OSIsoft® UC2010

Real Time Information — Currency of the New Decade

Hilton San Francisco Union Square | San Francisco, CA

April 26-28, 2010

OSIsoft® UC 2010

New Advances in Batch: Integrating with Batch Execution Systems

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OSIsoft, LLC.

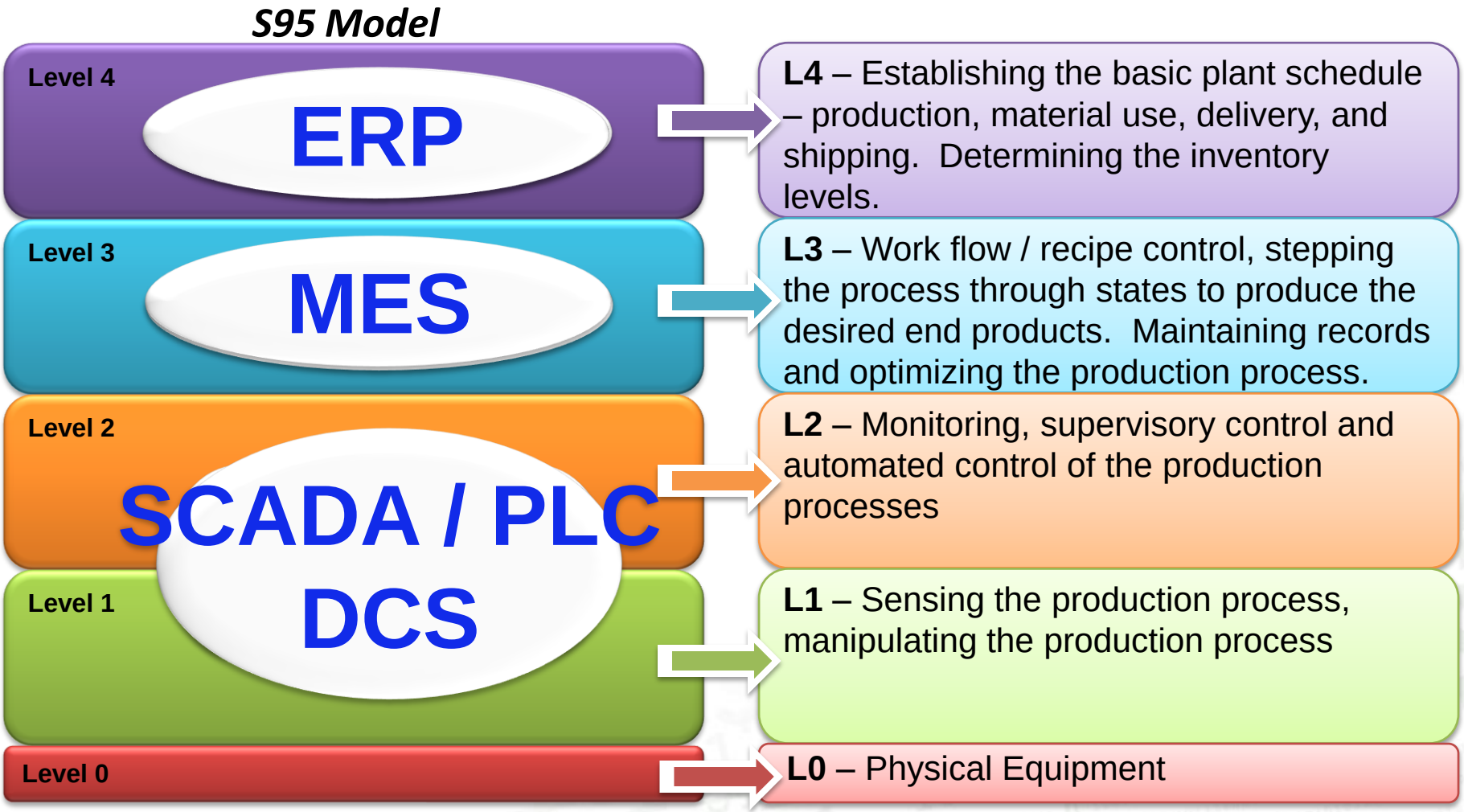
AGENDA

- The Value of a Common Plant Floor Abstraction Layer
- Manufacturing Execution Systems
- Batch Visualization
- Advantages of the Batch Interface Framework

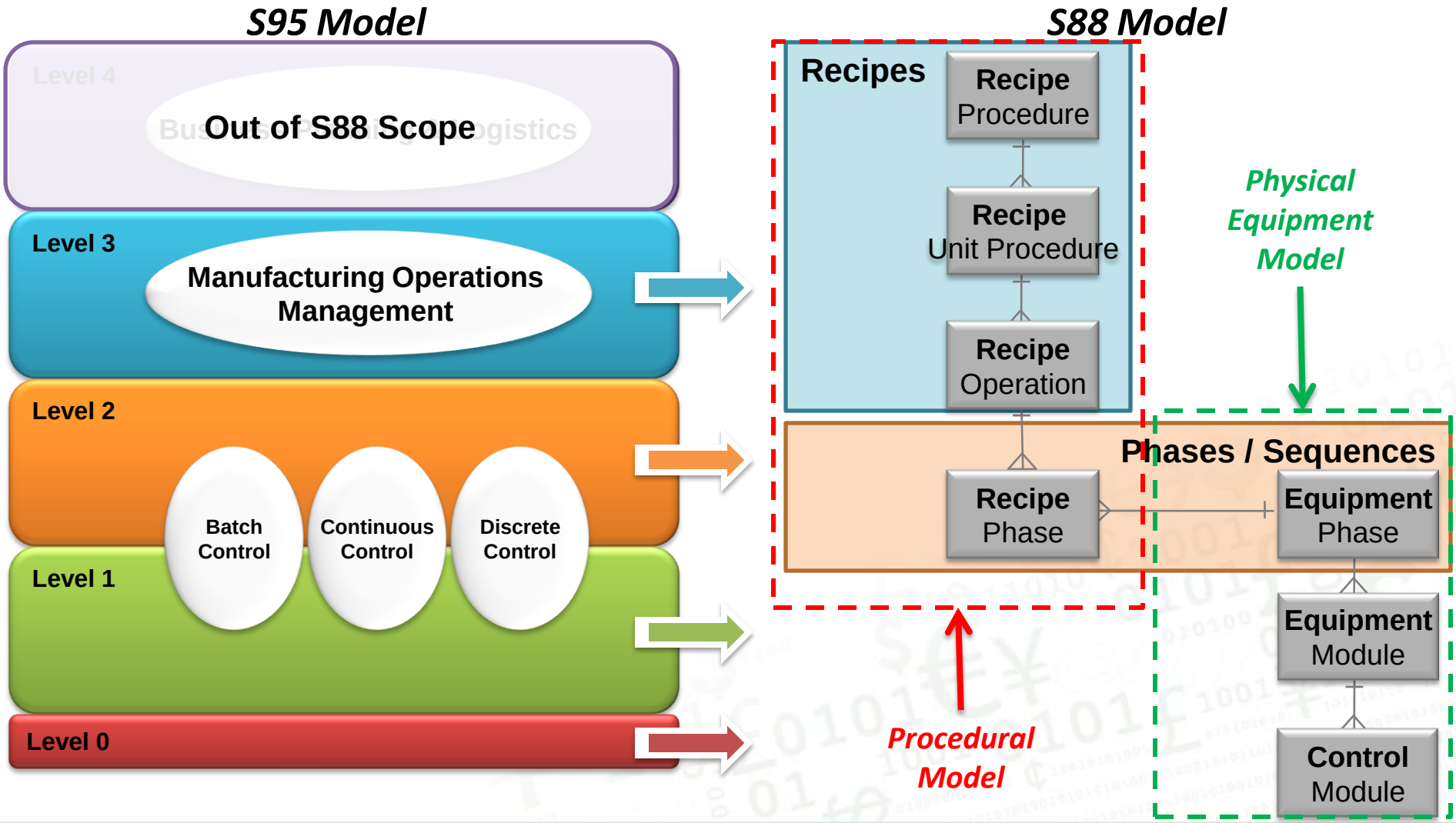
The Value of a Common Plant Floor Abstraction Layer

BATCH CONTEXT AND S95

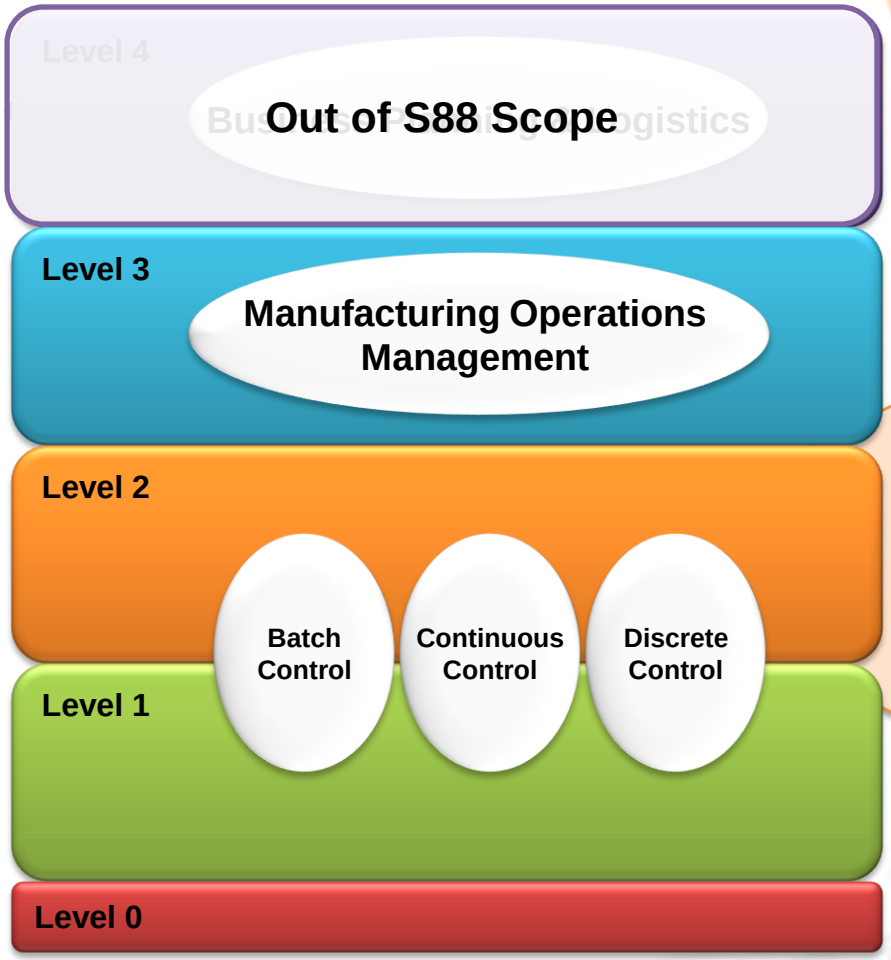
ISA S95 Architecture



Batch Concept through S95 & S88

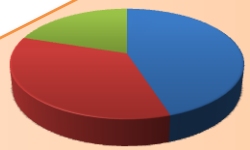


Challenges at Level 2



Variable PCS Landscape

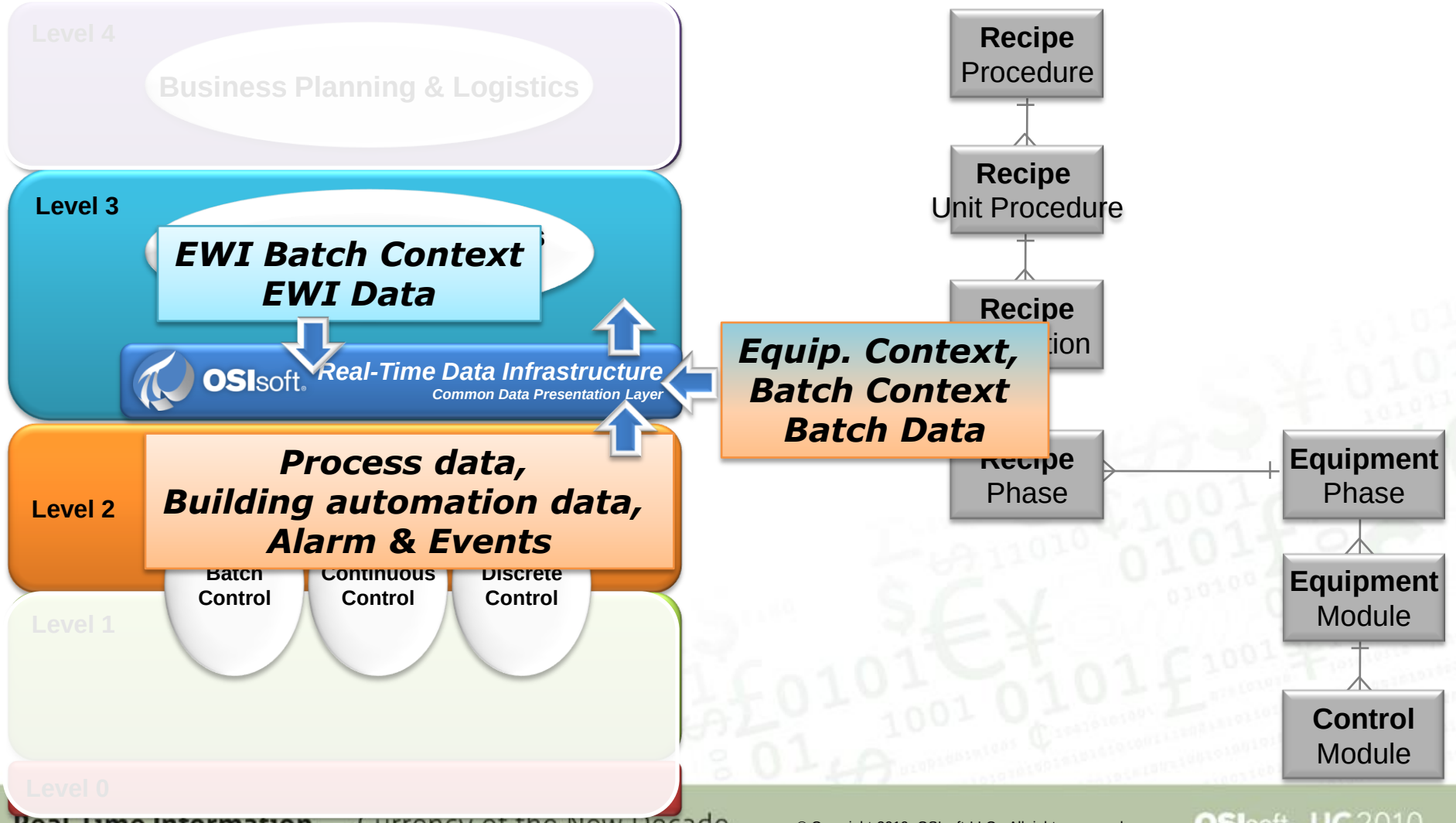
Typical Process Control System Landscape



