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USERS CONFERENCE 2012

The Power of Data



Business agility through PI System integration with SAP, Maximo and other business systems

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This talk is in 2 parts

Line of Business(LoB) Integration

- What, Why, How...
- Using PI Event Frames for “transactions” in LoB integration

Using the PI System with

- SAP HANA
- SAP BusinessObjects

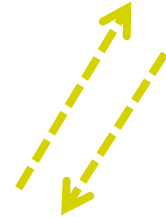
Q & A

Production Maintenance Inventory Quality








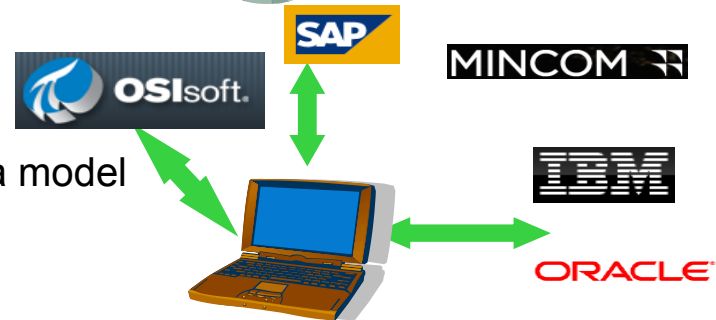
Business Integration - What?

- Data/Event integration (transactions)
 - 1000s/day
 - small amounts of data (per transaction)
- Visual integration
- Business Intelligence + Reporting (not covered in this talk)



Business Integration – What (Data, Event, Visual)

- Data - motor run-hours (once a day) 
- Event - motor vibration (on alert)  
- Event - raw material consumed, goods produced 
- Data - lab data (pH, density...) for a batch 
- Visual integration
 - shared asset naming convention or data model
 - Loosely coupled URLs



Business Integration – asset naming convention

Assets in Maximo

The screenshot displays the IBM Maximo AF - PI System Explorer interface. A yellow callout bubble points to the 'Assets' tab in the top left. The main window is divided into three panes:

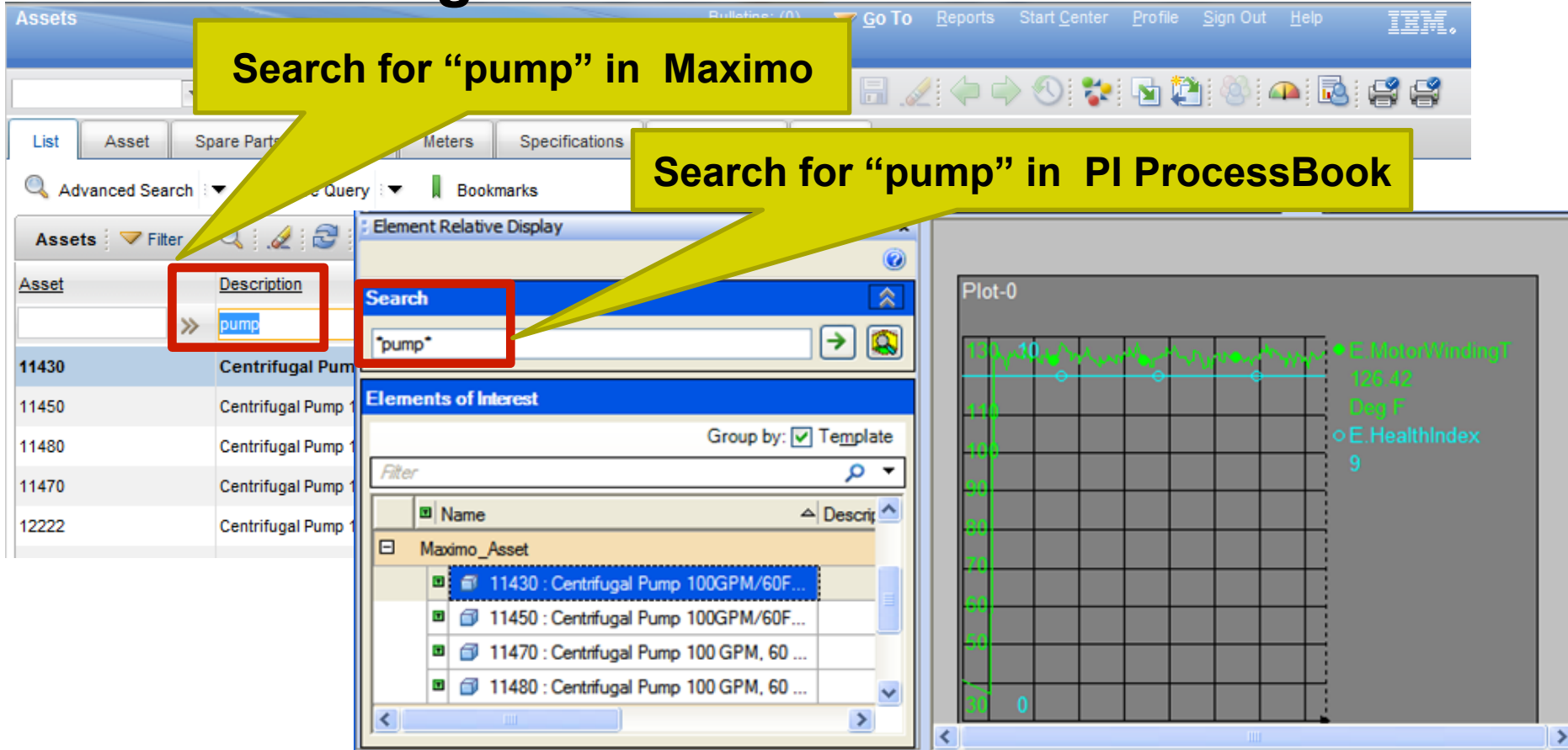
- Left Pane (Assets):** A table listing assets with columns 'Asset' and 'Description'. The asset '11210' is highlighted, corresponding to 'Circulation Fan- Centrifugal/ 20/000 CFM'.
- Middle Pane (Elements):** A tree view titled 'Maximo_Eqpt_List' showing a hierarchy of equipment. The selected element is '11210 : Circulation Fan- Centrifugal/ 20/000 CFM'.
- Right Pane (Form):** The 'General' tab for the selected element. It shows the 'Name' as '11210 : Circulation Fan- Centrifugal/ 20/000 CFM', the 'Template' as 'Maximo_Asset', and the 'Default Attribute' as 'assetnum'. There are links for 'Extended Properties' and 'Find' (Parents, Models, Layers, Connections, Analyses, Notifications).

