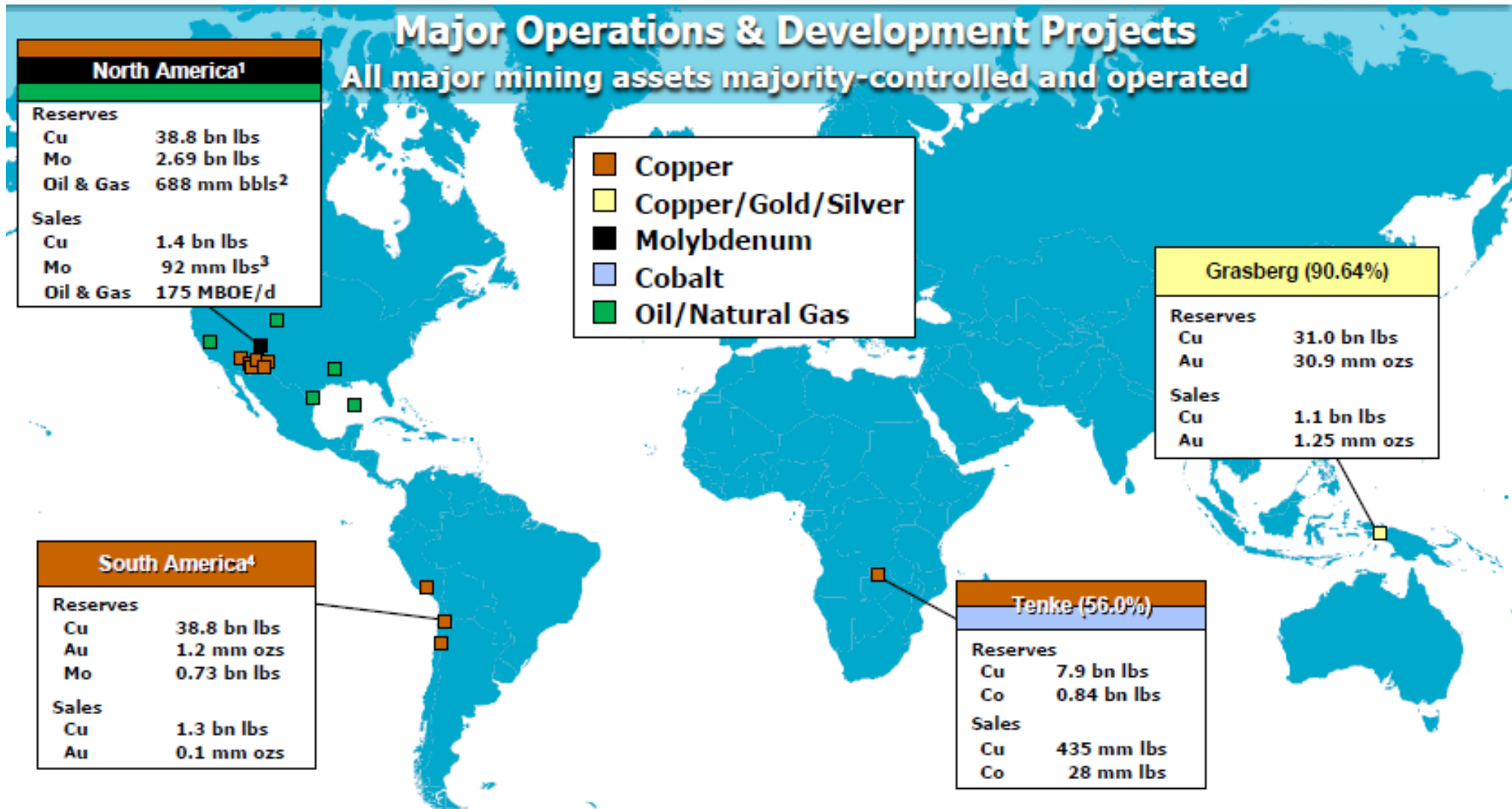


Building an "Enterprise" PI System

***How Freeport-McMoRan is delivering an enterprise class
machine data access solution.***

FCX
LISTED
NYSE

FCX Global Footprint



Issues we face...