Typical PLC Vendors

Typical DCS Vendors

Real-Time Data Infrastructure: A Key Enabler



Common Infrastructure for Collecting Data

Level 4

Business Planning & Logistics

Level 3

Manufacturing Operations Management

EWI

OSIsoft. Real-Time Data Infrastructure

Common Data Presentation Layer

Batch

Process data,
Building automation data,
Alarm & Events

Level 2

Batch Control

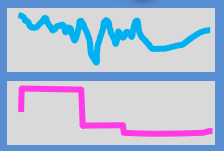
Continuous Control

Discrete Control

Level 1

Level 0

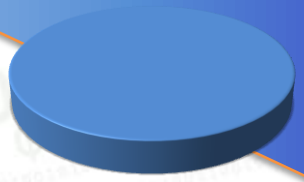
OSIsoft. PI Server



Tag Data

Equip / Batch Context

Process Control System Landscape with PI

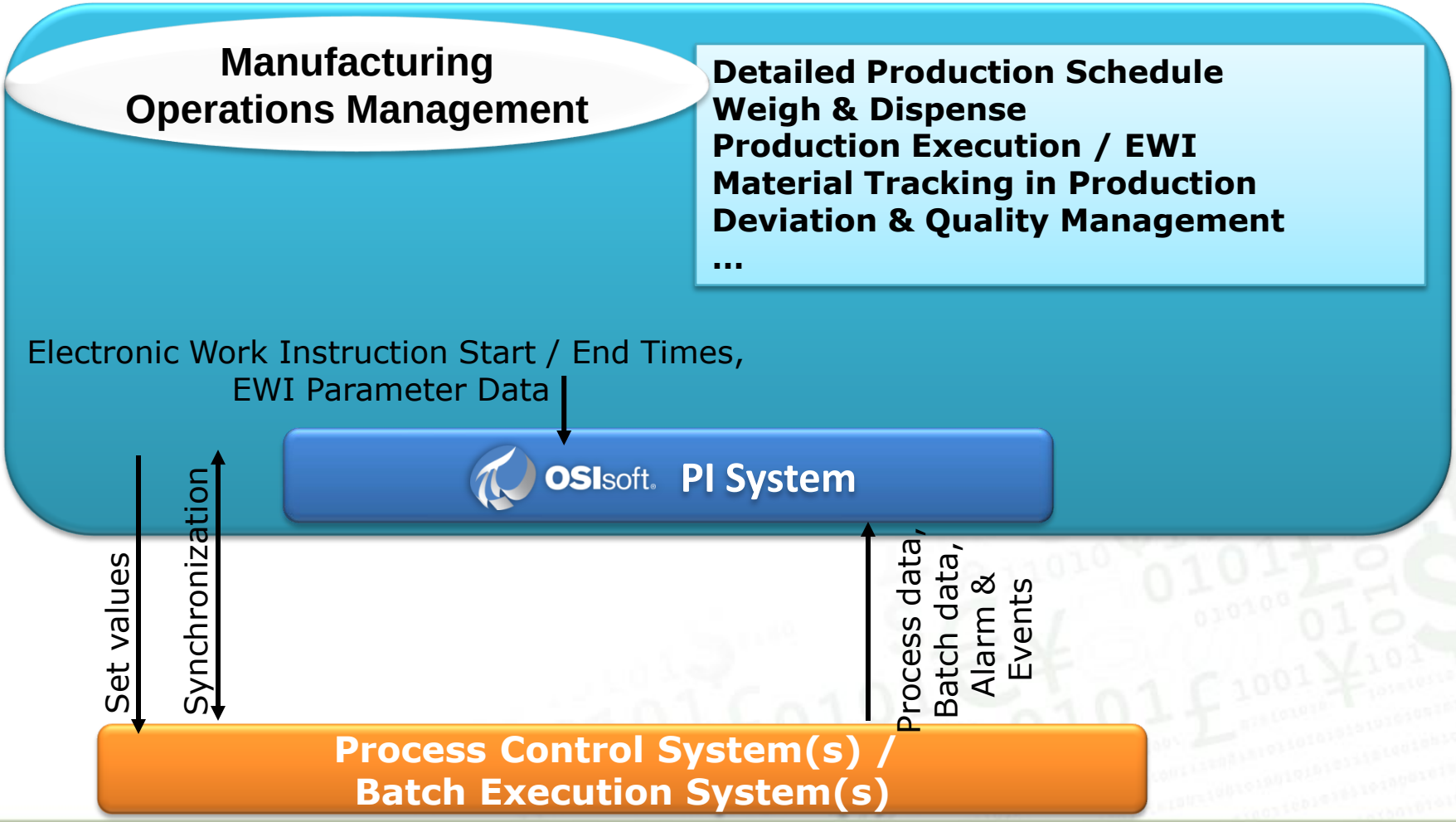


- DCS
- PLC
- BMS
- MES

Another Source of Valuable Context for Your Process Data

MANUFACTURING EXECUTION SYSTEMS (MES)

What is MES?



MES and PI Shared Value

- Provides a Single Highly Available Infrastructure for Real-Time Data Abstraction that Expands MES Connectivity
- Provides Long-Term Historizaton of Process Data
- Expands Analysis and Reporting Capabilities of MES
- …

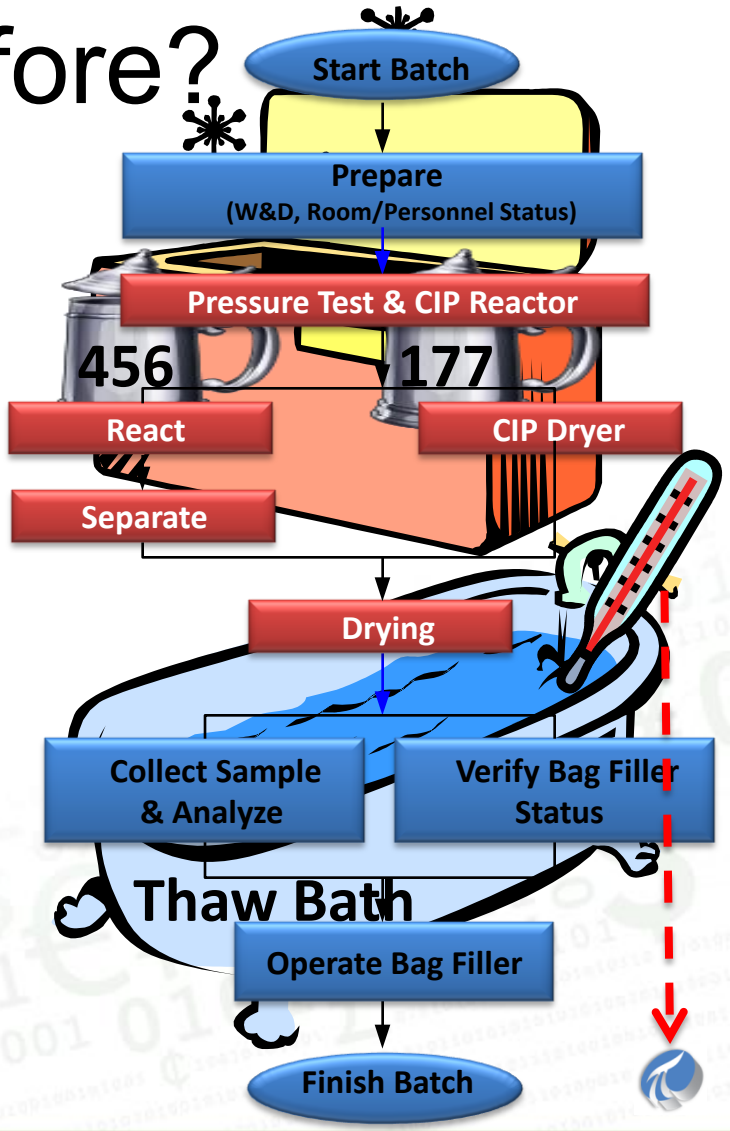
PI Value for MES

- Captures Manual Process Data in Context
- Another Valuable Source for Recipe / Batch Context
- Provides Genealogy at a Higher Level than is available in Batch Execution Systems
- …

MES Value for PI

What can we do now that we couldn't do before?

- Better tracking of manual raw material additions
- Combination of manual activity with process data
  - Vaccine Manufacturing Thawing & Pooling: Frozen Virus Can in temperature controlled Thaw Bath
- Full picture of Batch Cycle Time



OSIsoft PI Integration with MES Systems

Batch Interfaces

Emerson Syncade

- v1.0.1 Released Sept 2009

Werum PAS-X

- Release Scheduled mid 2010

** Development in Progress*

Performix xMES

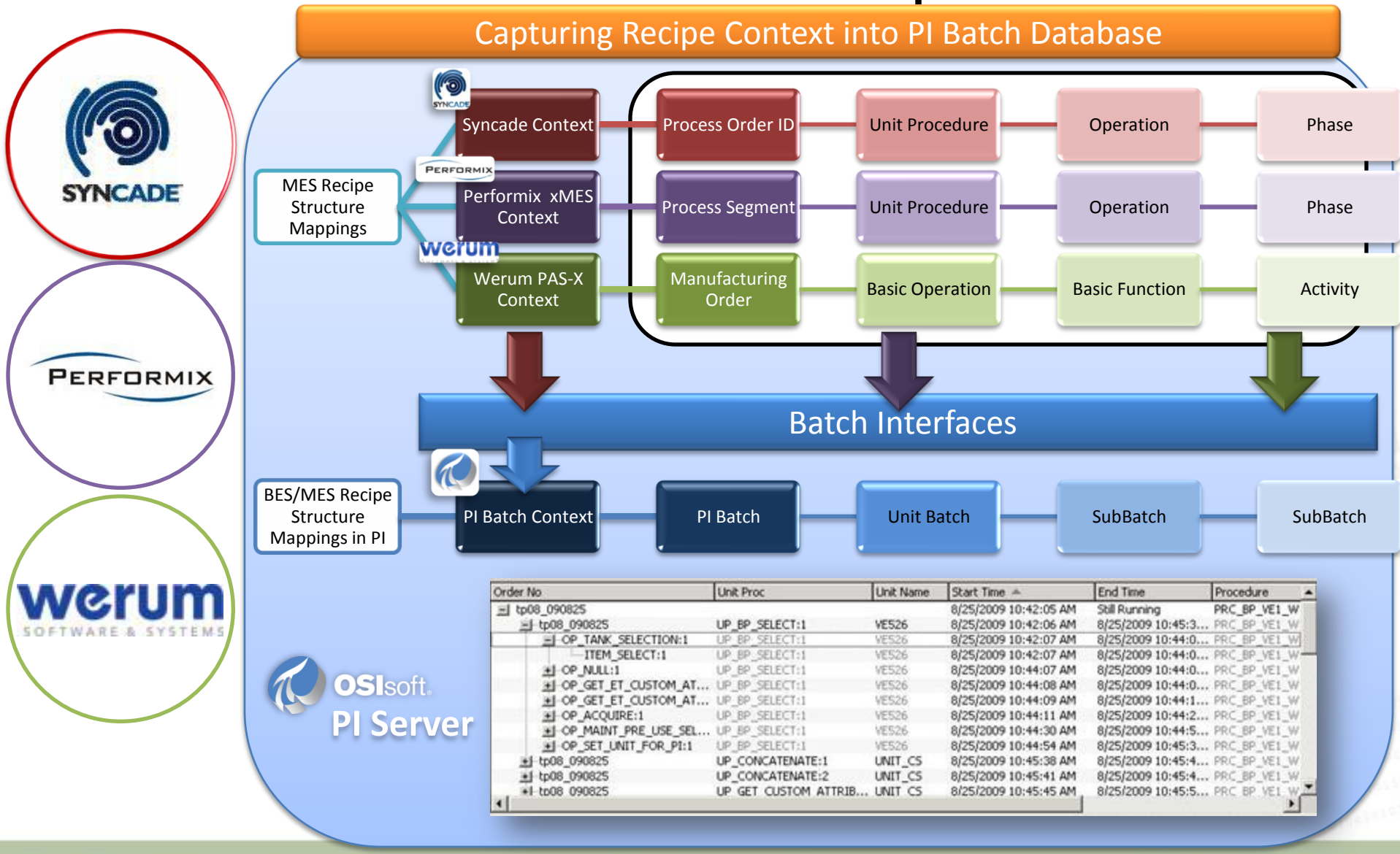
- Release Scheduled mid 2010

** Development in Progress*

Future MES Systems Integration?

- Honeywell POMSnet, Rockwell RS PMX, Siemens SIMATIC IT, …

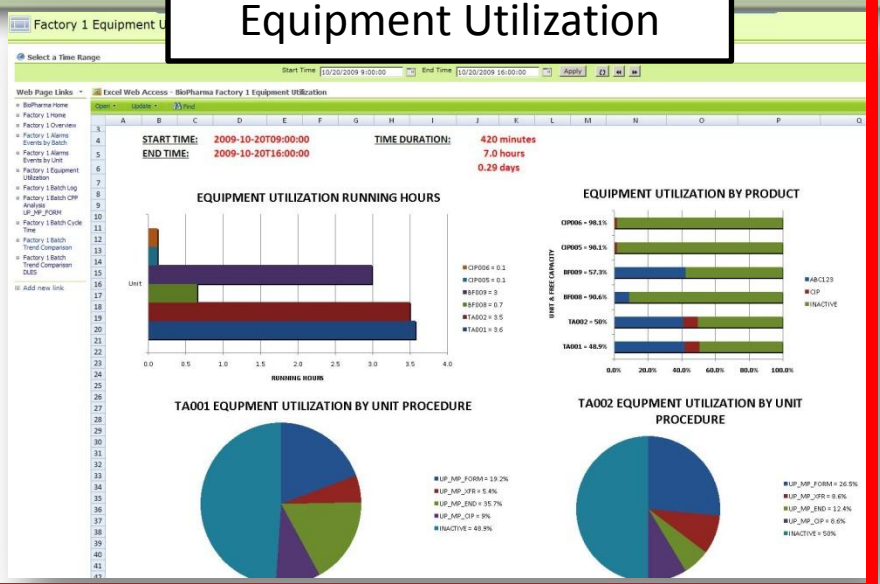
PI Infrastructure for Recipe Context



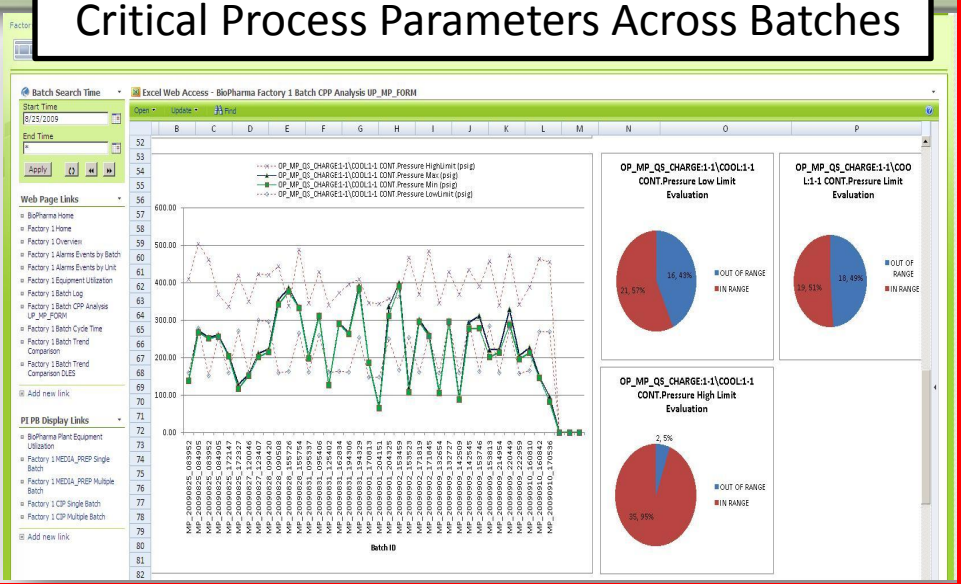
Configurable Analysis and Reporting

BATCH VISUALIZATION

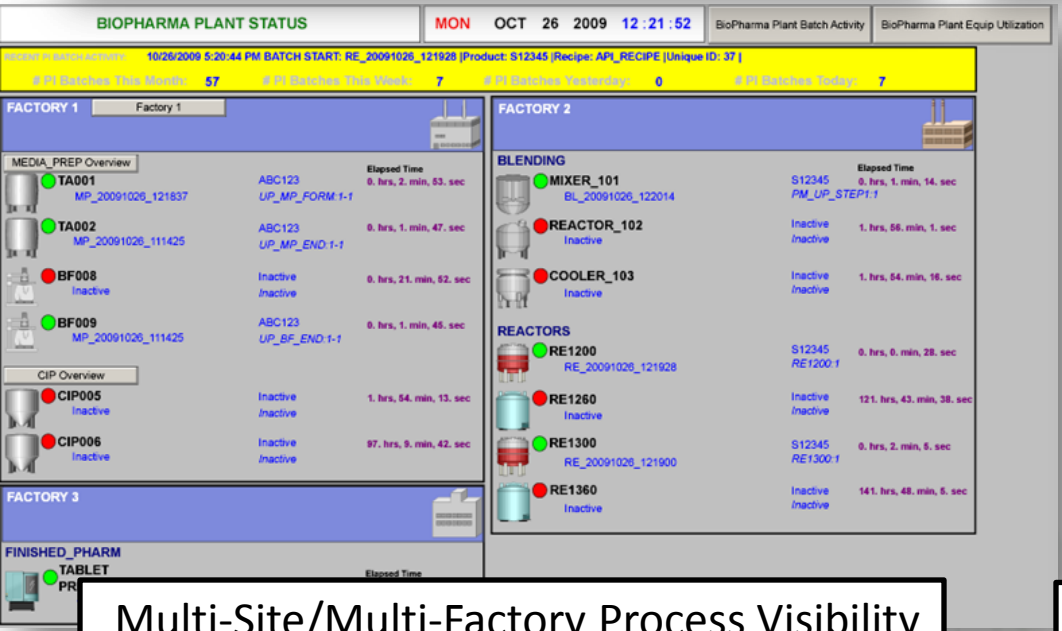
Equipment Utilization



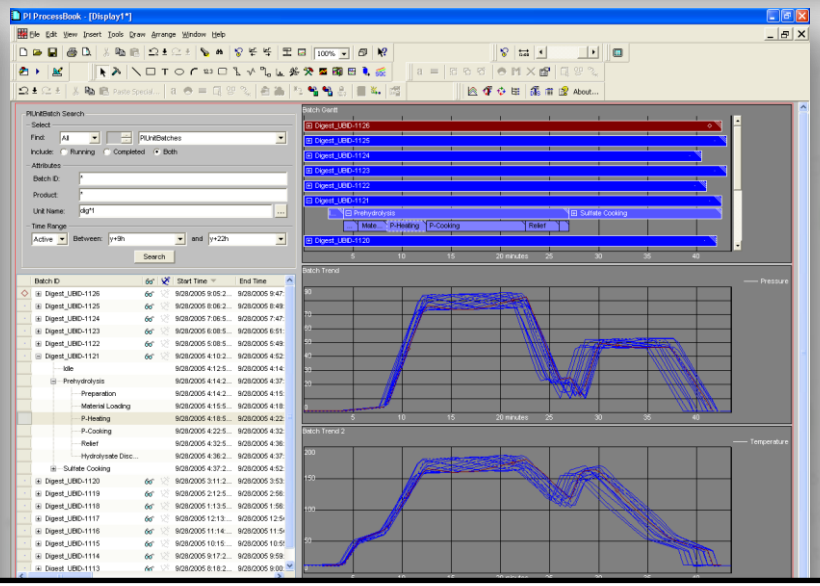
Critical Process Parameters Across Batches