Asset	Description
11200	HVAC System- 50 Ton Cool Cap/ 450 Heat Cap
11210	Circulation Fan- Centrifugal/ 20/000 CFM
11211	Motor Starter- Size 2/440v/3ph/60cy
11220	Electrical Control Panel- HVAC System
11230	Emergency Generator
11240	Circulation Fan- Centrifugal/ 20/000 CFM
11250	Circulation Fan- Centrifugal/ 20/000 CFM
11300	Reciprocating Compressor- Air Cooler
11340	Motor Starter- Size 4/NEMA 12/440v
11400	Boiler- 50,000 Lb/Hr/ Gas Fired/ Water Tube
11430	Centrifugal Pump 100GPM/60FT HD
11450	Centrifugal Pump 100GPM/60FT HD

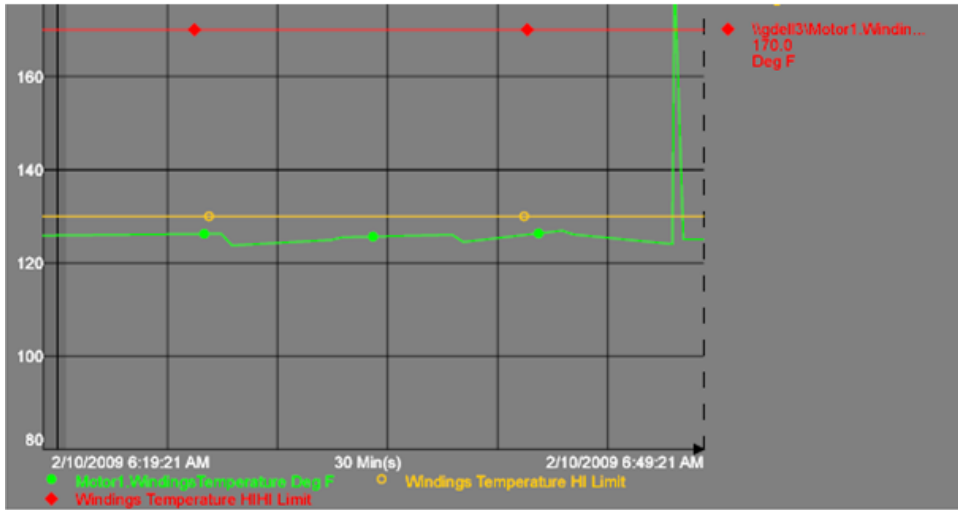
Business Integration – shared asset names

Search for “pump” in Maximo

Search for “pump” in PI ProcessBook



Business Integration – shared asset names



Maximo Work Orders

Equipment	WoNum	PM	Description	Status	StatusDate	Location	ReportedBy	Re
11430	1668		HiTempAlert	COMP	12/8/2008 10:22:18 AM	BR430	WILSON	12/10/2008 10:22:18 AM
11430	1666		HiTempAlert	COMP	11/21/2008 10:21:53 AM	BR430	WILSON	11/21/2008 10:21:53 AM
11430	T1573		Check pump operation.	WSCH	5/2/2008 1:33:34 PM	BR430	MAXADMIN	5/2/2008 1:33:22 PM
11430	T1574		Check pump float switch.	WSCH	5/2/2008 1:33:34 PM	BR430	MAXADMIN	5/2/2008 1:33:23 PM
11430	T1575		Check seal and housing for leaks.	WSCH	5/2/2008 1:33:33 PM	BR430	MAXADMIN	5/2/2008 1:33:23 PM

PI Coresight™
homepage

New Undo Redo Messages

Home ▶ DFPIAF ▶ PIML2 ▶ Maximo_Eqpt_List ▶

Search in Maximo_Eqpt_List

- 11220 : Electrical Control Panel- HVAC System
- 11230 : Emergency Generator
- 11240 : Circulation Fan- Centrifugal/ 20/000 CFM
- 11250 : Circulation Fan- Centrifugal/ 20/000 CFM
- 11300 : Reciprocating Compressor- Air Cooled/1
- 11340 : Motor Starter- Size 4/NEMA 12/440v/3p
- 11400 : Boiler- 50,000 Lb/Hr/ Gas Fired/ Water T
- 11430 : Centrifugal Pump 100GPM/60FT HD
- 11450 : Centrifugal Pump 100GPM/60FT HD1

Maximo Work Orders for “pump” 11430 in SharePoint using PI Web Parts

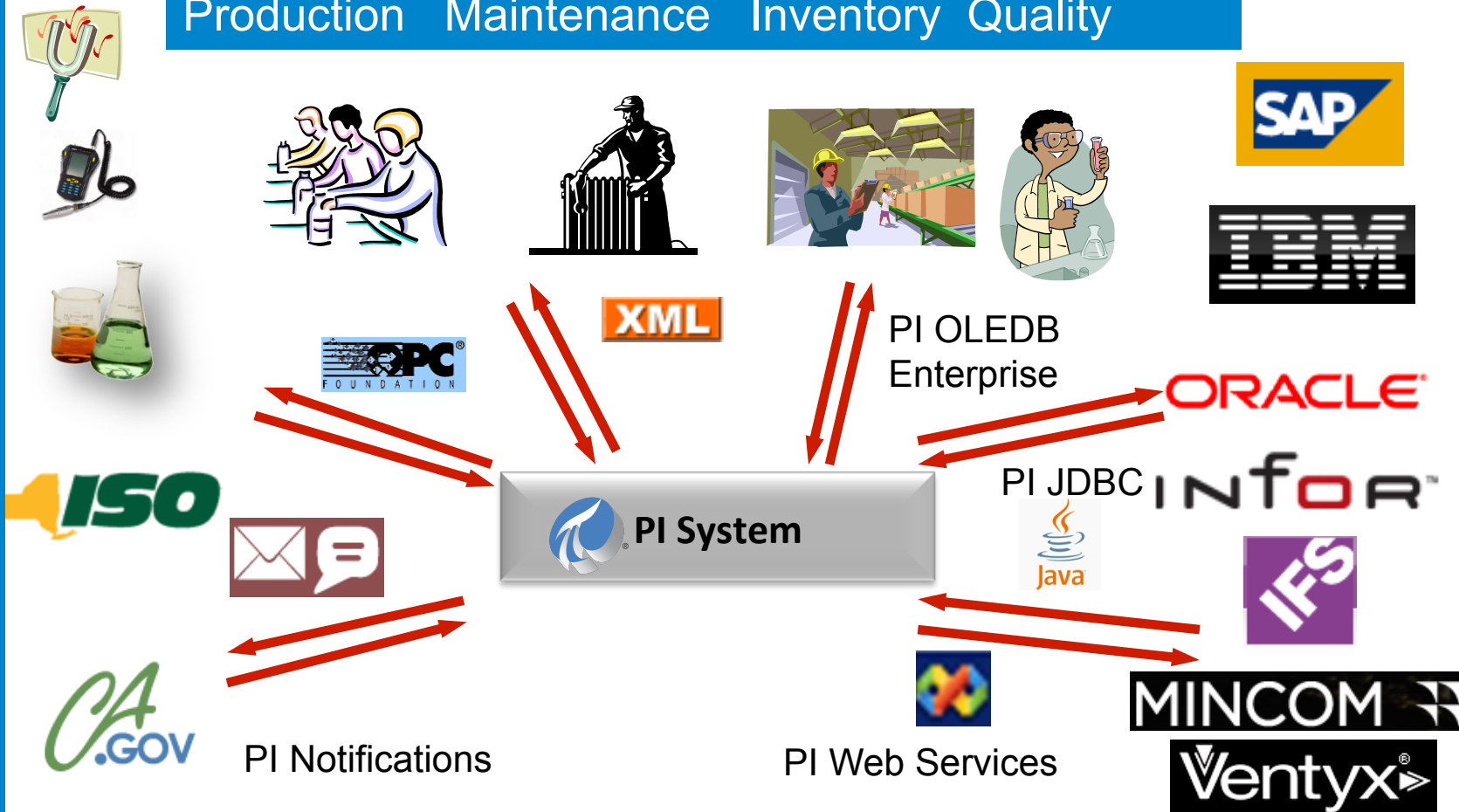
Business Integration – Why

Enable business agility (time enough to act)

- Available-to-promise (ATP), better inventory, visibility into capacity
- Condition-based maintenance (CBM) for better asset reliability, reduce maintenance cost
- Quality – compare production runs, close out orders faster
- Visual – visibility into PI System data throughout the enterprise



Production Maintenance Inventory Quality



PI Data Access family of products



PI System Access (PSA) license



Previous talks...