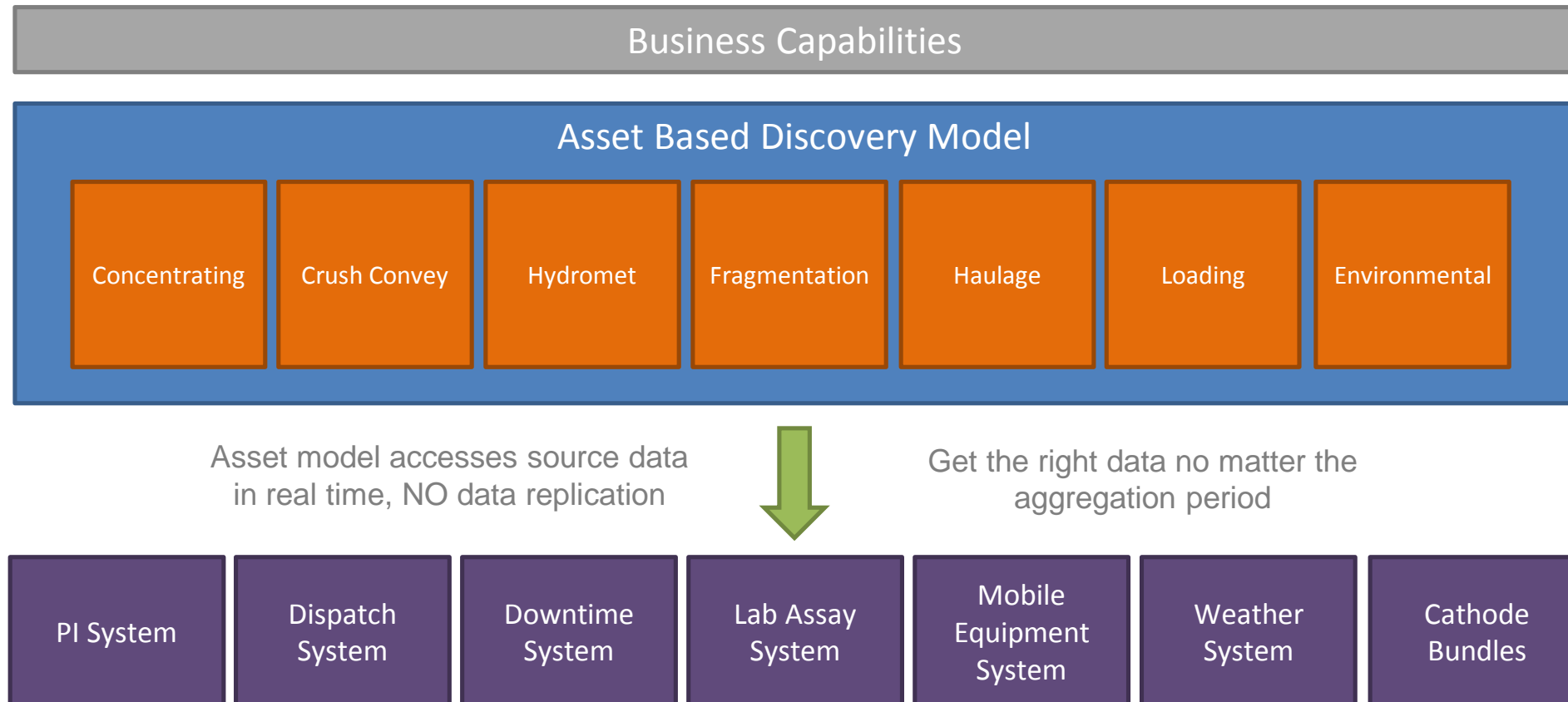
- Workforce rollover
- 15+ data historians across the globe, all implemented, managed independently
- How do we integrate the historian infrastructure with existing enterprise investments to deliver services that increase business value.
- Constant pressure to decrease administrative costs

What are our goals?