Multi-Site/Multi-Factory Process Visibility



Batch Trends / Golden Batch Analysis



Equipment Utilization

Factory 1 Equipment Utilization

Select a Time Range

Start Time 10/20/2009 9:00:00 End Time 10/20/2009 16:00:00 Apply

Web Page Links

- BioPharma Home
- Factory 1 Home
- Factory 1 Overview
- Factory 1 Alarms Events by Batch
- Factory 1 Alarms Events by Unit
- Factory 1 Equipment Utilization
- Factory 1 Batch Log
- Factory 1 Batch CPP Analysis UP_MP_FORM
- Factory 1 Batch Cycle Time
- Factory 1 Batch Trend Comparison
- Factory 1 Batch Trend Comparison DLES
- Add new link

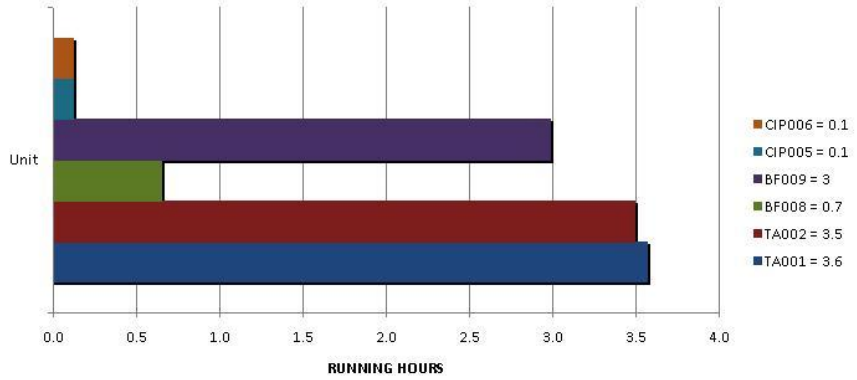
Excel Web Access - BioPharma Factory 1 Equipment Utilization

Open Update Find

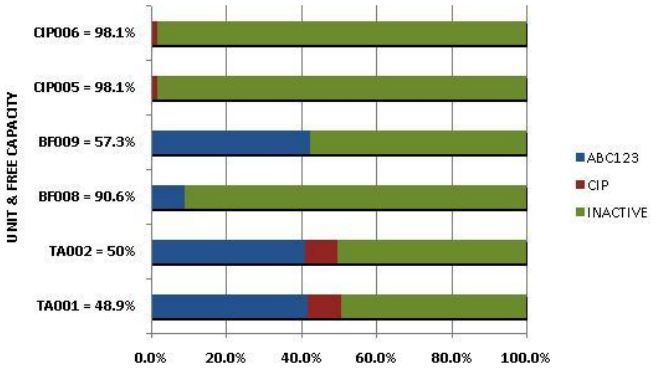
START TIME: 2009-10-20T09:00:00
END TIME: 2009-10-20T16:00:00

TIME DURATION: 420 minutes
7.0 hours
0.29 days

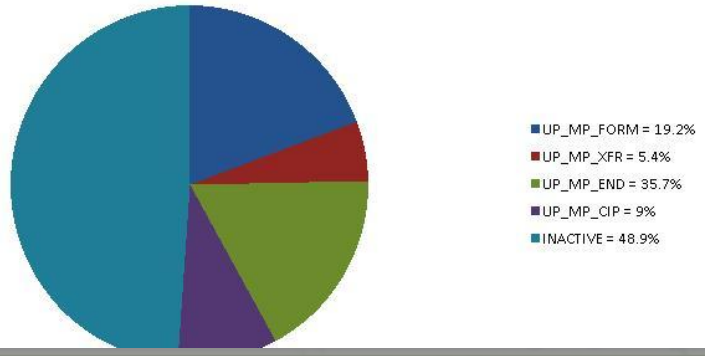
EQUIPMENT UTILIZATION RUNNING HOURS



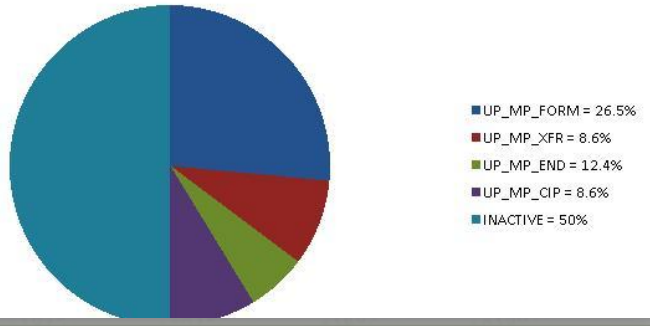
EQUIPMENT UTILIZATION BY PRODUCT



TA001 EQUPMENT UTILIZATION BY UNIT PROCEDURE



TA002 EQUPMENT UTILIZATION BY UNIT PROCEDURE



Critical Process Parameters Across Batches

Factory 1 Batch CPP Analysis UP_MP_FORM

OUT OF RANGE

IN RANGE

Batch Search Time

Start Time 8/25/2009

End Time *

Apply

Web Page Links

- BioPharma Home
- Factory 1 Home
- Factory 1 Overview
- Factory 1 Alarms Events by Batch
- Factory 1 Alarms Events by Unit
- Factory 1 Equipment Utilization
- Factory 1 Batch Log
- Factory 1 Batch CPP Analysis UP_MP_FORM
- Factory 1 Batch Cycle Time
- Factory 1 Batch Trend Comparison
- Factory 1 Batch Trend Comparison DLES

Add new link

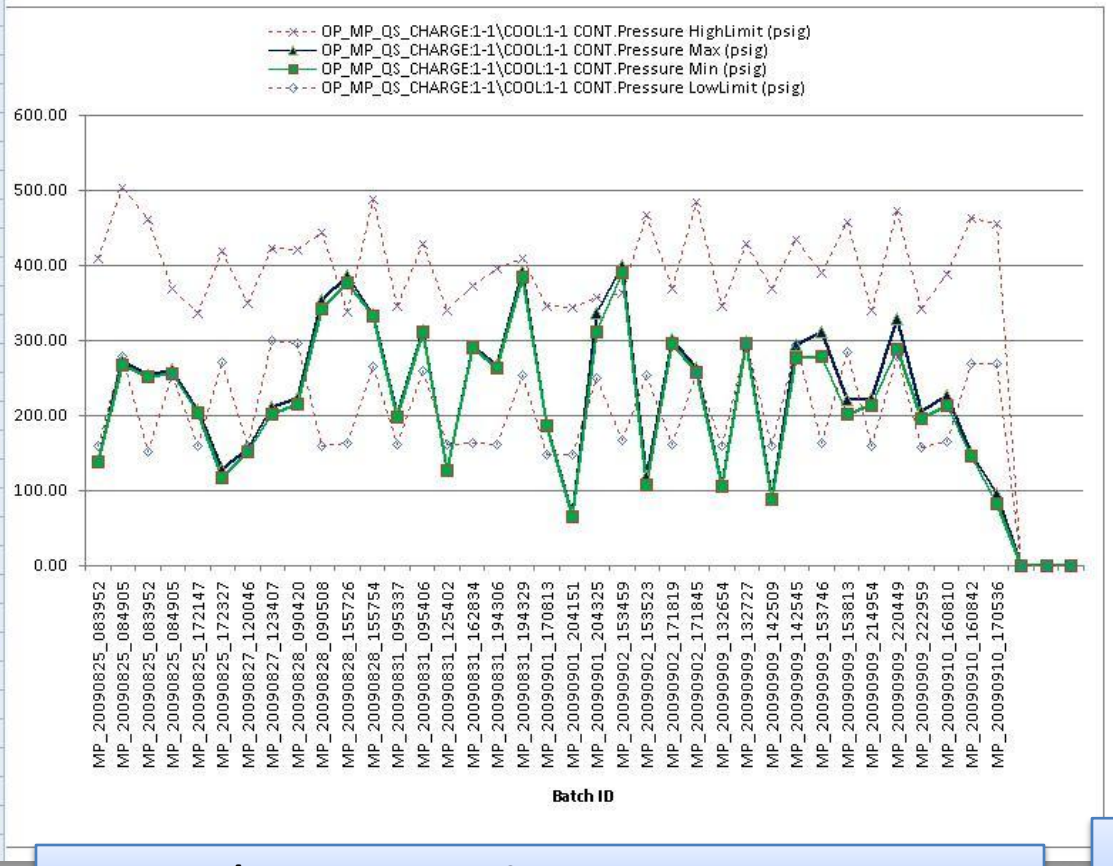
PI PB Display Links

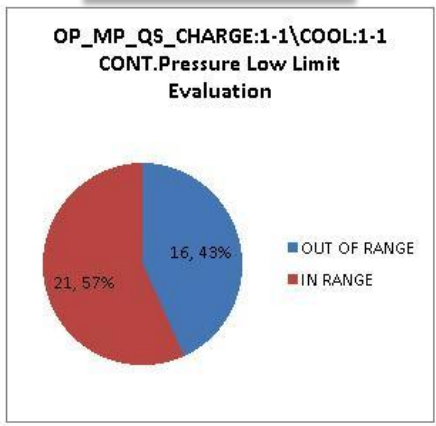
- BioPharma Plant Equipment Utilization
- Factory 1 MEDIA_PREP Single Batch
- Factory 1 MEDIA_PREP Multiple Batch
- Factory 1 CIP Single Batch
- Factory 1 CIP Multiple Batch

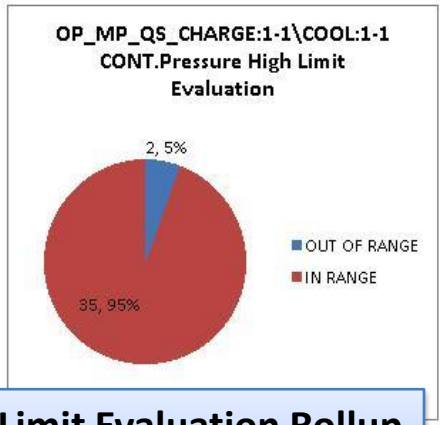
Add new link

Excel Web Access - BioPharma Factory 1 Batch CPP Analysis UP_MP_FORM

Open Update Find







Min / Max Pressure for COOL Phase vs Limits

Limit Evaluation Rollup Stats for All Batches

Select a Batch Search Time Range

Start Time 1/1/2010 End Time 2/5/2010

Select an Operation Start Time

SubBatchPath
\OP_MP_SETUP:1-1
\OP_MP_WFI_CHARGE:1-1
\OP_MP_RM_CHARGE:1-1
\OP_MP_QS_CHARGE:1-1
\OP_MP_SETUP:1-1\ACQ_REL:1-1
\OP_MP_SETUP:1-1\SETUP:1-1
\OP_MP_SETUP:1-1 \TK_PRESS_TEST:1-1
\OP_MP_SETUP:1-1\SETUP:2-1
\OP_MP_WFI_CHARGE:1-1 \CHARGE_WATER:1-1
\OP_MP_WFI_CHARGE:1-1 \AGITATE:1-1
Showing 1 to 10 of 17

Select an Operation End Time

SubBatchPath
\OP_MP_WFI_CHARGE:1-1\COOL:1-1
\OP_MP_RM_CHARGE:1-1 \AGITATE:1-1
\OP_MP_RM_CHARGE:1-1 \MP_RM_CHARGE:1-1
\OP_MP_RM_CHARGE:1-1 \AGITATE:2-1
\OP_MP_QS_CHARGE:1-1 \AGITATE:1-1
\OP_MP_QS_CHARGE:1-1 \ALARM_SET:1-1
\OP_MP_QS_CHARGE:1-1\COOL:1-1
Showing 11 to 17 of 17

Select a Parameter to Trend

Parameter
CONT.Agitator
CONT.Level
CONT.NoData
CONT.Pressure
CONT.Temp
CONT.Weight.Gross
CONT.Weight.Net
CONT.Weight.Tare

Web Page Links

- BioPharma Home
- Factory 1 Home
- Factory 1 Overview
- Factory 1 Room Environment
- Factory 1 Room Environment History

Excel Web Access - BioPharma Factory 1 Batch Trend Calcs

Open Update Find

BioPharma Plant: Factory 1 - UP_MP_FORM Batch Trend Calcs

UNIT FILTER: *

START TIME: 2010-01-01T00:00:00

END TIME: 2010-02-05T00:00:00

PARAMETER: CONT.Level

PH START: \OP_MP_WFI_CHARGE:1-1

PH END: \OP_MP_RM_CHARGE:1-1\AGITATE:2-1

Batches: 45

Symbol Legend	CYCLE TIME
75-100% - Highest Quartile	MIN 6.5
25-75%	MAX 13.6
0-25% - Lowest Quartile	AVG 10.3

BATCH ID	UNIT	CYCLE TIME
MP_20100203_141142	TA002	13.4
MP_20100203_141107	TA001	11.7
MP_20100202_202757	TA002	13.4
MP_20100202_162321	TA001	7.0
MP_20100202_120858	TA001	11.7
MP_20100202_120617	TA002	13.4
MP_20100202_104211	TA002	9.7
MP_20100202_093418	TA001	11.7
MP_20100202_085624	TA002	10.2
MP_20100202_082949	TA002	6.6
MP_20100202_082637	TA001	8.2
MP_20100126_102252	TA002	13.1
MP_20100126_102228	TA001	6.5
MP_20100126_071727	TA002	12.1
MP_20100125_200641	TA002	13.0
MP_20100125_200618	TA001	8.3
MP_20100115_131004	TA001	11.7
MP_20100115_131036	TA002	9.7
MP_20100115_113541	TA001	11.7
MP_20100115_085250	TA002	13.4
MP_20100115_085229	TA001	8.1
MP_20100114_215006	TA002	9.7
MP_20100114_214934	TA001	8.1
MP_20100114_203647	TA002	6.6
MP_20100114_203620	TA001	8.2

CONT.Level

	PI MIN	PI AVG	PI MAX	PI RANGE	PI STDEV
MIN	1.9	17.1	31.5	15.8	3.7
MAX	76.7	87.0	99.5	58.8	14.9
AVG	38.2	52.8	67.3	29.1	7.1