- Condition-based maintenance for better asset reliability (Maximo)
 - GenPower & DTE Energy (power industry)



- Production Costing
 - RockTenn (paper industry)



- Quality (SAP)
 - Klabin (paper industry)



Examples – previous talks

- UC 2009
 - [Using PI to Back-Test Usage and Condition Based Maintenance Strategies to Predict Quantifiable Benefits Prior to Deployment in Asset Management](#)
- UC 2010
 - [Enterprise Integration and PI Data Access](#)
- UC 2011
 - [Using PI System Data and Events in your Enterprise and Line of Business Systems](#)
- vCampus Live 2010
 - [Enterprise Business System Integration Using PI Data Access](#)
- vCampus Live 2011
 - [Hands on Lab - SAP and Maximo integration using Web Services and PI Notifications](#)

Business integration – via event frames

Integration w/Production
(SAP PP/PI)



Microsoft®
BizTalk® Server

Microsoft SAP Adapter



PI System

Message Monitor: Display Message

Plant 1100
Proc.Message Cat. PI_CONS
Sender OSI_GOPAL
☐ Test

Message characteristics

Characteristic	R..	T	V	Char. Value
PPPI_PROCESS_ORDER	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	70001263
PPPI_EVENT_DATE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	11.04.2012
PPPI_EVENT_TIME	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	10:17:00
PPPI_OPERATION	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1000
PPPI_PHASE	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1010
PPPI_MATERIAL	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	T-IC-R3006
PPPI_MATERIAL_CONSUMED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	4.0000
PPPI_UNIT_OF_MEASURE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	I

SAP Process Order (control recipe)

The screenshot displays the SAP Process Order interface. The main window is titled "Display Process Order: Process Instruction Overview". It shows details for Process order 70001263, Material T-HV100, and Plant 1100. The process is a "Vanilla Mix" with a "Mixer" operation. The instruction number is 0020, labeled "ACONS_1", with a description "Goods issue (PCS interface example)".

Below the main details, there are two tables:

Process instructions

Numbe...	Proc.instr. category
0001	ZORD_1
0010	APHASE_1
0020	ACONS_1
0030	APROD_1
0040	ACRST_I
0050	APHST_I
0060	AMAT_1
0070	AMAT_1
0080	AMAT_1
0090	AMATP01

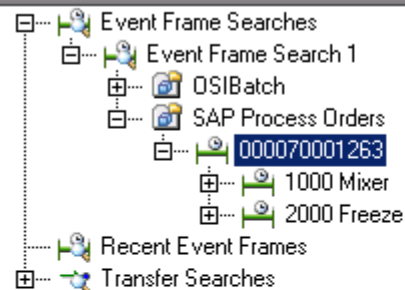
PI characteristics

Numbe...	Characteristic Name	Long t...	Au...	Val.as.	Characteristic value
0020	PPPI_MESSAGE_CATEGORY			✓	PI_CONS
0030	PPPI_PROCESS_ORDER		✓	✓	70001263
0040	PPPI_REQUESTED_VALUE			✓	PPPI_OPERATION
0050	PPPI_REQUESTED_VALUE			✓	PPPI_PHASE
0060	PPPI_REQUESTED_VALUE			✓	PPPI_MATERIAL
0070	PPPI_REQUESTED_VALUE			✓	PPPI_EVENT_DATE
0080	PPPI_REQUESTED_VALUE			✓	PPPI_EVENT_TIME
0090	PPPI_REQUESTED_VALUE			✓	PPPI_MATERIAL_CONSUMED
0100	PPPI_REQUESTED_VALUE			✓	PPPI_UNIT_OF_MEASURE

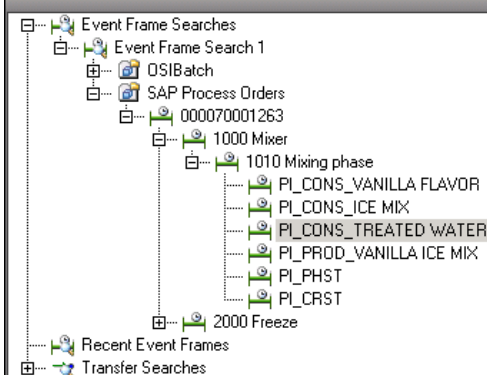
PI Event Frame with control recipe

Event Frames

000070001263



Event Frames



Elements

Event Frames

PI_CONS_TREATED WATER

General Child Event Frames Referenced Elements Attributes

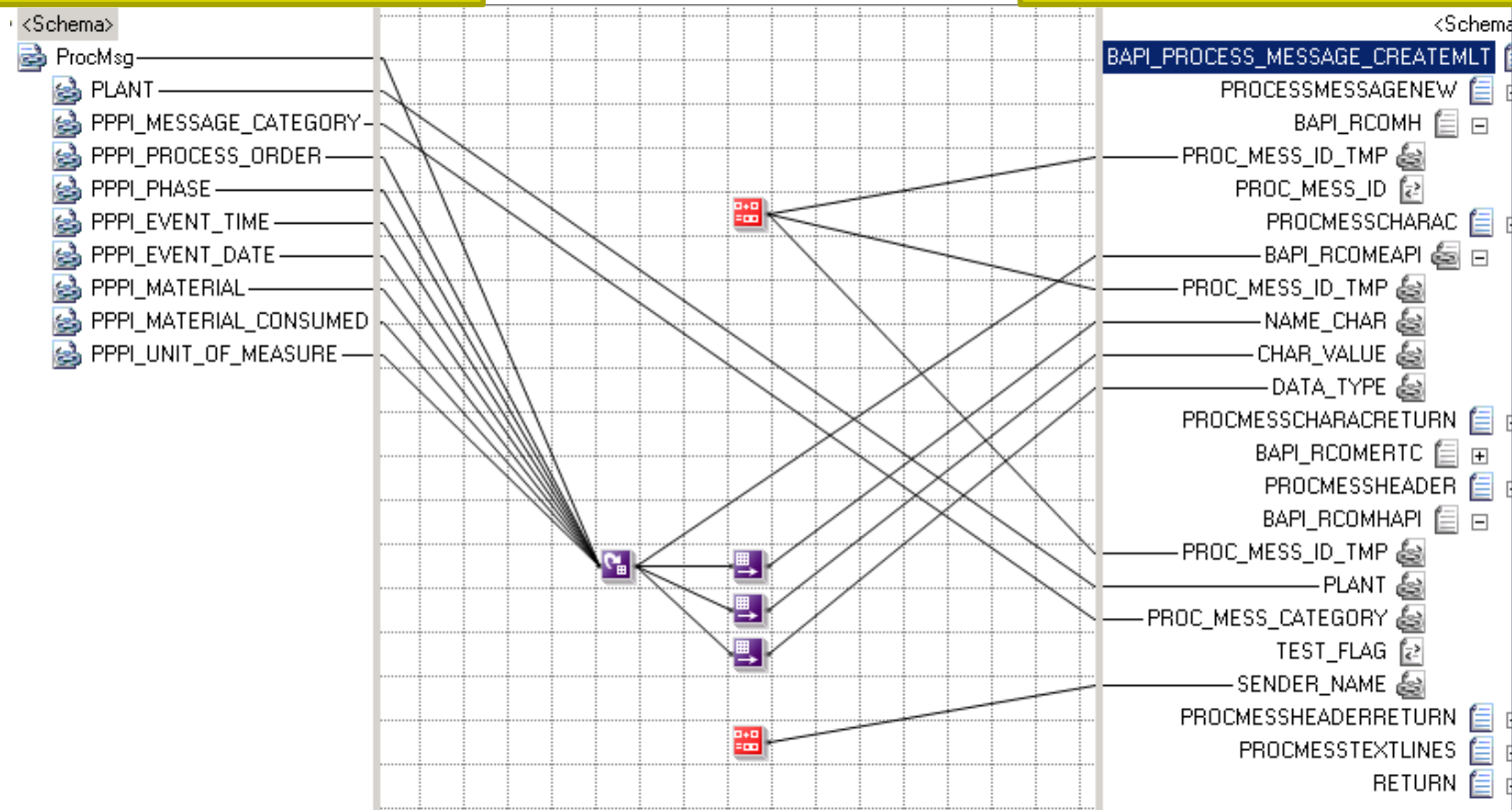
Filter

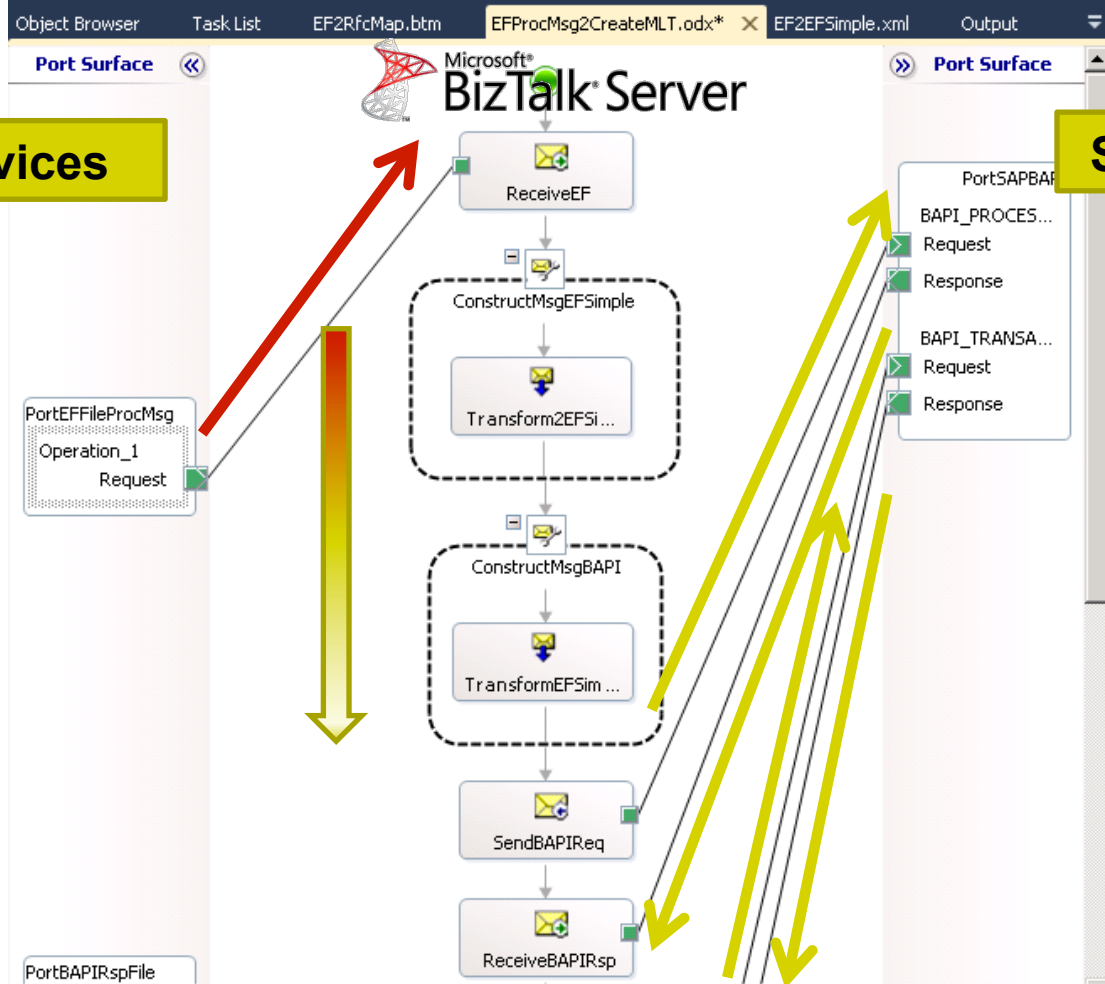
Name	Value
Category: <None>	
PPPI_MATERIAL_QUANTITY	5
PPPI_MATERIAL_TEXT	TREATED WATER
Category: PPPI_MESSAGE	
PPPI_EVENT_DATE	END_DATE
PPPI_EVENT_TIME	END_TIME
PPPI_MATERIAL	T-IC-R3006
PPPI_MATERIAL_CONSUMED	4
PPPI_OPERATION	1000
PPPI_PHASE	1010
PPPI_PROCESS_ORDER	000070001263
PPPI_UNIT_OF_MEASURE	L
Category: PPPI_MESSAGE_HEADER	
PLANT	1100
PROC_MESS_CATEGORY	PI_CONS
SENDER_NAME	OSI_GOPAL
TEST_FLAG	X
Category: ReturnCode	
PROC_MESS_ID	0
RCODE	0

PI Web Services or a proxy



SAP Web Services





Business integration – via event frames

- Integration w/Production (SAP PP/PI)



- Process Order Message

- Control Recipe hierarchy (in event frames)
 - Process Messages for **CONS** PROD, PHASE_STATUS...
 - PI Web Services & SAP Web Services (RFCs, BAPIs...)
 - Microsoft BizTalk as the middleware with Microsoft SAP Adapter



BAPI_PROCESS_MESSAGE_CREATEMLT
BAPI_PROCORDCONF_CREATE_TT

Process Message Create Multiple
Process Order Confirmation Time Ticket

Takeaways – Line of Business integration

- What, Why, and How
- <http://vCampus.osisoft.com>
 - Users Conference 2012 Special
 - 45 day free trial subscription for new members
 - At the Social Networking Lounge (Yosemite)
- Other topics
 - Using SAP, Maximo, Oracle, Infor... asset master data in the PI System
 - Visual integration (shared asset naming conventions, data models, loosely coupled URLs...)
 - Business Intelligence, Reporting
(SAP BusinessObjects, SAP Crystal Reports, IBM Cognos, SAS...)



Using the PI System with SAP HANA SAP BusinessObjects

Whether you have a PI System for a single facility...



Or a federated PI System managing data from a global fleet of operational assets...

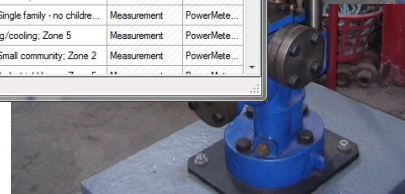
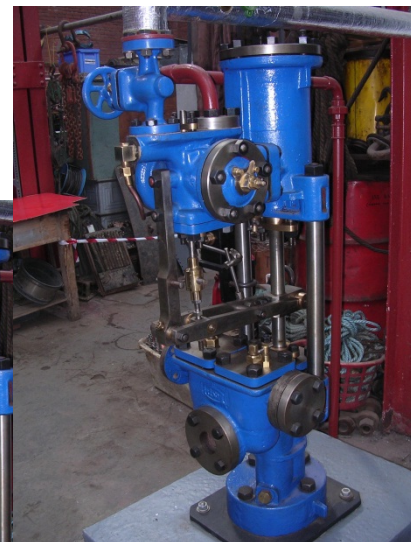


How can you glean more power from your data?



...of course you start with an AF model to map raw data tags to physical assets

Name	Description	Category	Type	Template
AMI Demo Elements				
1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	...
Next				
Arizona	Non physical entity d...		Other	Area
By household categories	Model use to define ...		Other	Hierarchical...
By industries	Model use to define ...		Other	Hierarchical...
California	Non physical entity d...		Other	Area
San Diego	Geographical location		Node	Location
District 01	Non physical entity d...		Other	Area
District 02	Non physical entity d...		Other	Area
District 03	Non physical entity d...		Other	Area
Neighborhood A1	Non physical entity d...		Other	Area
Neighborhood A2	Non physical entity d...		Other	Area
SD-03_A2-001	ABB power meter	Extended family: Gas heating/cooling; Household; Zone 3	Measurement	PowerMete...
SD-03_A2-002	GE power meter	Extended family: Gas heating/cooling; Household; Zone 4	Measurement	PowerMete...
SD-03_A2-003	Siemens power meter	Household: Single family - no children; Solar heating/cooling; Z...	Measurement	PowerMete...
SD-03_A2-004	Siemens power meter	Business: Geothemic heating/cooling; Industrial Super Heavy; ...	Measurement	PowerMete...
SD-03_A2-005	Siemens power meter	Business: Gas heating/cooling; Industrial Heavy; Zone 5	Measurement	PowerMete...
SD-03_A2-006	Siemens power meter	Electrical heating/cooling; Household; Single family - no childre...	Measurement	PowerMete...
SD-03_A2-007	ABB power meter	Business: Industrial Heavy; Solar heating/cooling; Zone 5	Measurement	PowerMete...
SD-03_A2-008	GE power meter	Electrical heating/cooling; Household; Small community; Zone 2	Measurement	PowerMete...



Broad Data Analysis

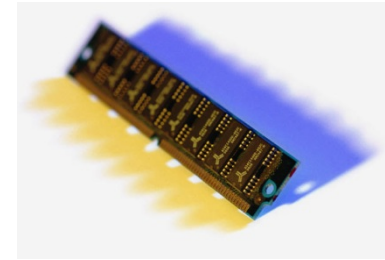
- Multi-dimensional arrays
- Complex relationship discovery
- Performance, productivity, efficiency, ...
- Reporting



Then, you may want to leverage 3rd party business analytics tools...

Such as SAP Business Objects on HANA

What is SAP HANA?



- High-performance ANalytical Apppliance
- In-Memory Relational Database
- No Star Schema. Lower TCO.
- Fast, Efficient Business Analytics on Big Data
- Today SAP HANA Natively Supports:
 - Netweaver BW
 - SAP BusinessObjects
 - Smart Meter Analytics
 - CO-PA Accelerator

SAP BusinessObjects BI 4.0

- Reporting
 - Crystal Reports, Excel
- Ad-Hoc Analysis
 - Explorer, Web Intelligence
- KPI's
 - Dashboard Design (Xcelsius)



Why SAP HANA and the PI System?

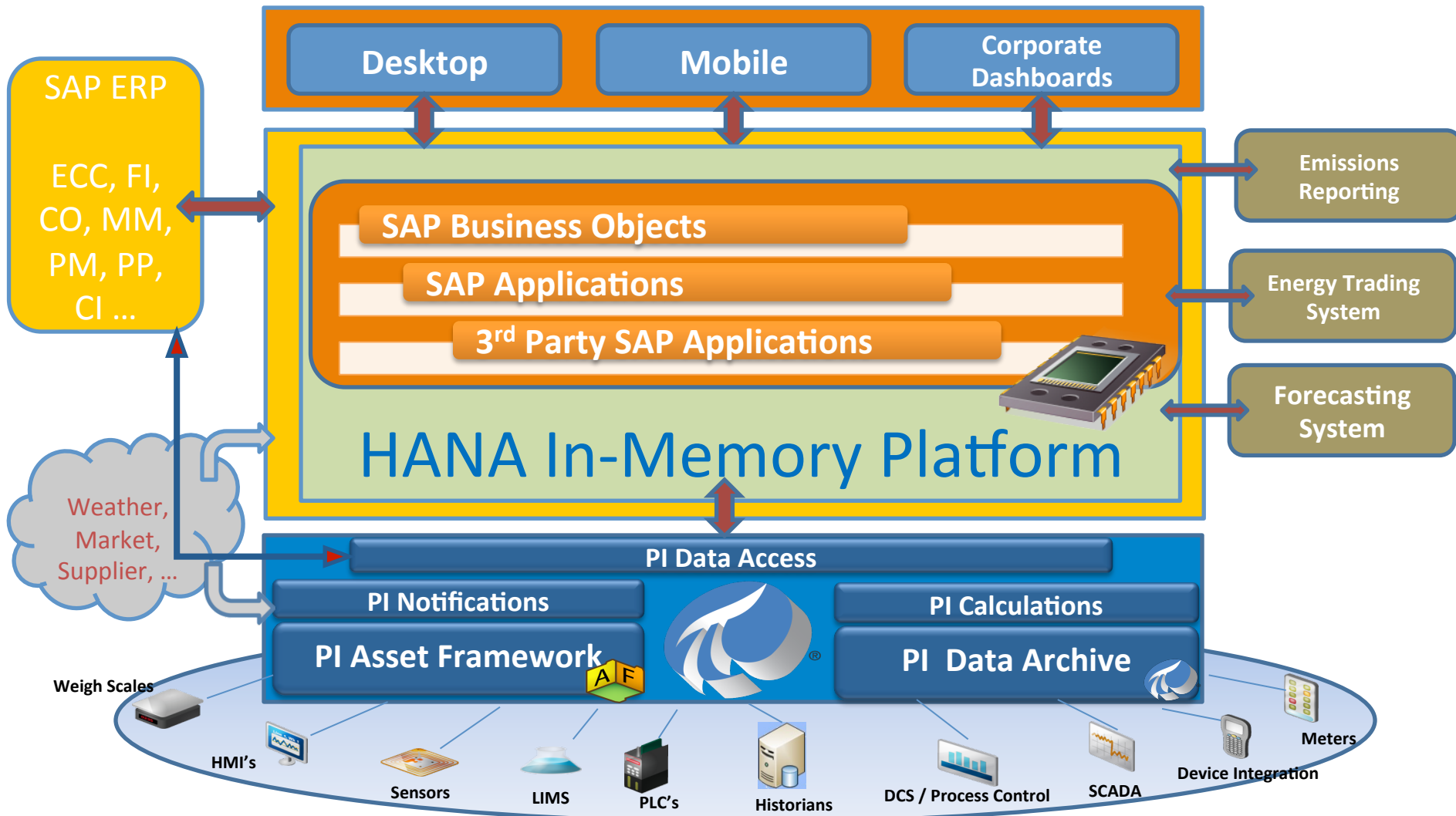
- PI System optimized for heterogeneous time-series data
 - Analyze individual data streams over long times
 - Gain deep insight on selected variables
- HANA optimized for wide relational queries
 - Analyze large volumes of data sources in homogeneous time
 - Gain broad insight about complex relationships