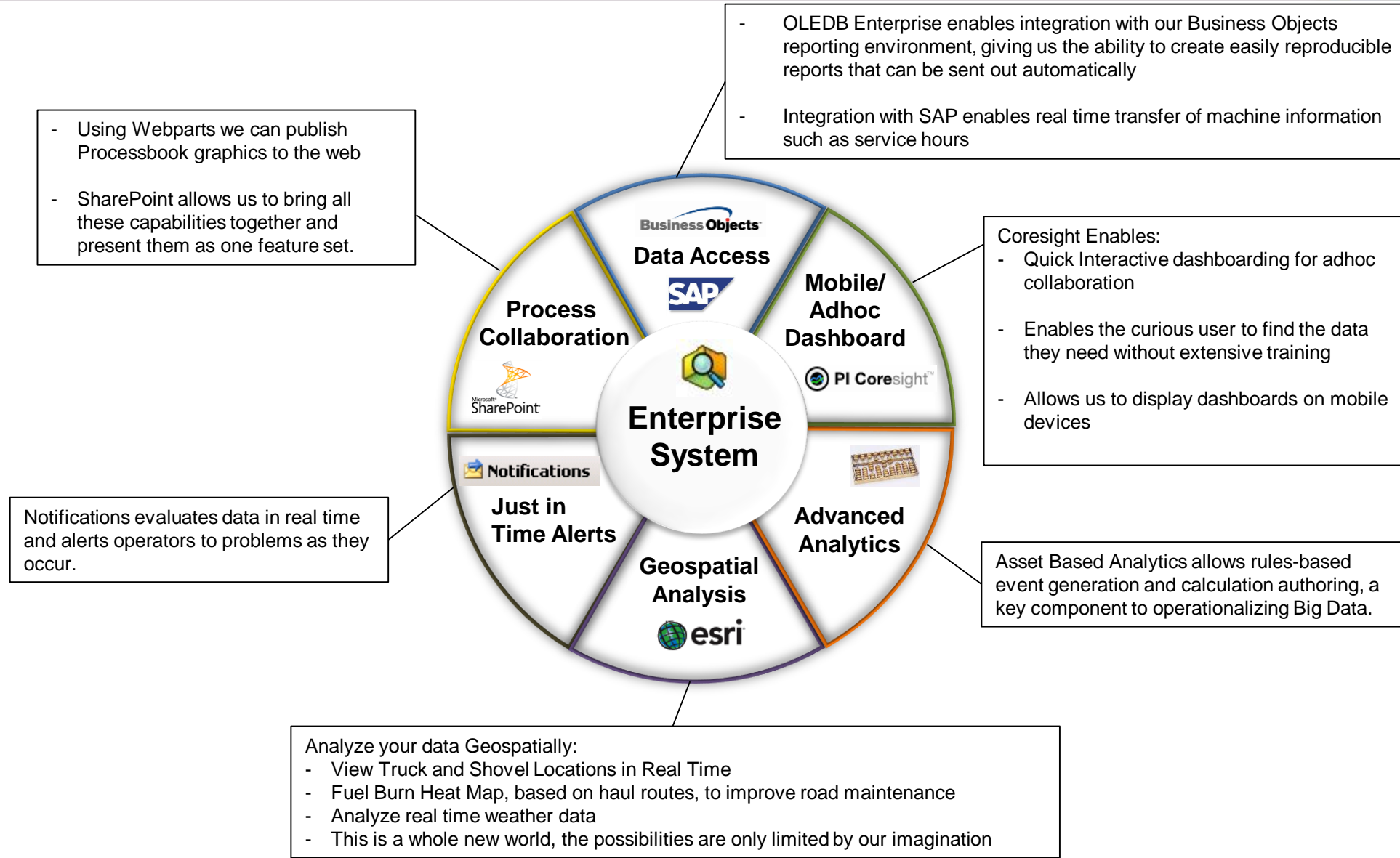
- Build a global common vocabulary
- Deliver web and mobile capabilities
- Enable users to leverage existing enterprise investments with no local infrastructure
- Maintain operations ability to quickly respond to local needs
- Deliver it all in a way that creates a global PI System community

Asset Based Model is the hub...