BATCH ID	UNIT	PI MIN	PI AVG	PI MAX	PI RANGE	PI STDEV
MP_20100203_141142	TA002	10.4	24.7	39.2	28.9	6.3
MP_20100203_141107	TA001	47.2	68.5	99.5	52.3	14.3
MP_20100202_202757	TA002	2.3	17.1	34.8	32.6	7.5
MP_20100202_162321	TA001	46.8	56.3	68.7	21.8	5.2
MP_20100202_120858	TA001	19.4	30.9	41.5	22.0	5.2
MP_20100202_120617	TA002	38.1	47.3	62.4	24.3	4.3
MP_20100202_104211	TA002	58.1	69.3	77.0	18.9	4.3
MP_20100202_093418	TA001	53.4	65.1	81.2	27.8	6.4
MP_20100202_085624	TA002	10.0	18.2	31.5	21.4	4.6
MP_20100202_082949	TA002	69.6	87.0	97.8	28.2	6.3
MP_20100202_082637	TA001	39.6	59.3	77.2	37.6	11.5
MP_20100126_102252	TA002	10.9	29.6	54.0	43.1	14.0
MP_20100126_102228	TA001	76.7	85.9	94.8	18.1	4.7
MP_20100126_071727	TA002	21.5	31.2	44.5	23.0	5.4
MP_20100125_200641	TA002	48.7	58.9	70.1	21.4	4.3
MP_20100125_200618	TA001	39.7	53.3	66.7	27.0	6.4
MP_20100115_131004	TA001	1.9	36.2	52.9	50.9	11.8
MP_20100115_131036	TA002	57.4	70.8	82.7	25.3	6.2
MP_20100115_113541	TA001	29.6	55.4	88.3	58.8	14.9
MP_20100115_085250	TA002	39.6	55.7	69.2	29.5	7.1
MP_20100115_085229	TA001	24.7	36.4	46.2	21.6	4.8
MP_20100114_215006	TA002	53.4	68.8	85.2	31.8	8.3
MP_20100114_214934	TA001	33.4	43.1	52.7	19.4	5.2
MP_20100114_203647	TA002	43.9	51.2	60.1	16.2	4.4
MP_20100114_203620	TA001	55.0	61.9	71.9	16.9	4.7

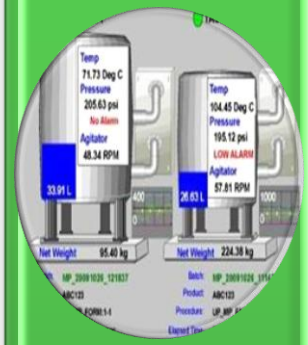
Cycle Time Over Selected Operation / Phase

CONT.Level Summary Calcs Over Selected Operation / Phase

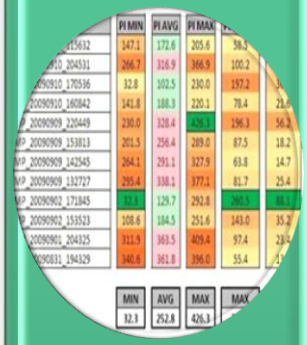
Real Time Inform

In Summary: Why store Batch Context & MES EWIs into PI?

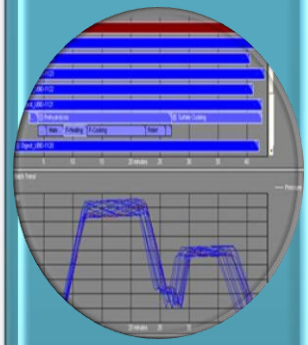
Single Interface for Consolidated Process Data



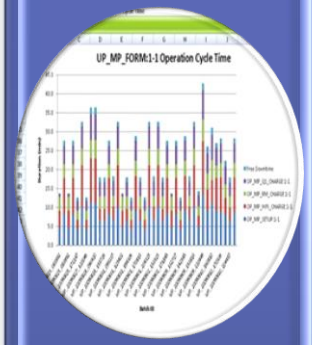
Real-time Production Monitoring



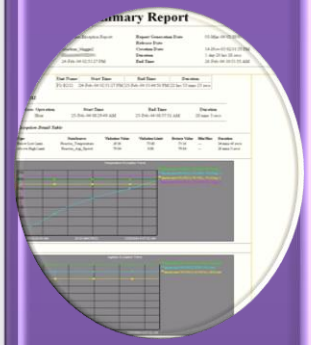
Detailed Batch Process Performance Analysis



Golden Batch Comparisons



Batch Cycle Time Analysis



Exception-based Reporting

OSIsoft PI System

Increased Reliability, Performance, Functionality, and a Roadmap to Event Frames

ADVANCES IN BATCH INTERFACES

Auto-Configure PI Tags

TagName	Server	Time	Value
BioPharma:TA001.AE.All	OSISOFT	2/19/2010 2:21:38 PM	ALARM|INSTRUMENT|MEDIA_PREP|CTRL_001|TA001|PI001_101|Media TANK PRESSURE|PVBAD_ALM|DISABLED|07-NGMP_WRN|IOF|General I/O Failure|
BioPharma:TA001.AE.Process	OSISOFT	2/19/2010 2:1[illegible] PM	ALARM|PROCESS|MEDIA_PREP|CTRL_001|TA001|PI001_009|BAG FILLER PRESSURE|LO_ALM|INACT/ACK|15-QLTY_CRT|LOW|Low Alarm Value 36.3883 Limit 2|
BioPharma:TA001.AE.Process_Alarm	OSISOFT	2/19/2010 2:1[illegible] PM	ALARM|PROCESS|MEDIA_PREP|CTRL_001|TA001|PI001_009|BAG FILLER PRESSURE|LO_ALM|INACT/ACK|15-QLTY_CRT|LOW|Low Alarm Value 36.3883 Limit 2|
BioPharma:TA001.AE.Process_Alarm.NewAlarms	OSISOFT	2/19/2010 1:45:51 PM	ALARM|PROCESS|MEDIA_PREP|CTRL_001|TA001|TA001_HIST|TA001 PLC HIST|F_6751_ALM|ACT/UNACK|15-QLTY_CRT|CFN|Change From Normal Value %P1|
BioPharma:TA001.AE.Process_Event	OSISOFT	2/19/2010 2:08:00 PM	EVENT|PROCESS|MEDIA_PREP|CTRL_001|TA001|TI001_101|Media TANK TEMP|ACTIVE|4-INFO|TI001_101/AI1|Module Failure Active|
BioPharma:TA001.COOL.Owner Change.Owner Changed Detected:	OSISOFT	3/31/2010 10:21:37 AM	DELTAV BATCH
BioPharma:TA001.COOL.Recipe Value.R_COOL_SP	OSISOFT	3/31/2010 10:22:14 AM	25
BioPharma:TA001.COOL.Recipe Value.R_COOL_STRT_AMT	OSISOFT	3/31/2010 10:22:15 AM	0
BioPharma:TA001.COOL.Recipe Value.R_MAX_COOL_TM	OSISOFT	3/31/2010 10:22:18 AM	240
BioPharma:TA001.COOL.Recipe Value.R_MAX_TEMP	OSISOFT	2/2/2010 10:43:42 AM	30
BioPharma:TA001.COOL.Recipe Value.R_MIN_TEMP	OSISOFT	2/2/2010 10:43:43 AM	0
BioPharma:TA001.COOL.Recipe Value.R_TEMP_HIGH	OSISOFT	3/31/2010 10:22:30 AM	6
BioPharma:TA001.COOL.Recipe Value.R_TEMP_HIGH_HIGH	OSISOFT	3/31/2010 10:22:30 AM	8
BioPharma:TA001.COOL.Recipe Value.R_TEMP_LOW	OSISOFT	3/31/2010 10:22:22 AM	5
BioPharma:TA001.COOL.Recipe Value.R_TEMP_LOW_LOW	OSISOFT	3/31/2010 10:22:36 AM	4
BioPharma:TA001.COOL.Recipe Value.R_TEMP_MON	OSISOFT	3/31/2010 10:22:26 AM	FALSE
BioPharma:TA001.COOL.Recipe Value.R_WAIT_TEMP	OSISOFT	3/31/2010 10:22:27 AM	25
BioPharma:TA001.COOL.Report.L_COOL_TEMP	OSISOFT	3/31/2010 10:23:31 AM	27.4
BioPharma:TA001.Event.Active Step Change	OSISOFT	2/2/2010 10:54:40 AM	CIP_20100202_104137|BATCH_EXEC_20060228_002243739|PR_MP_CIP\UP_MP_CIP:1-1\OP_MP_BURST_WASH:2-1|Active Step Change command attempted|Activ
BioPharma:TA001.Event.Mode Change	OSISOFT	2/2/2010 11:19:37 AM	CIP_20100202_104137|BATCH_EXEC_20060228_002243739|PR_MP_CIP\UP_MP_CIP:1-1\OP_MP_NULL:1-1|Mode Changed:|Mode Change|P-AUTO|Factory 1|MEDI
BioPharma:TA001.Event.Mode Command	OSISOFT	2/2/2010 10:54:57 AM	CIP_20100202_104137|BATCH_EXEC_20060228_002243739|PR_MP_CIP\UP_MP_CIP:1-1\OP_MP_BURST_WASH:2-1|Mode Commanded:|Mode Command|AUTO-M
BioPharma:TA001.Event.Multi.AllBatchEvents.Unit.Critical	OSISOFT	2/2/2010 11:19:29 AM	CIP_20100202_104137|BATCH_EXEC_20060228_002243739|PR_MP_CIP\UP_MP_CIP:1-1\\|State Changed:|State Change|HELD|Factory 1|MEDIA_PREP|TA001||
BioPharma:TA001.Event.Multi.Recipe_Report_OwnerChange_Prompt	OSISOFT	3/31/2010 10:29:11 AM	END_PROCESS.Recipe Value.R_DF_WT_TM: 15 sec
BioPharma:TA001.Event.Operator Prompt	OSISOFT	3/31/2010 10:20:55 AM	MP_20100331_094647|BATCH_EXEC_20060412_201412308|PR_MP_FORM\UP_MP_XFR:1-1\OP_MP_XFR:1-1\MP_MEDIA_TRANSFR:1-1|Make Connection to Drain
BioPharma:TA001.Event.Prompt Response	OSISOFT	3/31/2010 10:21:[illegible] AM	MP_20100331_094647|BATCH_EXEC_20060412_201412308|PR_MP_FORM\UP_MP_XFR:1-1\OP_MP_XFR:1-1\MP_MEDIA_TRANSFR:1-1|Make Connection to Drain
BioPharma:TA001.Event.Recipe Value Change	OSISOFT	2/2/2010 10:54:[illegible] AM	CIP_20100202_104137|BATCH_EXEC_20060228_002243739|PR_MP_CIP\UP_MP_CIP:1-1\OP_MP_BURST_WASH:2-1|Change Recipe Data: O_BAG_FILLER|Recipe
BioPharma:TA001.Event.State Change	OSISOFT	3/31/2010 10:33:07 AM	MP_20100331_094647|BATCH_EXEC_20060412_201412308|PR_MP_FORM\UP_MP_END:1-1\\|State Changed:|State Change|READY|Factory 1|MEDIA_PREP|TA001|
BioPharma:TA001.Event.State Change.ReportString	OSISOFT	3/31/2010 10:33:07 AM	Batch ID: MP_20100331_094647 | Recipe: PR_MP_FORM \ UP_MP_END:1-1 (TA001) \ \ | State Change: READY |
BioPharma:TA001.Event.State Command	OSISOFT	2/2/2010 10:54:41 AM	CIP_20100202_104137|BATCH_EXEC_20060228_002243739|PR_MP_CIP\UP_MP_CIP:1-1\OP_MP_BURST_WASH:2-1\CIP_USER_ROUTE:2-2|State Commanded:|St
BioPharma:TA001.Event.Step Activity	OSISOFT	3/31/2010 10:33:08 AM	MP_20100331_094647|BATCH_EXEC_20060412_201412308|PR_MP_FORM\UP_MP_END:1-1\\|Step Deactivated|Step Activity|Terminal Step||Factory 1|MEDIA_PREP|
BioPharma:TA001.Event.System Message	OSISOFT	3/31/2010 10:33:01 AM	MP_20100331_094647|BATCH_EXEC_20060412_201412308|PR_MP_FORM\UP_MP_END:1-1\\|Unit Procedure Finished|System Message|0||Factory 1|MEDIA_PREP|TA
BioPharma:TA001.PIEvent.Operation.Active	OSISOFT	3/31/2010 10:31:57 AM	OPERATION END: PR_MP_FORM\UP_MP_END:1-1\OP_MP_END:1-1
BioPharma:TA001.PIEvent.Phase.Active	OSISOFT	3/31/2010 10:31:39 AM	PHASE END: PR_MP_FORM\UP_MP_END:1-1\OP_MP_END:1-1\END_PROCESS:1-1
BioPharma:TA001.PIEvent.UnitBatch.Active	OSISOFT	3/31/2010 10:32:13 AM	0
BioPharma:TA001.PIEvent.UnitBatch.Active.Calc.ElapsedTime	OSISOFT	4/1/2010 1:02:12 PM	26. hrs, 29. min, 58. sec
BioPharma:TA001.PIEvent.UnitBatch.BatchID	OSISOFT	3/31/2010 10:32:13 AM	Inactive
BioPharma:TA001.PIEvent.UnitBatch.BatchID_UniqueID	OSISOFT	3/31/2010 10:24:31 AM	[illegible]_201412308|
BioPharma:TA001.PIEvent.UnitBatch.Procedure	OSISOFT	3/31/2010 10:32:13 AM	Inactive
BioPharma:TA001.PIEvent.UnitBatch.Product	OSISOFT	3/31/2010 10:32:13 AM	Inactive
BioPharma:TA001.PIEvent.UnitBatch.UniqueID	OSISOFT	3/31/2010 10:24:31 AM	BATCH_EXEC_20060412_201412308
BioPharma:TA001.PIEvent.UnitBatch.UnitName	OSISOFT	3/31/2010 10:24:31 AM	TA001