PI System and SAP HANA

Bring together large volumes of both PI System, SAP ERP and transactional data for BI and Analytics using BOBJ

- Enterprise Asset Management
 - Drive intelligent CBM
- Energy Management

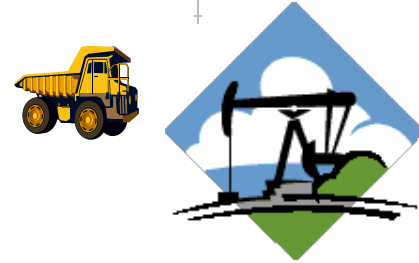
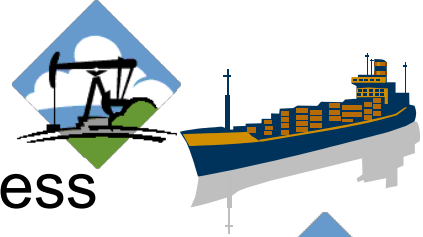




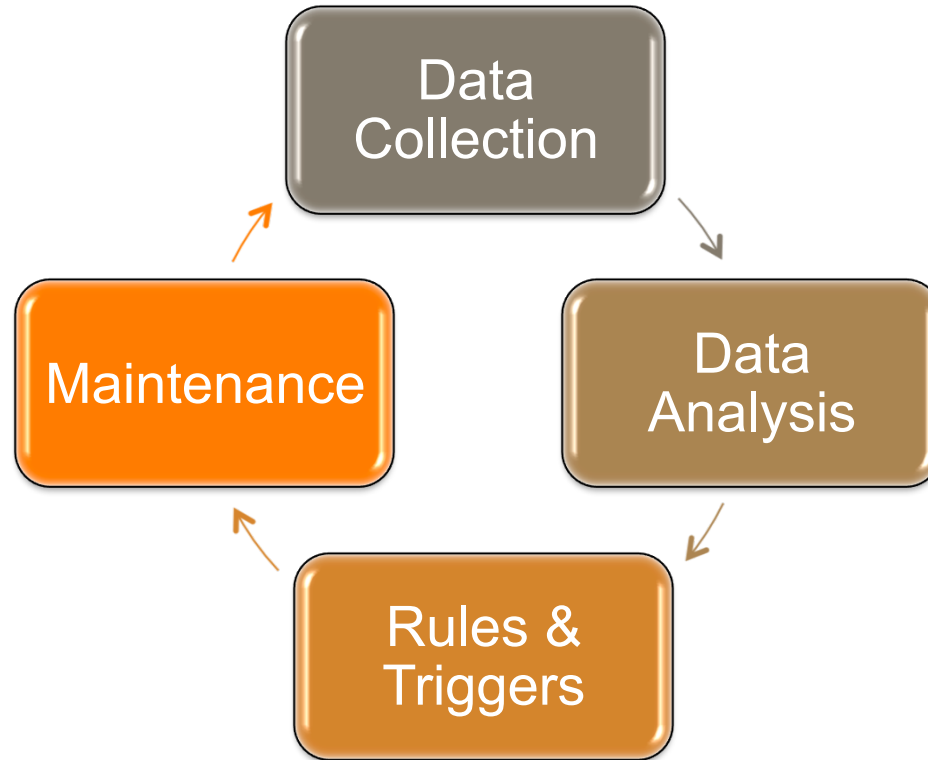
Enterprise Asset Management (EAM)

Investigate the performance of assets based on

- Equipment manufacturer
- Maintenance history
- Environmental Operating conditions
- Downtime and Overall Equipment Effectiveness
- Startups / Shutdowns
- Duration of out-of-band operation
- Shifts, days, operators
- ...

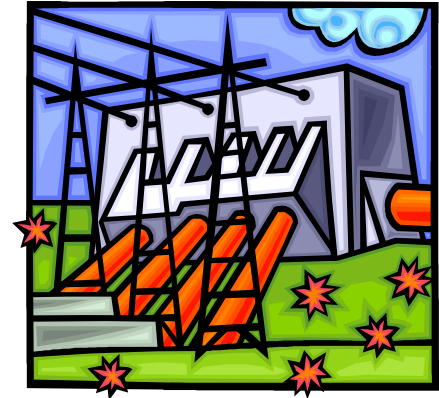


Gain Additional Insight on CBM



Energy Management

- Cost / benefit of adjusting an energy supply portfolio (electric, gas, fuel, steam, renewables)
 - Based on operational activities
 - Based on time-of-year, time-of-day
 - Based on shifting peak load
- Modeling & Forecast



PI System and SAP HANA Roadmap

- SAP developing next-generation HANA-based Applications
 - Roadmap includes both industry solutions and ERP
- HANA as a unified analytical platform to bridge data from PI System, SAP ERP, and other sources

PI System and SAP HANA Tomorrow

OSIsoft and SAP working together to design tools to optimize your investment in these systems and gain Enterprise Solutions

Seeking customer engagements on use cases, proof of concept, etc



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The Power of Data