- Builds a common vocabulary: Stop talking about servers and tags, start talking about assets, measures, and events
- Provides relational model that enables delivery of enterprise class services



From the hub, we extend capabilities



Capabilities delivered from integrated experience

- The SharePoint home page delivers general information, self help resources, and communication to our user community

Browse Page

Welcome: Catron, Robert FM Web | Self-Service Center | Phoenix | Operations

Enterprise PI This Site: Enterprise PI

Enterprise PI North America South America Coresight Query PI Administrators Site Actions

View All Site Content

Libraries

- PI FAQ
- PI Graphics

Lists

- PI Resources
- PI Client Connection Settings
- PI Announcements
- PI Users Group

Recycle Bin

All Site Content

PI FAQ

Name	Modified	Modified By
- Whats going on with PI in 2013	9/6/2013 8:59 PM	System Account
How do I create a new SharePoint page for publishing PI Weparts	10/29/2013 2:24 PM	Catron, Robert
How to Connect to a PI Server	3/27/2013 12:34 PM	Catron, Robert

Add document

PI Resources

URL	Notes
PI Youtube Training	This is a great resource to learn about using PI tools. There are subjects for each PI Technology (i.e. Processbook, Datalink), and each of those subjects are broken up into small videos reviewing different functionality
OSISoft User Community	This is an OSISoft discussion forum for OSI PI users. This is a great research tool if you have a specific problem you are trying to solve or question you need answered. Signing up for an account is free, and we highly recommend it!
PI Client Tools	These are the latest PI Client Tool Install kits. To have these installed on your computer please submit and MIS Helpdesk ticket and include this link.

Add new link

PI Announcements

Title
2013 OSI Regional Conference - DEC 11 - 12, 2013
2014 OSI User Conference - MAR 24 - 28, 2014

Add new announcement

PI Users Group

Interested in knowing more about PI? Add your name to the PI Users Group to get emails about upcoming opportunities to see what other Freeport users, as well as, outside organizations are doing with PI.

Capabilities delivered from integrated experience

- Using the dropdown menus a user can navigate to any operations page

The screenshot displays the Enterprise PI web application interface. At the top, there is a navigation bar with 'Browse' and 'Page' tabs. Below this, a welcome message for 'Catron, Robert' is shown alongside the 'CORE' logo and links to 'FM Web', 'Self-Service Center', 'Phoenix', and 'Operations'. The main header area includes the 'Enterprise PI' logo and a search bar. A dropdown menu is open under 'Enterprise PI', showing options for 'North America', 'South America', 'Coresight Query', and 'PI Administrators'. The 'China' option is highlighted. On the left, a sidebar contains 'Libraries' (PI FAQ, PI Graphics) and 'Lists' (PI Resources, PI Client Connection Settings, PI Announcements, PI Users Group). The main content area features a table of documents with columns for 'Modified' and 'Modified By'. Below the table, there are sections for 'PI Resources' and 'PI Announcements'. The 'PI Resources' section includes links to 'PI Youtube Training', 'OSISoft User Community', and 'PI Client Tools'. The 'PI Announcements' section lists two conferences: '2013 OSI Regional Conference - DEC 11 - 12, 2013' and '2014 OSI User Conference - MAR 24 - 28, 2014'. The 'PI Users Group' section includes a description and a 'Person' field with two profile pictures.

Capabilities delivered from integrated experience

- Now you have a series of links to visualizations the operation has published

Browse Page

Welcome: Catron, Robert CORE FM Web | Self-Service Center | Phoenix | Operations

Chino This Site: Chino

Enterprise PI North America South America Coresight Query PI Administrators

Enterprise PI > Chino Site Actions

View All Site Content

Milling

Tower Mills

Flotation

Reagent Dosage

Tailings

Tailings Thickeners

Utilities

Caldon

Reagents

CHI Ops Portal

Business Objects

Recycle Bin All Site Content

Crush Convey Summary

Dataset	Time	Value	EngineeringUnits
Tons Crushed, Wet	11/14/2013 7:15:44 AM	1967.17	ston
Throughput	11/14/2013 7:15:44 AM	2163.75	tph

