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April 4-8, 2016 | San Francisco

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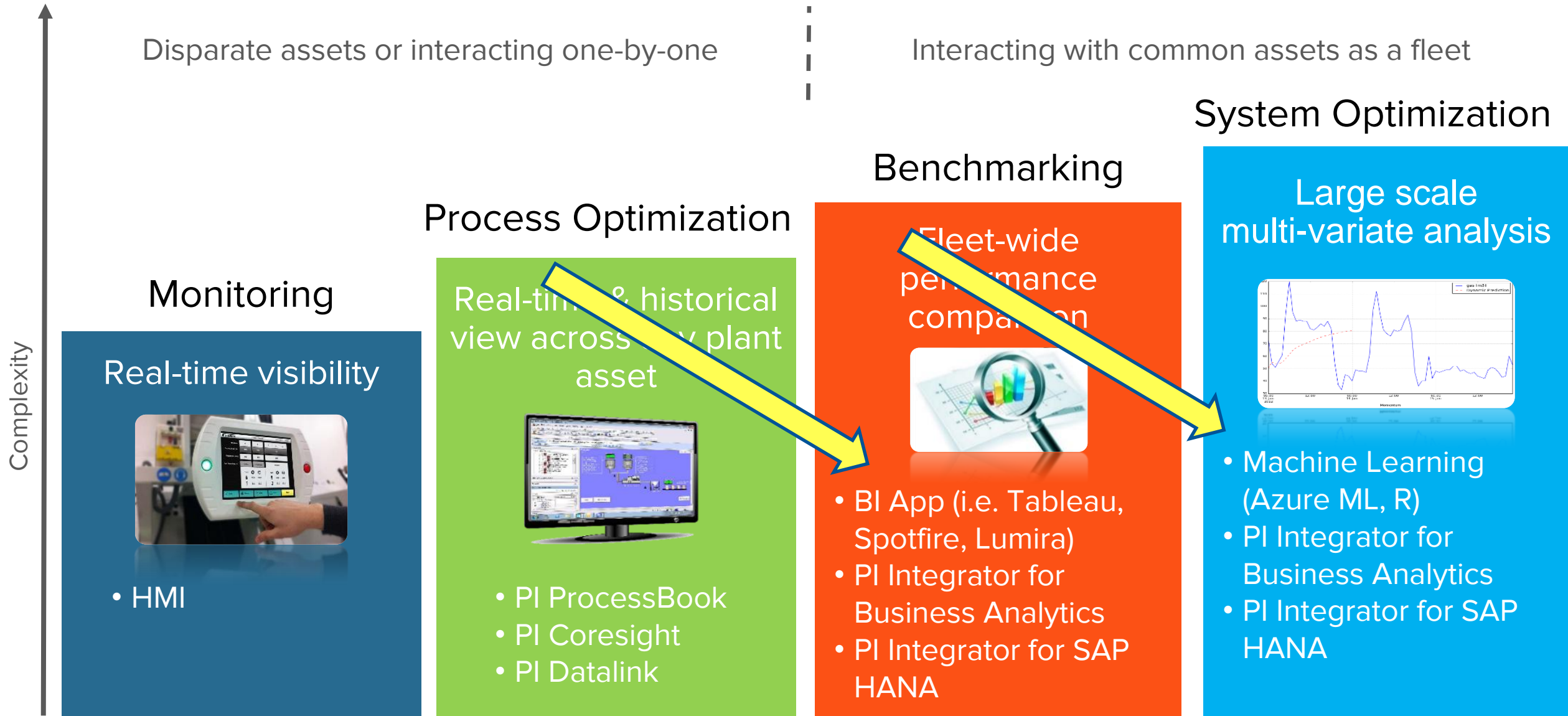


Bridge IT and OT with a process data warehouse

Presented by **Matt Ziegler, OSIsoft**



Problem Complexity Drives the Need for Integrators



Recipe for PI Integrator for Business Analytics

1. Start with business need

- Don't Start with technology
- Example use cases to follow

2. Assess internal readiness

- PI System Maturity
- Data Flows, Systems Involved
- Ownership, Skills, and People Boundaries

3. Implement and iterate

- Incorporate results
- Have a plan to operationalize

4. Ask for Help



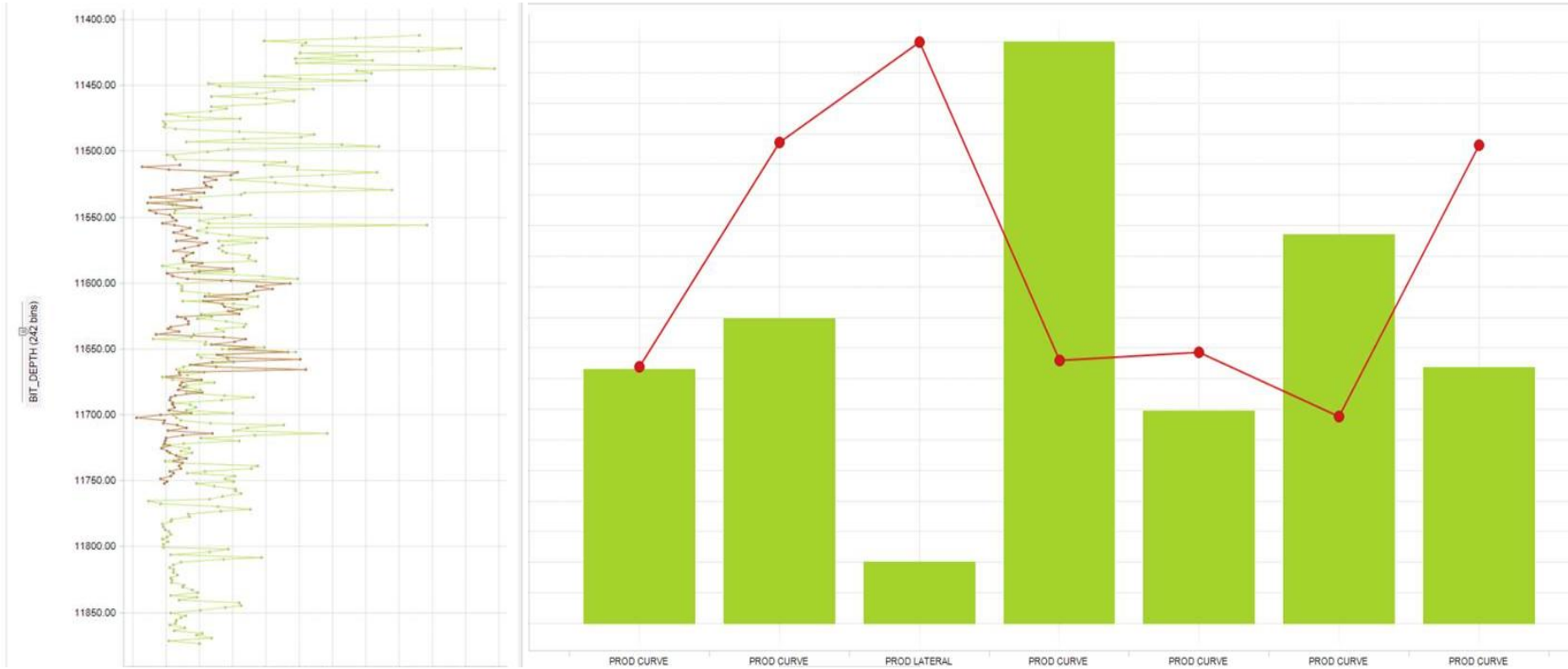
Use Cases

- Production Reporting
 - More detailed view into energy, oil, metals

Drilling Phase Performance Comparison

More Responsive Business Tools

Bit Depth



Existing Concepts

Executed with:
More Speed &
Larger Scale

Oil and Gas

Drilling and production comparisons
Information Distribution



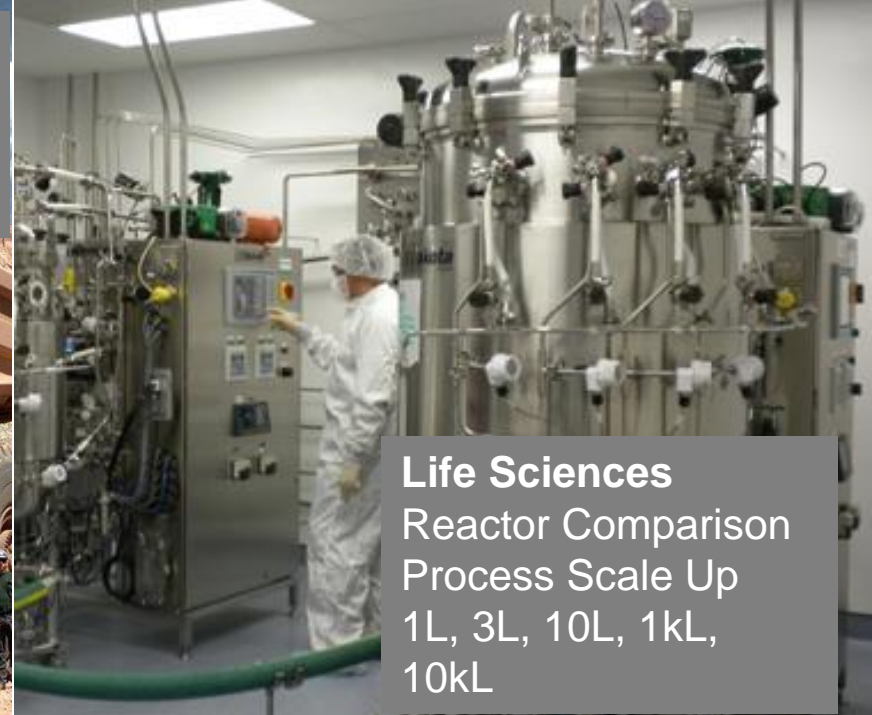
Mining

Route optimization
Energy Reduction
300 haul trucks



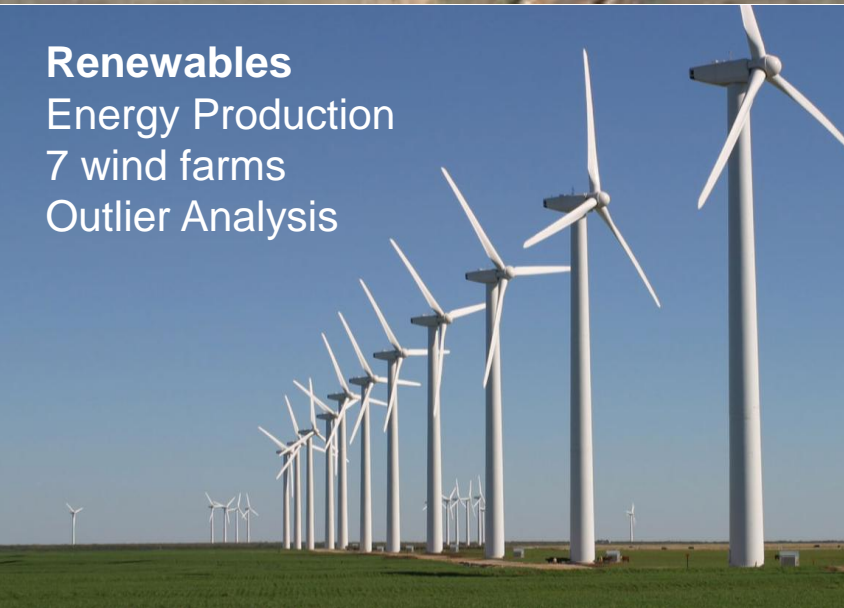
Life Sciences

Reactor Comparison
Process Scale Up
1L, 3L, 10L, 1kL,
10kL



Renewables

Energy Production
7 wind farms
Outlier Analysis



PI Integrator for Business Analytics 2015
usage today

- ✓ IT/ OT Integration
- ✓ Business Intelligence and Reporting
- ✓ Data Warehouse Integration
- ✓ Broad Platform Support

Food and Beverage

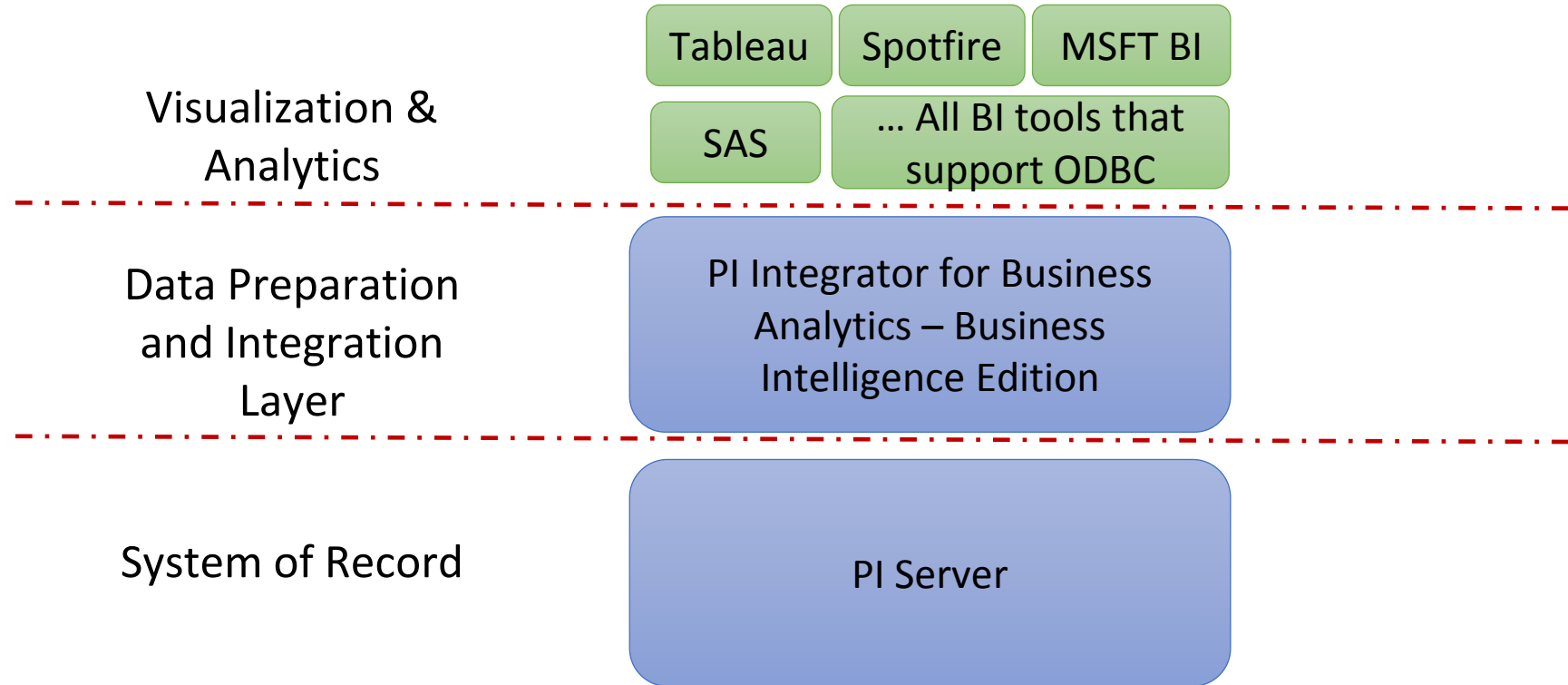
Utility Usage
Process Analytics



Use Cases

- Production Reporting
 - More detailed view into energy, oil, metals
- Alerting and Customer Intimacy
 - Integrate detailed production data with CRM data to alert on outages and meet customized SLA requirements
- Regulatory Compliance
 - Keep product genealogy data on hand for products to deal with regulatory requests
- Root Cause Analysis
 - Discover patterns related to equipment failure or low quality product

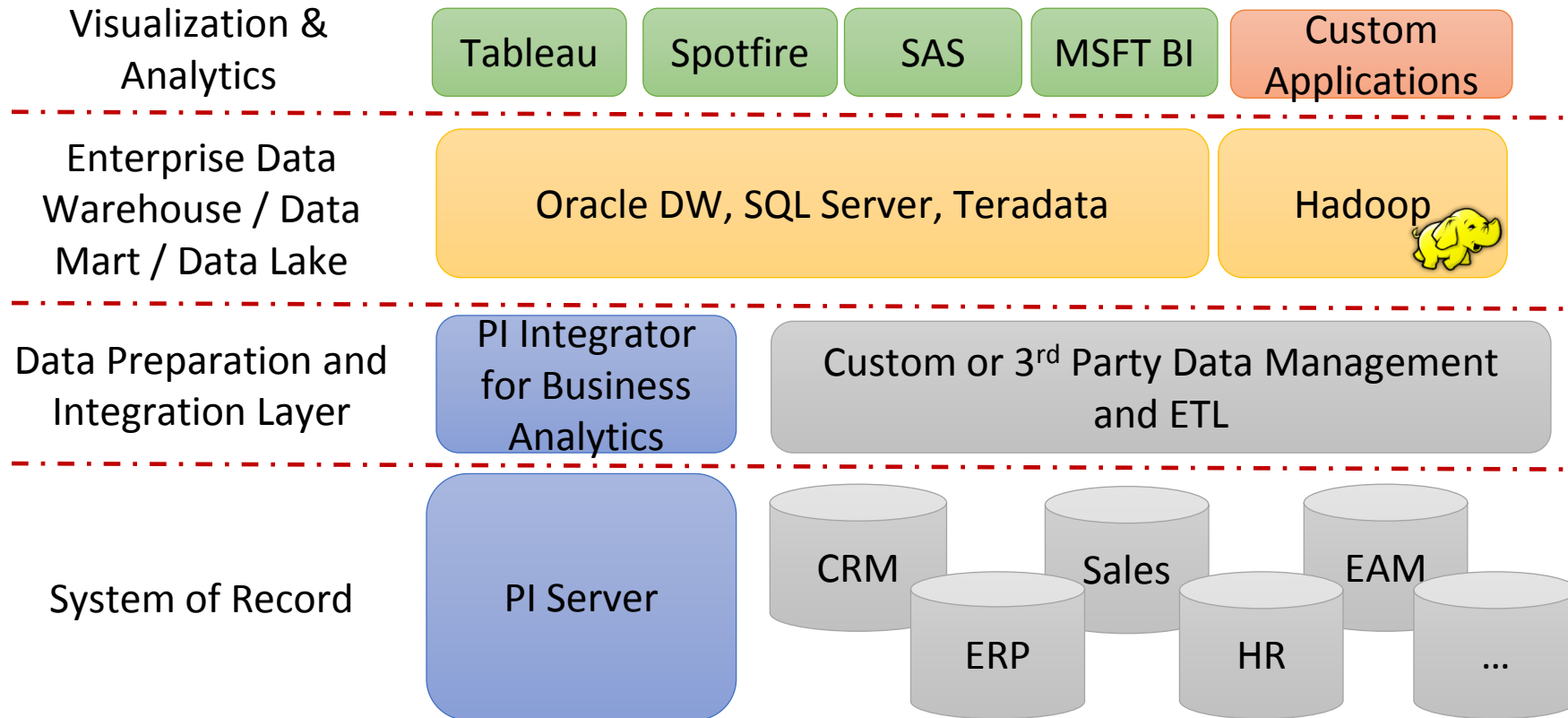
Operational Reporting & Analysis Architecture



I want to analyze operations data stored in the PI System using modern BI tools



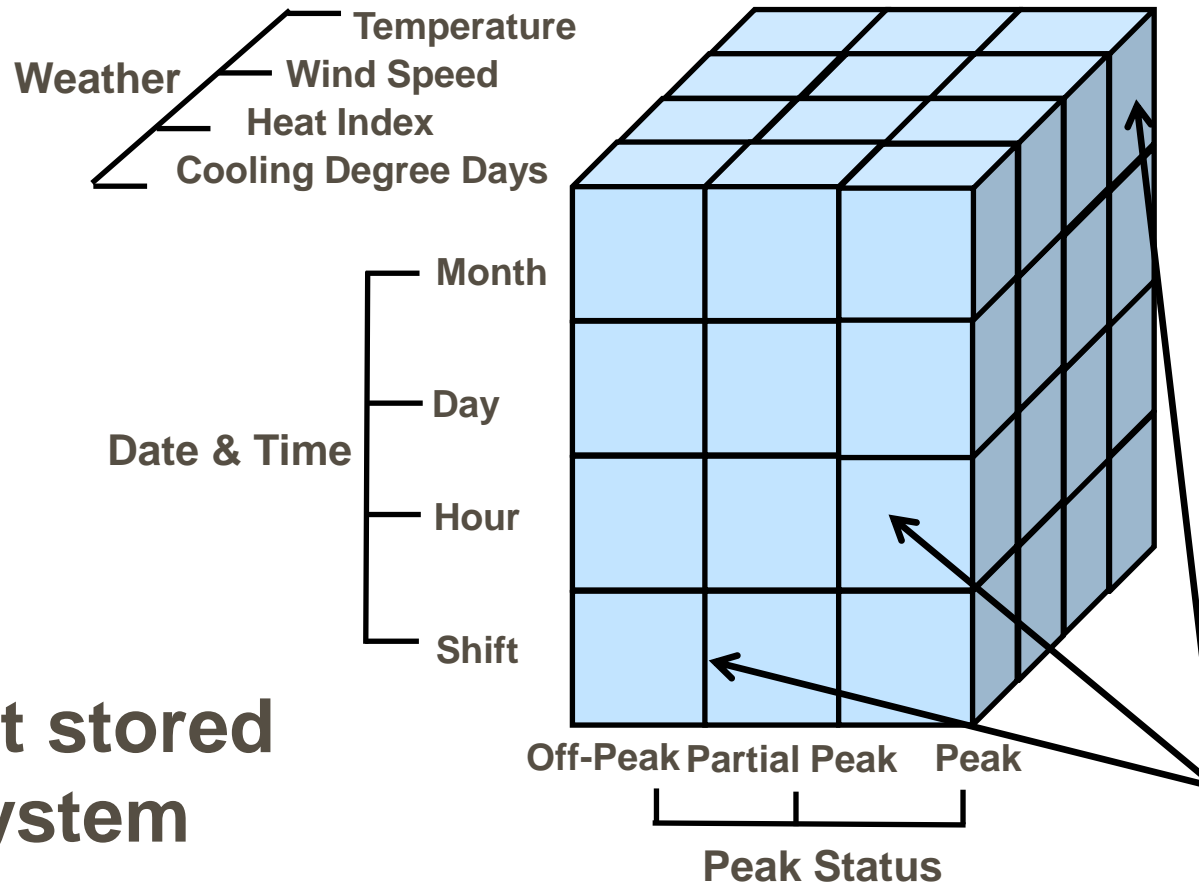
Enterprise Data Warehouse Architecture



I need to fit operational data into my existing company IT information architecture



Prepare Your Data Model



Context stored
in PI System

Show me the
total energy cost

For the first shift

During Peak Status

Time-series data
stored in PI System



Example

Project Summary

1. Ask some good business questions
2. Build a dataset using PI Integrator for Business Analytics
3. Publish data to SQL Azure
4. Use Power BI to analyze and explore the data
5. Discuss Best Practices

Questions

- Where is the most energy consumed in the building?
- What effect does weather have on energy consumption?
- Are there any unexpected patterns or anomalies?



Analyzing Fleets with PI Asset Framework

Temperature Zones

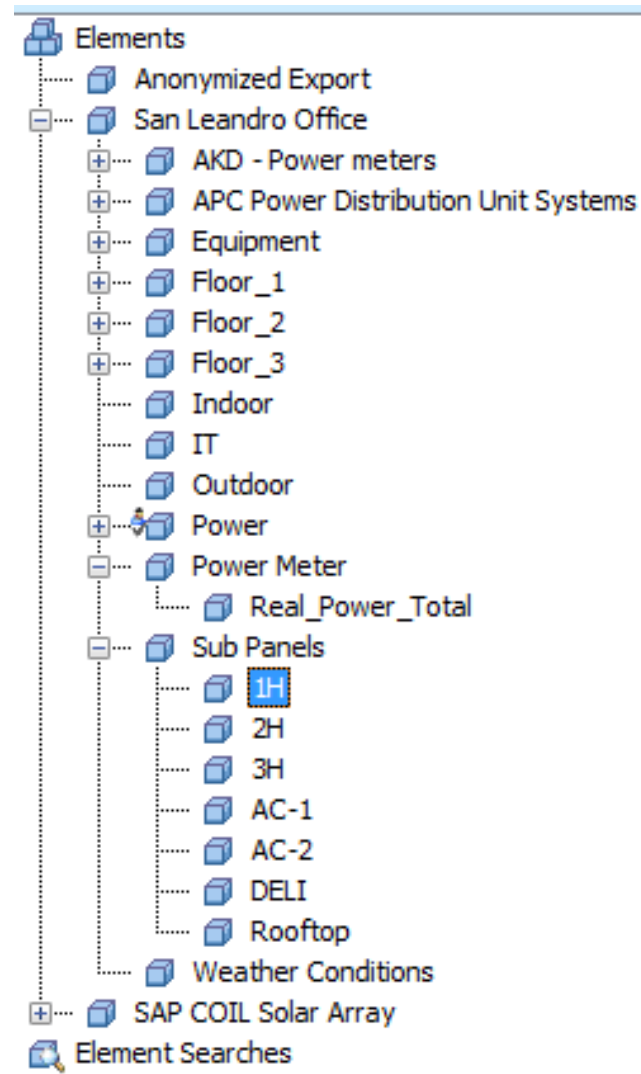
Sub Panels

3 Floors

2 AC Units

1 Roof

1 Commercial Kitchen



General Child Elements Attributes Ports Analyses Version			
Filter			
		Name	Value
Category: <None>			
		Energy (Apparent)	533686528 VAh
		Energy (Reactive Delivered)	44902680 VARh
		Energy (Reactive Received)	17644520 VARh
		Energy (Real Delivered)	502826784 Wh
		Energy (Real Received)	0 Wh
+		Phase A	
+		Phase B	
+		Phase C	
		Power (Apparent)	19503 VA
		Power (Reactive)	-246 VAR
		Power (Real)	19503 W
		Power Factor	0.999915361404419 %



Demo

Other considerations

- Build a business case first. Evaluate technology second.
- Establish trust between data providers and data users
 - Governance, security, sign off
 - Data lifecycle management
- Know your end to end data flows
 - Use process to supplement technology
- Utilize OSIsoft and partners. We're here to make your first project successful.

Scalability – Scales via Quantity of Assets

No Guidance Required

- < 10,000 Assets with 10 tags each (100,000 output streams)

- < 1,000 Assets with 100 tags each

- < 100 Assets with 1000 tags each

Seek Guidance (Multiple Instances)

- > 10,000 Assets

- > 100,000 Output Streams



Roadmap

Problem Complexity Drives the Need for Integrators

Disparate assets or interacting one-by-one

Interacting with common assets as a fleet

System Optimization

Benchmarking

Process Optimization

Monitoring

Real-time visibility



- HMI

Real-time & historical view across any plant asset



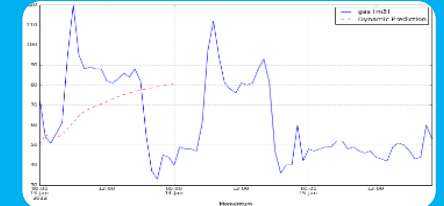
- PI ProcessBook
- PI Coresight
- PI Datalink

Fleet-wide performance comparison



- BI App (i.e. Tableau, Spotfire, Lumira)
- PI Integrator for Business Analytics
- PI Integrator for SAP HANA

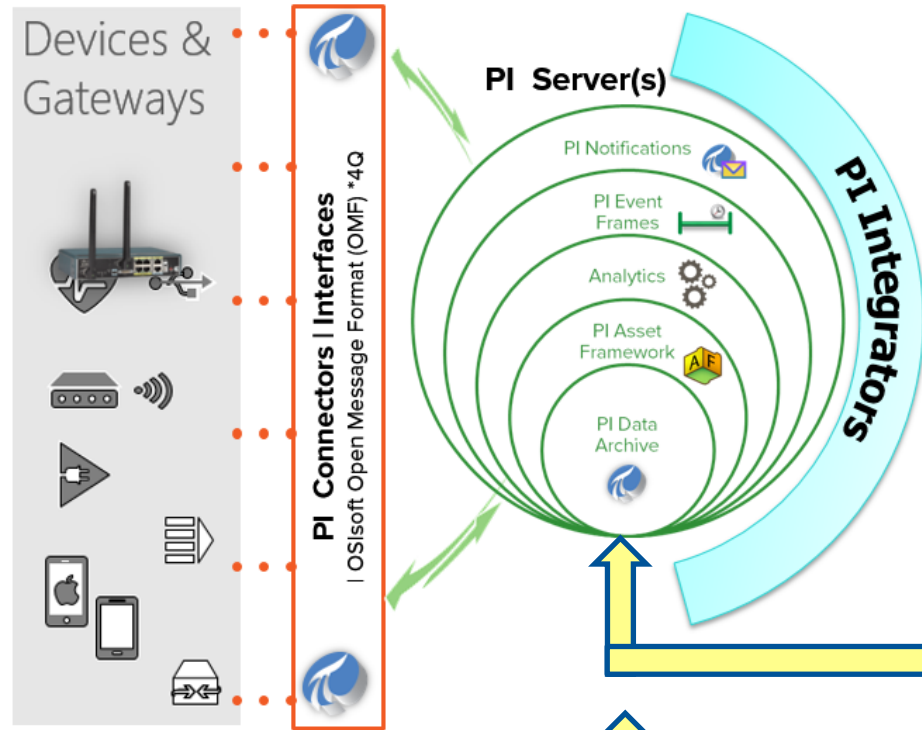
Large scale multi-variate analysis



- Machine Learning (Azure ML, R)
- PI Integrator for Business Analytics
- PI Integrator for SAP HANA

Complexity

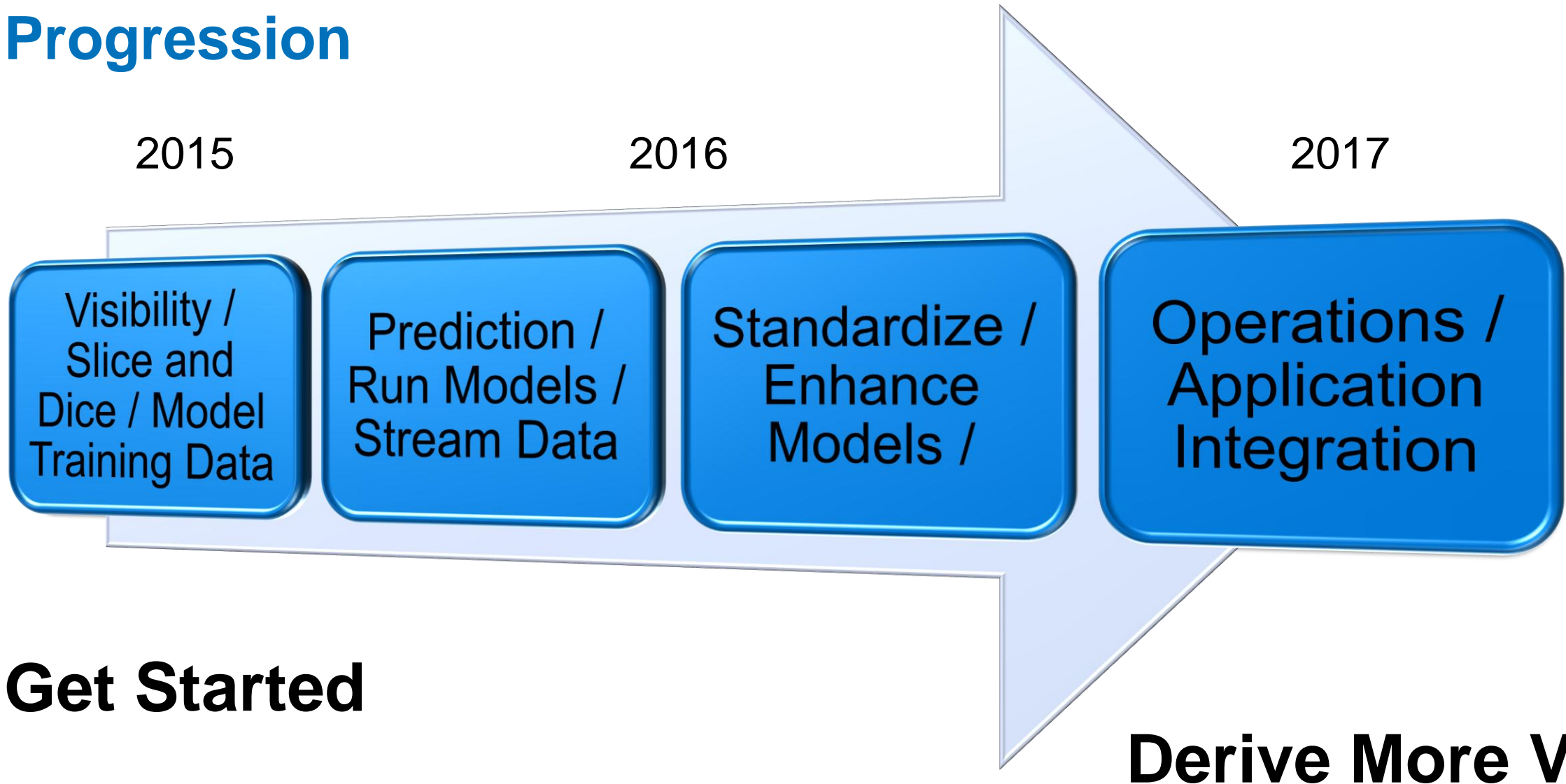
PI Integrator for SAP HANA



Full platform coverage for all data integration scenarios

Data Access Pattern	Product / Feature Roadmap	Databases and Applications
Query Data (API)	Planned 2017	<div> <div>HANA Database</div> <div>Smart Data Streaming</div> <div>SAP HANA Platform Edition</div> <div>SAP HANA Cloud Platform</div> </div>
Pull Data (Federated)	SAP IoT Connector (Smart Data Access)	Lumira Vora S4 Etc.
Publish Data (Push)	PI Integrator for SAP HANA 2015R2	
Stream Data (Stream Events)	PI Integrator for SAP HANA 2016	
Receive Data (Predictions)	PI Integrator for SAP HANA 2016	
Receive Metadata (Assets / PM)	Planned 2017	

Progression



Get Started

Derive More Value

More systems, less systems management

	2015	1H-2016	2H-2016
Business Intelligence & Data Warehouses	<div>Available Today</div> <div>Scalable BI for the PI System</div> <div>Initial Release</div> <ul style="list-style-type: none">Fleet Asset ReportingReduce Reporting TimeIntegrate w/ Data Warehouse	<div>Planned</div> <div>Expanded Systems and Events</div> <div>May 2016</div> <ul style="list-style-type: none">OracleHadoop (HIVE & HDFS)Event Frames	<div>Planned</div> <div>Scale</div> <div>High Availability</div> <div>Backfill and OOO data</div>
Streaming Systems		<div>Research</div> <div>Streaming Pattern</div> <div>Market Problems</div> <ul style="list-style-type: none">External Computing and Event PlatformsApp Specific Data Shapes (JSON/XML)	<div>Planned</div> <div>Stream Systems</div> <div>Initial Release</div> <ul style="list-style-type: none">Azure Event & IoT HubKafkaCustom Data Output

Streaming Lighthouse Program

Problems

- Real-time predictions and models
- Alerting and pushing data out
- Feeding a data lake with streams
- Real-time GIS visualization

Platforms

- Kafka
- SAP Smart Data Streaming
- Azure Event Hub / Azure IoT Hub
- JSON, XML, PMML, XSD



- Leave Contact Info
 - Card
 - E-mail
- Engage in late Q2 and early Q3
- Urgency Required

Contact Information

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OSIsoft, LLC



Questions

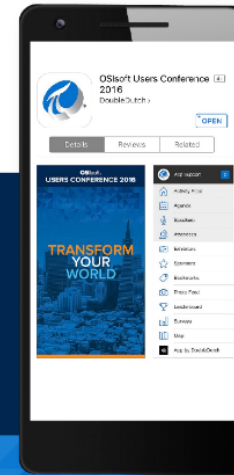
Please wait for the **microphone** before asking your questions



State your **name & company**

Please remember to...

Complete the Online Survey for this session



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감사합니다

谢谢

Danke

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado

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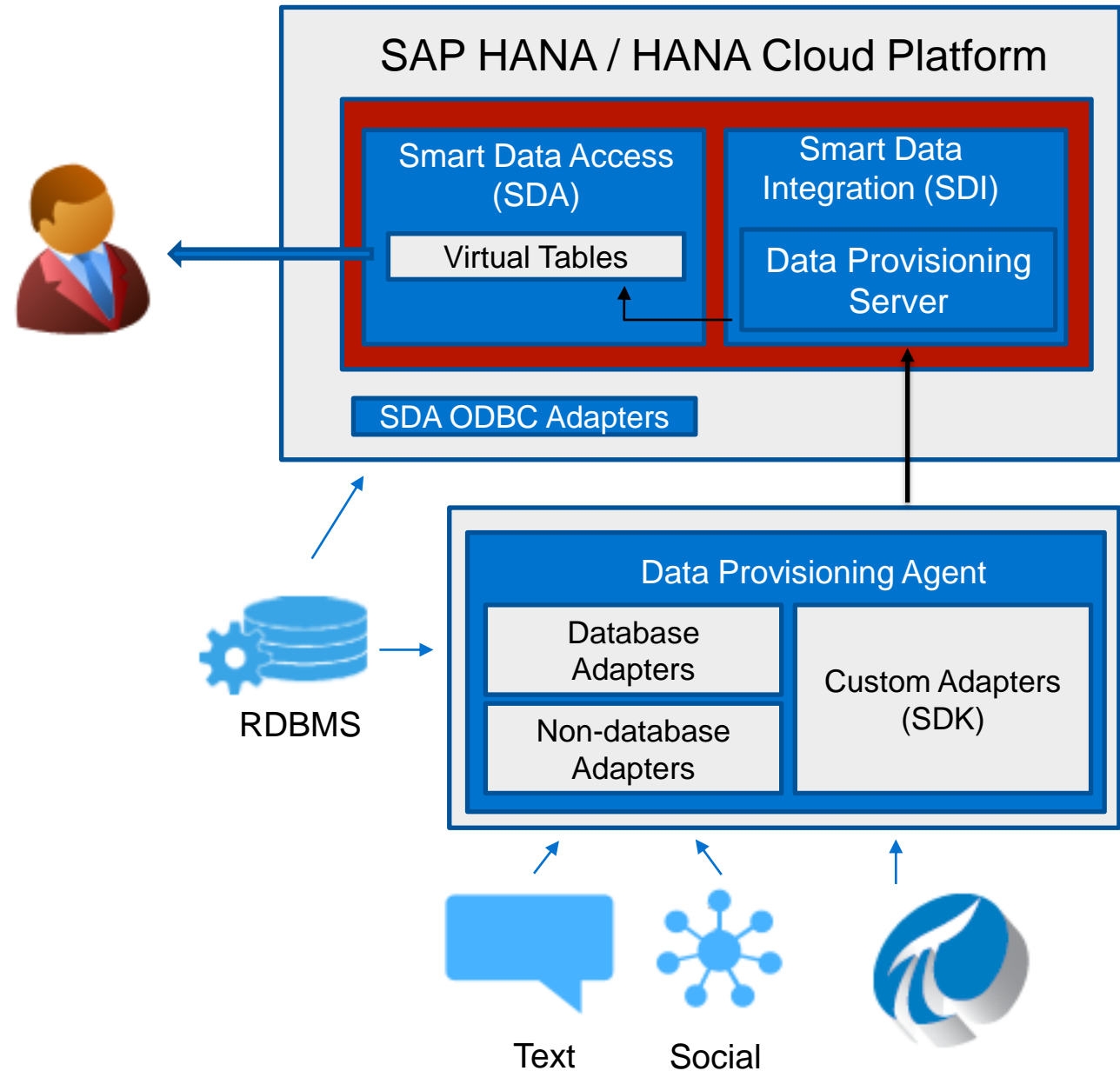
Federated Data Model

Virtual Tables

- Data stays in source by default
- Balance Performance / Storage

Best For

- Maximum control over data
- Limiting HANA Memory Usage
- Smaller Datasets



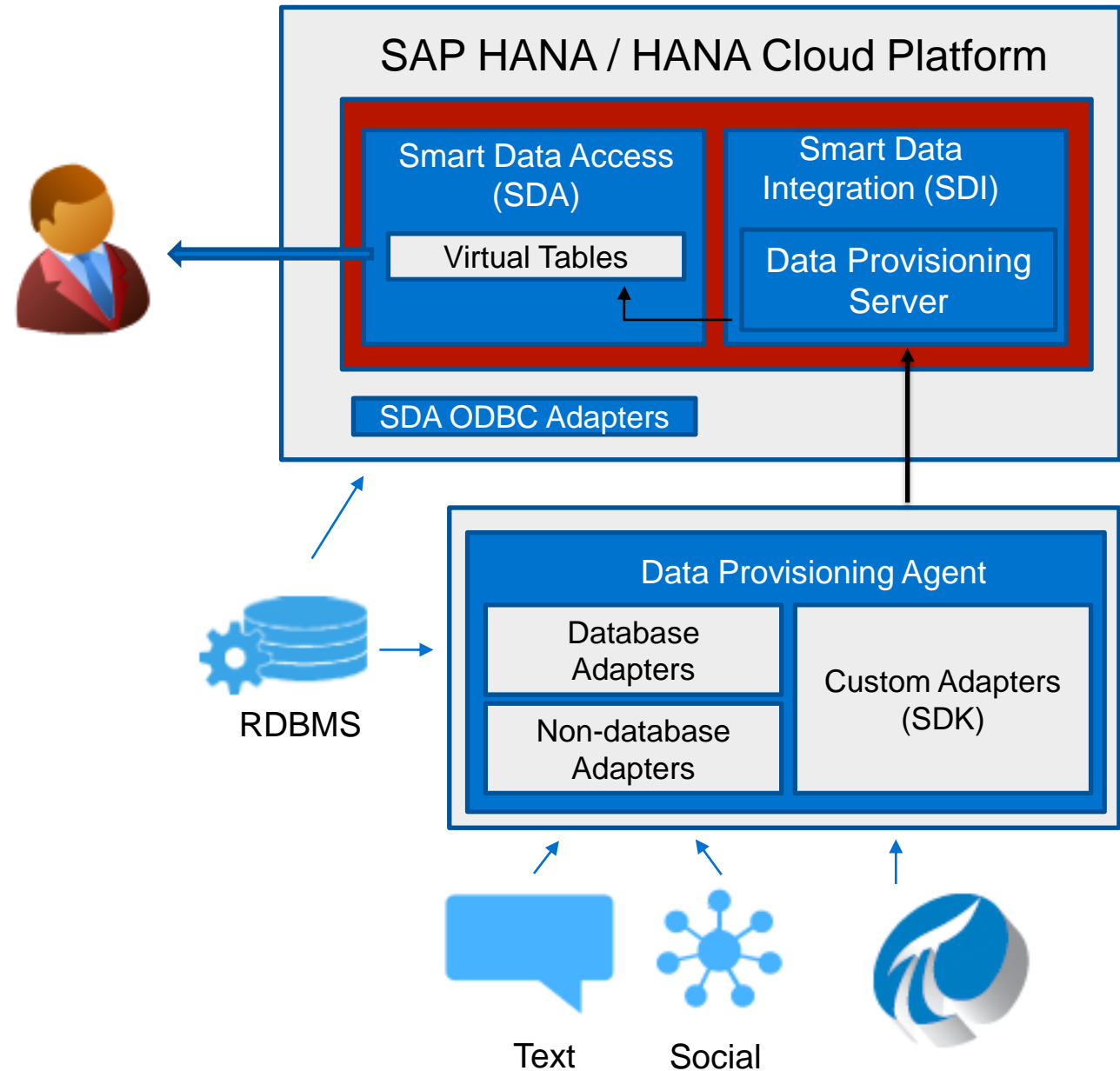
PI Views (ODBC Access)

Virtual Tables

- Data managed by PI System
- Balance Performance / Storage

Best For

- Workgroup level BI and Reports
- Smaller Datasets



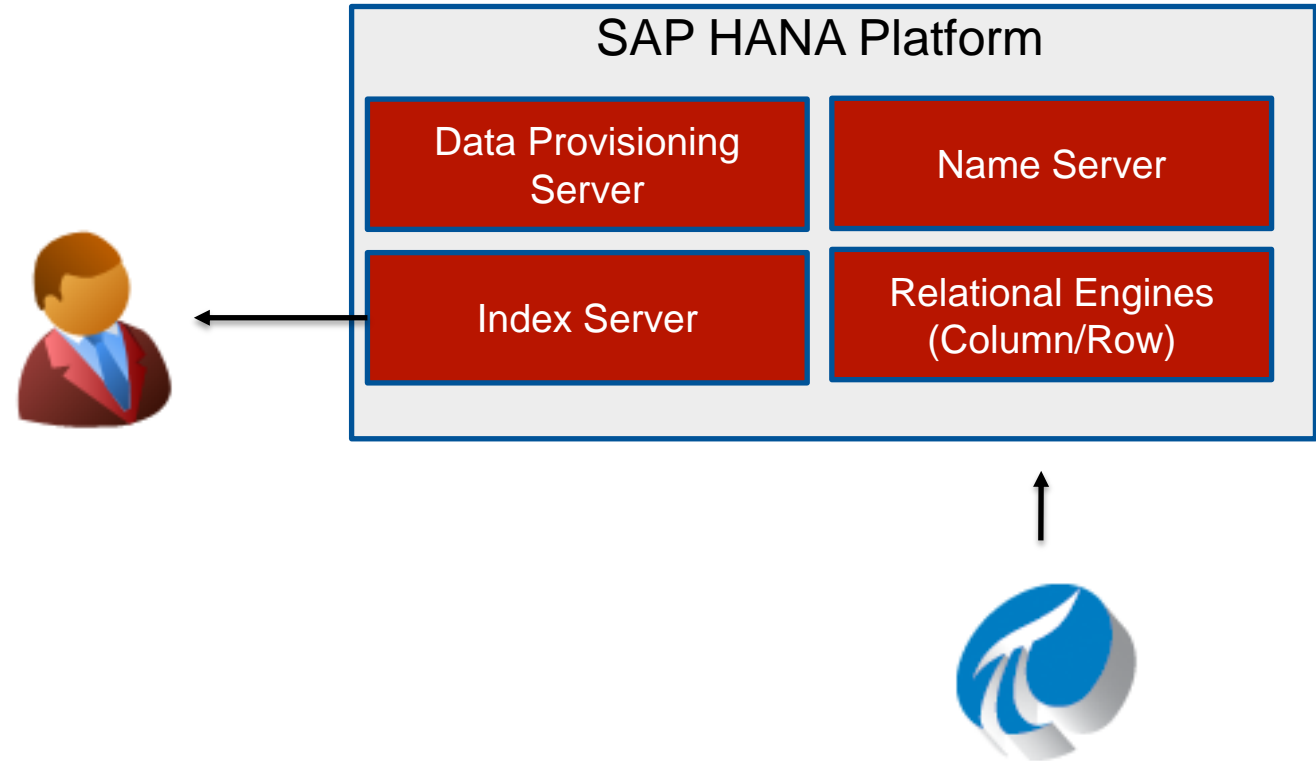
Direct Data Model (On premises)

