



Big Data Analytics with the PI System

Presented by John Baier
Director, Integration Technologies





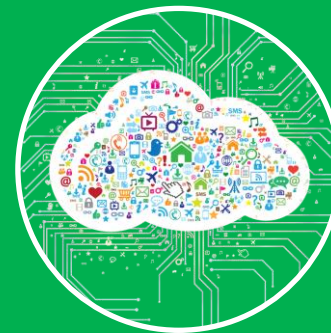
Plant Enterprise Operations

- Small # Assets
- Diverse / Complicated
- Optimization
- Mostly On-premise



Distributed Asset Monitoring

- Medium # Assets
- Similar / Dispersed
- Remote Monitoring
- Enterprise / Cloud

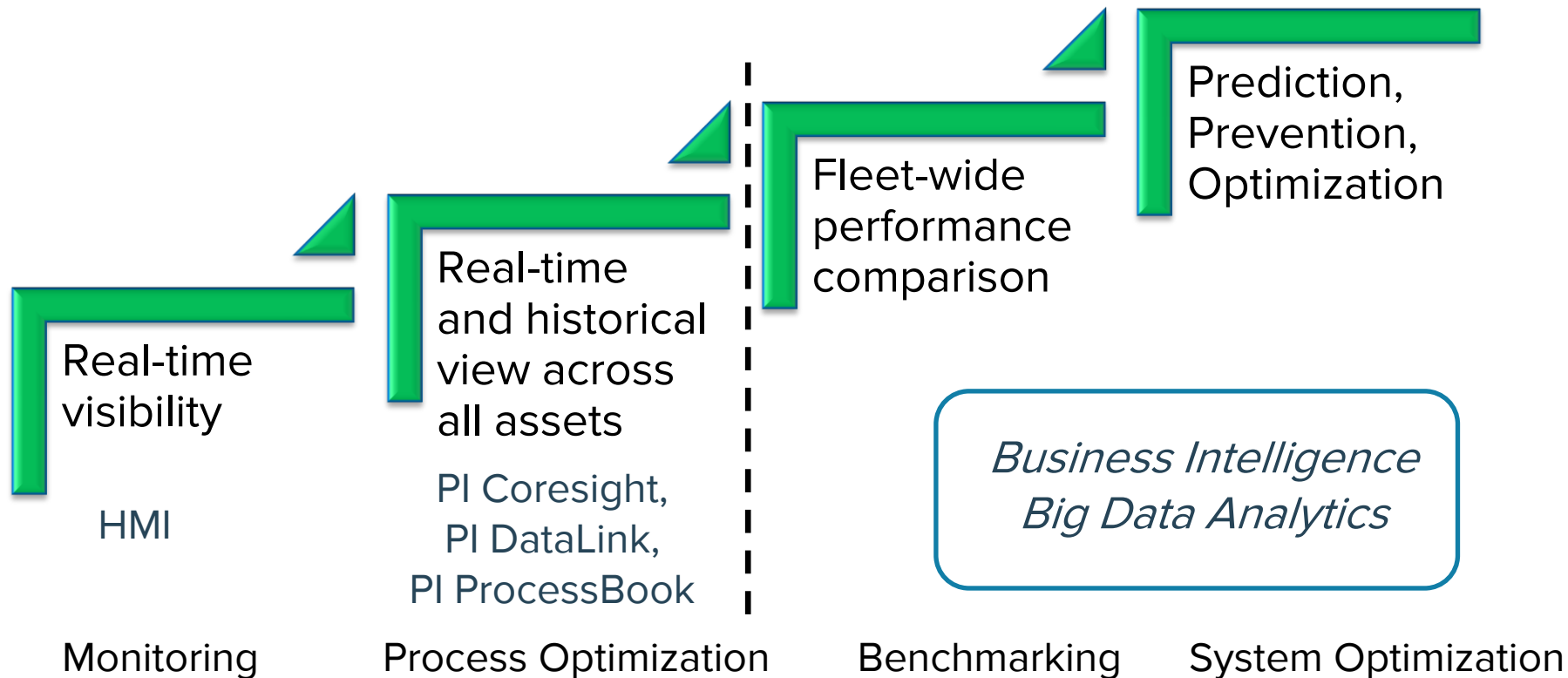


Internet of Things and M2M

- Massive # Assets
- Relatively Simple
- Analytics / Big Data
- Mostly Cloud

Hybrid / Cloud Environment – *OSIsoft Focus*

Evolving Data Goals



BIG DATA



high **"volume, velocity, and/or variety"** information assets that demand cost-effective, innovative forms of information processing that enable insight, decision making, and process automation