Concentrator Summary

Dataset	Time	Value	EngineeringUnits
Tons Milled, Wet	11/14/2013 7:15:44 AM	2455.00	ston
New Feed	11/14/2013 7:15:44 AM	983.7014	tph
Recycle Feed	11/14/2013 7:15:44 AM	215.85	tph
New Feed	11/14/2013 7:15:44 AM	978.72	tph
Recycle Feed	11/14/2013 7:15:44 AM	206.11	tph
Concentrate, Copper - Production	11/18/2013 5:56:40 PM	Scan Off	ston
Concentrate, Copper - Throughput	11/18/2013 5:56:40 PM	Scan Off	tph
Concentrate, Moly - Mo Grade	11/14/2013 6:19:44 AM	0.11	%
Tail Assay - Cu	11/14/2013 7:11:14 AM	0	%

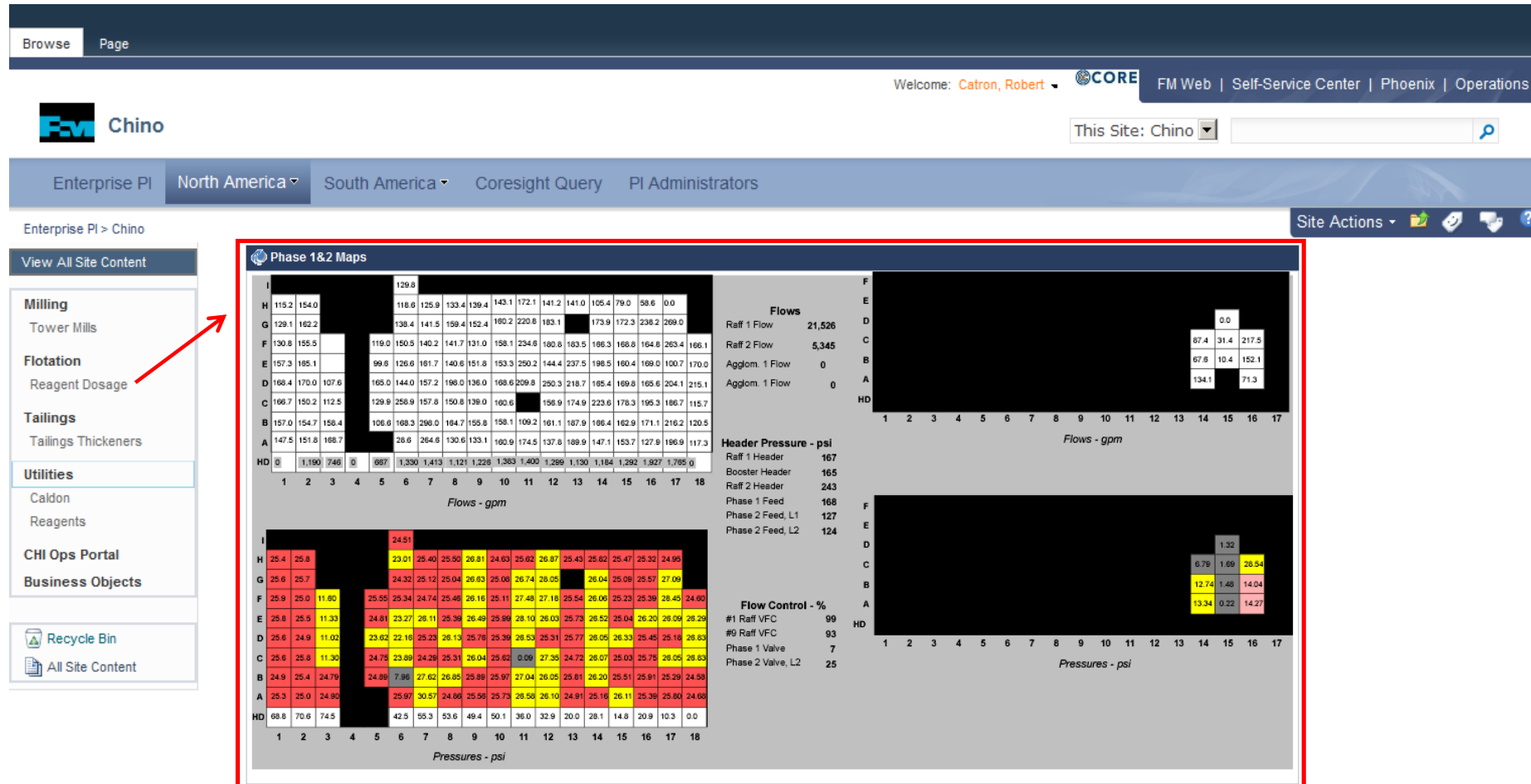
Capabilities delivered from integrated experience