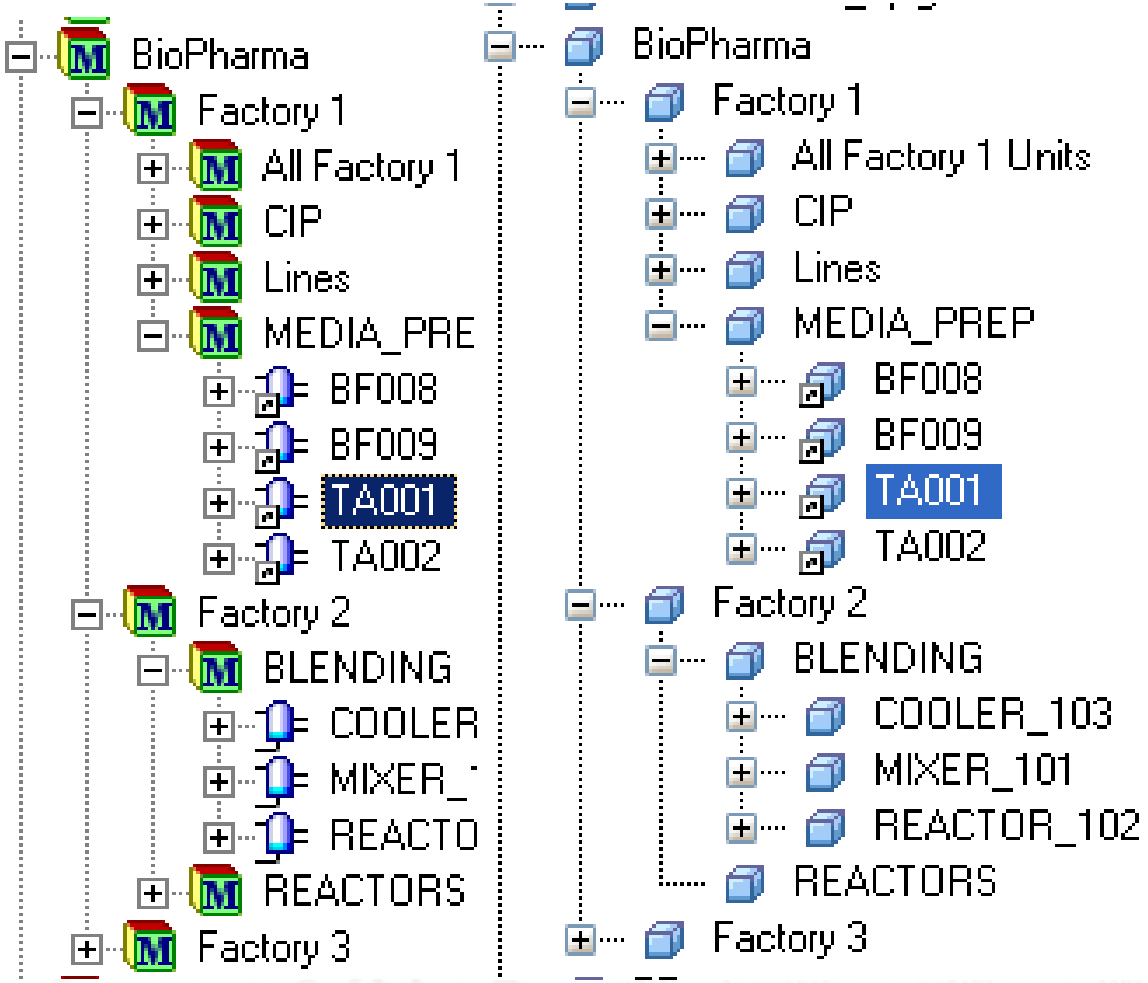
Alarm & Event Tags

Phase Recipe & Report Parameter Tags

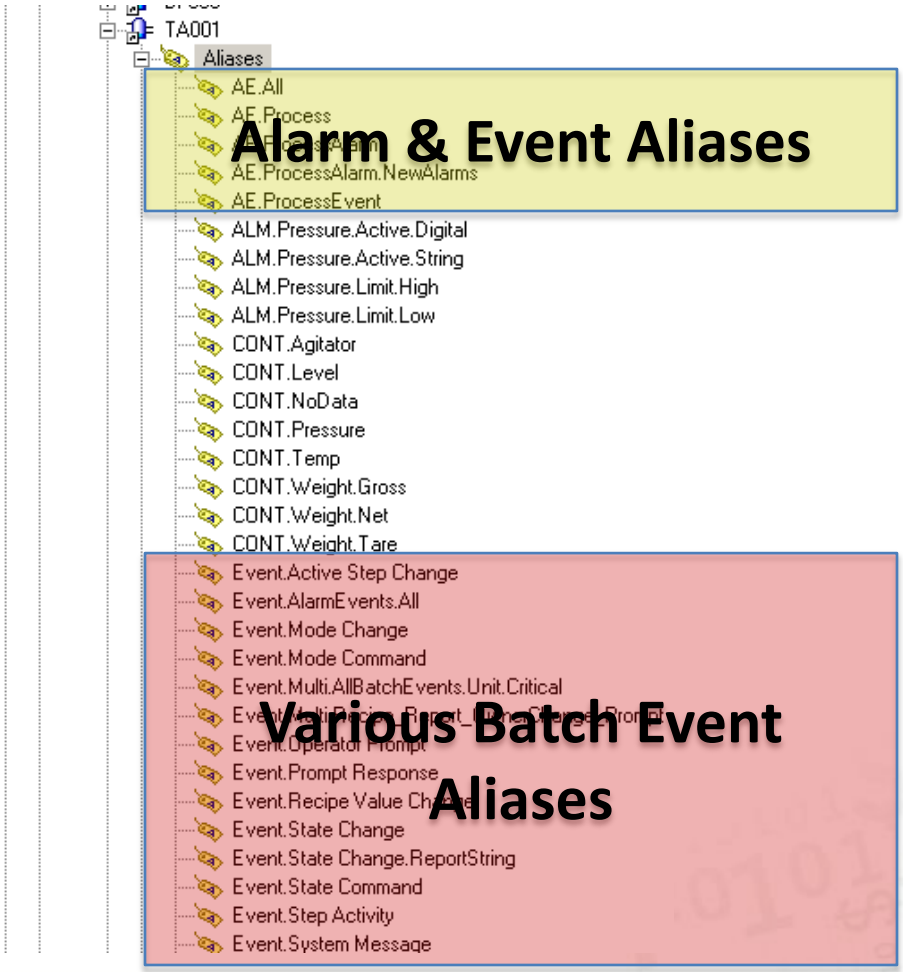
Various Batch Event Tags

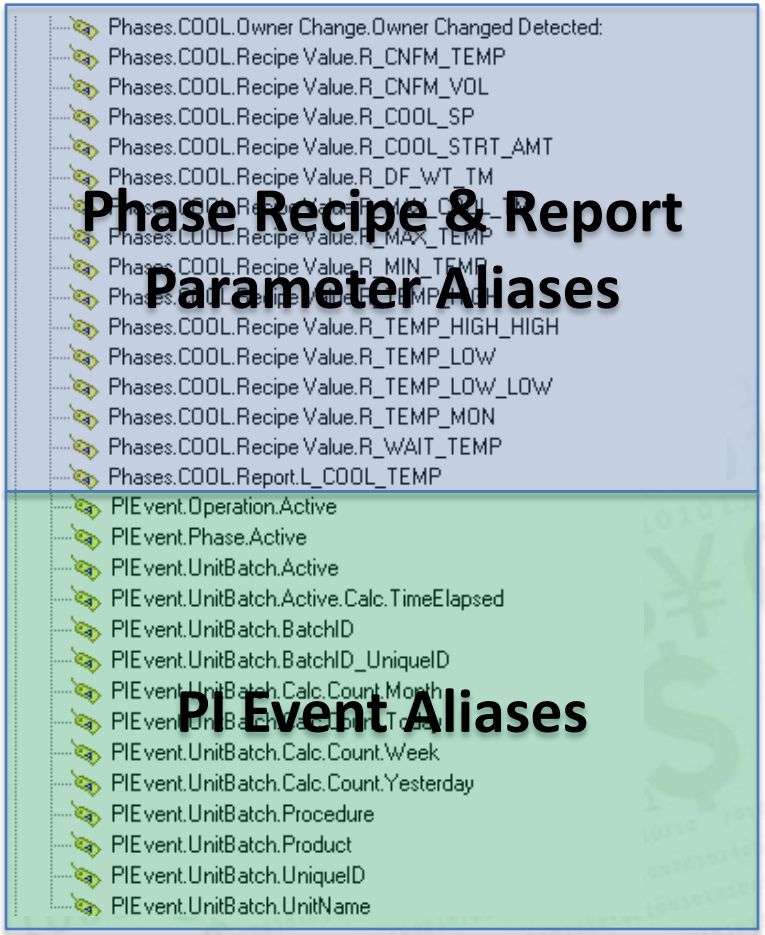
PI Event Tags

Auto-configure Assets

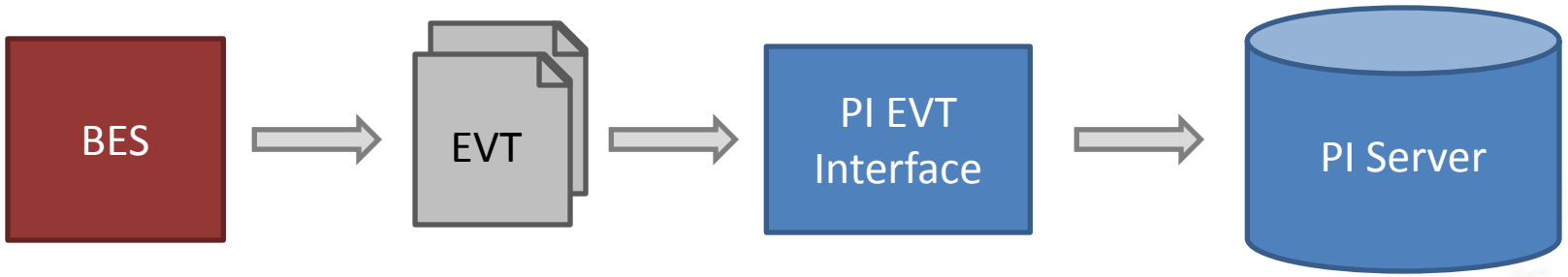


Auto-Configure Aliases



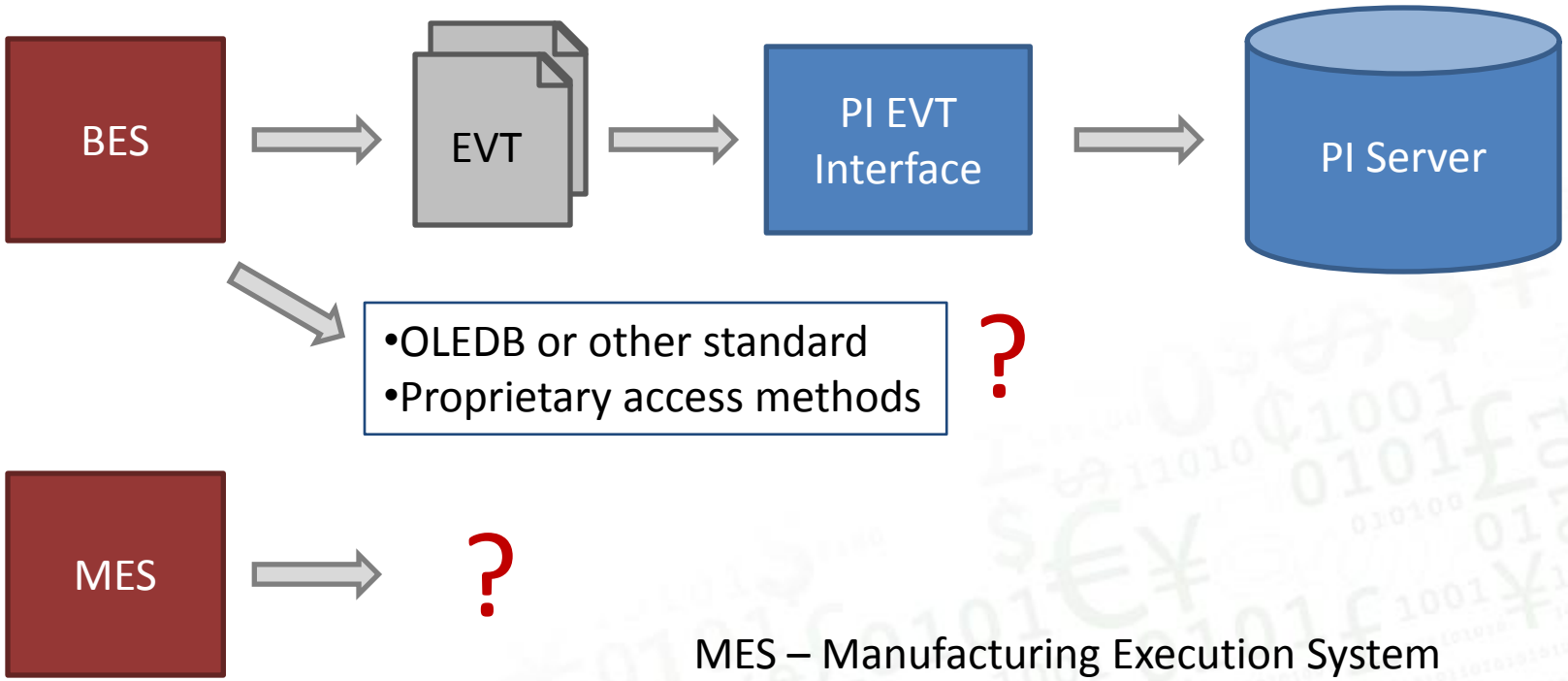


The EVT file interface

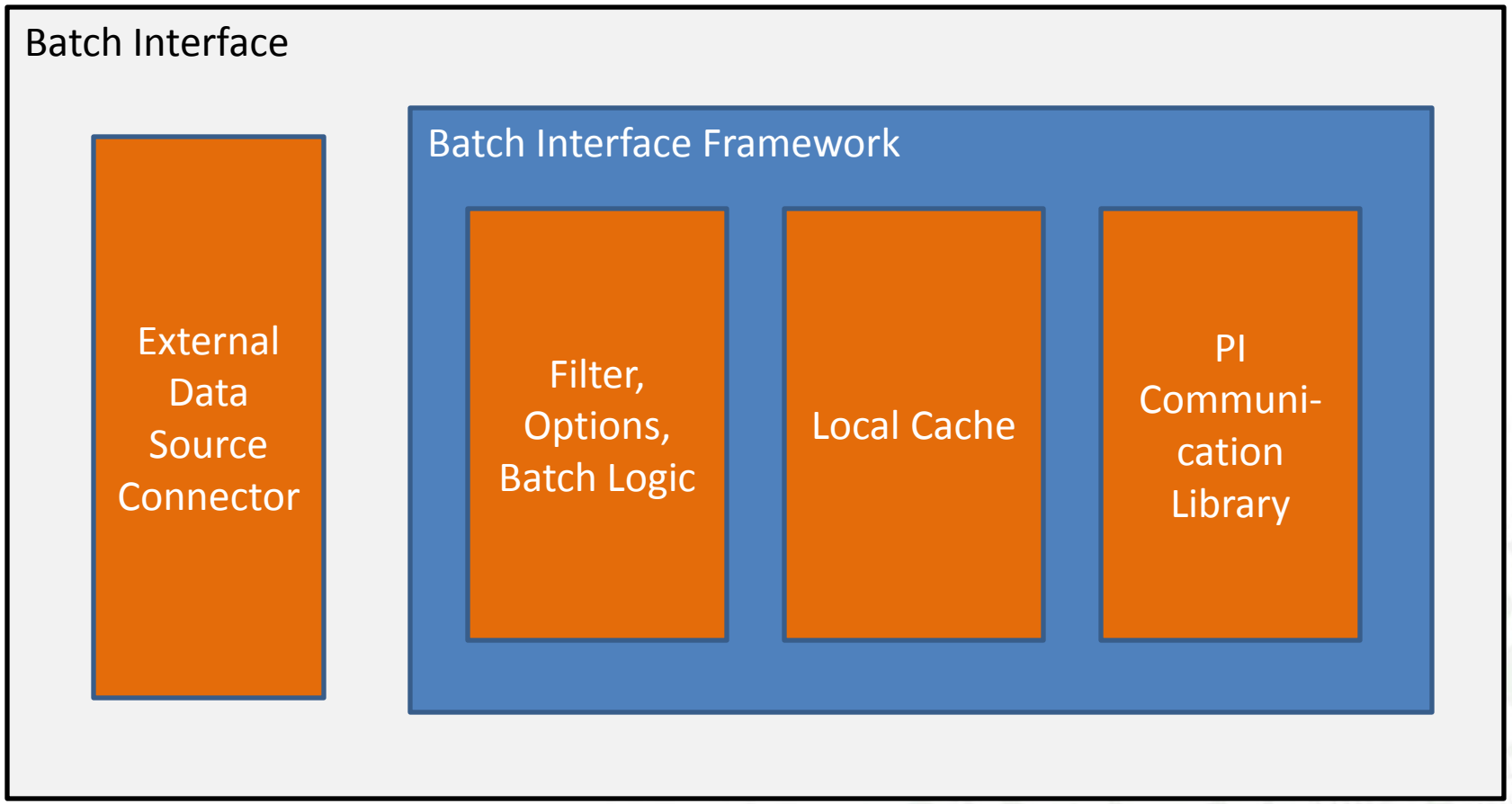


BES – Batch Execution System
EVT – Event File

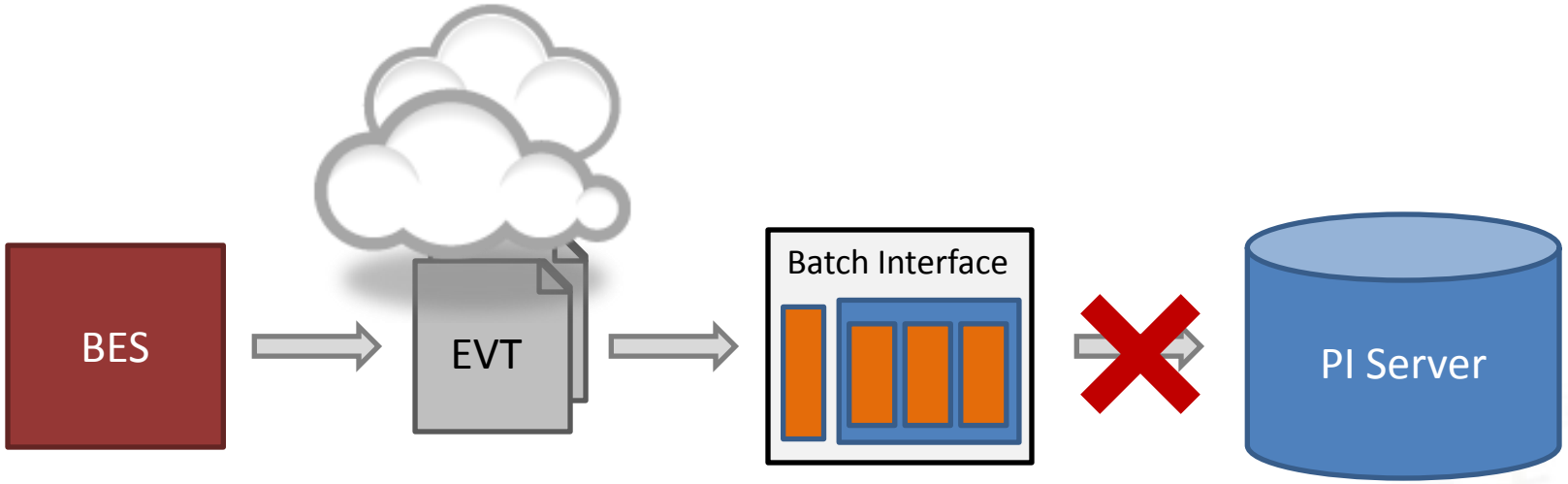
The EVT file interface



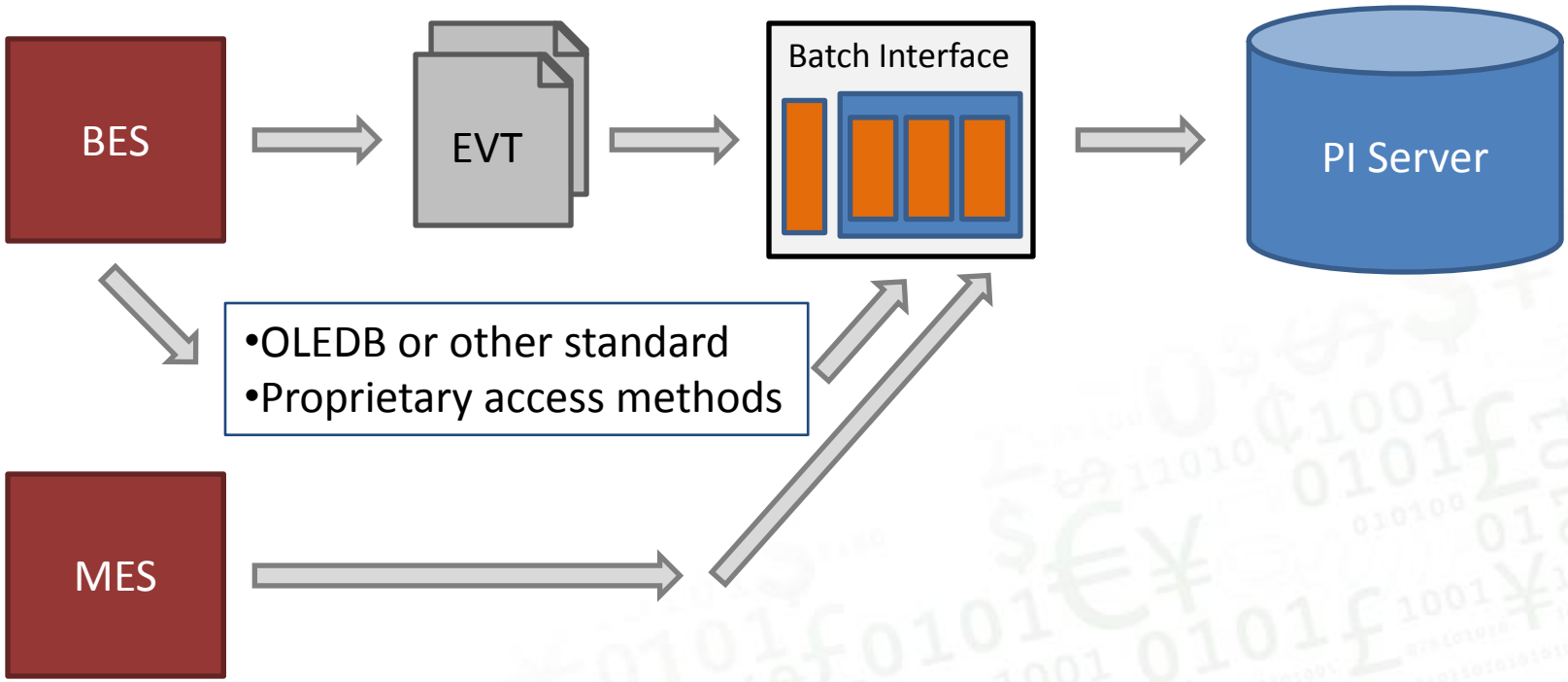
Batch Interface Framework Architecture



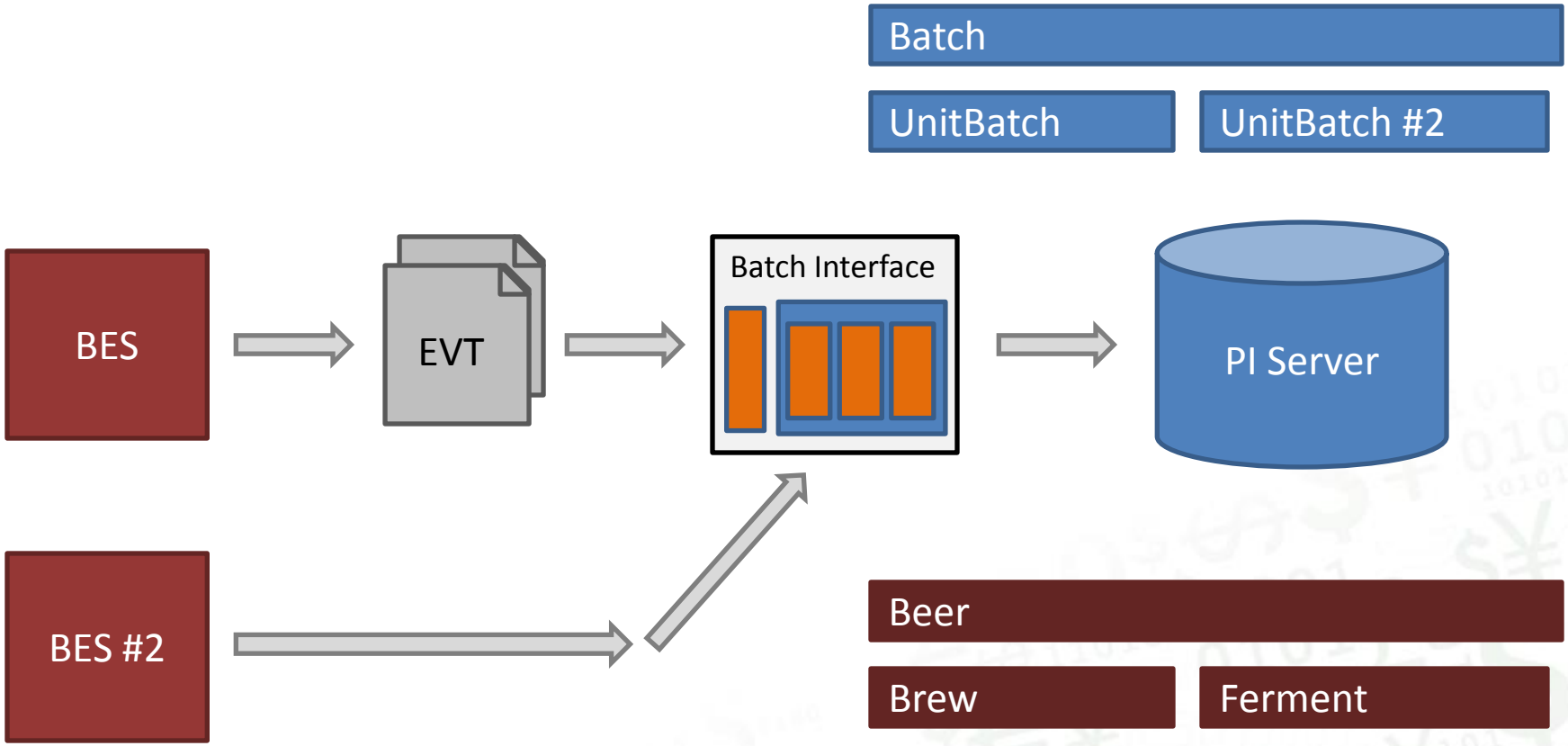
Batch Interface Framework Interface



Batch Interface Framework Interface

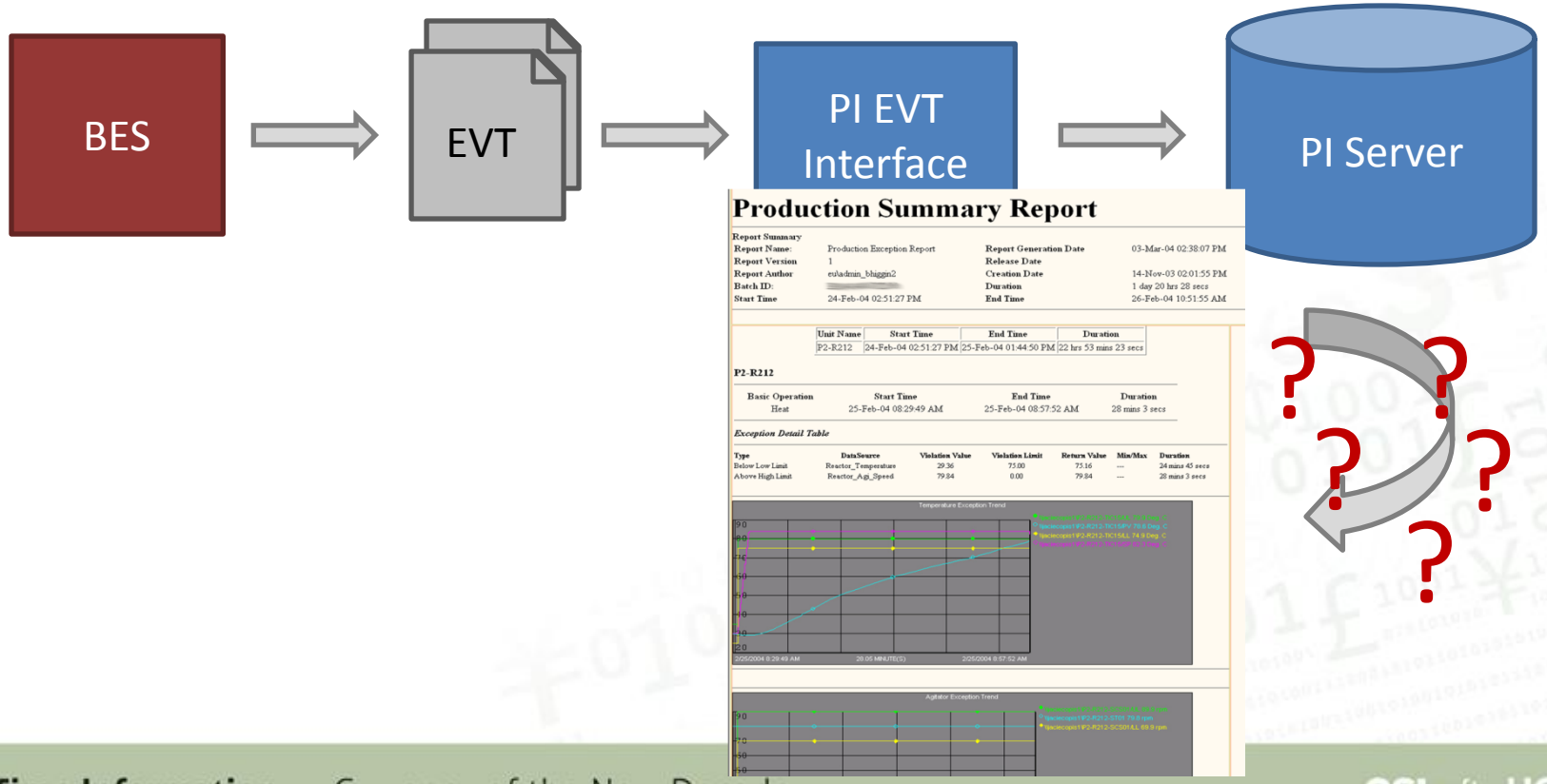


Batch Interface Framework Interface



Batch Interface Framework Interface