The Benefits of Big Data

6% more profitable

83% improved process cycle times

49% had payback in one year or less

54% report ROIs >100%

27% year-over-year increase in revenue

12% less operating expense

5% more productive

Sources: Harvard Business Review, Forbes, IDB

The Big Data Landscape

Apps



Infrastructure

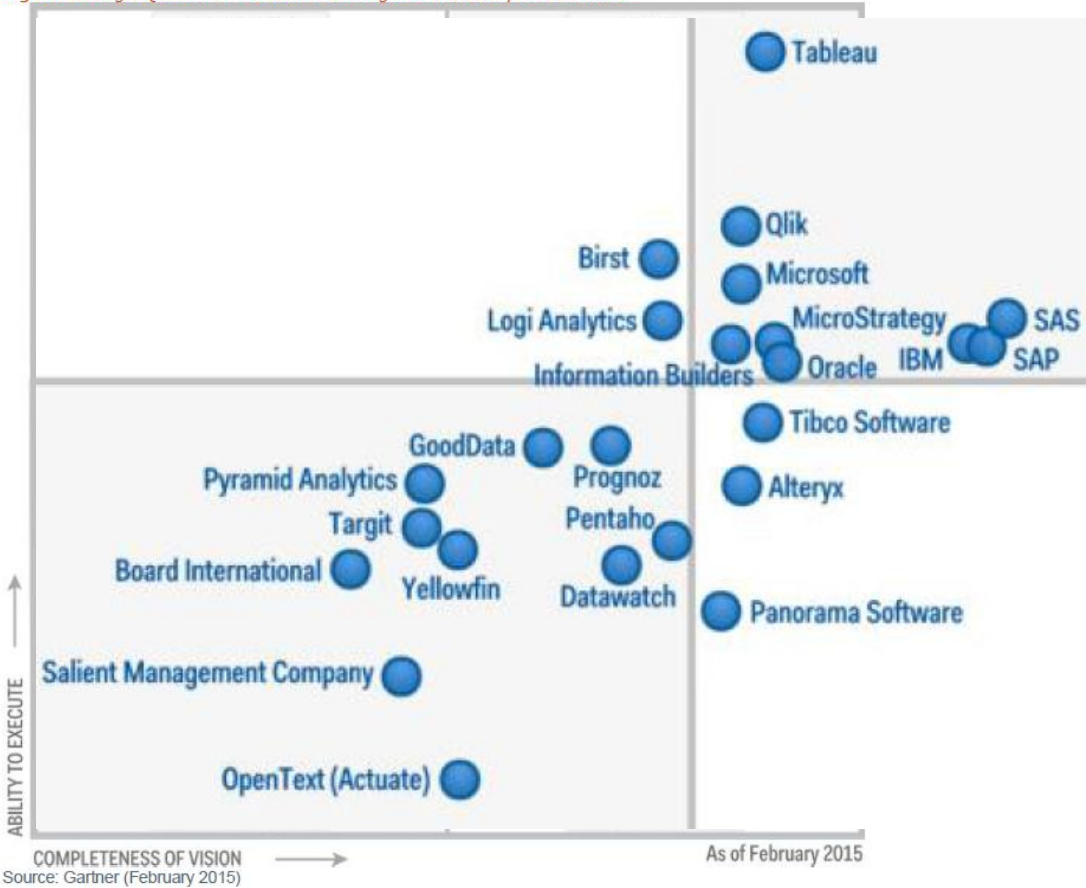


From: <http://www.bigdatalandscape.com/>

BI Landscape

Magic Quadrant

Figure 1. Magic Quadrant for Business Intelligence and Analytics Platforms



Big Data Analytics



- Analytics is required to transform information into intelligence
- More than storage
 - Visual Analytics
 - Machine learning
 - Combining Data Sets