- By clicking on the first link I bring up a dashboard built on Coresight



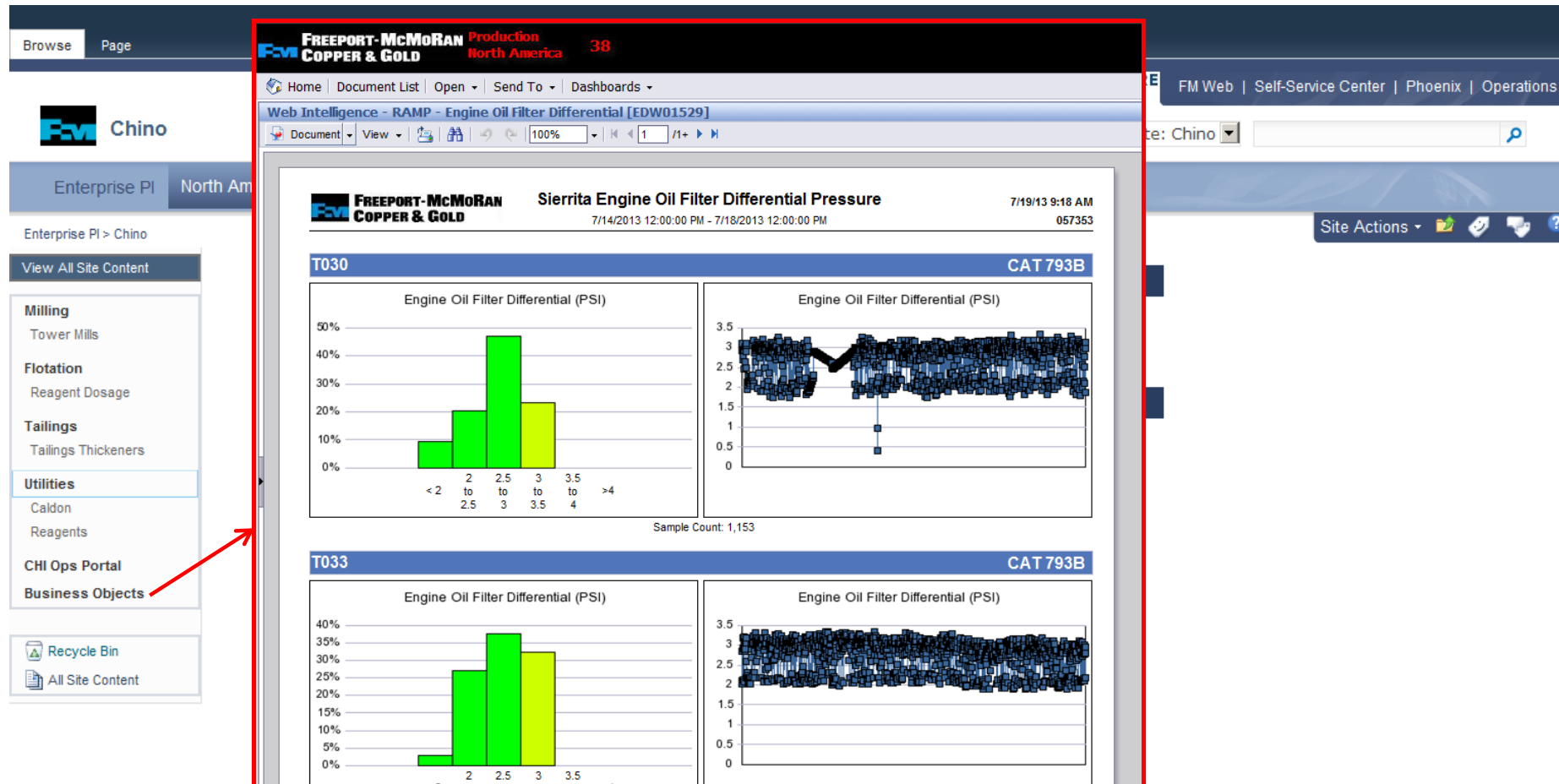
Capabilities delivered from integrated experience

- By clicking on the next link I bring up a process graphic

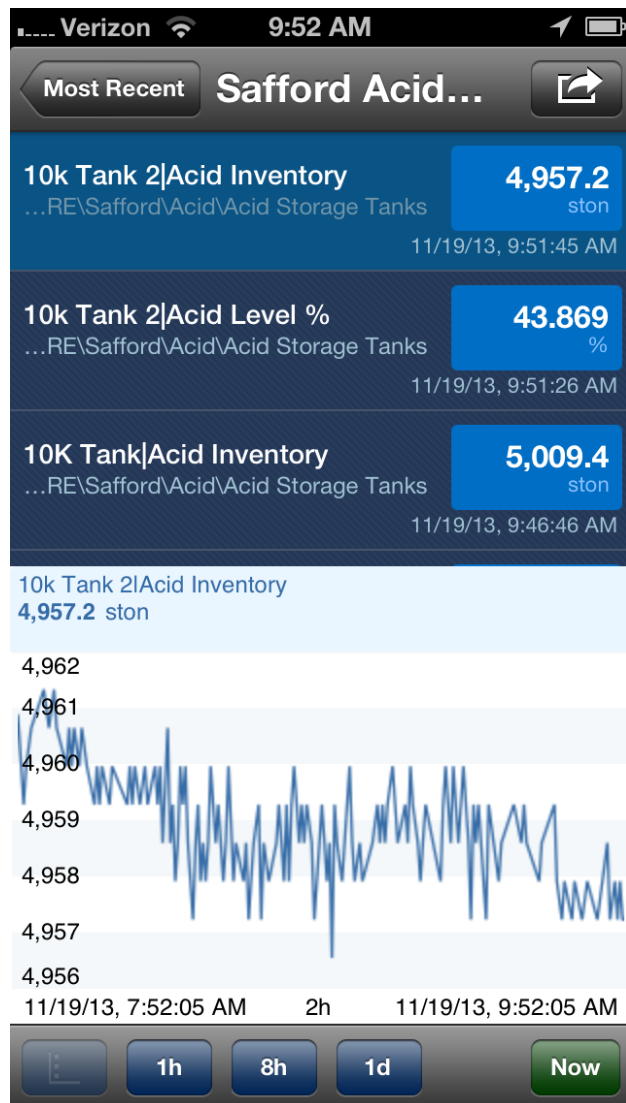


Capabilities delivered from integrated experience

- Clicking on another link brings up a report created in Business Objects



Mobile capabilities keep operators in the field



Are we accomplishing our goals?

- Build a global common vocabulary
Using Asset Framework we deliver a common vocabulary across the organization.
- Deliver web and mobile capabilities
Using Coresight and WebParts we delivered analytic capabilities via the web and iDevices
- Enable users to leverage existing Enterprise investments with no local infrastructure
Using AF and OLEDB Enterprise we leveraged our existing Business Intelligence environment to deliver a robust reporting solution

Are we accomplishing our goals?

- Maintain operations' ability to quickly respond to local needs
Using ProcessBook and DataLink operations can continue to respond to local analytical needs as they arise
- Deliver it all in a way that creates a global PI System Users community
Using SharePoint we were able to deliver all of this with an integrated user experience that fosters global collaboration

An Example of Business Value

- Identifying/Prioritizing Haul Truck Engines Cylinder Kit Failures
 - Problem: Over time an engines Cylinder Kit degrades, causing the differential filter pressure to rise.
 - If this issue is not addressed it can cause catastrophic failure of the Engine resulting in a \$180,000 core value loss.
 - While we have real time monitoring in place to prevent catastrophic failure, early detection is key to efficient maintenance planning and overall equipment health.

How do we identify equipment with chronic cylinder issues, so that we can proactively prioritize maintenance and bring the truck down in a controlled manner.

An Example of Business Value

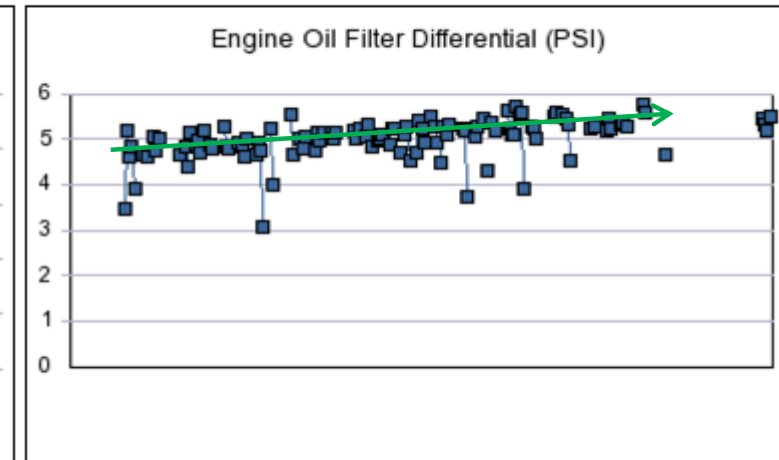
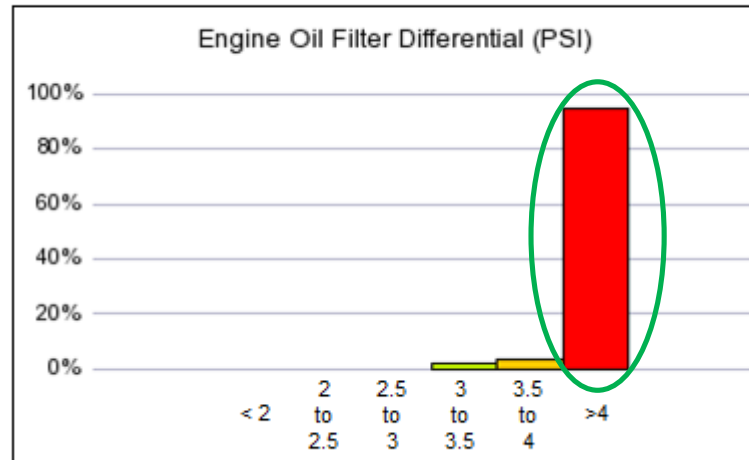
- Solution: Using Business Objects, connected to our machine data, we created a daily report that prioritizes trucks by their cylinder health.

FREEPORT-McMORAN **Sierrita Engine Oil Filter Differential Pressure** 12/9/13 8:55 AM
COPPER & GOLD 12/7/2013 12:00:00 PM - 12/8/2013 12:00:00 PM 057353

Truck	Fleet	Max Eng Oil Filter Differential Pressure	Avg Eng Oil Filter Differential Pressure	Average Engine Oil Pressure	Sample Count
T062	CAT 793D	5.76	5.01	64.21	114
T063	CAT 793D	5.44	2.69	60.49	7
T036	CAT 793B	4.81	3.81	70.14	85
T034	CAT 793B	4.49	3.6	65.11	90
T073	CAT 793D	3.92	3	66.6	107

This is a summary of all Haul Trucks sorted by Engine Oil Pressure descending, allowing us to quickly identify equipment with a possible cylinder problem.

T062 CAT 793D



Sample Count: 114

Supporting the summary with detail, I can see the sample distribution and trend...validating the issue and indicating action should be taken

Based on the above maintenance would be scheduled and the Cylinder Kit replaced.

Question and Answer



Appendix – High Level Infrastructure