Tag count



Released new Batch Interfaces

Rockwell Automation

ABB

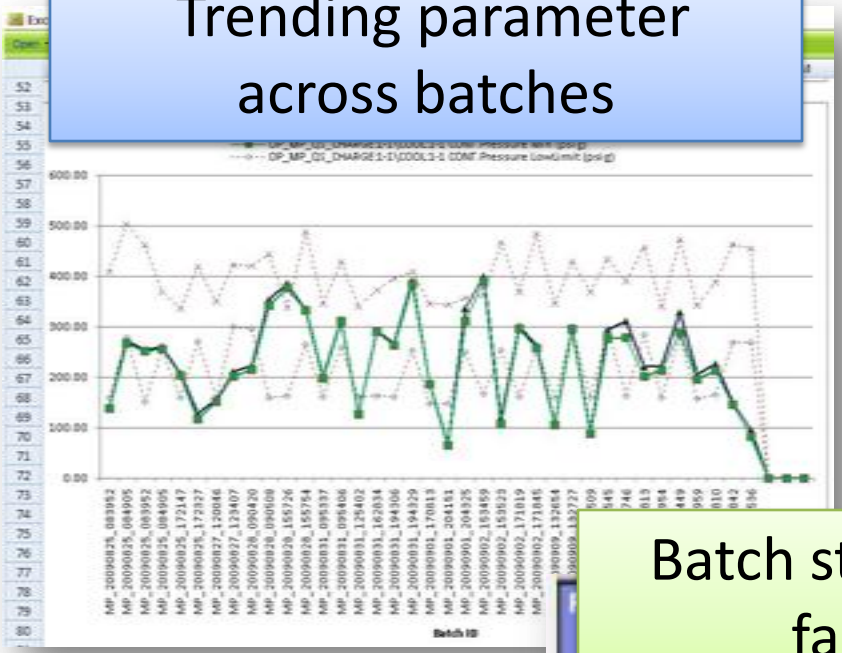
GE Intelligent Platforms

invensys Wonderware

Honeywell

Tailor Data Collection for Reporting & Analysis

Trending parameter across batches



Single batch phase drill down

Time	StringValue
1.2632E+09	AGITATE.Recipe Value.R_AGIT_FINAL_ST: On
1.2632E+09	AGITATE.Recipe Value.R_AGIT_SPEED: 480 R
1.2632E+09	AGITATE.Recipe Value.R_AGIT_ACTIVATE: TR
1.2632E+09	AGITATE.Recipe Value.R_AGIT_MIX_TM: 5 mi
1.2632E+09	AGITATE.Recipe Value.R_DF_WT_TM: 15 sec
1.2632E+09	AGITATE.Recipe Value.R_AUTO_LVL: FALSE M
1.2632E+09	AGITATE.Recipe Value.R_AGIT_OFF_LVL: 60 k
1.2632E+09	AGITATE.Recipe Value.R_AGIT_ON_LVL: 80 kg

Batch status across plants / factories / units

```
Tag[1].Name=[UNIT]([PHASEMODULE]):[DESCRIPT]-[EVENT]
Tag[1].Value=[PVAL]
```