I need to **minimize risks** through Data Driven Decisions

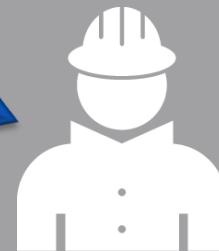
I want to share PI System data to groups outside of Operations

I want to build predictive models from historical data



Plant Manager

I want to **compare** my equipment with **ALL** of our other sites



Engineer

I want to spend **less time** on operational reports



CIO

We need to be more confident in the decisions we make.
We need trusted data

I want to analyze operational data along with financials

We are starting a Big Data project, and we need operational data



Business Analyst

I want to add Operational Data to our enterprise data warehouse

Most of the users I support have a favorite BI tool



IT Architect

Freeport McMoRan Copper and Gold



- CIO wanted Big Data Project
- Fuel Savings – Route Optimization (\$14M potential), Idle Times (\$4M)
- Need Granular Data - 1s and 5s data, 300+ Trucks

Big data analytics and the PI System

Statistical
Analytics



Analytical
Insight



Visual
Analytics

Time Series



Relational



Unstructured



GIS

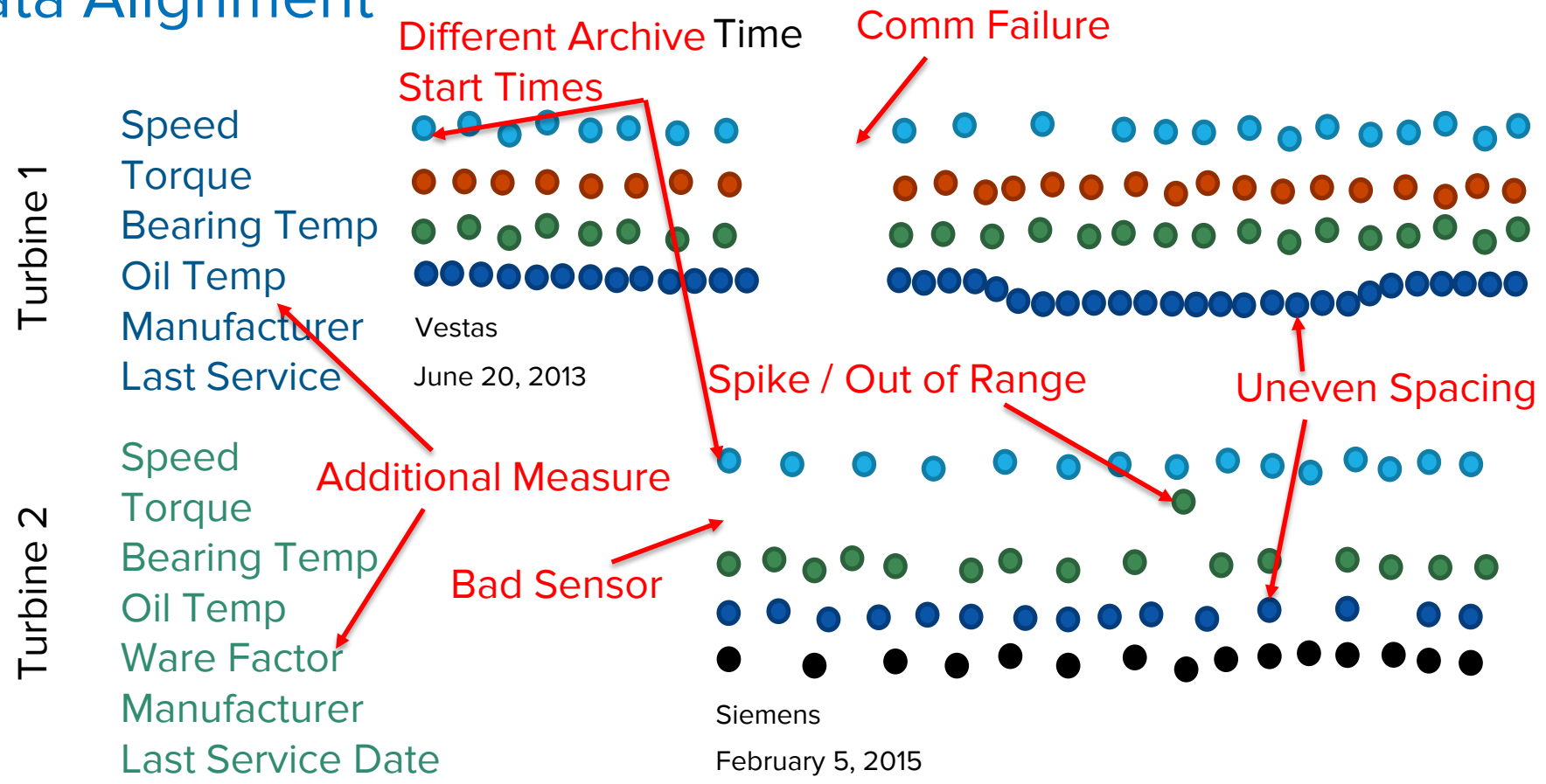


Real-time time series data isn't perfect



- Naturally incomplete
 - data delays
- Doesn't look like SQL
 - Asset Context
- Not evenly spaced
 - time is framed by events
- Subject to errors in measurement

Data Alignment

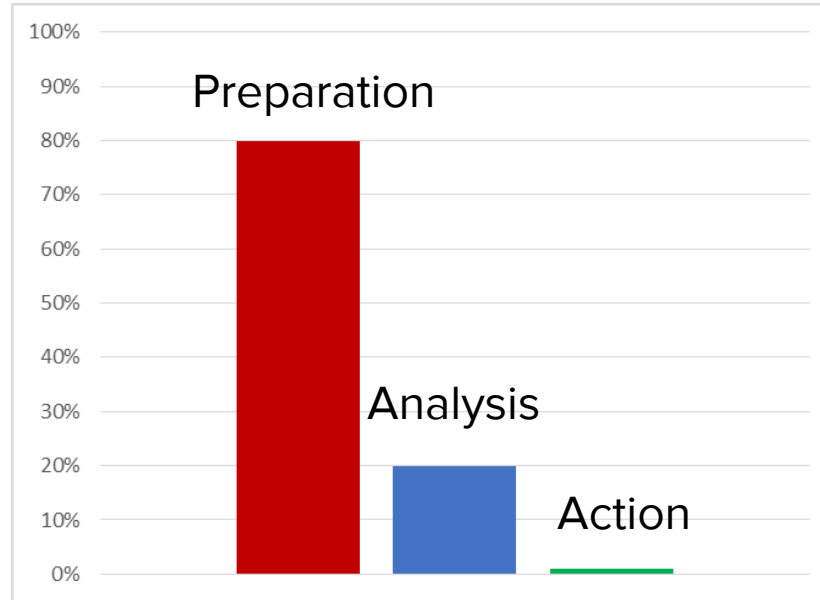


Why are These Objectives Elusive?

1. Data Alignment
2. Scalability
3. Context
4. Managing changes over time
5. Data Governance
6. Security
7. Organizational Hurdles

...these require time and \$\$\$

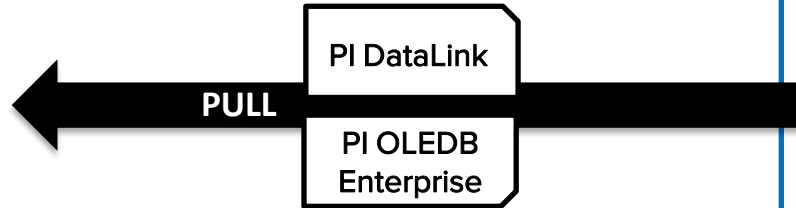
Data Wrangling



Data cleansing and preparation tasks can take 50-80% of the development time and cost

<https://hbr.org/2014/04/the-sexiest-job-of-the-21st-century-is-tedious-and-that-needs-to-change/>

