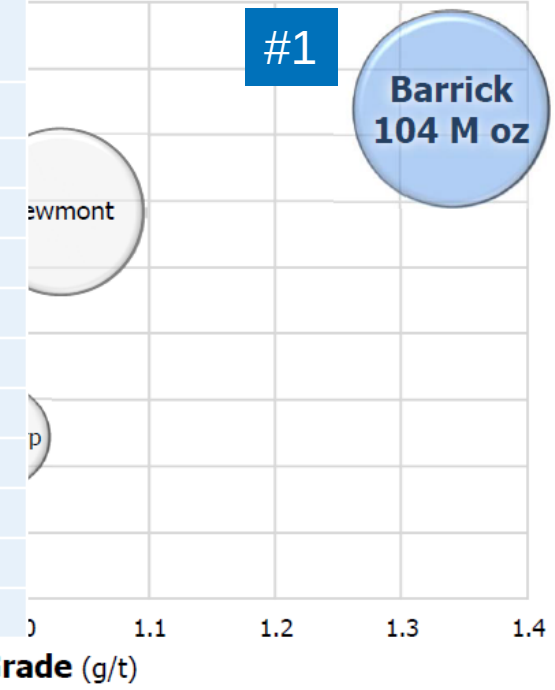
Tough and getting tougher
Cost control is paramount

Barrick in the Gold Mining Business



Company	Market Cap (US$Bn)	
	2015	2014
Barrick	21.26	15.7
Newmont	20.09	14
Goldcorp	14.02	13.19
Polyus	13.65	8.79
Newcrest	12.93	9.93
Agnico	11.99	7.93
Anglogold Ashanti	6.4	5.58
Yamana	3.94	2.91
Gold Fields	3.82	3.25
Eldorado	2.73	2.25

#1



(1) Source: Company filings. See final slide #4.

Why an EA for Barrick?

OSIsoft Learning

Cart (Empty)

click cart to proceed to checkout

My Registration

Things to Do

- Where Do I Sta
- Schedules by L
- Browse the Co
- Ask a Questior
- Check Out the FAQ Page

Center of Excellence

The OSIsoft Center of Exc
created to provide strateg
Enterprise Agreement (EA
advantage of the PI Syste
throughout their organiza
side by side with your sta
company road map targe
establishing the groundw

Operational Intelligence > Solutions > Industry Solutions > **Metals, Mining & Metallurgy**

Expected EA Benefits

Training Progress

Extra vouchers for On line training

Voucher usage: 178 / 172

106% ✓

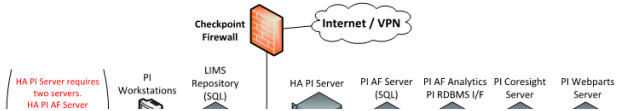
FS Jobs: 32 Services

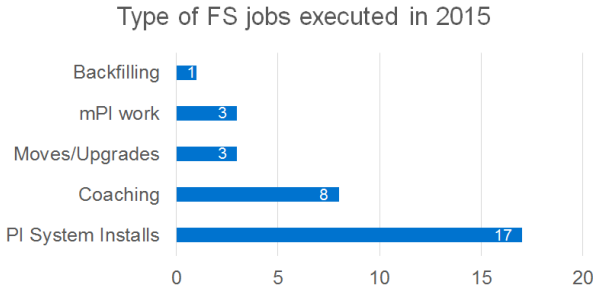
34 Weeks of Field Service

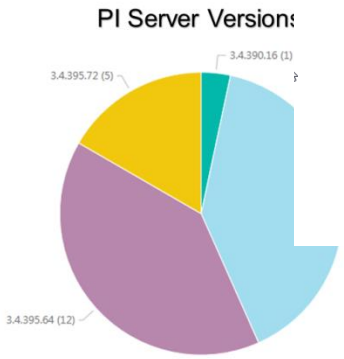
mPI Inventory

- ✓ PI S
- ✓ PI A
- ✓ 4 R
- ✓ 6 O

Barrick Gold IT/OT (Process) Network – High Availability PI Configuration







PI Servers Monitored 30

Coaching
•IT Monitoring •RDBMS interface •LoggerNet •PI Manual Logger •PI Notifications

PI System Installs
•PI System was Installed on all sites under the EA •2 on-site visits (Goldstrike and Cortez)

mPI
•All sites monitored in mPI •Pilot project for un-attended remote access in Pierina

PI Interfaces nodes 34

PI Interfaces Instances Monitored 101

		NOC Monitored	PI System Version
		✓	2012
		✓	2015 R2
		✓	2012
		✓	2012
		✓	2015
		✓	2012
✓	✓	✓	2015
✓	✓	✓	2012
✓	✓	✓✓	2015
✗	✓	-	2015 R2
✗	✓	-	2015 R2

Unexpected EA Benefits

"Mining needs to reinvent itself. The only way companies will cut costs and increase efficiency will be to embed digital technologies in every dimension of how mines are operated and managed."

John L. Thornton, Executive Chairman, Barrick Gold

John Chambers, Executive Chairman, Cisco

Why Digitize? To Be Gold Price Agnostic

"Our aspiration is to achieve **A**ll-**I**n **S**ustaining **C**osts (AISC) **below $700** per ounce by 2019."