SP_CHARGE_MATERIAL

SP_CHARGE_AMOUNT

ACT_CHARGE_AMOUNT

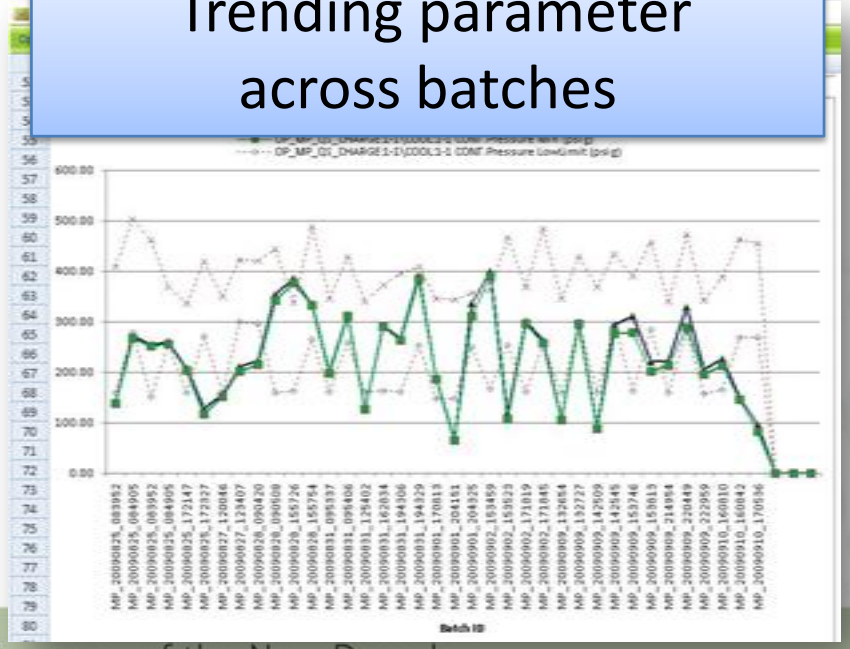
TAG TEMPLATE 1
Multiple Events into Multiple Tags

```
RE1560(CHARGE_DIW):SP_CHARGE_MATERIAL-Recipe Value
 03/03/2010 14:24:01.000    PW100
```

```
RE1560(CHARGE_DIW):SP_CHARGE_AMOUNT-Recipe Value
 03/03/2010 14:24:01.000    2480
```

```
RE1560(CHARGE_DIW):ACT_CHARGE_AMOUNT-Report
 03/03/2010 14:24:03.000    2414.5
```

Trending parameter across batches



```
Tag[2].Name=[UNIT].Event.Multi.Recipe_Report
Tag[2].Value=[PHASEMODULE].[EVENT].[DESCRIPT]: [PVAL] [EU]
```

SP_CHARGE_MATERIAL

SP_CHARGE_AMOUNT

ACT_CHARGE_AMOUNT

TAG TEMPLATE 2
Multiple Events into Single Tag

```
RE1560.Event.Multi.Recipe_Report
 03/03/2010 14:24:01.000   CHARGE_DIW.Recipe Value.SP_CHARGE_MATERIAL: PW100
 03/03/2010 14:24:01.000   CHARGE_DIW.Recipe Value.SP_CHARGE_AMOUNT: 2480 kg
 03/03/2010 14:24:03.000   CHARGE_DIW.Report.ACT_CHARGE_AMOUNT: 2414.5 kg
```

Single batch phase drill down

Time	StringValue
1.2632E+09	AGITATE.Recipe Value.R_AGIT_FINAL_ST: On
1.2632E+09	AGITATE.Recipe Value.R_AGIT_SPEED: 480 R
1.2632E+09	AGITATE.Recipe Value.R_AGIT_ACTIVATE: TR
1.2632E+09	AGITATE.Recipe Value.R_AGIT_MIX_TM: 5 mi
1.2632E+09	AGITATE.Recipe Value.R_DF_WT_TM: 15 sec
1.2632E+09	AGITATE.Recipe Value.R_AUTO_LVL: FALSE M
1.2632E+09	AGITATE.Recipe Value.R_AGIT_OFF_LVL: 60 k
1.2632E+09	AGITATE.Recipe Value.R_AGIT_ON_LVL: 80 kg

```
Tag[3].Name=[UNIT].PIEvent.UnitBatch.BatchID
Tag[3].Value=[BATCHID]
```

Unit Procedure Start

TAG TEMPLATE 3
PI Event Tags - Start

Unit Procedure End

TAG TEMPLATE 4
PI Event Tags - End

```
RE1560.PIEvent.UnitBatch.BatchID
 03/03/2010 14:30:30.000    MP_20100415_01
 03/03/2010 16:17:10.000    Inactive
```

```
Tag[4].Name=[UNIT].PIEvent.UnitBatch.BatchID
Tag[4].Value=Inactive
```

Batch status across plants / factories / units

Available Data from BES/MES

Emerson DeltaV Batch Historian Placeholders

- TIME, BATCHID, PROCEDURE, UNITPROCEDURE, OPERATION, PHASE, DESCRIPT, EVENT or PARAMETER, PVAL or VALUE, EU, AREA, PROCESSCELL, UNIT, PHASEMODULE, USERID or USER, UNIQUEID

Emerson DeltaV Alarms & Events Placeholders

- TIME, EVENT, CATEGORY, NODE, AREA, PROCESSCELL, UNIT, MODULE, MODULEDESC, ATTRIBUTE, STATE, LEVEL, DESC1, DESC2

Emerson Syncade Placeholders

- TIME, BATCHID, PROCEDURE, UNITPROCEDURE, OPERATION, PHASE, DESCRIPT, PARAMETER, VALUE, USER, AREA, PROCESSCELL, UNIT, UNIQUEID,SET,HIGH,LOW

Rockwell FactoryTalk Batch Placeholders

- TIME, BATCHID, PROCEDURE, UNITPROCEDURE, OPERATION, PHASE, DESCRIPT, EVENT, PVAL, EU, AREA, PROCESSCELL, UNIT, PHASEMODULE, USERID or USER, UNIQUEID, MATERIALNAME, MATERIALID, LOTNAME, LABEL, CONTAINER

ABB 800xA PlaceHolders

- TIME, UNIQUEID, BATCHID, UNIT, PROCEDURE, UNITPROCEDURE, OPERATION, PHASE, PARAMETER, VALUE

Wonderware InBatch PlaceHolders

- TIME, UNIQUEID, BATCHID, PROCEDURE, UNIT, UNITPROCEDURE, OPERATION, PHASE, PARAMETER, VALUE, TARGETVALUE, OLDVALUE, DESCRIPT , EU, USERID

GE iBatch Placeholders

- TIME, BATCHID, PROCEDURE, UNITPROCEDURE, OPERATION, PHASE, DESCRIPT, EVENT, PVAL, EU, AREA, PROCESSCELL, UNIT, PHASEMODULE, USERID or USER, UNIQUEID

Honeywell TotalPlant Batch Placeholders

- TIME, BATCHID, PROCEDURE, UNITPROCEDURE, OPERATION, PHASE, DESCRIPT, EVENT, PVAL, EU, AREA, PROCESSCELL, UNIT, PHASEMODULE, USERID or USER, UNIQUEID, MATERIALNAME, MATERIALID, LOTNAME, LABEL, CONTAINER

Tag Templates Functionality

Tag Templates can contain placeholders which are vendor / system specific

Placeholders are replaced at runtime with actual values from the source system

TIME, BATCHID, PROCEDURE, UNITPROCEDURE, OPERATION, PHASE, DESCRIPT, EVENT or PARAMETER, PVAL or VALUE, EU, AREA, PROCESSCELL, UNIT, PHASEMODULE, USERID or USER, UNIQUEID

Rockwell Automation

TIME, BATCHID, PROCEDURE, UNITPROCEDURE, OPERATION, PHASE, DESCRIPT, EVENT, PVAL, EU, AREA, PROCESSCELL, UNIT, PHASEMODULE, USERID or USER, UNIQUEID, MATERIALNAME, MATERIALID, LOTNAME, LABEL, CONTAINER

New Batch Interfaces

- Common Code Library
- More Robust
- New Caching Mechanism
- New Batch Merging Functionality
- New Tag Templates Functionality

Batch Interface Roadmap - Releases

- Siemens PCS7 Batch Interface (pending acceptance test)
- Performix xMES Batch Interface (Mid 2010)
- Werum PAS-X Batch Interface (Mid 2010)

Batch Interface Roadmap - Event Frames

- Swap out PI Communication Layer: write to EF database instead of PI Batch Database
- Enable auto-configuration of AF Database instead of Module Database
- Enhance tag template functionality to write to AF/EF attributes
- See Event Frames in Product Expo (PI AF pod)
- EF available as Community Technology Preview (CTP) on OSIsoft vCampus

New Advances in Batch Interfaces: Integrating with Batch Execution Systems

WRAP-UP & CONCLUSIONS

Conclusions

New Batch Interfa
get more value ou
provide a path t
F

MES systems pro
valuable context a
PI pr

Use the PI System
enabling your
Integra

Where to find more Information:

- FAQs about the Emerson DeltaV Batch Interface and the Rockwell FactoryTalk Batch Interface (KB00258)

- Join us at the Batch Interfaces Pod!
  - Batch Interface Demos
  - Batch Visualization Demos
  - Answer your Batch Questions

- Contact us:
  - Todd Brown – tbrown@osisoft.com
  - Chris Coen – ccoen@osisoft.com
  - Ivan Datskov – idatskov@osisoft.com
  - Chris Nelson – cnelson@osisoft.com

OSIsoft® UC 2010

Real Time Information — Currency of the New Decade

Thank you

Backup Slides

Tag Templates Functionality

Examples

- Allow for creation of PI tags, aliases, and data associated with any Event Type
- Support two extremes (and everything in-between): single events can be stored in different PI tags and multiple events can be stored in a single PI tag.

EXAMPLE TAG TEMPLATES

Single Event into Tag

```
Tag[9000301].Name=BESName:[UNIT]([PHASEMODULE]):[DESCRIPT]-[EVENT]
Tag[9000301].Descriptor=[UNIT] [PHASEMODULE] [DESCRIPT]-[EVENT]
Tag[9000301].EngUnits=[EU]
Tag[9000301].Value=[PVAL]
Tag[9000301].Type=string
Tag[9000301].UnitAlias=\\Phases\[PHASEMODULE]\[DESCRIPT] - [EVENT]
Tag[9000301].PhaseAlias=[EVENT]|[DESCRIPT]
Tag[9000301].Trigger=[EVENT,value="Recipe Value"]
Tag[9000301].Trigger=[EVENT,value="Report"]
Tag[9000301].Trigger=[EVENT,value="Owner Change"]
Tag[9000301].Trigger=[EVENT,value="Prompt"]
Tag[9000301].Translate=FALSE
```

Multiple Events into Tag

```
Tag[9000202].Name=BESName:[UNIT].Event.Multi.Recipe_Report_OwnerChange_Prompt
Tag[9000202].Descriptor=[UNIT].Event.Multi.Recipe_Report_OwnerChange_Prompt
Tag[9000202].EngUnits=PHASEMODULE.EVENT.DESCRIPT: PVAL EU
Tag[9000202].Value=[PHASEMODULE].[EVENT].[DESCRIPT]: [PVAL] [EU]
Tag[9000202].Type=string
Tag[9000202].UnitAlias=Event.Multi.Recipe_Report_OwnerChange_Prompt
Tag[9000202].Trigger=[EVENT,value="Recipe Value"]
Tag[9000202].Trigger=[EVENT,value="Report"]
Tag[9000202].Trigger=[EVENT,value="Owner Change"]
Tag[9000202].Trigger=[EVENT,value="Prompt"]
Tag[9000202].Trigger=[EVENT,value="Prompt Response"
Tag[9000202].Translate=FALSE
```

```
TAG = BESName:RE1560(CHARGE_DIW):ACT_CHARGE_AMOUNT-Report
 03/03/2010 14:24:03.000   2414.5
```

Same event written to two tags, in two different formats

```
TAG = BESName:RE1560.Event.Multi.Recipe_Report_OwnerChange_Prompt
 03/03/2010 14:24:01.000   CHARGE_DIW.Recipe Value.CPP_HIGH_LIMIT: 2535 kg
 03/03/2010 14:24:01.000   CHARGE_DIW.Recipe Value.SP_CHARGE_MATERIAL: PW100
 03/03/2010 14:24:01.000   CHARGE_DIW.Recipe Value.SP_CHARGE_AMOUNT: 2480 kg
 03/03/2010 14:24:03.000   CHARGE_DIW.Report.ACT_CHARGE_AMOUNT: 2414.5 kg
```

Tag Templates Functionality

Tailor to meet your reporting needs … Examples - Same Event

E

- 1 tag for all units.
- 1 tag for all batches.
- 6 tags for all units based on the defined triggers.
- 1 tag for all alarms and events.

TAG = BESName:Event.Multi.AllBatchEvents
…
FTB13|37|API_RECIPE\RE1500:1\MAKE_A:1\CHARGE_FM:2-1|ACT_CHARGE_AMOUNT|Report|1120|kg|Factory 1|Train C|RE1500|CHARGE_FM||
…

D

- 1 tag per unit.
- 1 tag per unit capturing all events for that unit.
- 1 tag per unit capturing all State Change events for that unit.

TAG = BESName:RE1500.Event.Multi.AllBatchEvents.Unit
…
FTB13|37|API_RECIPE\RE1500:1\MAKE_A:1\CHARGE_FM:2-1|ACT_CHARGE_AMOUNT|Report|1120|kg|Factory 1|Train C|RE1500|CHARGE_FM||
…

C

- 1 tag per unit per event type for each .Trigger event defined.
- 5 tags per unit for the five defined Event Trigger Types

TAG = BESName:RE1500.Event.Report
…
PROMPT.Report.PROMPT_ANSWER: 5.5 kg
CHARGE_FM.Report.ACT_CHARGE_AMOUNT: 1120 kg
XFEROUT.Report.ACT_TRANSFER_AMOUNT: 175 GALLONS
…

B

- 1 tag for every phase module event type (recipe, report, etc.) value running on each unit.
- 1 tag per phase module that runs on a unit.

TAG = BESName:RE1500(CHARGE_FM):ACT_CHARGE_AMOUNT-Report
4058
1120
68.4

A

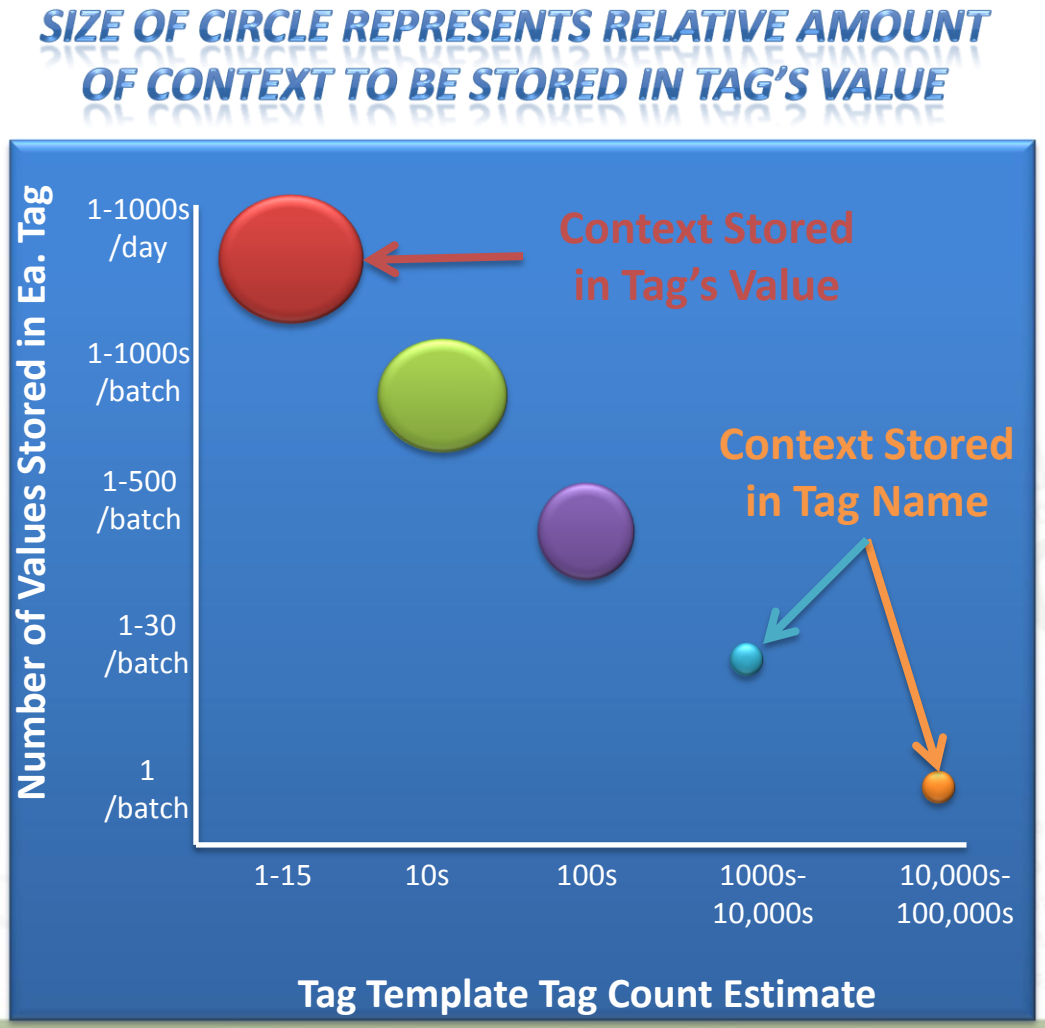
- 1 tag per operation & phase sub step\instance that runs on a unit.