Traditional Data Delivery



BUSINESS TOOLS



TIBCO Spotfire®



Excellent for “small” datasets

- Hours, days, 1-2 months

Does not scale to “large” datasets

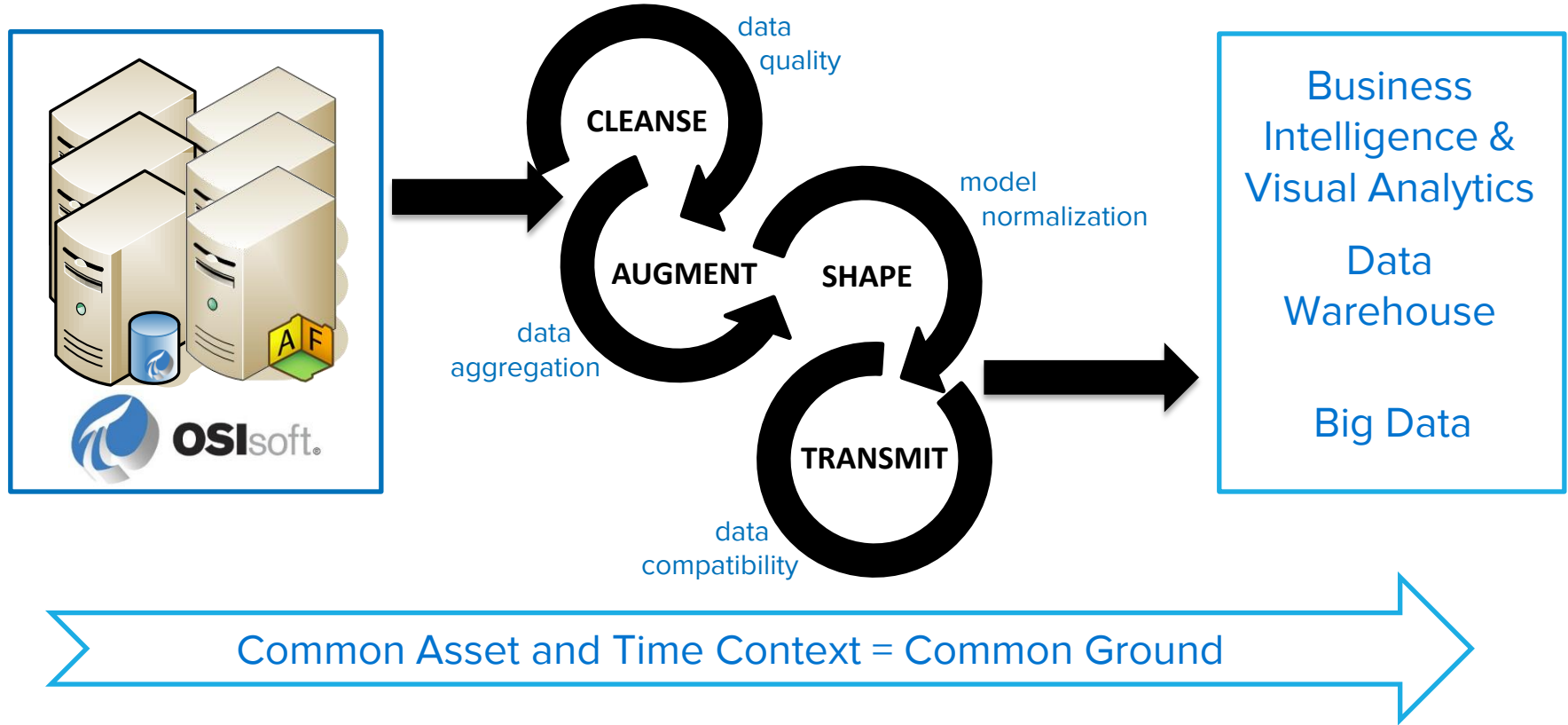
- 6 months, 3 yrs...
- “High Density” data - Drilling

OSIsoft Solution: PI Integrator for Business Analytics

Reduce the complexity of analyzing real world
industrial data

*All PI System data delivered on **your terms**, in **your language**, to
the **tools you use**, and **to the people** that can make a difference*