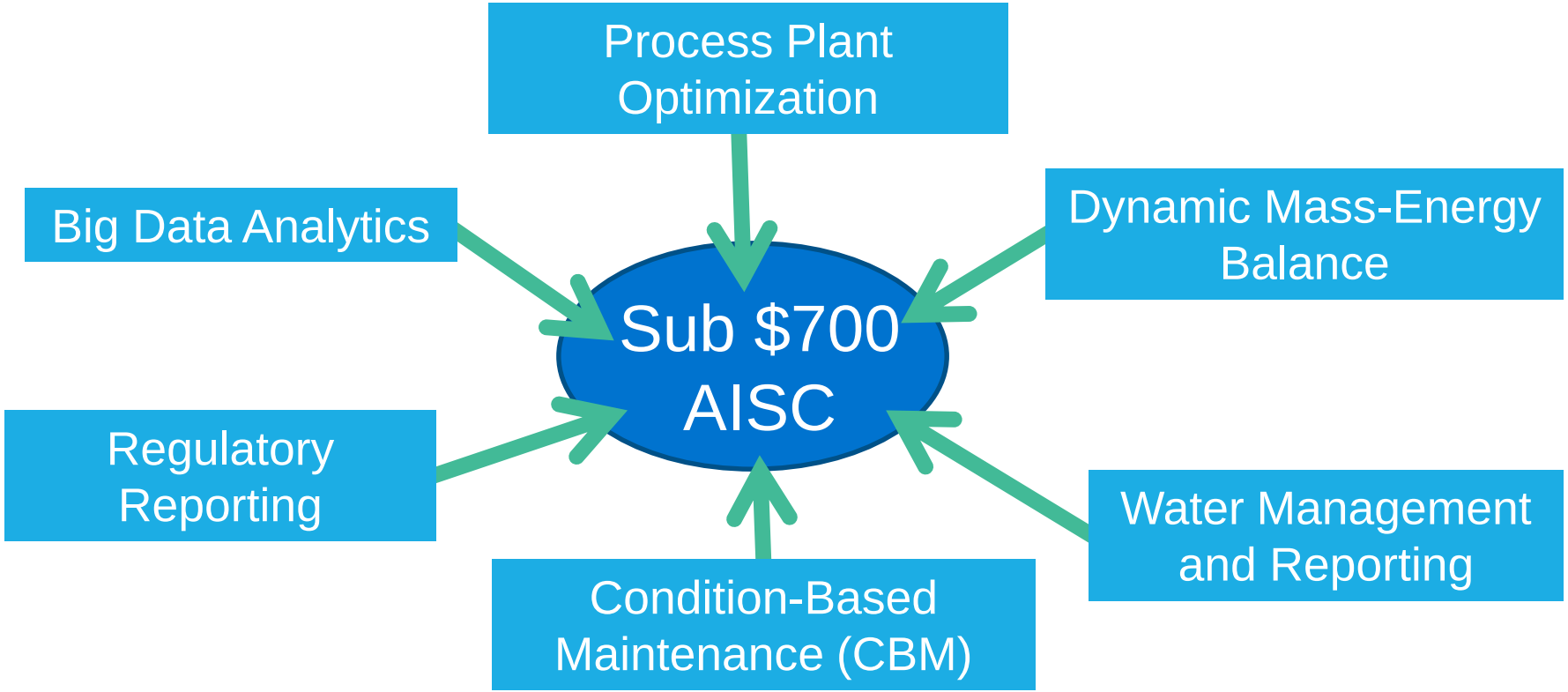
2013	
Actual	$915

2014	
Guidance	920-980

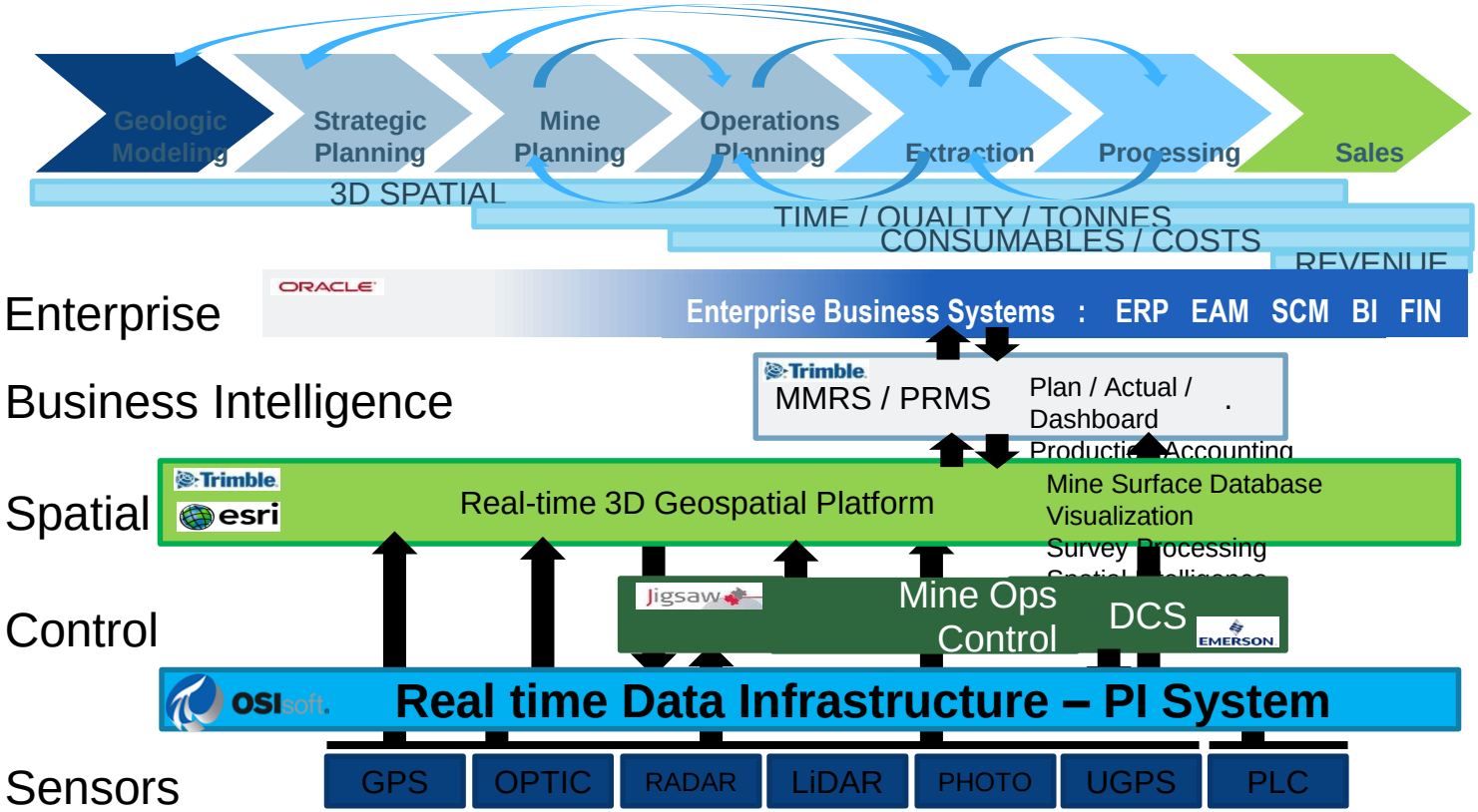
2015	
Guidance	830-860

The Law of Diminishing Returns

The Digitization of Barrick



Digital Architecture

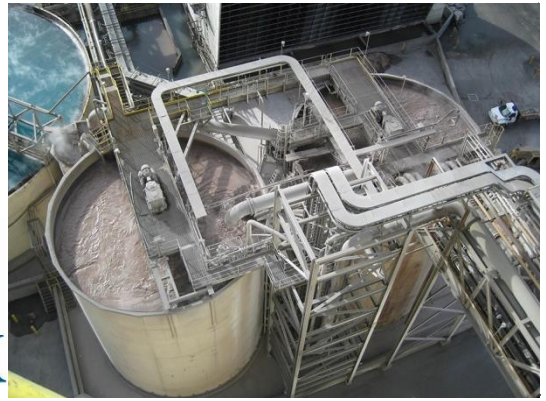


Process Plant Optimization - Goldstrike Mine

COMPANY and GOAL

Barrick Goldstrike Mine produces roughly 1.2M ounces of gold annually, and needs to comply with strict environmental operating permits.

BARRICK



CHALLENGE

Deviations were not being identified by operators and thus were not being reported

- Operators were required to learn how to operate and maintain many new pieces of equipment in a new and complex large-scale capital project that was installed.

SOLUTION

Environmental monitoring points connected to a PI System with real-time data displayed on dashboards and being analyzed via PI AF.

- PI AF analysis along with Notifications were used to identify deviations and email responsible parties

RESULTS

Total number of environmental deviations decreased by 45%

Total fan trips reduced 61%

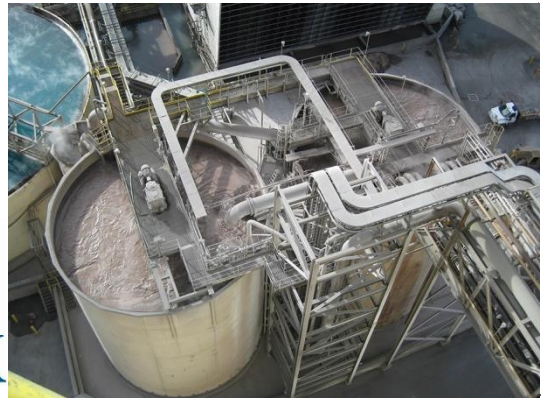
- Reduced the time to identify, react, and correct deviations
- Increased reporting standards
- Ensured License to Operate

Operational Excellence with the PI System at Barrick Gold

COMPANY and GOAL

Barrick Pueblo Viejo needed to reduce time spent manually preparing reports, improve their quality and improve tracking of batch processes

BARRICK



CHALLENGE

Gold recovery is a batch process that was tracked and reviewed manually

- Data entry was manual – paper forms keypunched into Excel. Errors were common.

SOLUTION

Use the Asset Framework to build a robust, scalable reporting tool that creates automatic batch reports

- Reports are generated and updated with a single click.

RESULTS

85% reduction in reporting time.

Easy comparison of different batches

- Report preparation in 4.5 minutes versus 30 minutes.
- Manual data entry errors eliminated

Dynamic Mass-Energy Balance – Cortez Mine

By Business Unit Summa	Electricity (kWh)		Electricity (GJ)		Electricity (%)	
Month	Aug-15	Sep-15	Aug-15	Sep-15	Aug-15	Sep-15
Open Pit	10,758,701	9,922,016	38,731	35,719	48%	47%
Underground	4,410,709	4,187,557	15,879	15,075	20%	20%
Surface Processes	7,243,968	6,799,832	26,078	24,479	32%	33%
Total	**22,413,378**	**20,909,405**	**80,688**	**75,274**	**100%**	**100%**

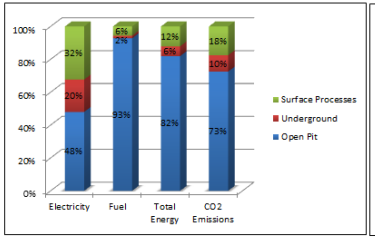
By Business Unit Summa	Fuel (GJ)		Fuel (%)	
Month	Aug-15	Sep-15	Aug-15	Sep-15
Open Pit	234,798	217,779	93%	92%
Underground	3,948	4,198	2%	2%
Surface Processes	14,263	14,754	6%	6%
Total	**253,009**	**236,732**	**100%**	**100%**

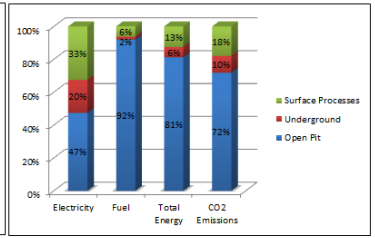
By Business Unit Summa	All Energy (GJ)		All Energy (%)	
Month	Aug-15	Sep-15	Aug-15	Sep-15
Open Pit	273,529	253,499	82%	81%
Underground	19,827	19,273	6%	6%
Surface Processes	40,341	39,233	12%	13%
Total	**333,697**	**312,005**	**100%**	**100%**

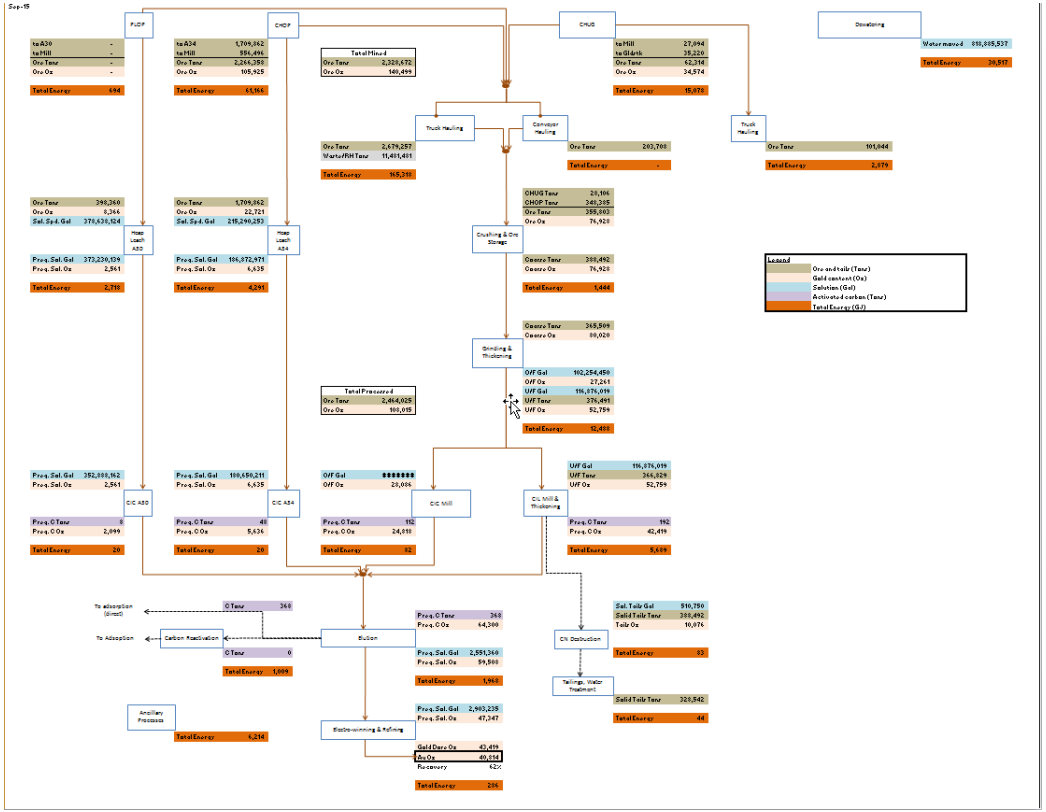
By Business Unit Summa	CO2 emissions Total (t CO2-e		CO2 emissions (%)		CO2 emissions Elec (t CO2-e		CO2 emissions Fuel (t CO2-e	
Month	Aug-15	Sep-15	Aug-15	Sep-15	Aug-15	Sep-15	Aug-15	Sep-15
Open Pit	23,992	22,153	73%	72%	7,266	6,701	16,726	15,451
Underground	3,289	3,156	10%	10%	2,979	2,828	310	328
Surface Processes	5,808	5,523	18%	18%	4,893	4,593	915	930
Total	**33,089**	**30,832**	**100%**	**100%**	**15,138**	**14,122**	**17,951**	**16,710**

Aug-15	Electricity	Fuel	Total Energy	CO2 Emissions
Open Pit	48%	93%	82%	73%
Underground	20%	2%	6%	10%
Surface Processes	32%	6%	12%	18%

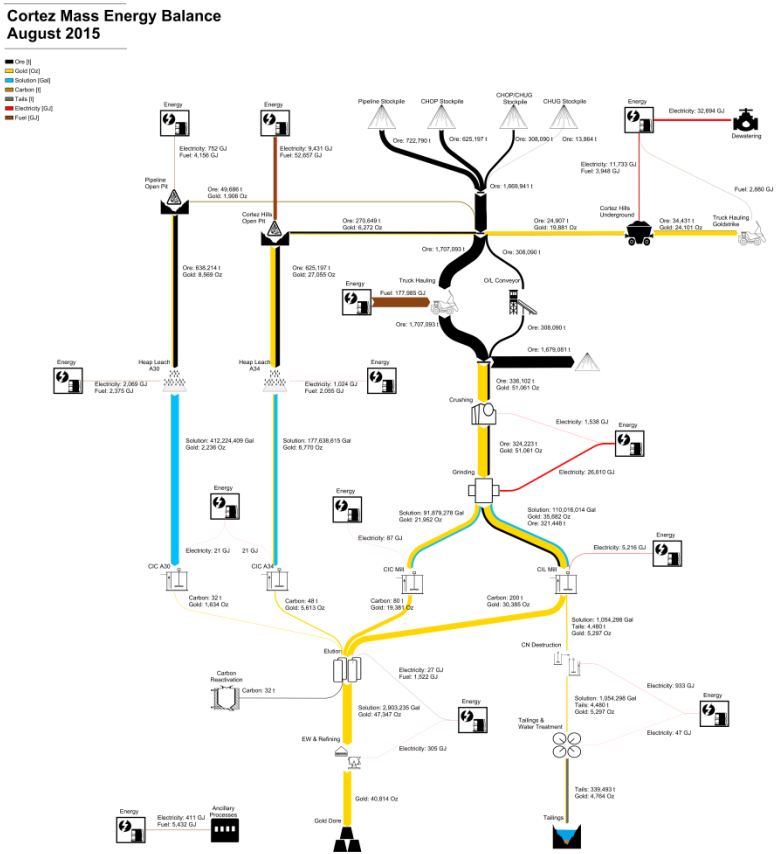
Aug-15	Electricity	Fuel	Total Energy	CO2 Emissions
Open Pit	47%	92%	81%	72%
Underground	20%	2%	6%	10%
Surface Processes	33%	6%	13%	18%



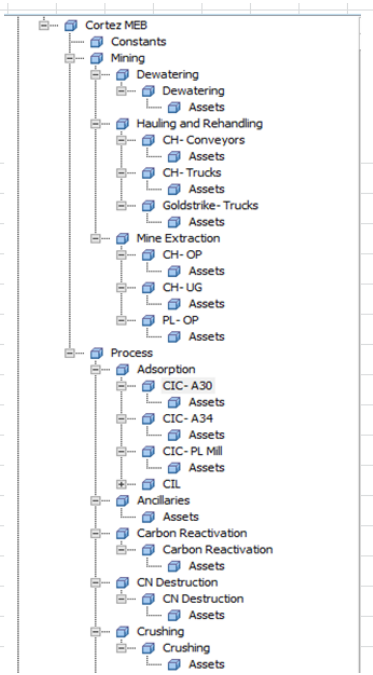




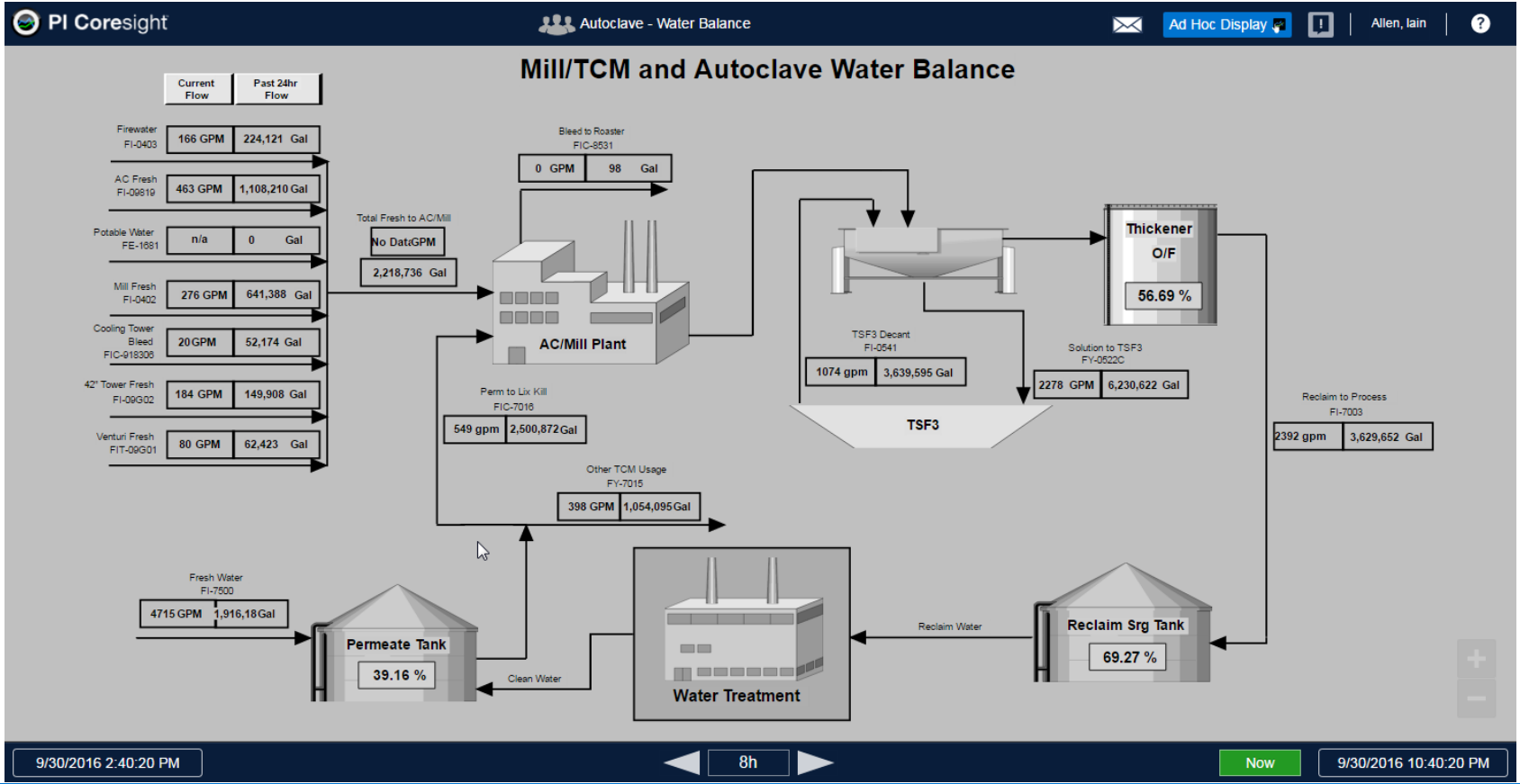
Dynamic Mass-Energy Balance – Cortez Mine



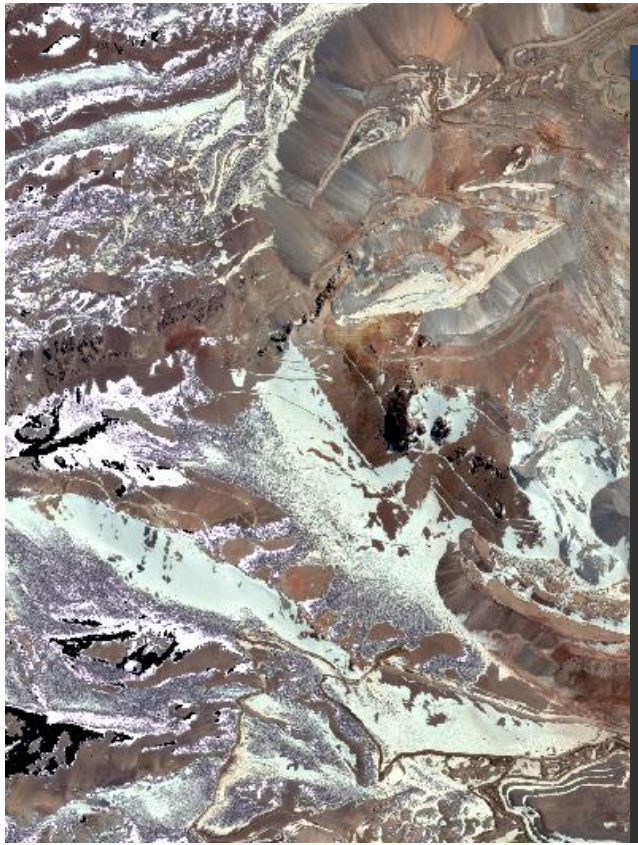
Parent Element (Site Name)	Level 1 Child element (Process/ Mining)	Level 2 Child element (Functional Level)	Level 3 Child element (Process Modules Instance)	Level 4 Child element (Assets)
			CH- OP	Assets
		Mine Extraction	CH- UG	Assets
			PL- OP	Assets
	Mining	Dewatering	Dewatering	Assets
			CH- Conveyors	Assets
		Hauling and Rehandling	Cortez Trucks	Assets
			Goldstrike Trucks	Assets
			CIL- PL Mill	Assets

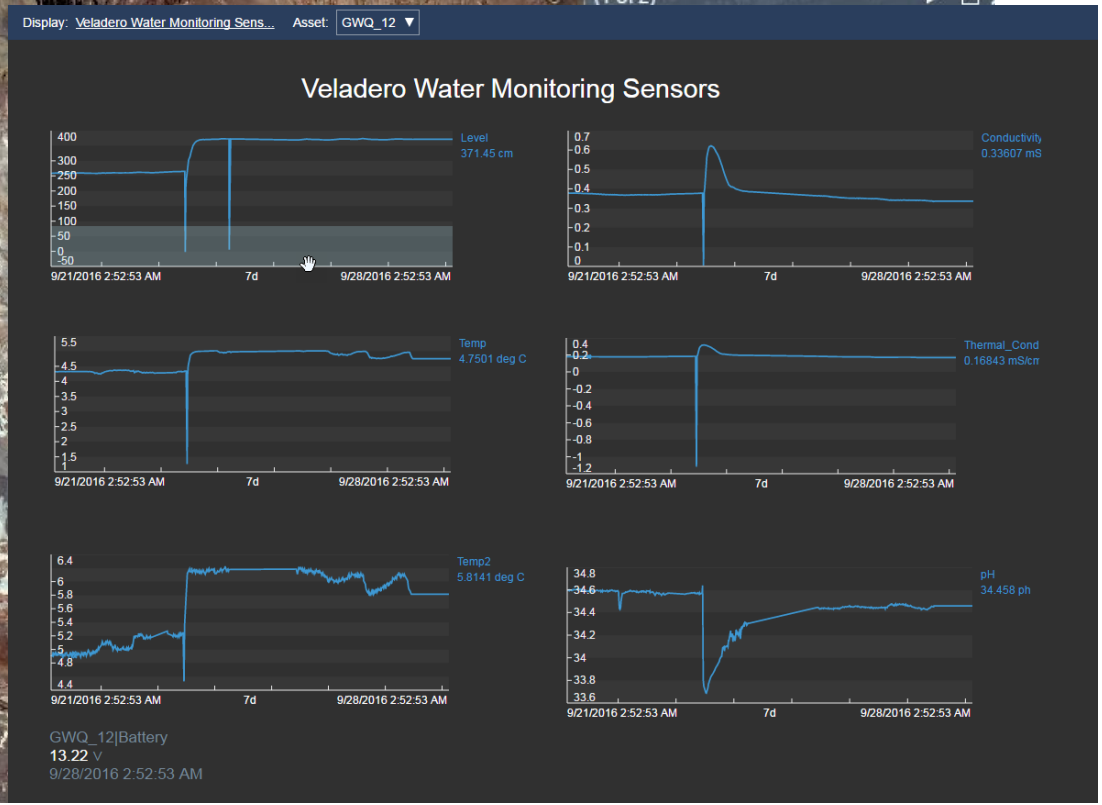


Water Management and Reporting – TCM Plant Water Balance

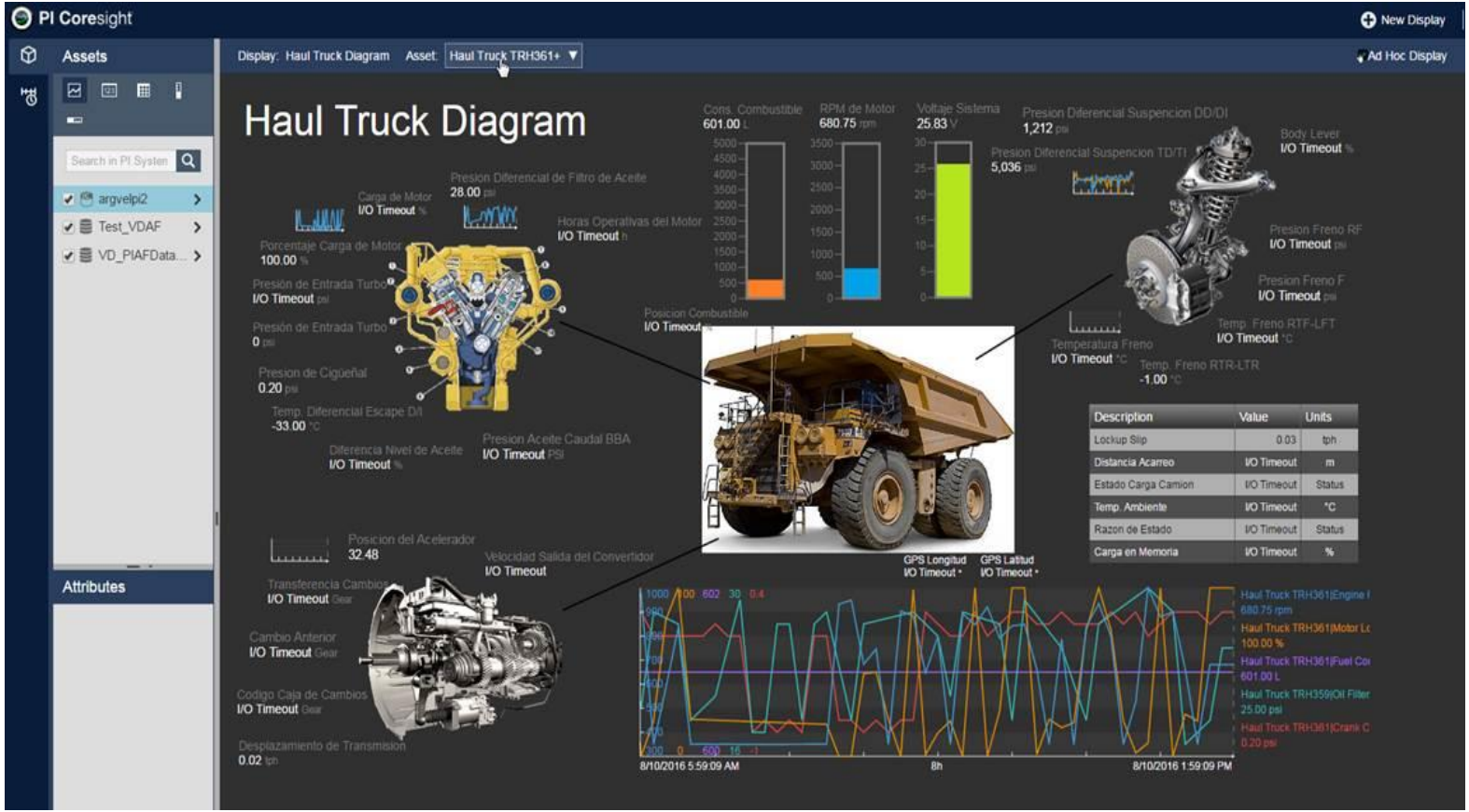


Water Management and Reporting Real-time Data on Web Maps

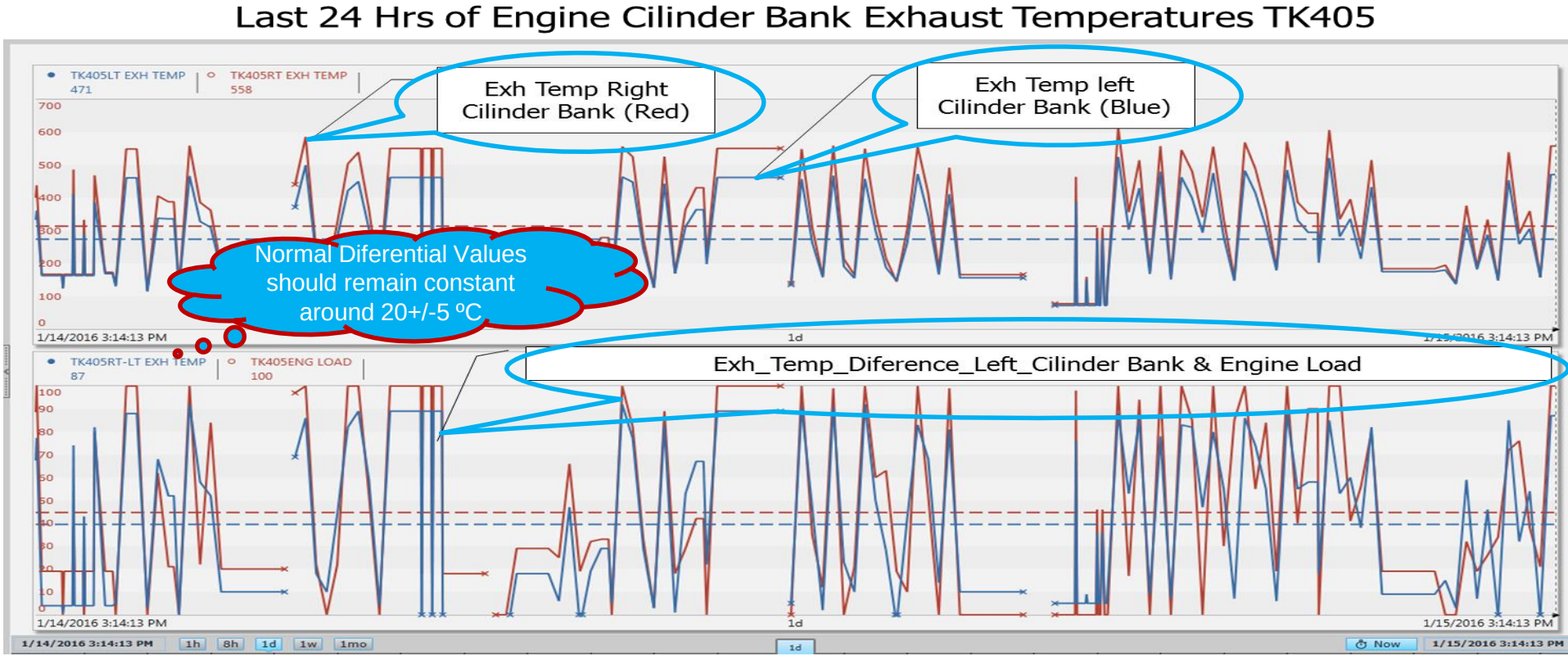




Condition-Based Maintenance – Haul Trucks



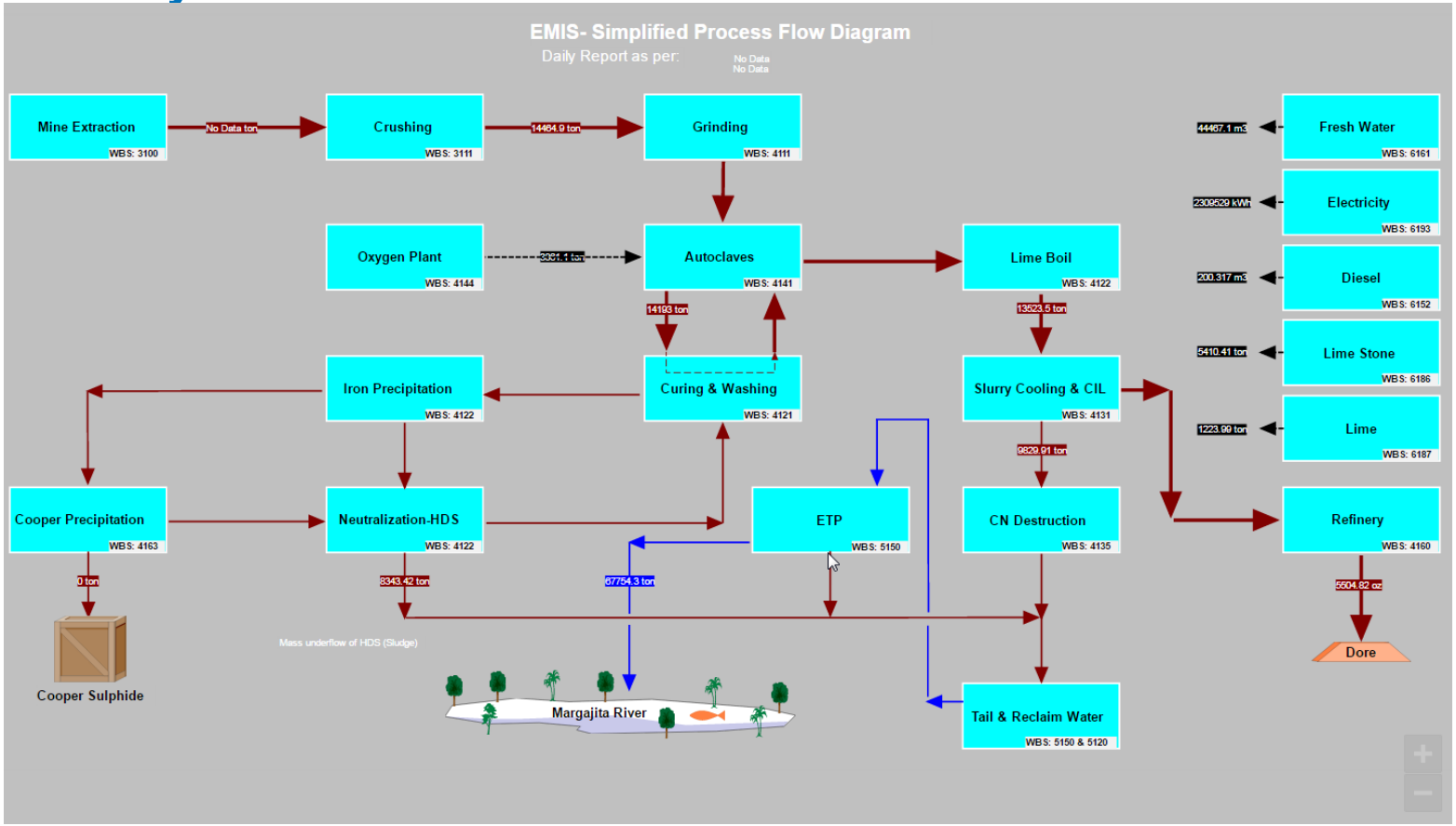
Example Using Jigsaw-Jhealth and PI CoreSight



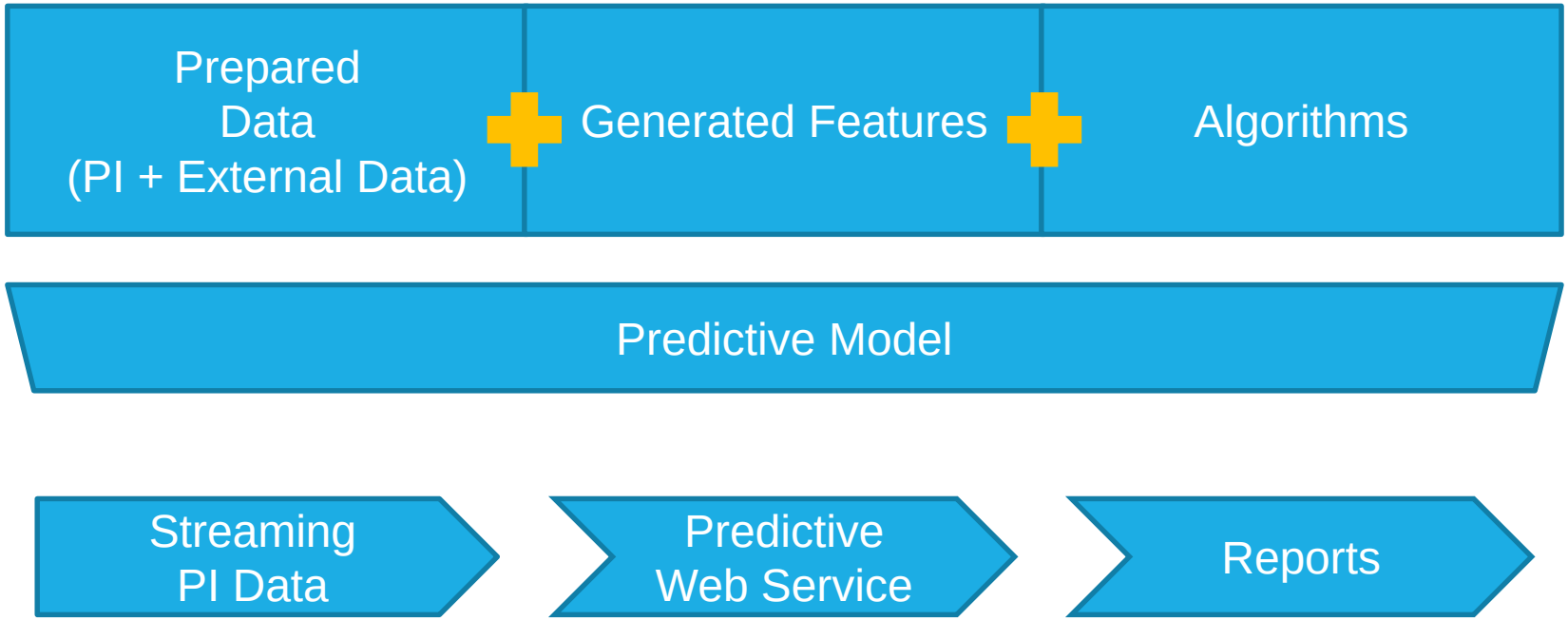
Regulatory Reporting – Air Quality

- Mill PI Calculations Spreadsheet
- **Copy and Paste** the most recent month's Mill PI Calculations Spreadsheet and **rename** to current month, make sure to **keep same naming convention.**
- Open the current Mill PI Calculations Spreadsheet and **enable macros**.
- Start with the S1 Loading tab. Work through each tab following the specific instructions on each of the pages.
  - Mill PI Calculations Spreadsheet Notes
- **Double check dates** to make sure they are for the correct month.
- If there are any highlighted cells from the previous month, **change back to original formulas.**
- If **any cells are changed highlight them** so they can be recognizable for the next month.
- **Save updates frequently**.

Big Data Analytics – Microsoft Power BI



Big Data Analytics – Machine Learning



Big Data Analytics – IBM's Watson

An OSIsoft EA For Barrick Gold Money Well Spent?

COMPANY and GOAL

Barrick, the world's largest gold mining company, has embarked on a concentrated digitization effort that depends heavily on the PI System for data collection and management.

BARRICK

CHALLENGE

Through Digitization, reduce the AISC from $830/oz to below $700/oz by 2019

- Digitize the company
- One source of the truth
- Reliable roll up reporting

SOLUTION

The EA with OSIsoft provided the knowledge, software and services to support the Digitization goal

- The Asset Framework will play a key roll in all reporting
- Real-time data provided by the PI system facilitates rapid decision-making and optimization

RESULTS

Real time data is improving decision making, reporting has been streamlined, we will have one source of the truth

- Processes have been optimized
- Water management is improving
- Real time data has facilitated faster, better decisions.

An OSIsoft EA For Barrick Gold Money Well Spent!

Presented by **Iain Allen, Senior Manager, Digital Mining, Barrick Gold**

BARRICK

Contact Information

Iain Allen
iallen@barrick.com
Senior Manager, Digital Mining
Barrick Gold Corporation

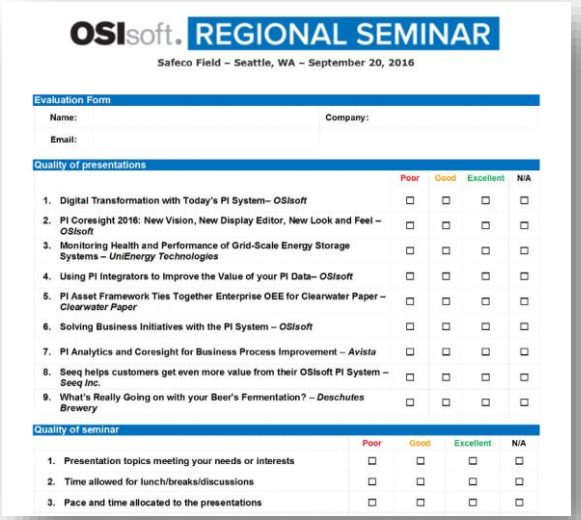
Questions

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

State your **name & company**

Please remember to…

Complete the Survey for this session



OSIsoft. REGIONAL SEMINAR

Safeco Field – Seattle, WA – September 20, 2016

Evaluation Form

Name: Company:

Email:

Quality of presentations

	Poor	Good	Excellent	N/A
1. Digital Transformation with Today's PI System– *OSIsoft*	☐	☐	☐	☐
2. PI Coresight 2016: New Vision, New Display Editor, New Look and Feel – *OSIsoft*	☐	☐	☐	☐
3. Monitoring Health and Performance of Grid-Scale Energy Storage Systems – *UniEnergy Technologies*	☐	☐	☐	☐
4. Using PI Integrators to Improve the Value of your PI Data– *OSIsoft*	☐	☐	☐	☐
5. PI Asset Framework Ties Together Enterprise OEE for Clearwater Paper – *Clearwater Paper*	☐	☐	☐	☐
6. Solving Business Initiatives with the PI System – *OSIsoft*	☐	☐	☐	☐
7. PI Analytics and Coresight for Business Process Improvement – *Avista*	☐	☐	☐	☐
8. Seeq helps customers get even more value from their OSIsoft PI System – *Seeq Inc.*	☐	☐	☐	☐
9. What's Really Going on with your Beer's Fermentation? – *Deschutes Brewery*	☐	☐	☐	☐

Quality of seminar

	Poor	Good	Excellent	N/A
1. Presentation topics meeting your needs or interests	☐	☐	☐	☐
2. Time allowed for lunch/breaks/discussions	☐	☐	☐	☐
3. Pace and time allocated to the presentations	☐	☐	☐	☐

Thank You