TAG = BESName: RE1500.ProceduralModel.MAKE_A:1.CHARGE_FM:2-1.Report.ACT_CHARGE_AMOUNT
1120

Tag Templates Functionality

A word on controlling tag creation … to save on tag licensing

- Customers that were displeased with the number of tags that the EVT Interface created (licensing issue) may 'jump' towards the prospect of writing many events to a single or a few tags.
- There is a **trade-off** between storing many different types of events to a tag and the ease of use for data in the tag by end users and/or reporting applications.
  - By storing more events types into a single tag, that tag's value will need to have MORE CONTEXT to allow the user to make sense of the data.
  - This needs to be evaluated based on the intended use of the data by end users and analysis/reporting applications.



Tag Templates Functionality

Advanced Parsing Parameters

- OR conditions for Placeholders can be defined by listing multiple .Trigger attributes for the tag template.
- AND conditions for Placeholders can be defined by specifying multiple Placeholders within a single .Trigger attribute.

```
Tag[9000205].Name=BESName:[UNIT].Event.Multi.AllBatchEvents.Unit.Critical
Tag[9000205].Descriptor=[UNIT] Critical Unit Batch Events
Tag[9000205].EngUnits=BATCHID_UNIQUEID_PROCEDURE_UNITPROCEDURE_OPERATION_PHASE_DESCRIPT_EVENT_PVAL_EU_UNIT_PHASEMODULE_USERID
Tag[9000205].Value=[BATCHID]|[UNIQUEID]|[PROCEDURE]\[UNITPROCEDURE]\[OPERATION]\[PHASE]|[DESCRIPT]|[EVENT]|[PVAL]|[EU]|[UNIT]|[PHASEMODULE]|[USERID]|
Tag[9000205].Type=string
Tag[9000205].UnitAlias=Event.Multi.AllBatchEvents.Unit.Critical
Tag[9000205].Trigger=[EVENT,value="Active Step Change Commencing"]
Tag[9000205].Trigger=[EVENT,value="Comment"]
Tag[9000205].Trigger=[EVENT,value="Recipe Data Changed"]
Tag[9000205].Trigger=[EVENT,value="Recipe Value Change"]
Tag[9000205].Trigger=[EVENT,value="State Change"] [PVAL, value="HELD"]
Tag[9000205].Trigger=[EVENT,value="State Change"] [PVAL, value="RESTARTING"]
Tag[9000205].Trigger=[EVENT,value="State Change"] [PVAL, value="ABORTED"]
Tag[9000205].Trigger=[EVENT,value="System Message"] [DESCRIPT, value="Phase Logic Failure*"]
Tag[9000205].Translate=FALSE
```

Tag Templates Functionality

PIEVENTs

- The Batch Interface is capable of providing its activity on PI Batch database by generating its own **PIEvents**
  - These events are based on the triggering batch event logic the interface uses against each source system to trigger PI Batches, PIUnitBatches, PISubBatches (Operations, Phases, Phase States, Phase Steps).
  - This functionality allows customers to configure Tag Templates based on these PIEvents to write batch triggering data to PI tags (the interface is already creating PI Batch records in the PI Batch Database).

PIEVENT Example 1: PI Batch Active Tag

Tag[11].Name=BESName:PIEvent.Batch.Active
Tag[11].Value=BATCH START: [BATCHID] |Prod: [PRODUCT] |Rec: [PROCEDURE]
Tag[11].Trigger=[EVENT,value="PIEVENT"] [DESCRIPT, value="BATCH"] [PVAL,value="START"]
//// SAME TAG
Tag[12].Name=BESName:PIEvent.Batch.Active
Tag[12].Value=BATCH END: [BATCHID] |Prod: [PRODUCT] |Rec: [PROCEDURE]
Tag[12].Trigger=[EVENT,value="PIEVENT"] [DESCRIPT, value="BATCH"] [PVAL,value="END"]

PIEVENT Example 2: PI Unit Batch Active Tag

Tag[21].Name=BESName:[UNIT].PIEvent.UnitBatch.Active
Tag[21].Value=1
Tag[21].Type=integer
Tag[21].UnitAlias=PIEvent.UnitBatch.Active
Tag[21].Trigger=[EVENT,value="PIEVENT"] [DESCRIPT, value="UNITBATCH"] [PVAL,value="START"]
//// SAME TAG
Tag[22].Name=BESName:[UNIT].PIEvent.UnitBatch.Active
Tag[22].Value=0
Tag[22].Type=integer
Tag[22].UnitAlias=PIEvent.UnitBatch.Active
Tag[22].Trigger=[EVENT,value="PIEVENT"] [DESCRIPT, value="UNITBATCH"] [PVAL,value="END"]

PIEVENT Example 3: PI Unit Batch BatchID Tag

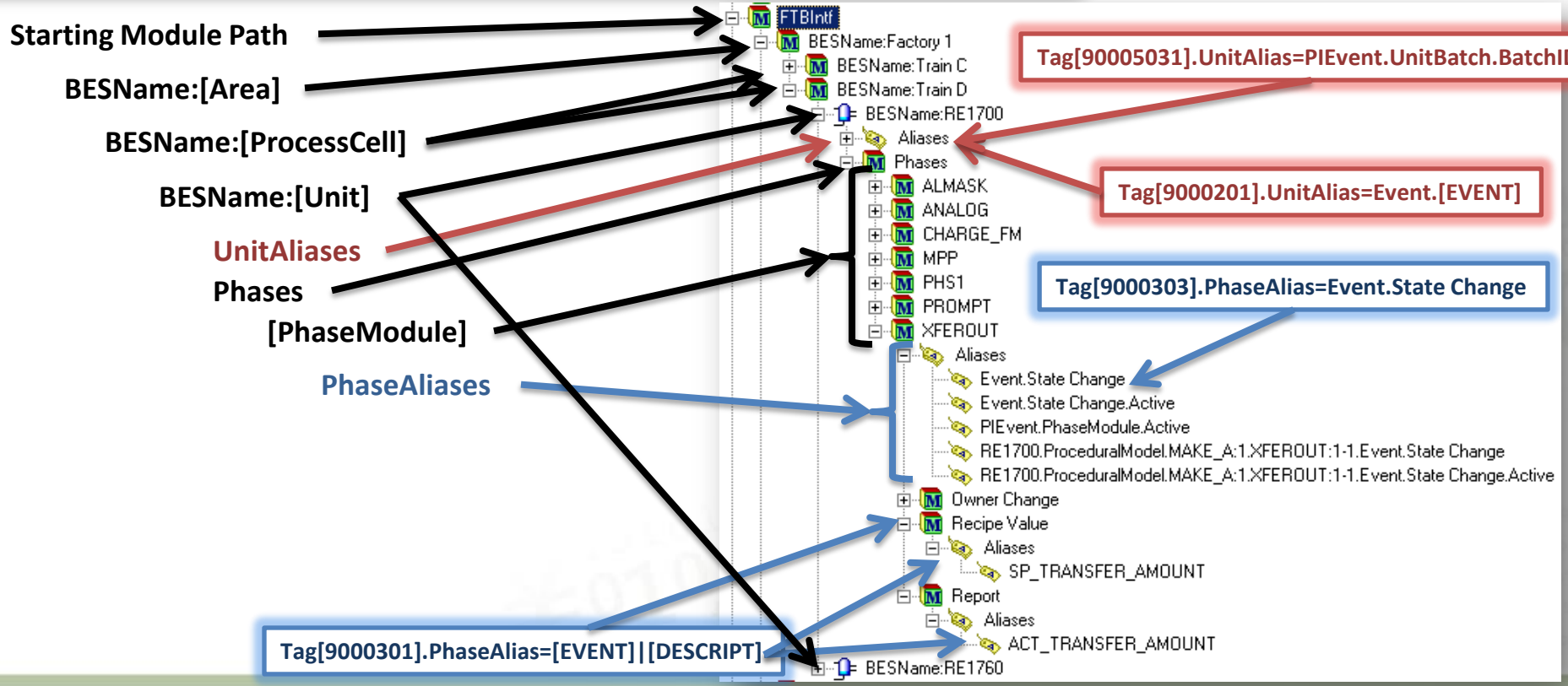
Tag[31].Name=BESName:[UNIT].PIEvent.UnitBatch.BatchID
Tag[31].Value=[BATCHID]
Tag[31].UnitAlias=PIEvent.UnitBatch.BatchID
Tag[31].Trigger=[EVENT,value="PIEVENT"] [DESCRIPT, value="UNITBATCH"] [PVAL,value="START"]
//// SAME TAG
Tag[32].Name=BESName:[UNIT].PIEvent.UnitBatch.BatchID
Tag[32].Value=Inactive
Tag[32].UnitAlias=PIEvent.UnitBatch.BatchID
Tag[32].Trigger=[EVENT,value="PIEVENT"] [DESCRIPT, value="UNITBATCH"] [PVAL,value="END"]

Tag Templates Functionality

PI Module Creation

- The Batch Interface performs automated module and unit creation within the PI Module DB on the PI Server.
  - An optional Starting Module Path (/smp command line parameter) can be defined in the interface .bat startup file. Example: /smp=FTBIntf

[GENERAL]
Equipment=BESName:[Area]\BESName:[ProcessCell]\BESName:[Unit]\Phases\[PhaseModule]



EVT Interface & RtReports Migration to BIF

Migration Summary

EVT Interface Configuration / Data Type	Required Batch Interface Framework Configuration	Impact on RtReports Reports
Interface Point Source & ID	Configure the same /PS (point source) and /ID (interface instance ID) in the interface .bat file.	No impact on existing reports.
Module Database Hierarchy	Use the following Equipment specification in the Tag Template file include (replace "BESName:" with appropriate /BES prefix OR delete): [GENERAL] Equipment=BESName:[Area]\BESName:[ProcessCell]\BESName:[Unit]\Phases\[PhaseModule]	No impact on existing reports.
Phase Recipe & Report Parameter Tags	Use Tag Template ID 9000301. Do not use Tag Template ID 9000302.	No impact on existing reports.
PI Batch Properties	Use Property Template IDs: 9000001, 9000002, 9000003, 9000004, 9000005, 9000006 for procedure level information. Add additional Property Templates as needed based on current EVT configuration or migrate this data to Tag Templates (recommended best practice).	Must upgrade to RtReports version 3.3.0+. No Impact on report configuration if all same batch property templates are configured as in EVT. Report configuration needs to be updated if migrating from batch properties to Tag Templates (recommended best practice).
EVT String Pool Tags	Must configure Tag Templates to replace EVT String Pool Tag functionality. Tag Templates associated with this best practice can be used by evaluation needs to be performed on a case by case basis by the customer based on their usage of the data.	Must upgrade to RtReports version 3.3.0+ for new string filtering and parsing Journal Action result type. Must update report configuration for Journal Actions retrieving data via EVT String Pool tags to the new Parse String Tag result type. Format Templates will also need to be updated to reference the new result type.

RtReports 3.3 Support for BIF

Product Roadmap

- RtReports 3.3.0.0 was released on August 24, 2009
- Primary Goal is to bring RtReports into alignment with the new Batch Interface Framework
  - PI Batch Property Result Definition enhancement
  - New Result Definition for Compressed Values
  - Additional Manufacturing Aliases
  - Generic Batch Property Result Definition
  - Support for Overlapping Unit Batch Convention

Where to find more information

Reference	Source
Event File Interface to the PI System, Version 3.8.6.8	OSIsoft User Manual [LINK TO DOCUMENT]
Emerson DeltaV Batch Interface to the PI System, Version 1.0.1.0	OSIsoft User Manual [LINK TO DOCUMENT]
Emerson DeltaV Syncade Batch Interface to the PI System, Version 1.0.1.0	OSIsoft User Manual [LINK TO DOCUMENT]
Rockwell FactoryTalk Batch Interface to the PI System, Version 1.0.1.0	OSIsoft User Manual [LINK TO DOCUMENT]
FAQs about the Emerson DeltaV Batch Interface and the Rockwell FactoryTalk Batch Interface KB00258	OSIsoft FAQ / KB Article [LINK TO DOCUMENT]

Best Practice Document & Presentation is Available for EA Customers

Existing EVT interface
PIEMDVBCS: Emerson DeltaV Compliance Suite interface
PIEMDVB: Emerson Deltav batch interface
PIFTBInt: Rockwell FactoryTalk Batch interface

Feature List	Existing_EVT	PIEMDVBCS	PIEMDVB	PIFTBInt
Supported data source types	EVT	EVT, SQL, OPCAE, MSMQ, WebService	EVT, SQL, OPCAE,	EVT
Active EVT Directory Monitor(s) on changes	-	X	X	X
Forced Directory Scan of EVT directory	(every scan)	Startup and loss of connectivity	Startup and loss of connectivity	Startup and loss of connectivity
Alphabetical EVT file Processing	X	-	-	-
Event Time ordered based EVT file processing	X	X	X	X
Support for multiple data sources	-	X	X	X
Data source altering such as file renaming	X	-	-	-
Auto EVT file position pointer recovery	3.8.6.4+	X	X	X
Perform data validation and recovery for active batches on startup. (Note: active batches are batches which are currently open or were open at last interface shutdown. Data recovery includes modules, aliases, tags, tag events, batch data.	-	X	X	X
Processing of partially processed batches on startup	Requires POS files	-	-	-
Progress Tracking method	POS files	Last good timestamp written to PI	Last good timestamp written to PI	Last good timestamp written to PI
Supports History Recovery	X	X	X	X
Prerequisites for History Recovery	PI Server cleaning	-	-	-
History Recovery initiated by customer providing the following data:	Specific EVT files (requires customer investigation)	Approximate time frame (auto source search)	Approximate time frame (auto source search)	Approximate time frame (auto source search)
Build-in data statistics (Validation)	-	X	X	X
Build-in Preprocessing mode	X	X	X	X
Build-in Delete mode	-	X	X	X
Bulk data processing	-	X	X	X
Performance Counters	Through UNIINT	Health, timers, object and event counters	Health, timers,object and event counters	Health, timers,object and event counters
Use multiple	-	X	X	X

From FAQ Doc

Tailor Data Collection for Reporting & Analysis

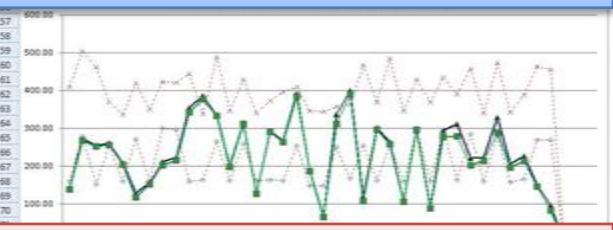
TAG TEMPLATE 1
Multiple Events into Multiple Tags

```
RE1560(CHARGE_DIW):SP_CHARGE_MATERIAL-Recipe Value
 03/03/2010 14:24:01.000    PW100
```

```
RE1560(CHARGE_DIW):SP_CHARGE_AMOUNT-Recipe Value
 03/03/2010 14:24:01.000    2480
```

```
RE1560(CHARGE_DIW):ACT_CHARGE_AMOUNT-Report
 03/03/2010 14:24:03.000    2414.5
```

Useful for trending parameter across batches



TAG TEMPLATE 2
Multiple Events into Single Tag

```
RE1560.Event.Multi.Recipe_Report
 03/03/2010 14:24:01.000    CHARGE_DIW.Recipe Value.SP_CHARGE_MATERI
 03/03/2010 14:24:01.000    CHARGE_DIW.Recipe Value.SP_CHARGE_AMOUNT
 03/03/2010 14:24:03.000    CHARGE_DIW.Report.ACT_CHARGE_AMOUNT: 241
```

Useful for single batch phase drill down

TAG TEMPLATE 3
PI Event Tags - Start

TAG TEMPLATE 4
PI Event Tags - End

```
RE1560.PIEvent.UnitBatch.BatchID
 03/03/2010 14:30:30.000    MP_20100415_01
 03/03/2010 16:17:10.000    Inactive
```

Useful for batch status across plants / factories / units

Tag Templates Functionality Examples