PI Integrator for Business Analytics



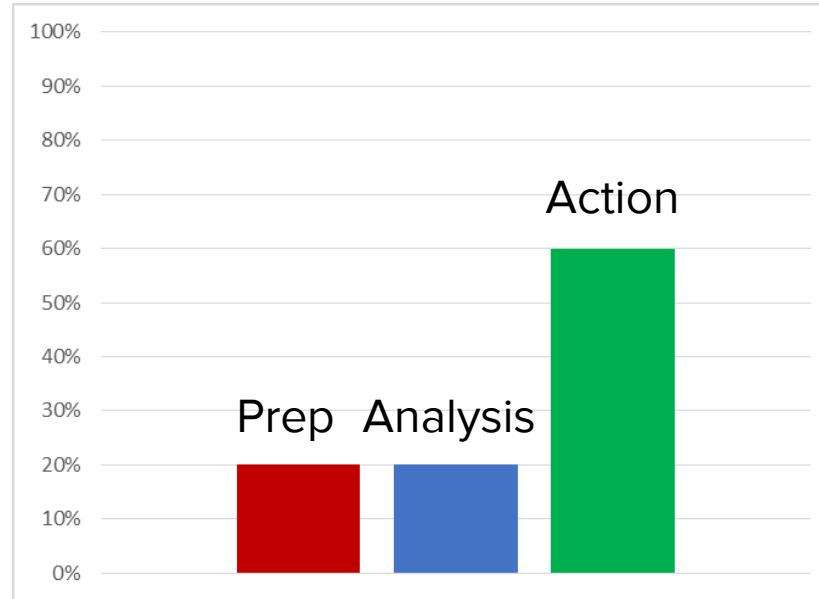
Freeport McMoRan – What they did

- Collect Truck Data at high fidelity
- Used Established AF Model for Trucks
- Use PI Integrator for Business Analytics
- Established Big Data Lake (Hortonworks)
- Hired Integrator (WWT) to learn Data Science
- Identified Target Use Cases

Freeport McMoRan - Results

- Initial Project started October 2014
- \$4M in Fuel Savings (out of \$14M possible) on Truck Route Optimization
- \$1M in Fuel Savings (out of \$4M possible) on Idle Time
- Paid for all costs associated with establishing big data practice
 - Including 5 data scientists

Freeport McMoRan – more time on Action



<https://hbr.org/2014/04/the-sexiest-job-of-the-21st-century-is-tedious-and-that-needs-to-change/>