HANA Tables

- Data is materialized in memory

Best For

- Highest Performance
- Large Datasets



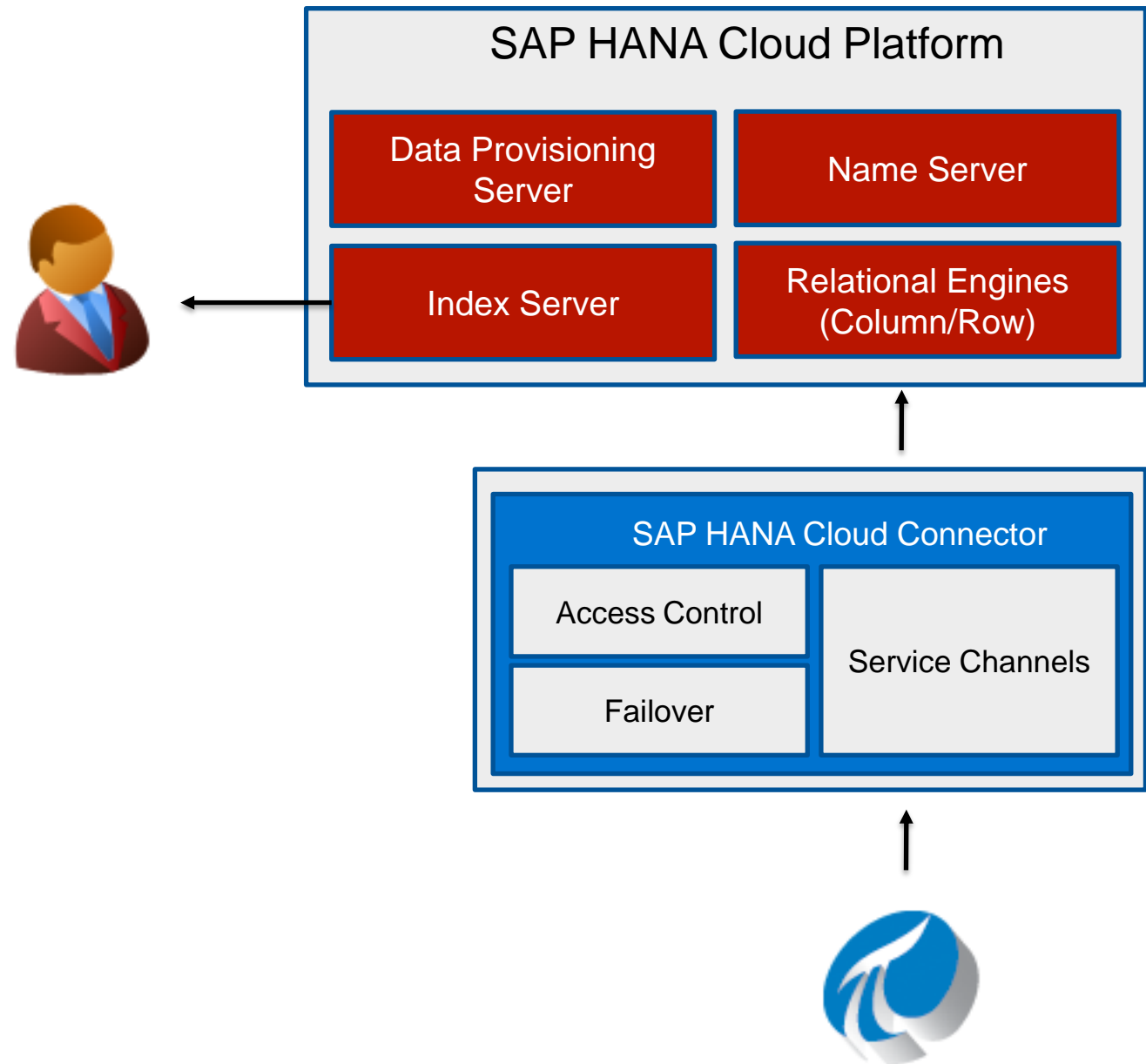
Direct Data Model (Cloud)

Virtual Tables

- Data stays in source by default
- Balance Performance / Storage

Best For

- Maximum control over data
- Limiting HANA Memory Usage



Agenda

- Why Are We Here?
 - IT OT Challenges
 - Common Use Cases
 - Product Demo
- Scenarios
 - Best Practices
 - Organizational Challenges
- Roadmap
- Q&A

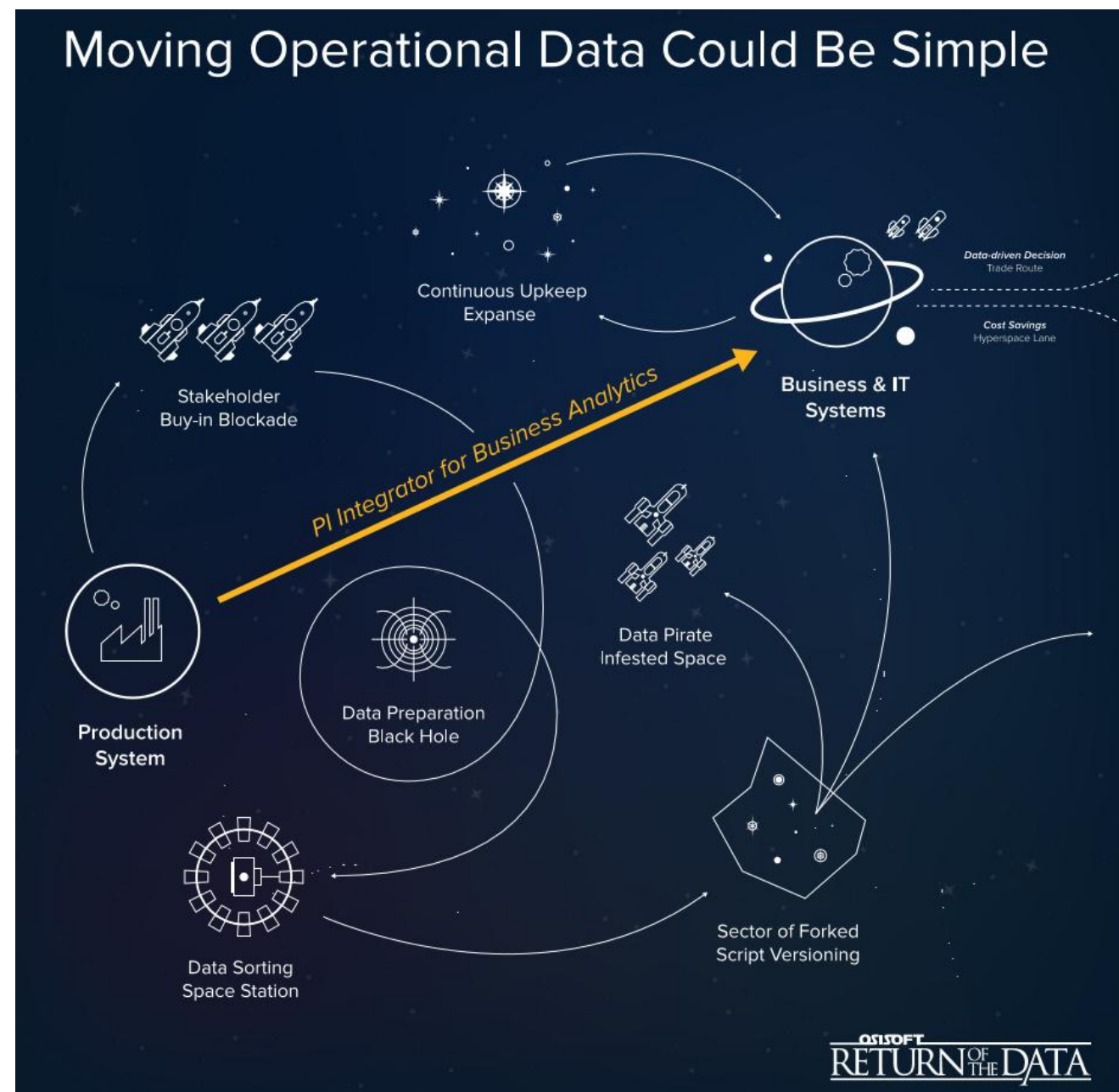


Simplify

Eliminate Custom Code

Transcend Organizational
Data Problems

Accelerate Insights and
Cost Savings



FAQs

- How do I size?
 - Method 1: # of Assets * # of Tags for analysis
 - Method 2: 20-50% of PI Data Archive Size
- How do I track?
 - Binary Restricted
 - Measured in product in Administration → Licensing
- Can I re-use or recover streams?
 - Once a stream is in a view it is counted against license
 - It can be used in multiple views
 - If a stream is not used in any views for 90 days, it may be recovered manually.

PI Integrator for Business Analytics

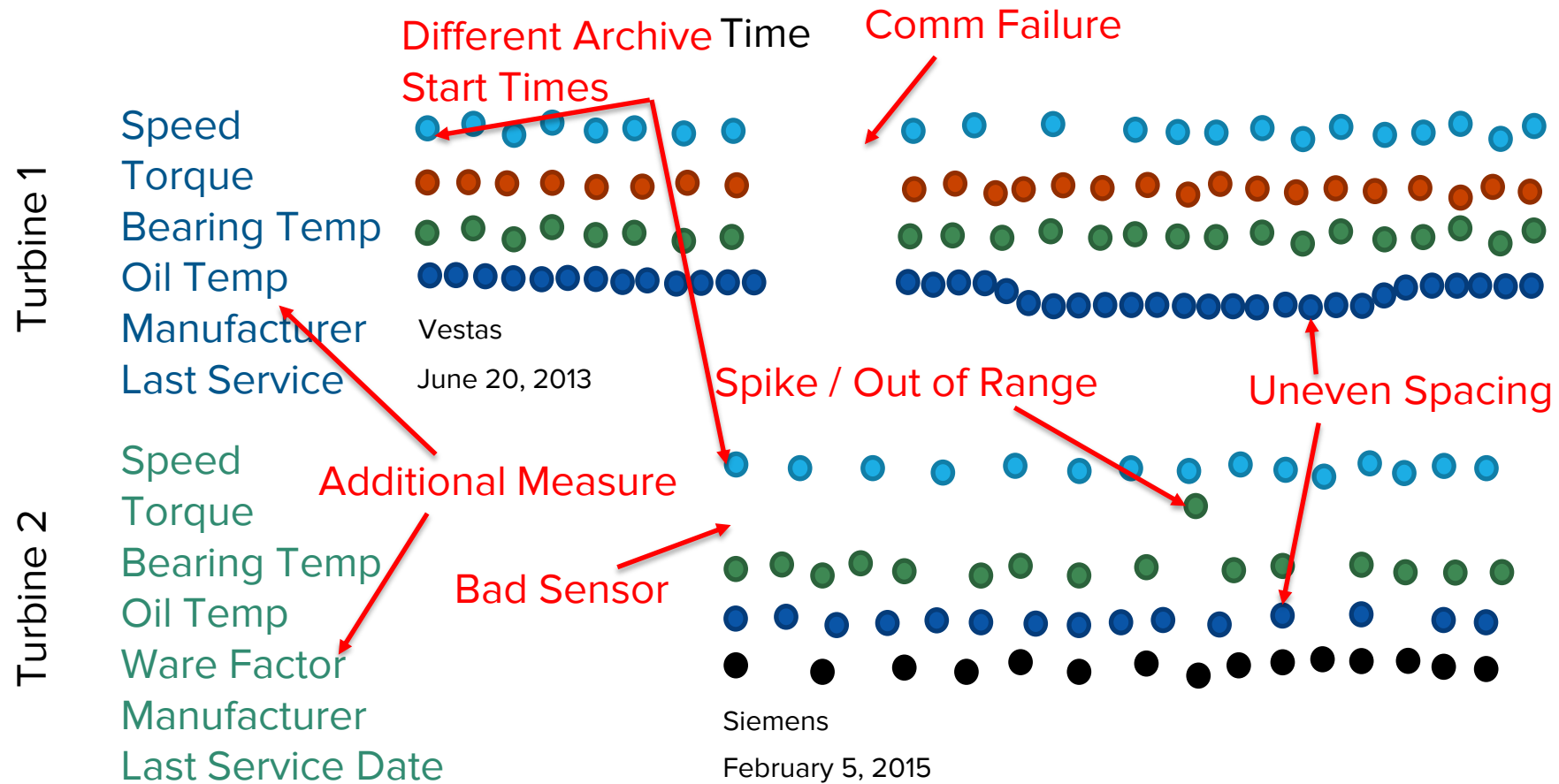


**Self Service
Access** for
operational data

**Decision Ready
Data** for Business
Intelligence and
Data Warehouses

**Broad Platform
Support and
Scale**

Save Time, Handle Complexity



Consumption Reporting

Business Driver

Deliver 5 minute data directly from the field to the Enterprise Data Warehouse so that it can be used for:

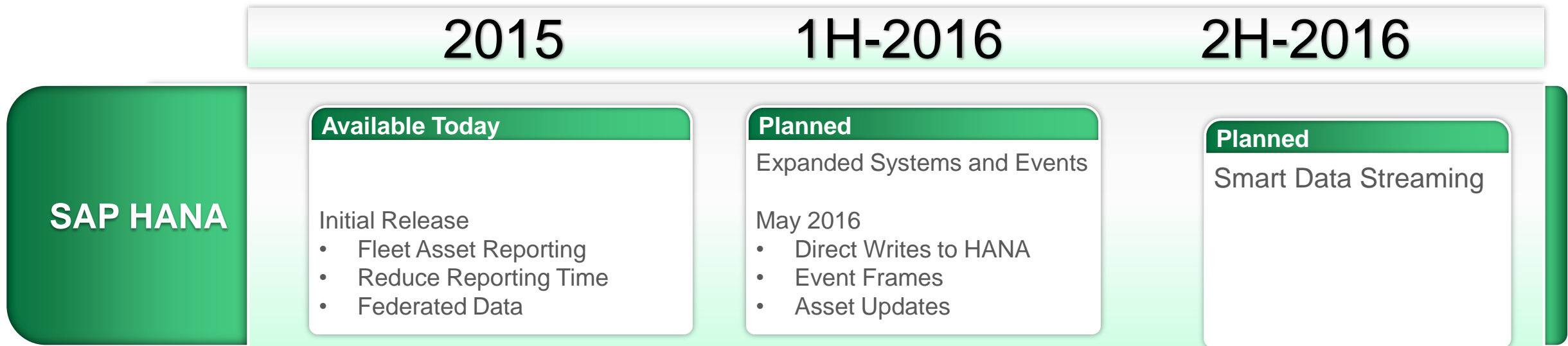
- 1) Detailed Consumption Reporting so that the business can close the books 5 days earlier.
- 2) Asset optimization.

Detailed Technical Requirements

- ✓ Send data to SQL Server and Hadoop (Hive)
- ✓ Handle late arriving data
- ✓ Deliver one version of the truth (same data)
 - Performance and data validation
 - Handle diverse equipment across sites
 - Federated and Centralized PI Servers
 - Merge and join data with other sources

Switch to Demo

SAP HANA - Less management, streaming, predictions





People