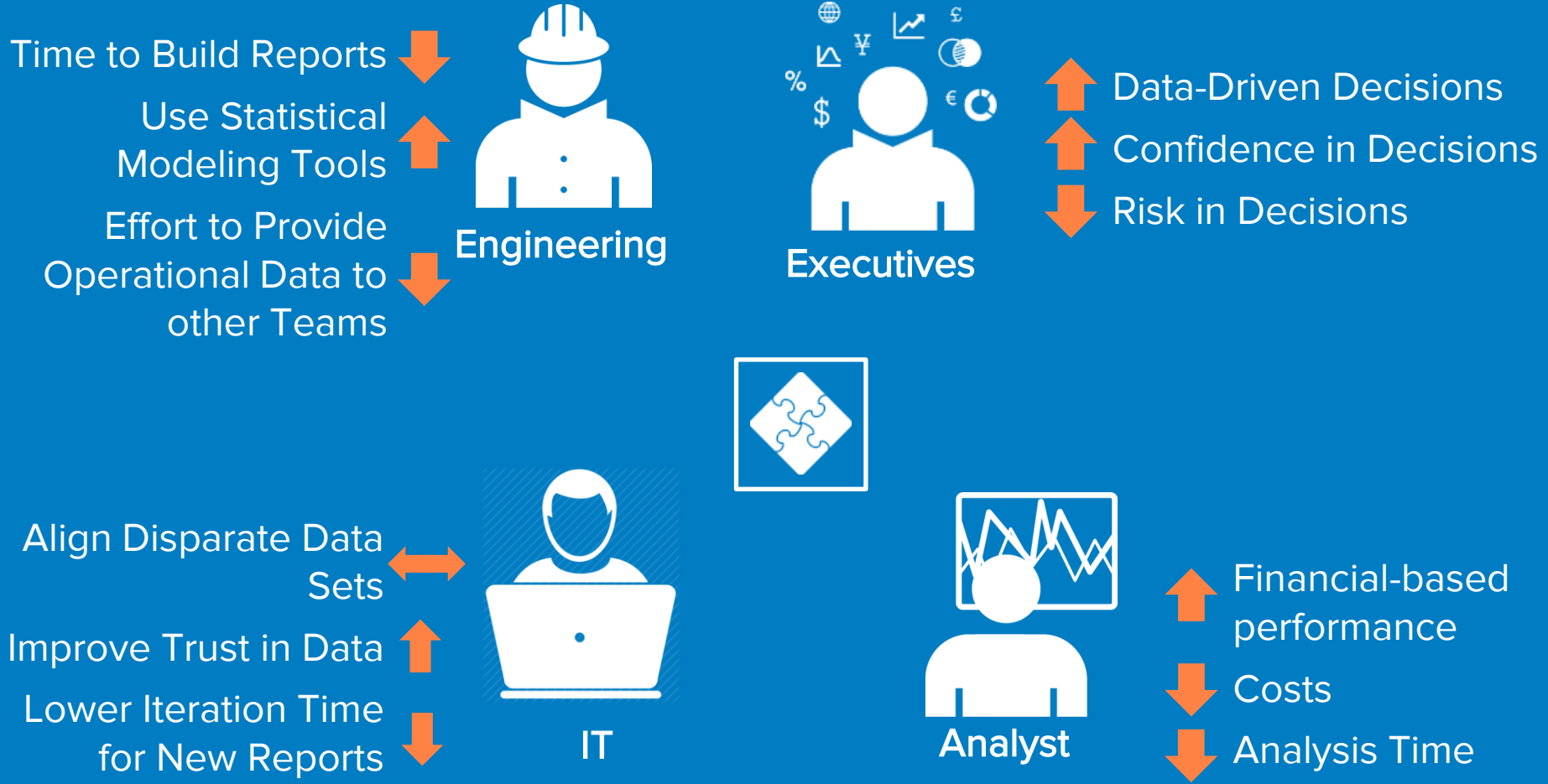
Freeport McMoRan – Lessons Learned

- Establish AF Model Early – this provides critical context
- Analysis Requires Iteration
 - Different Aggregations and Data Sets
 - Data Scientists working with Subject Matter Experts
- Establish Internal Data Science Group
- Operationalizing Results (Action) is hardest part
 - BI Tools can play a role
 - Company Culture plays a role

The Data Wrangling Tool of Choice

Spend less time preparing and more time analyzing:

- High volumes of historical operational data sets
 - Fleets
 - Historical models
- PI System data in trusted, reliable formats for the organization
- Align Disparate and Unique data sets for advanced analytics
- OT and IT working together, iteratively



Product Availability

PI Integrator for Business Analytics

- **Now Shipping!!!**
- BI and Data Warehouse Editions

PI Integrator for SAP HANA

- Q4 2015

New Platform Support - Hadoop, Oracle

- Q1 2016
- Preview available soon for select Data Warehouse Customers

Call to Action

- Stay for the Next Talk – DEMO
 - Matt Ziegler, Product Manager
- See “Big Data and Business Intelligence”
 - Thursday, 14:20, Congress Hall I, Lower Level
- Experience PI Integrator for Business Analytics at Product Expo

Contact Information

John Baier

jbaier@osisoft.com

Director, Integration Technologies

OSISoft

Questions

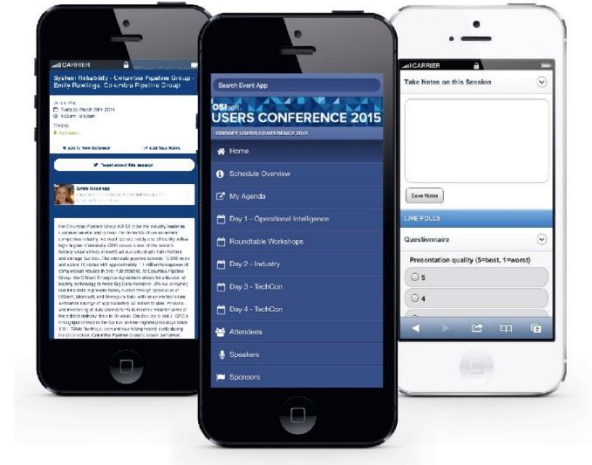
Please wait for the **microphone** before asking your questions



State your
name & company

Please don't forget to...

Complete the Online Survey
for this session



<http://eventmobi.com/emeauc15>



감사합니다

谢谢

Danke

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado