Maximizing the Value of Your Operational Data

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25 April 2018

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Wonderware by Schneider Electric

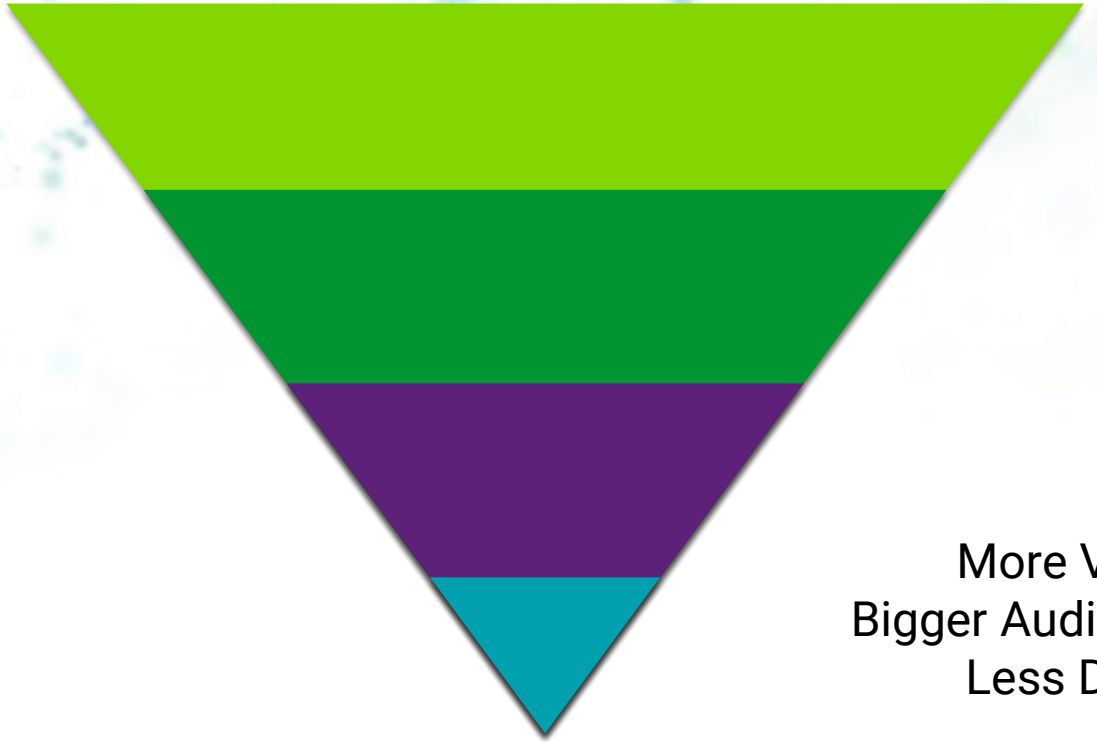
Operational Context

Information Content

Historical Context

Current Context

Isolated, Current Values



More Value
Bigger Audience
Less Detail

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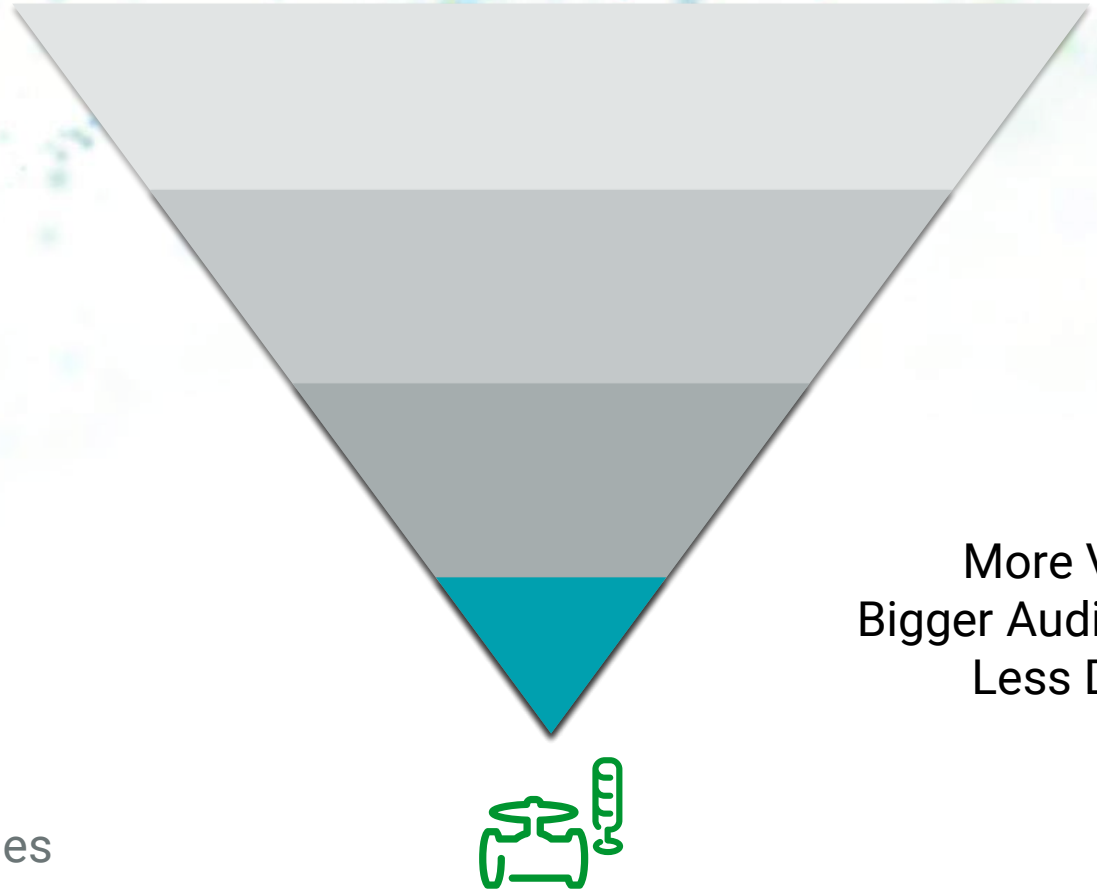


More Value
Bigger Audience
Less Detail

Current Value Example: Drive

1

0

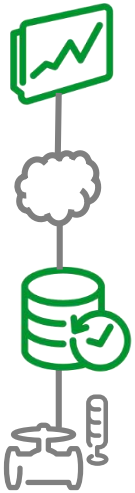
How to find?

- Motor starts
- Duty cycle

Wonderware InTouch

- World’s Favorite HMI
- Includes
  - Data Acquisition
  - Simple historical logging (LGH)
  - Basic trend
  - CSV export

Wonderware Historian



- Full-featured Historian
- Includes
  - Data Acquisition
  - Rich transformation
  - Scalable from 100s to millions of tags
- Over 80,000 sold

Wonderware by Schneider Electric

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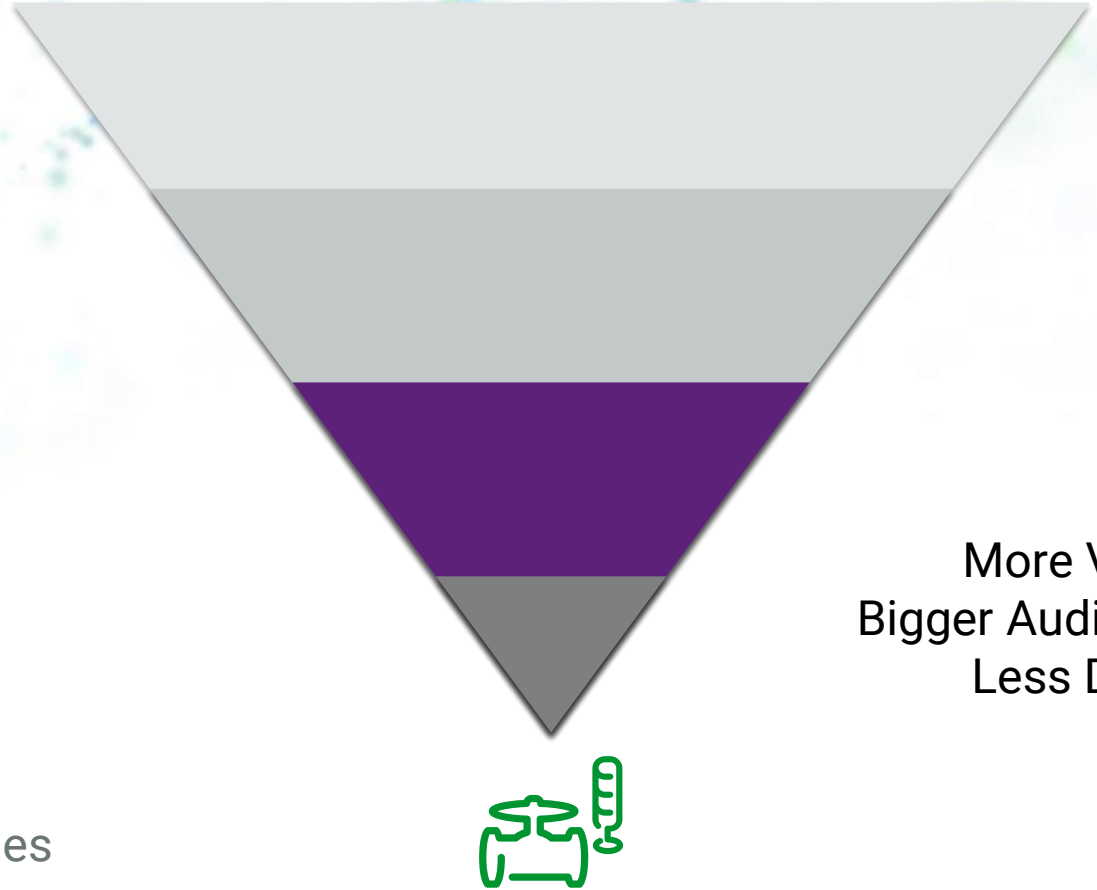
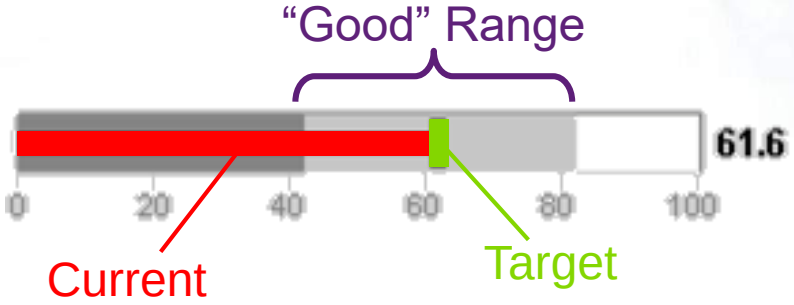
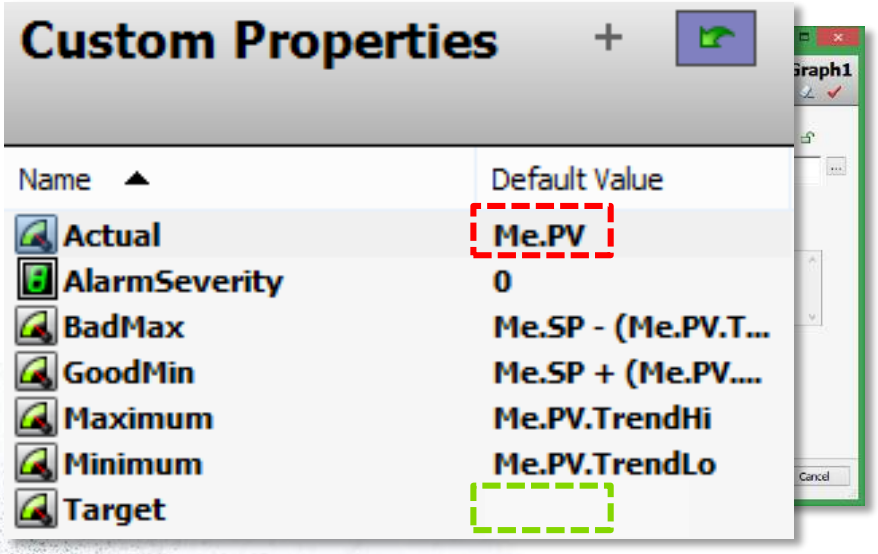
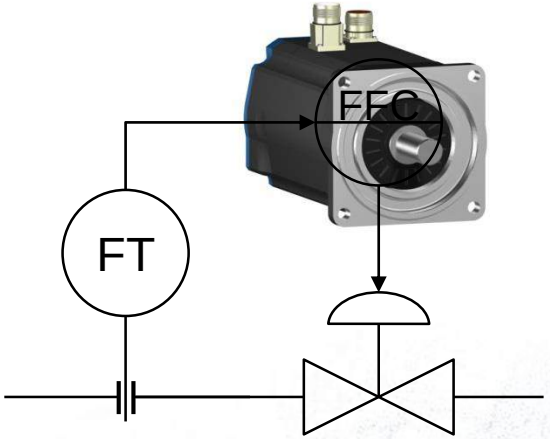


More Value
Bigger Audience
Less Detail

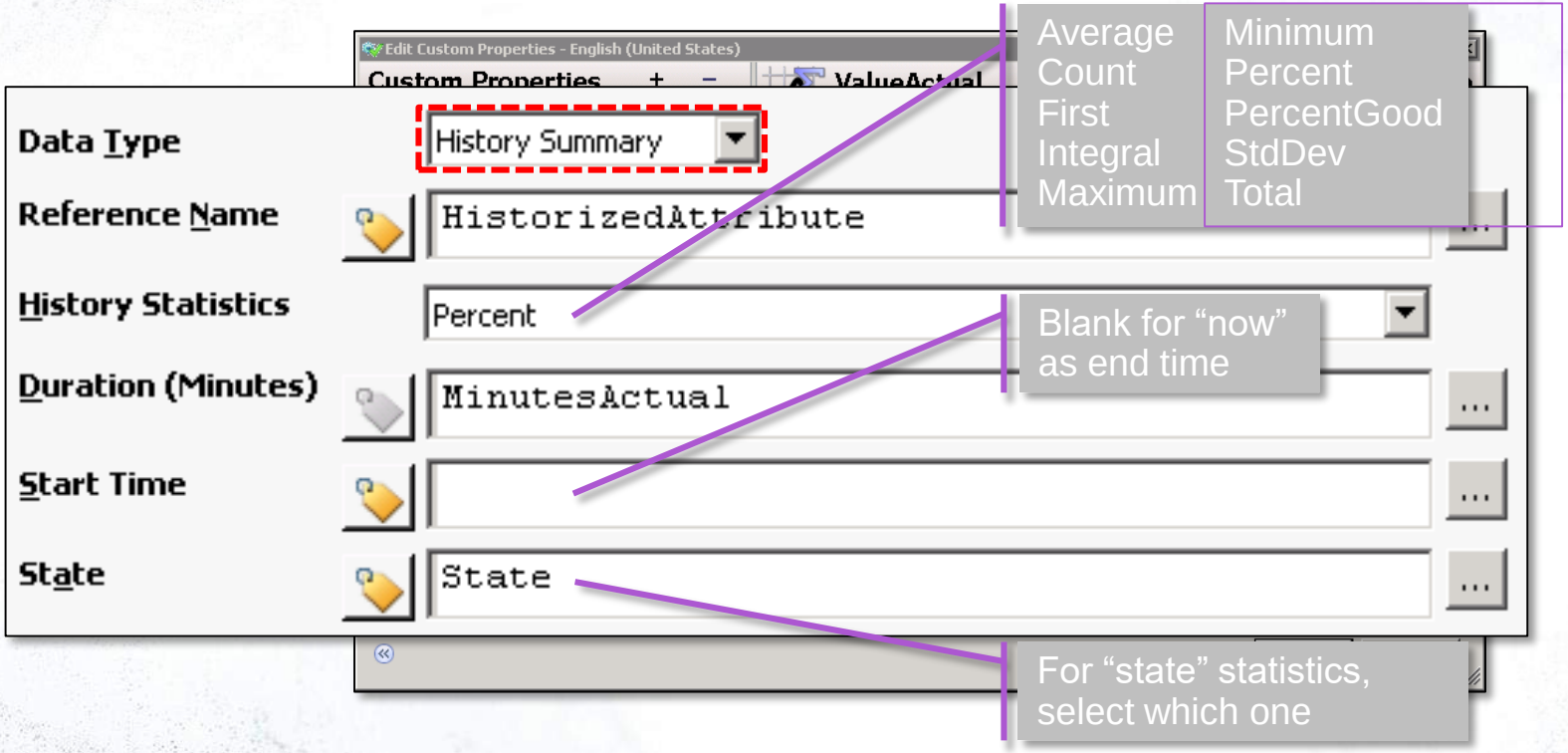
Bullet Chart



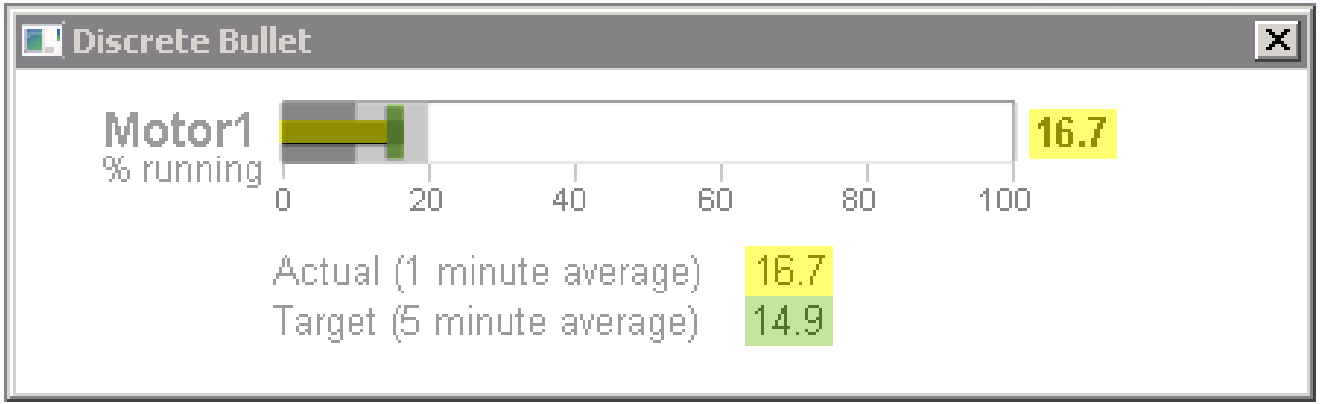




Historian Custom Property



Example


Discrete Bullet
Motor1
% running
0
20
40
60
80
100
16.7
Actual (1 minute average)
16.7
Target (5 minute average)
14.9

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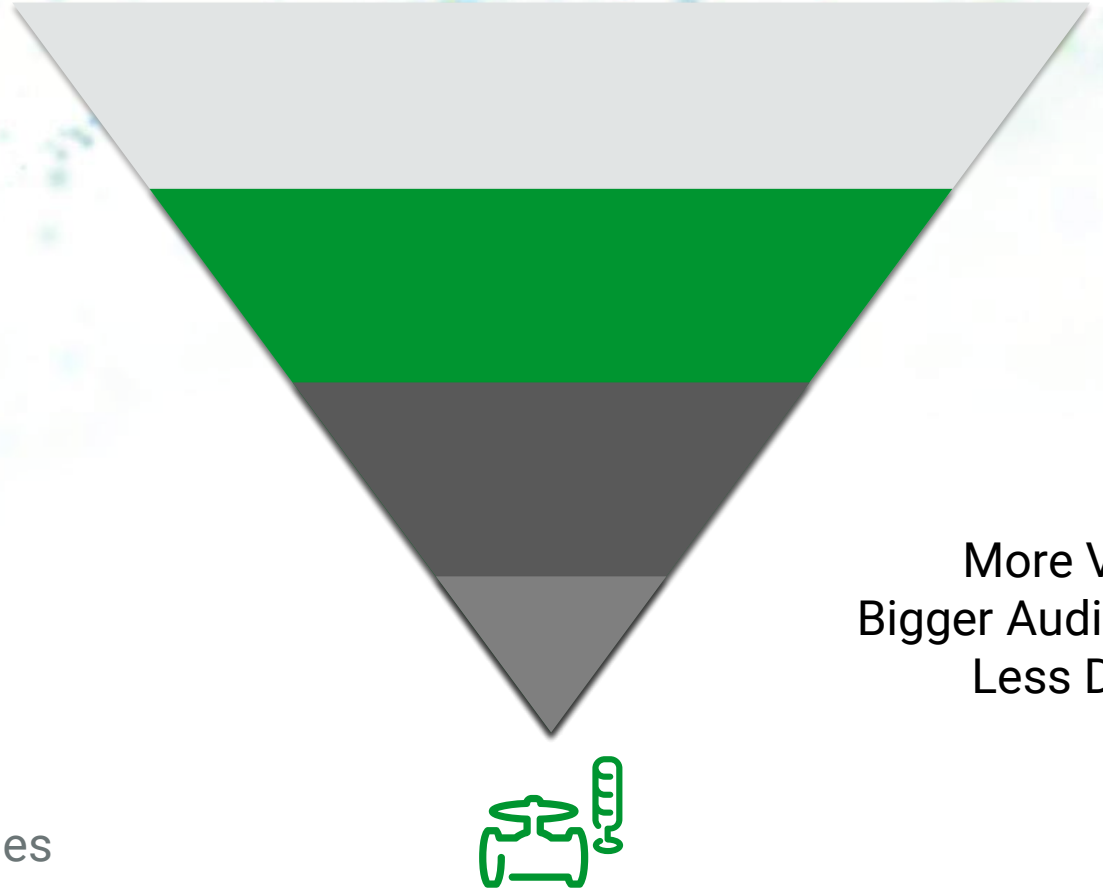


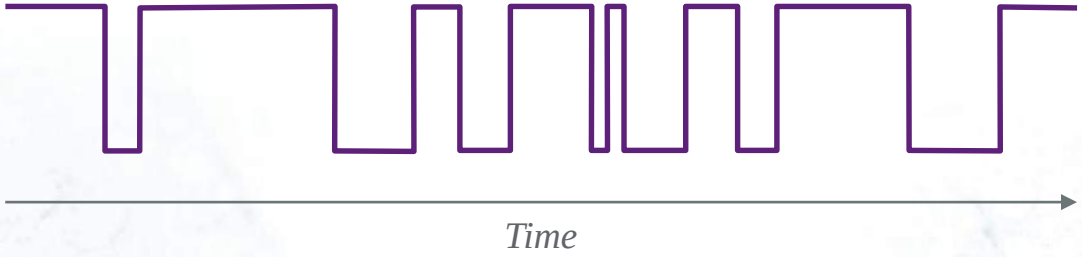
More Value
Bigger Audience
Less Detail

Transformation Example: Drive

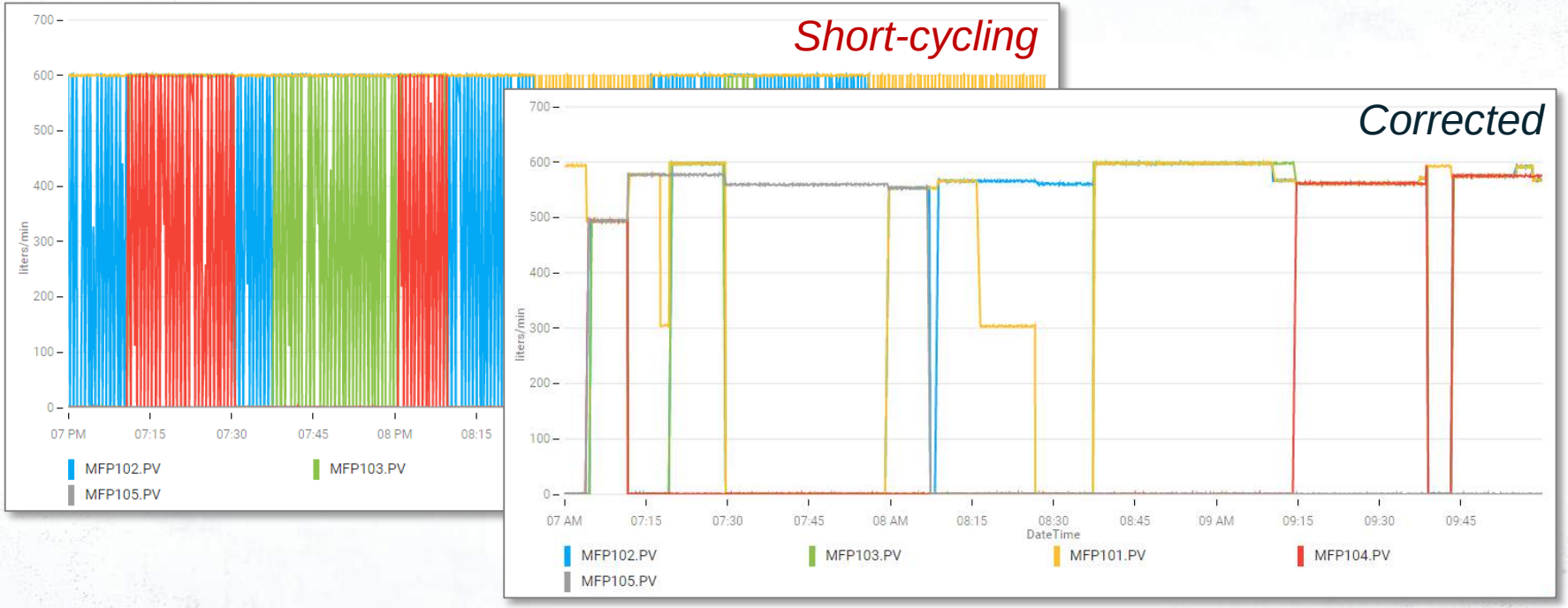
1

0

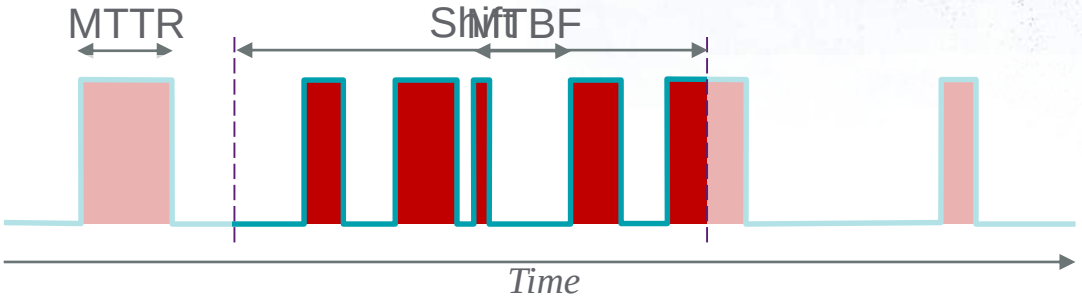
- Motor starts
- Duty cycle
  - Average
  - Shortest stop
  - Shortest run



Cycle Times

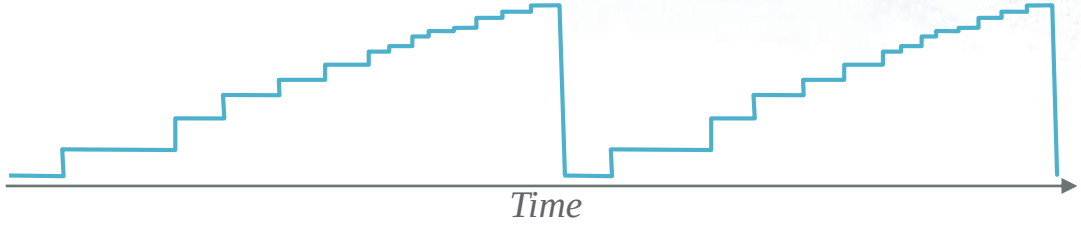

Short-cycling
700
600
500
400
300
200
100
0
liters/min
07 PM
07:15
07:30
07:45
08 PM
08:15
MFP102.PV
MFP103.PV
MFP105.PV
Corrected
700
600
500
400
300
200
100
0
liters/min
07 AM
07:15
07:30
07:45
08 AM
08:15
08:30
08:45
09 AM
09:15
09:30
09:45
DateTime
MFP102.PV
MFP103.PV
MFP101.PV
MFP104.PV
MFP105.PV

Transformation Example: Downtime



- Downtime Statistics
  - Total (split or not)
  - Longest
  - Shortest
- Mean Time Between Failure
- Mean Time To Repair

Transformation Example: Counter



- Calculate amount of increase
  - Rollover
  - Reset
  - Reverse

Breadth Of Data

Discrete
(Boolean)

Analog
(floating point, integer)

Aa

String
(512 characters)

∑μ

Summary
(Analog & State)

Alarms
(structured time series)

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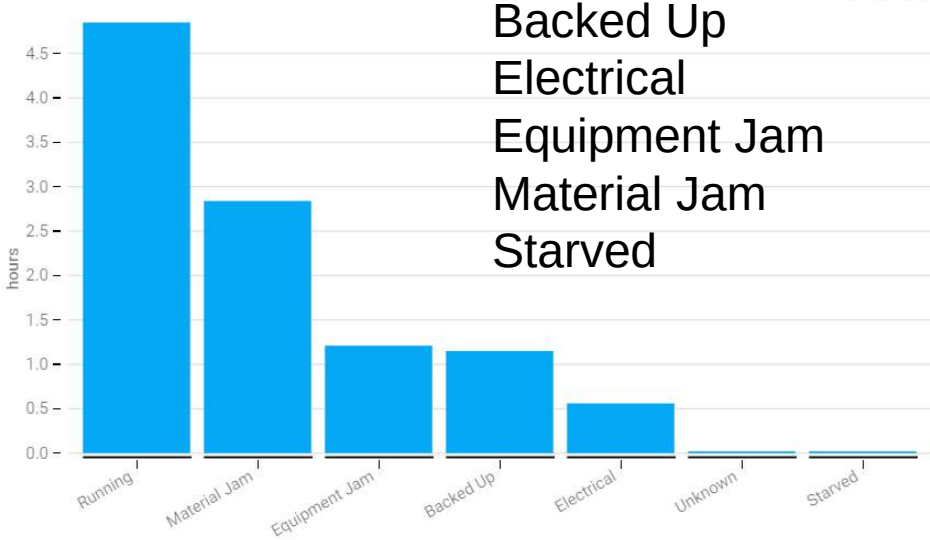
Simple Utilization

- Historize Downtime Reason
  - String or integer tag
  - Accurately records micro-stops
  - State summary calculates statistics
- View As A Pareto
  - In InSight
  - Custom charts



Scenarios Guide

Scenario 7: Pinpoint reasons for downtime

You can use State Summary information to help you answer questions like:

- How much downtime was due to feeder jams?
- What else is causing downtime?

What is State Summary Data?

State summary data summarizes the states of a tag value. You can use this to analyze process variables with a limited number of states, such as a machine's state of running/starting/stopping/off or a string that represents a downtime reason.

For each distinct state within a cycle, state summary replication also provides:

- Total time
- Percent of the cycle
- Shortest time
- Longest time
- Average time

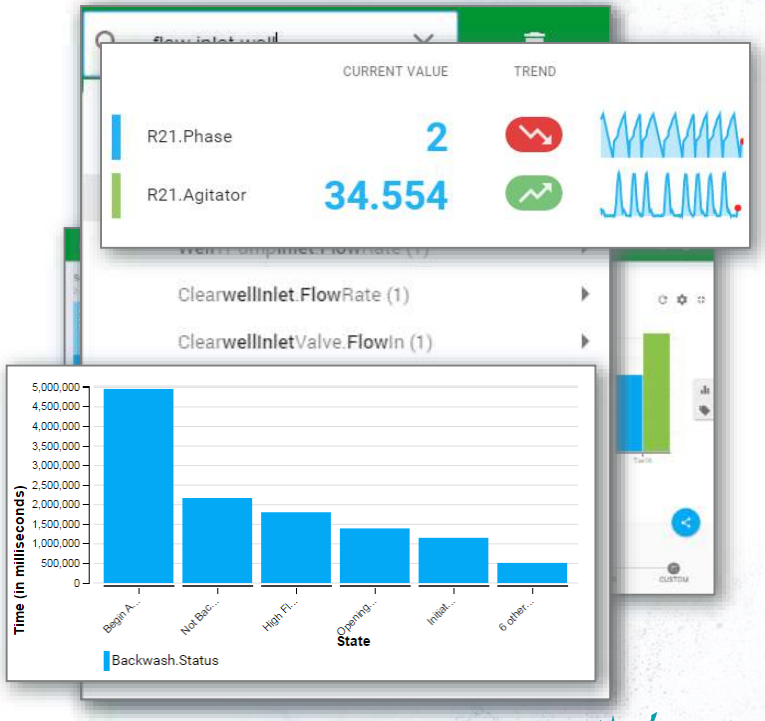
Using the StateSummaryHistory View

You can use the StateSummaryHistory view to retrieve state summary data.

A state summary results in a series of values, each representing a different state, for the same tag and time period. You configure the maximum states when you create the state summary tag. For more information, see the State Summary Replication section in the *Wonderware Historian Server Concepts*

Simple Browser Access: InSight

- Casual User/Supervisor
  - Not familiar with tag names
  - Initial interest is a summary view
  - Others can still use Historian Client Trend
- Selection: Search-based
- Summary Views
  - Harnesses the power of “retrieval modes”
  - Without requiring a training course



High-Speed Operations

Step	Label
1	Load
2	Open
3	Fill
4	Settle
5	Close
6	Seal
7	Release

Target 2.5 bags/minute

Actual 3.5 bags/minute

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High-Speed Operations

Step	Label
1	Load
2	Open
3	Fill
4	Settle
5	Close
6	Seal
7	Release

Where’s the opportunity?
Could increase throughput ~20%
At $250 per bag → ~$720K/day

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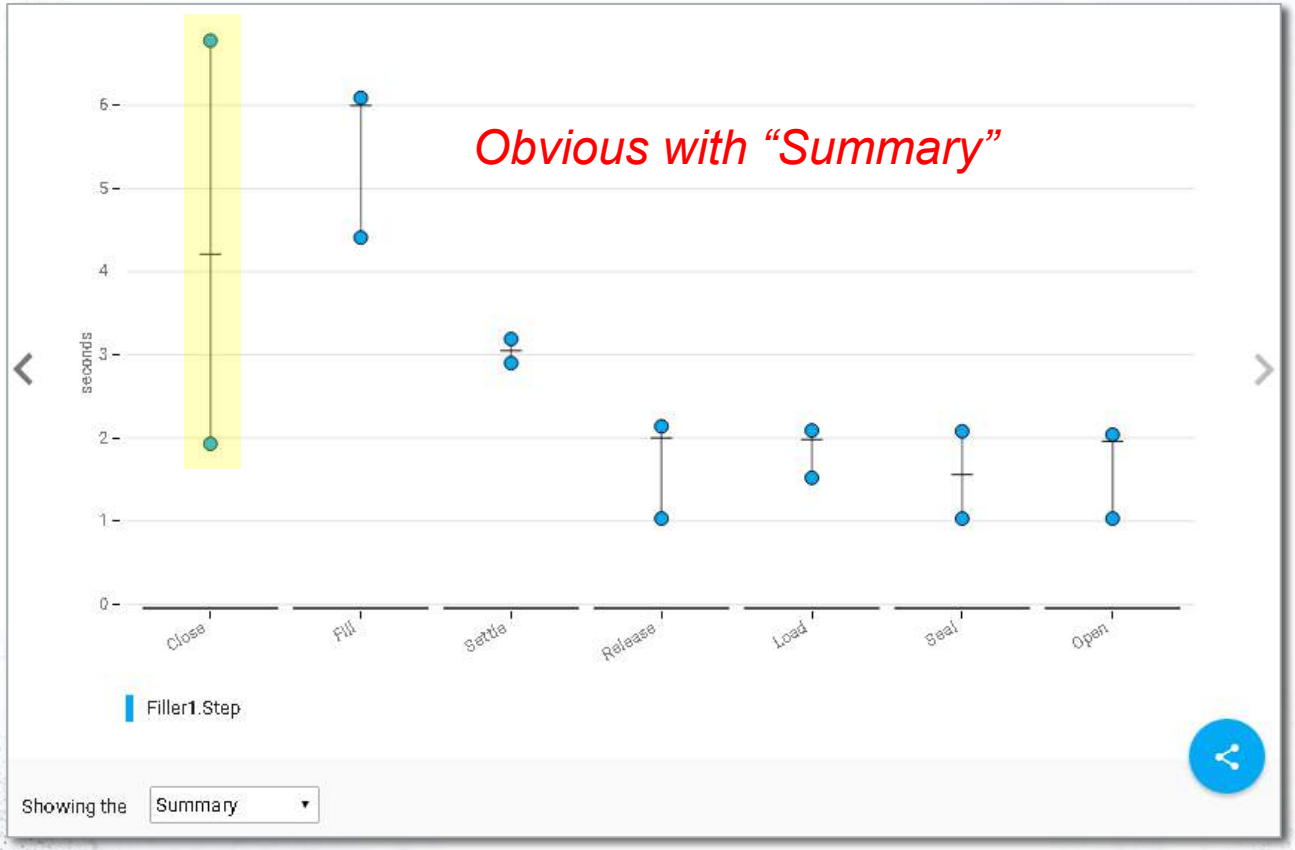
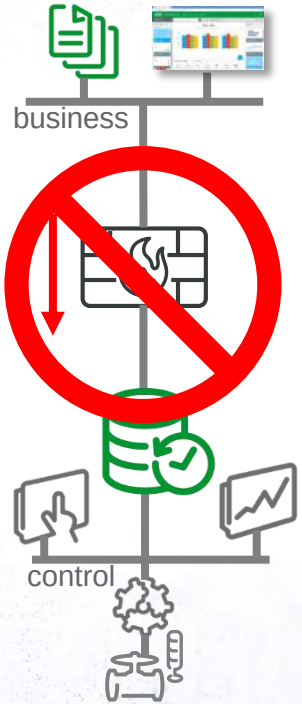
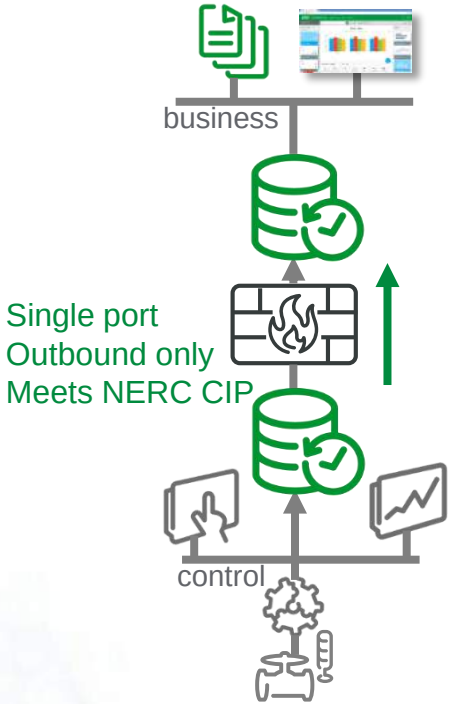
Easier To Spot With InSight Time-In-State



InSight Deployment Implications





- Business User Access
  - Restricted access to control network
  - Isolated domains
- Network Isolation
  - Software “data diode”
  - Independent domains
  - Guaranteed “read-only”
  - InTouch Graphics, too

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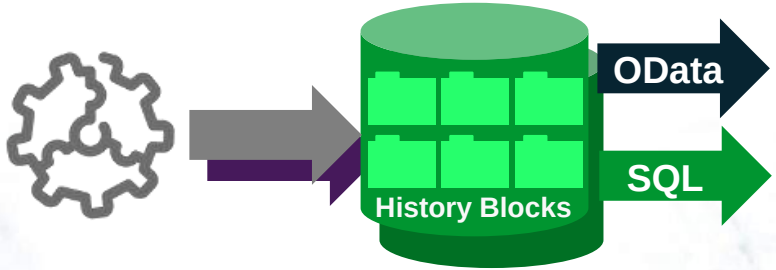
Alarm History In Historian

- Performance
  - Significantly higher storage rates
  - Capacity limited by disk space, not insertion rate
- Easier To Manage
  - Archive/purge/restore using Windows Explorer
  - No need to purge to sustain storage

Application Server 2014 R2



in SP1

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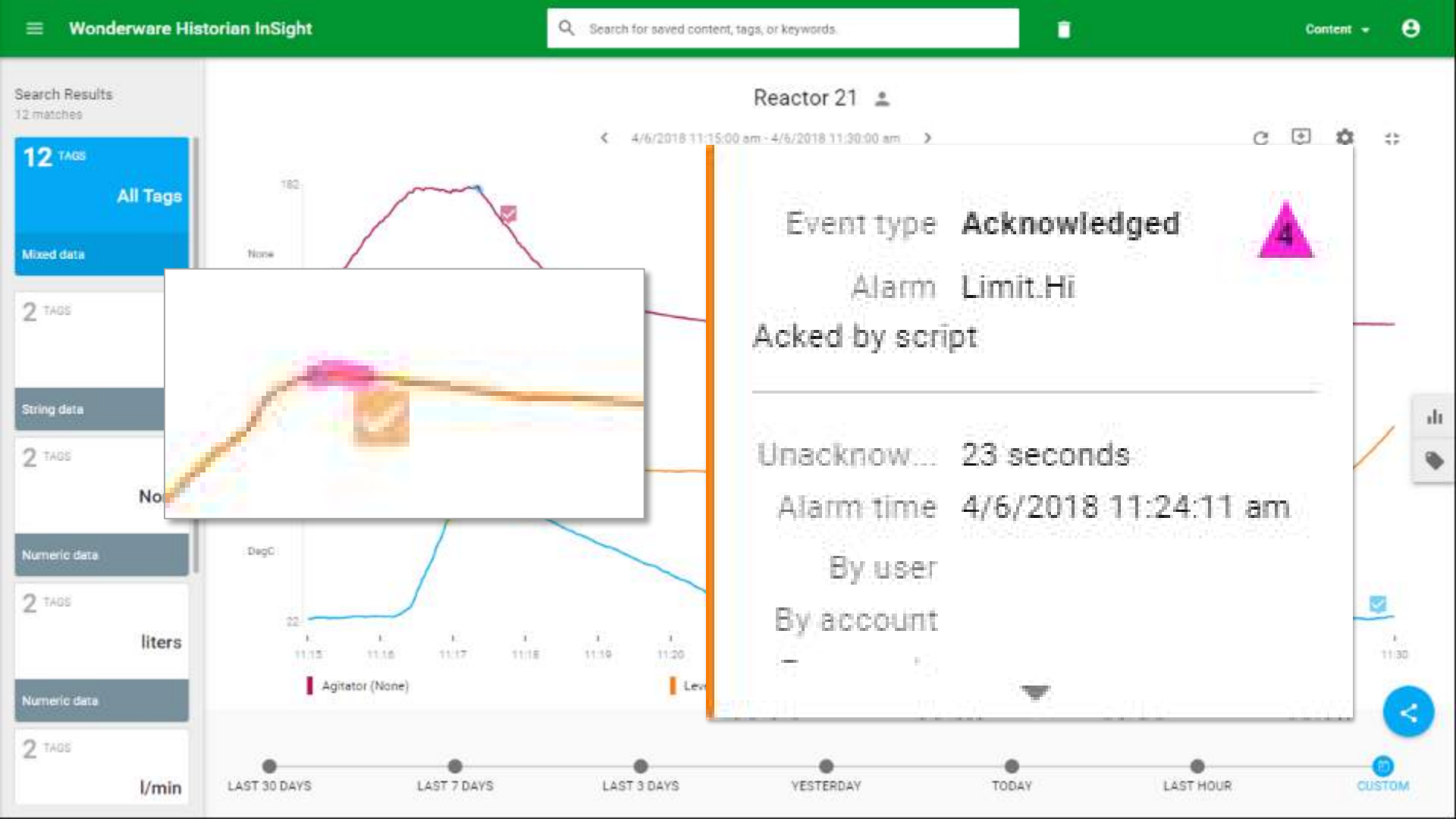

Wonderware Historian InSight
Search for saved content, tags, or keywords.
Content
Search Results
12 matches
12 TAGS
All Tags
Mixed data
2 TAGS
String data
2 TAGS
Numeric data
2 TAGS
liters
Numeric data
2 TAGS
l/min
Reactor 21
4/6/2018 11:15:00 am - 4/6/2018 11:30:00 am
Event type Acknowledged
Alarm Limit.Hi
Acked by script
Unacknow... 23 seconds
Alarm time 4/6/2018 11:24:11 am
By user
By account
Agitator (None)
LAST 30 DAYS
LAST 7 DAYS
LAST 3 DAYS
YESTERDAY
TODAY
LAST HOUR
CUSTOM

Trend - [R21.aaTrend]

File Edit View Chart Tools Window Help

4/ 6/2018 11:15:00 AM | [00] 00:15:00.000 | 4/ 6/2018 11:30:00 AM

Tag Picker

Servers

- LOCALHOST
  - Public Groups
  - Private Groups

Tags

Tag Name	Description
AppEngine.Engine...	The AppEngine
AppEngine.Engine...	The AppEngine
AppEngine.Engine...	The AppEngine
AppEngine.Engine...	The AppEngine
B100.Pressure	Combined flow
B100.Temperature	Combined flow
Backwash.Status	Enter attribute
Batch.Counter	
Color.Status	Enter attribute
Downtime.Status	Enter attribute
EffluentBOD.Value	Effluent BOD
EffluentCOD.Value	Effluent COD
EffluentpH.Value	Effluent pH
EffluentTurbidity....	Enter attribute
Enterprise.AlarmD...	The Area repre
Enterprise.AlarmO...	The Area repre

All | Analog | Discrete

(4/6/2018 11:17:15 AM) 54 DegC

(4/6/2018 11:27:45 AM) 39 DegC

-15 DegC (0 days, 00:10:30)

Alarm Name:ROCLo
Value: 0
Priority: 0
Originated: 1/18/2018 3:58:43 PM
Clear : 1/18/2018 3:58:53 PM
Duration: 0
Severity: 0

190
0
160
-10
60
20

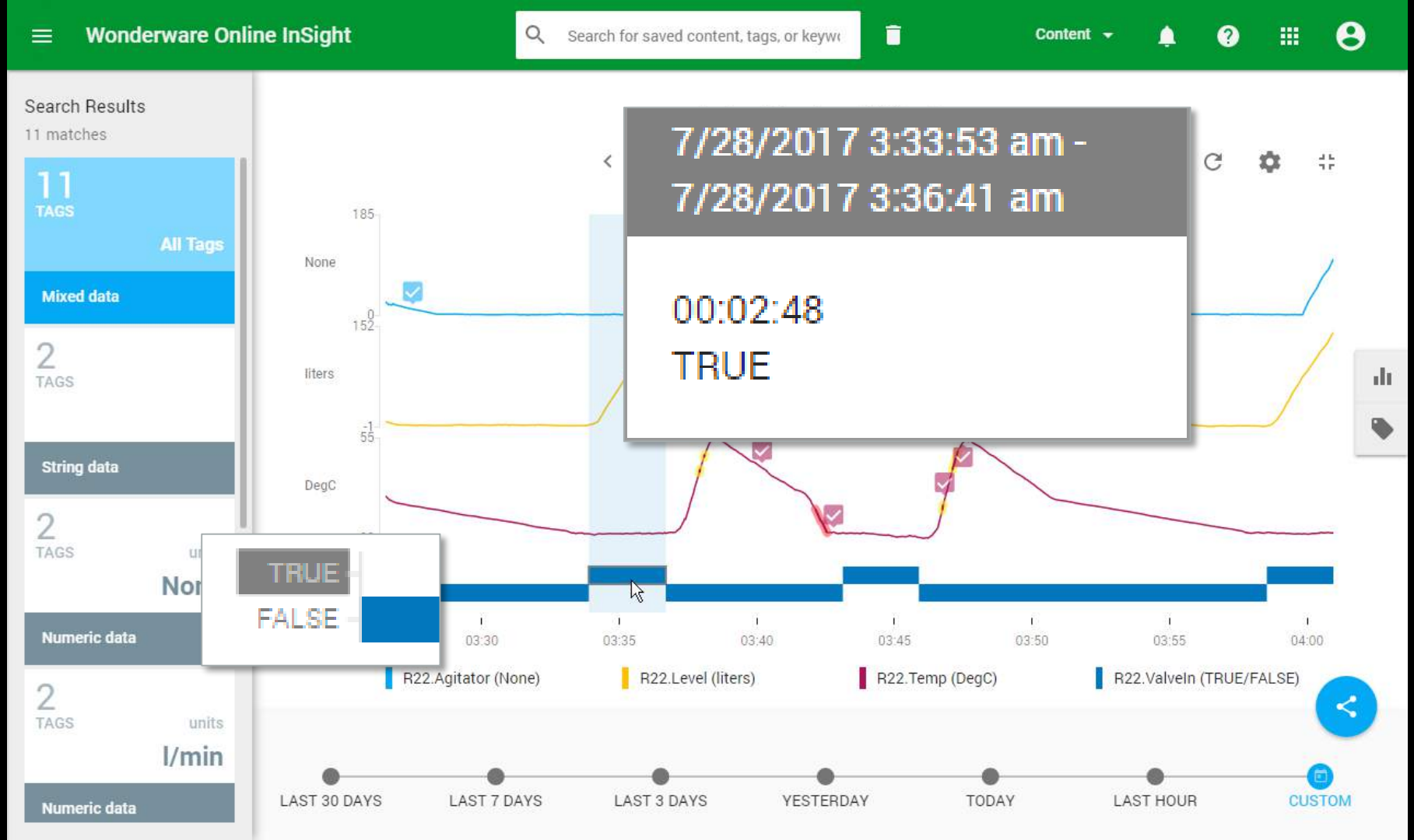
11:15:00 AM 4/6/2018
11:18:00 AM 4/6/2018
11:21:00 AM 4/6/2018
11:24:00 AM 4/6/2018
11:27:00 AM 4/6/2018
11:30:00 AM 4/6/2018

LOCALHOST:R21.Temp [BestFit - 00 00:00:04.955]

Tag Name	Description	Number	Server	Color	Units	Minimum	Maximum	IO Address	Time Offset	Source Tag	Source Server	Value at
R21.Agitator	Agitator speed in React...	1	LOCALH...		None	0	190	\\WIN10VM\InSQL_M...	0:00:00.000			178
R21.Level	Level in reactor R21	2	LOCALH...		liters	-10	160	\\WIN10VM\InSQL_M...	0:00:00.000			142
R21.Temp	Temperature in reactor ...	3	LOCALH...		DegC	20	60	\\WIN10VM\InSQL_M...	0:00:00.000			54

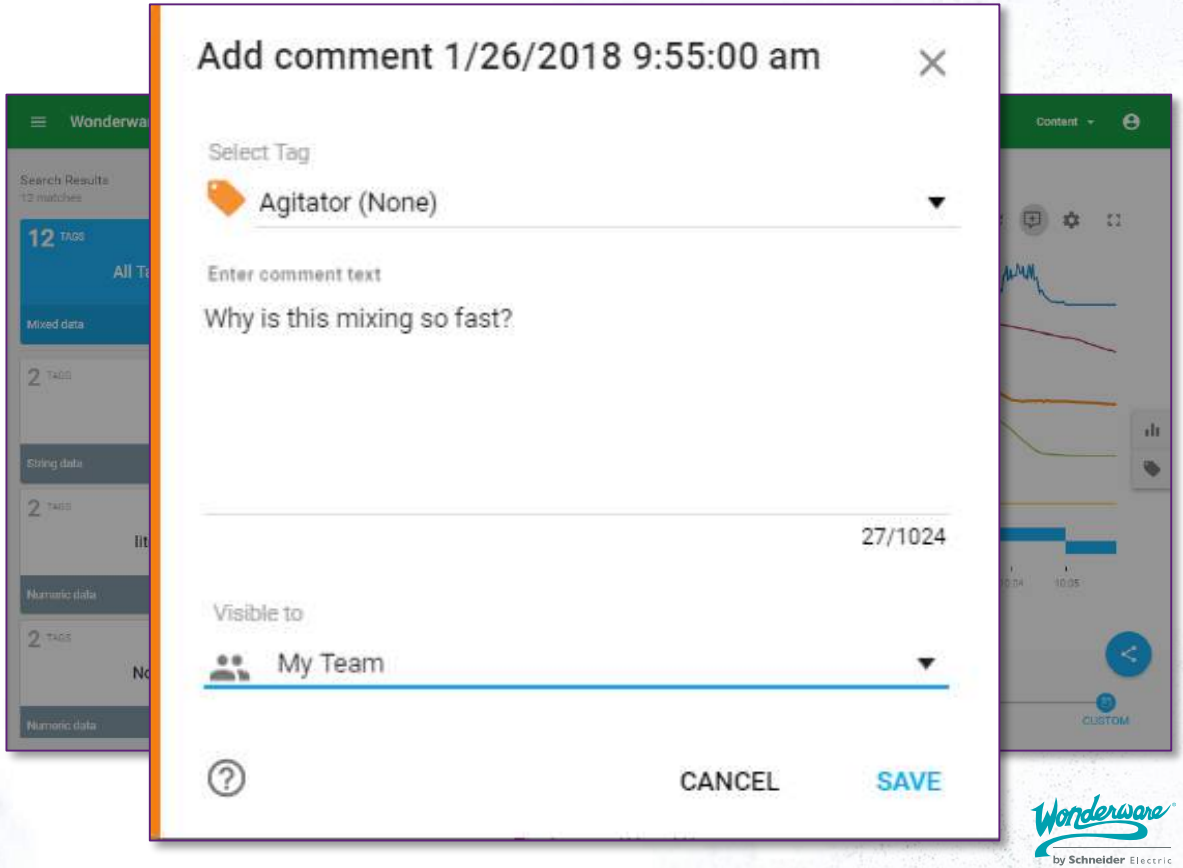
Ready

12:42 PM
4/6/2018

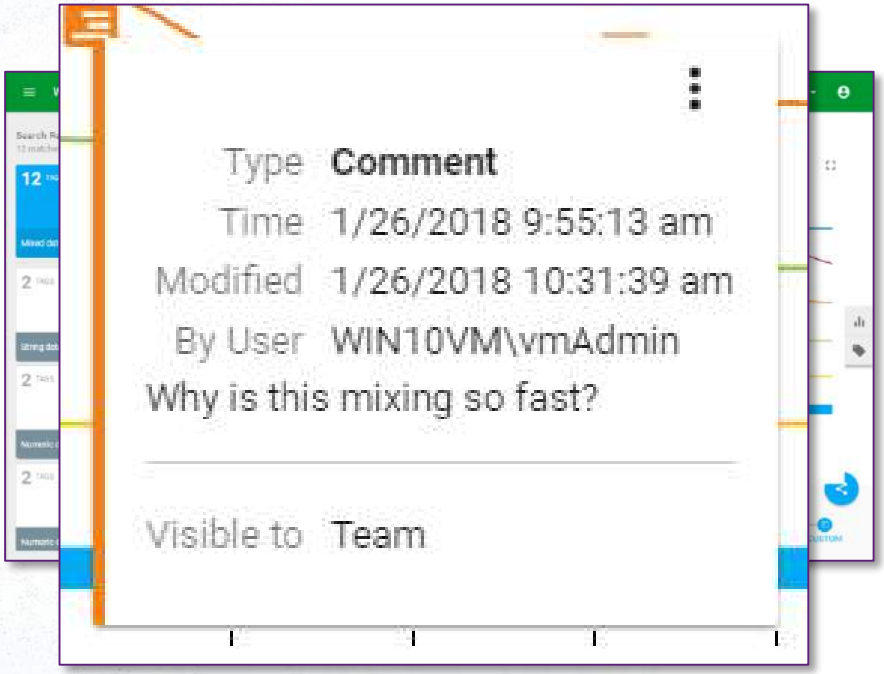

Wonderware Online InSight
Search for saved content, tags, or keyw
Content
Search Results
11 matches
11
TAGS
All Tags
Mixed data
2
TAGS
String data
2
TAGS
Numeric data
2
TAGS
units
l/min
Numeric data
7/28/2017 3:33:53 am -
7/28/2017 3:36:41 am
00:02:48
TRUE
185
None
0
152
liters
-1
55
DegC
TRUE
FALSE
03:30
03:35
03:40
03:45
03:50
03:55
04:00
R22.Agitator (None)
R22.Level (liters)
R22.Temp (DegC)
R22.ValveIn (TRUE/FALSE)
LAST 30 DAYS
LAST 7 DAYS
LAST 3 DAYS
YESTERDAY
TODAY
LAST HOUR
CUSTOM

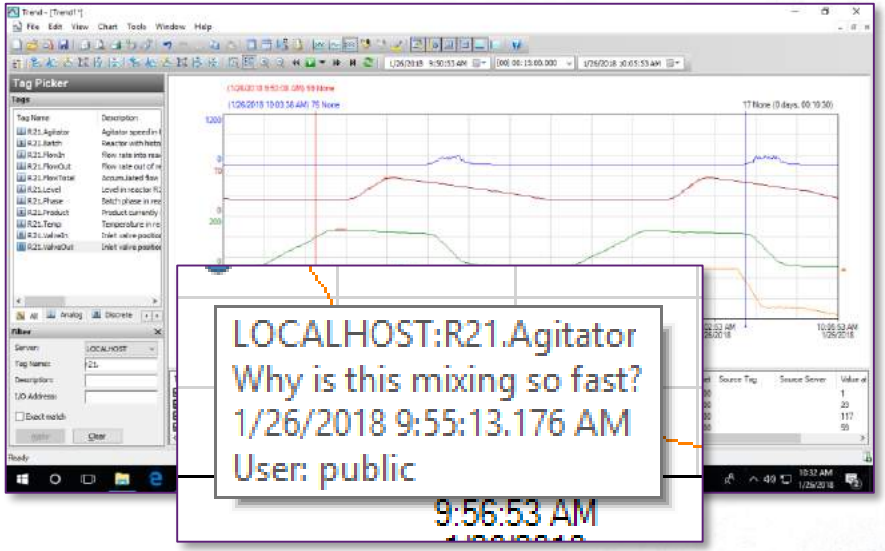
Comments/Annotations

- Share insights, observations
- Preserved in context by Historian



Comments/Annotations





Wonderware Historian Scale

Over 80,000
Licensed Systems

12 Petabytes
New Data Added Each Year

Only 2%
Storage Space vs. Relational Databases

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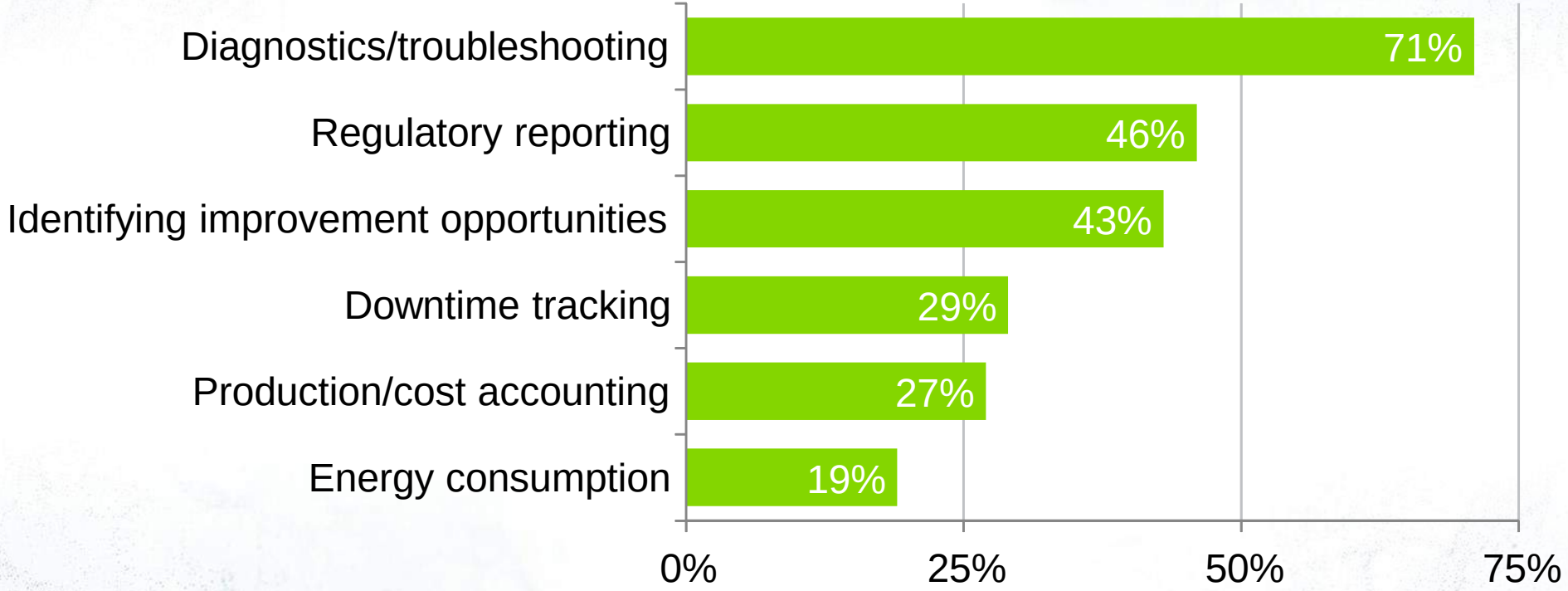
How Customers Use Historian



Multiple responses allowed
Source: Tech Validate 2015

Amazing Feedback!

A Global 500 food company increased its uptime by 5-10% with Wonderware Historian.

"Fast access to real time and history data that provides insights to process control."
– Process Engineer, Fortune 500 Construction Company

"Wonderware Historian has brought integrity and reliability to our organization."
– Optimization Engineer, Large Manufacturing Company

"Wonderware Historian allows for a centralized, enterprise approach to collecting and analyzing data."
– IT Director, State & Local Government

"We found the problem very quickly with an important compressor with [Wonderware Historian]."
– Engineering Management, Oil & Gas

Wonderware by Schneider Electric

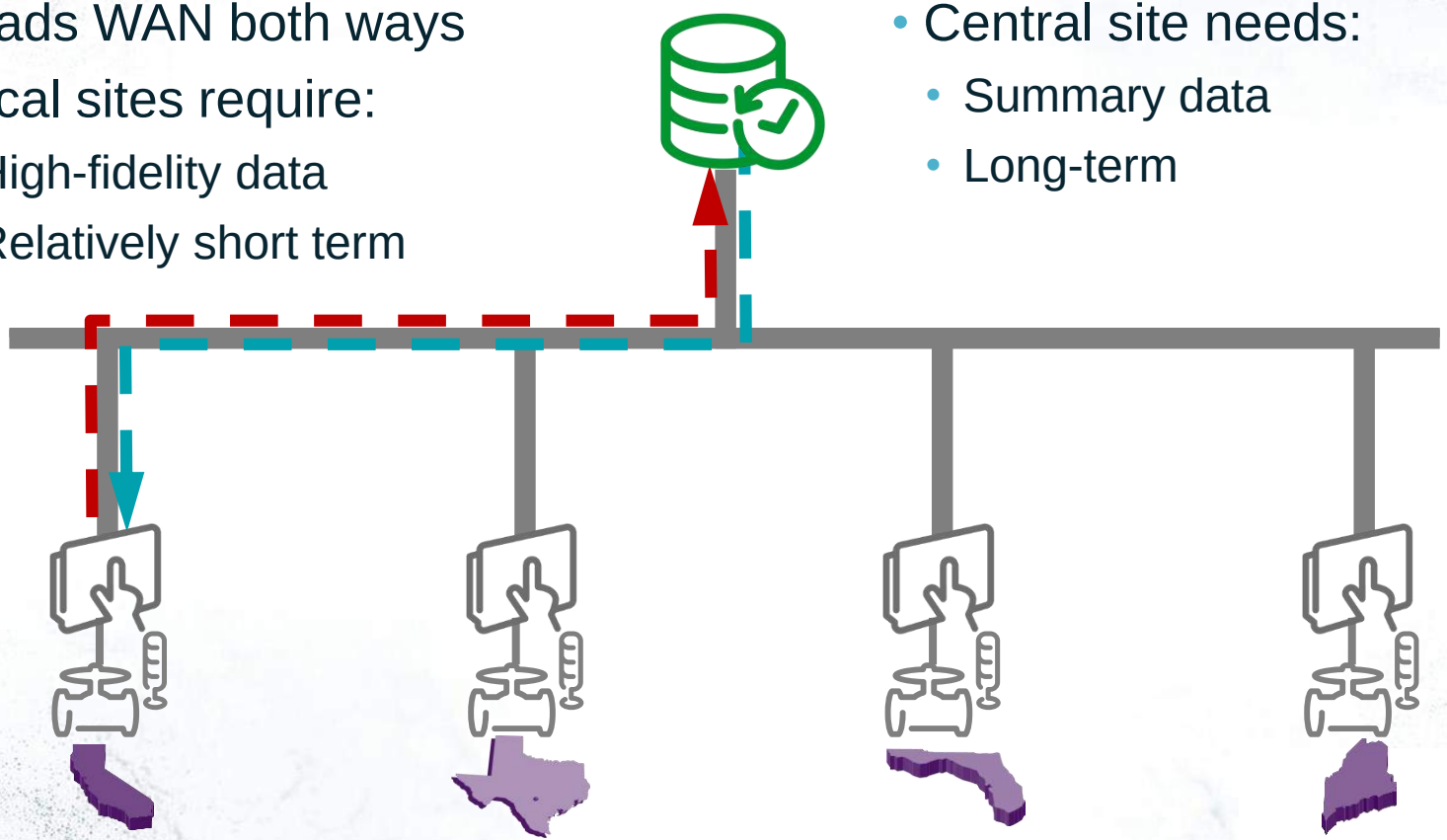
Historian 2014 R2 SP1 Patch 1

This slide has an embedded video

Wonderware by Schneider Electric

Centralized Historian

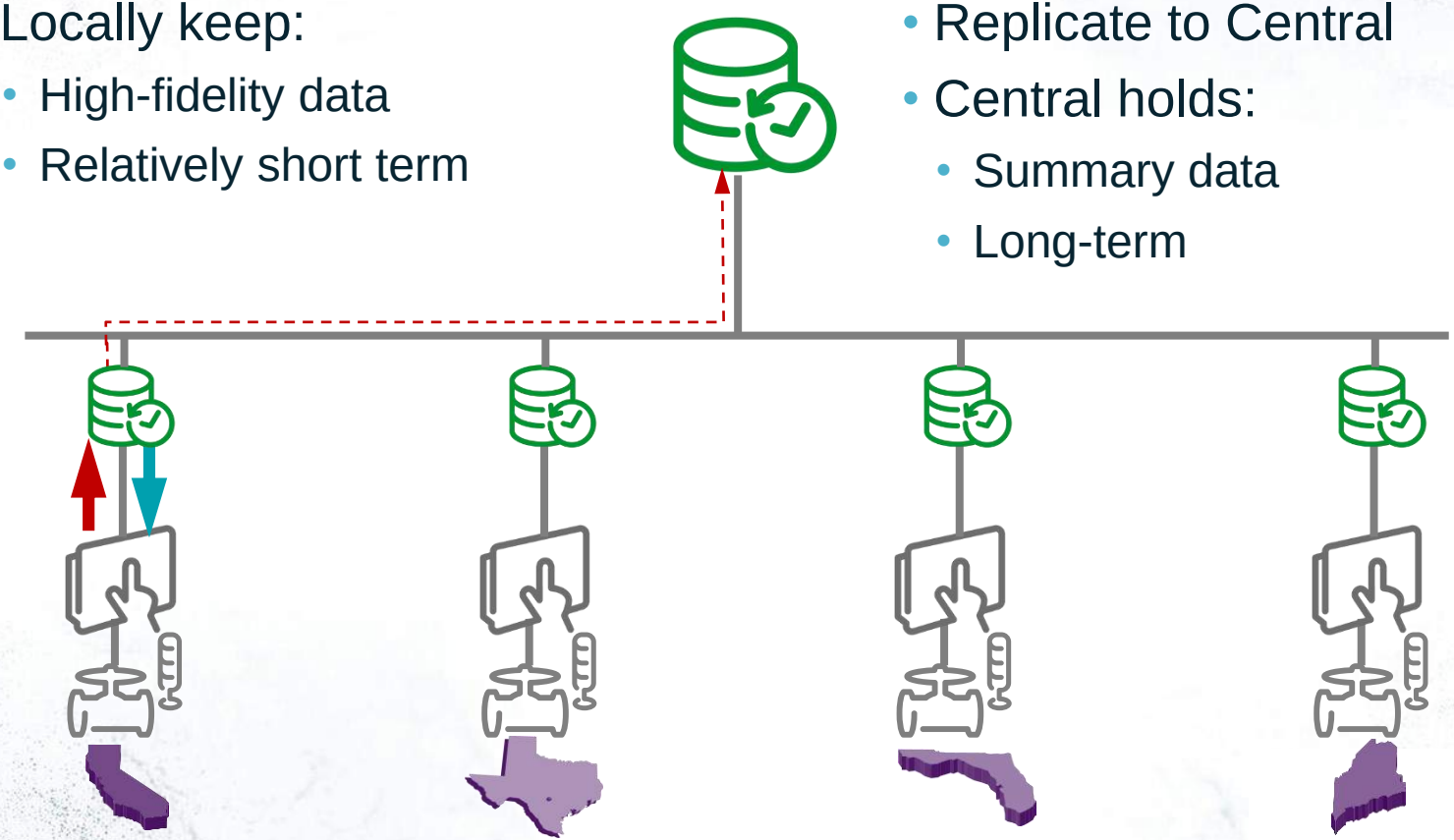
- Loads WAN both ways
- Local sites require:
  - High-fidelity data
  - Relatively short term
- Central site needs:
  - Summary data
  - Long-term



Wonderware by Schneider Electric

Distributed Historian Architecture

- Locally keep:
  - High-fidelity data
  - Relatively short term
- Replicate to Central
- Central holds:
  - Summary data
  - Long-term



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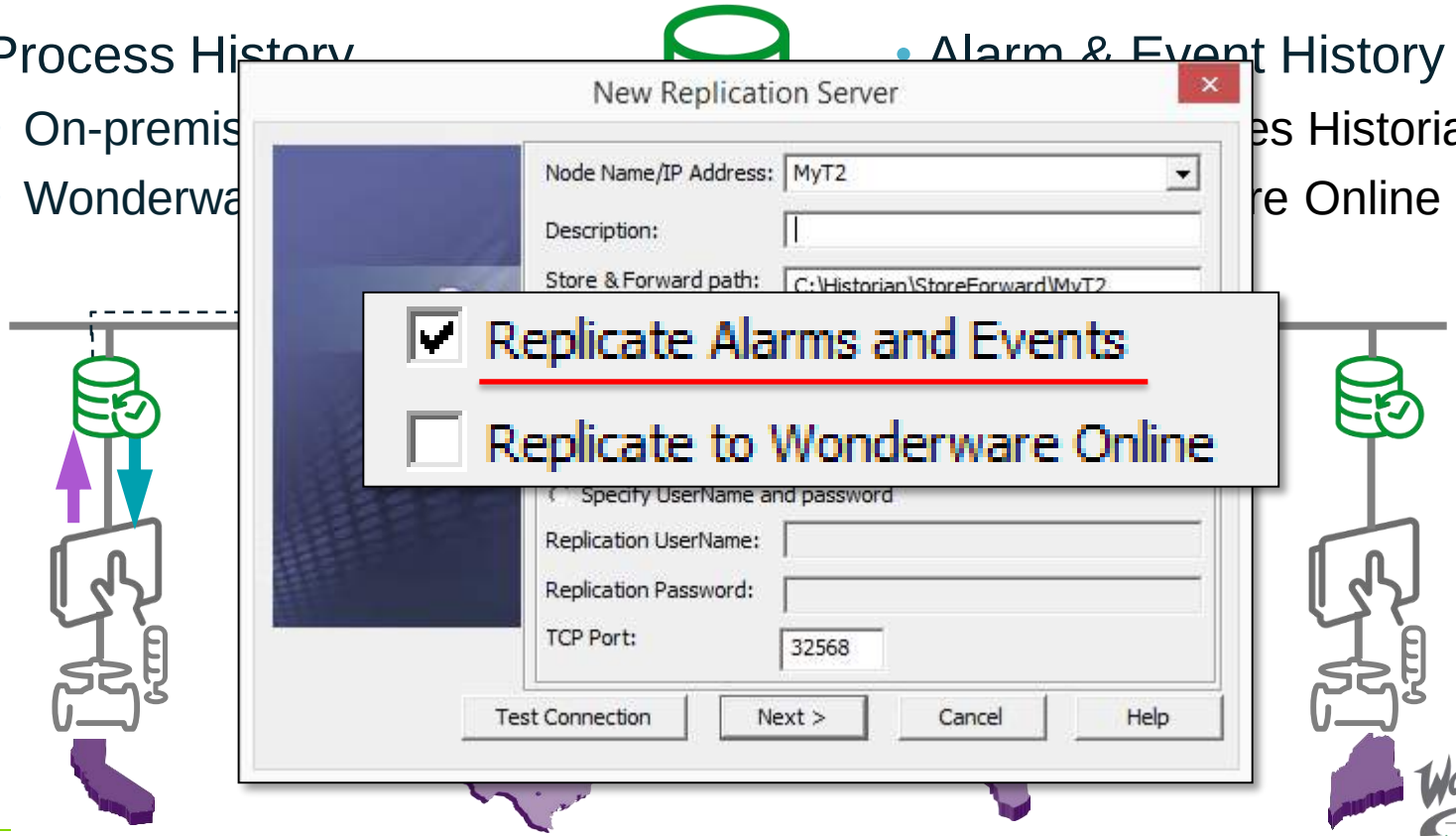
Distributed Historian Architecture

- Process Hist
  - On-premis
  - Wonderwa
- Alarm & Event History in 2017
  - es Historian
  - re Online InSight



Estimating Bandwidth

	2014 R2 SP1 (11.6 SP1)				
AppServer & Simple Replication	**1-Second**	**5-Second**	**15-Second**	**1-Minute**	**Custom**
Data Frequency (Seconds)	1	5	15	60	-
Analog (Integer, Single Precision) Tags	1,000	2,000	-	-	-
Analog (Double Precision) Tags					
Discrete Tags					
String Tags					
Average string length (bytes)					

String State Summary Tags	-	-	-
States for analog & string summaries	10		
SuiteLink (IDAS)	**1-Second**	**15-Second**	**1-Minute**
Data Frequency (Seconds)	1	15	60
Analog-Integer Tags	-	-	-
Analog-Floating Point Tags	-	-	-
Discrete Tags	-	-	-
String Tags	-	-	-
Store-Forward			
Outages per day	1	instance	
Duration Of Outage	30	minutes	
Network Bandwidth			
Normal Utilization (30% or less recommend)	30%		
Utilization During Store-Forward	50%		
Physcal Bandwidth	1,000.0	Mbps	
Engine/Replication Compression	0	0=Off, 1=On	
History to keep online	36	months	

Enter parameters in cells with a fill color (for tag counts for time/rates for other se
This spreadsheet is for information purposes only and is provided "as is" without warranty o
The calculations apply to Historian 2012 R2 - 2014 R2 SP1

Results

Storage	**2014 R2 SP1 (11.6 SP1)**	
Total Tag Count (License tags may be lower)	**4,100**	Tags
Overall average rate	**1,468**	Values/Sec
Total Storage/Day	**999.4**	Megabytes
Total Storage/Yea	**364.8**	Gigabytes
Total Storage for 3	**1,094.3**	Gigabytes
Storage IOPS (409	**3**	IOPS
Recommended blo	**24**	Hours/block
Recommended ev	**n/a**	
Network		
Streaming Load	**413.9**	Kbps
Bandwidth Required for 30% Utilitization	**1,379.5**	Kbps
Store-Forward Completion Time/Outage	**Fast**	
"Wait to send incomplete packets" setting	2	Seconds

For non-redundant Historians. Double for redundant configurations.

This is the network load, but the actual required bandwidth will be higher--see next row.

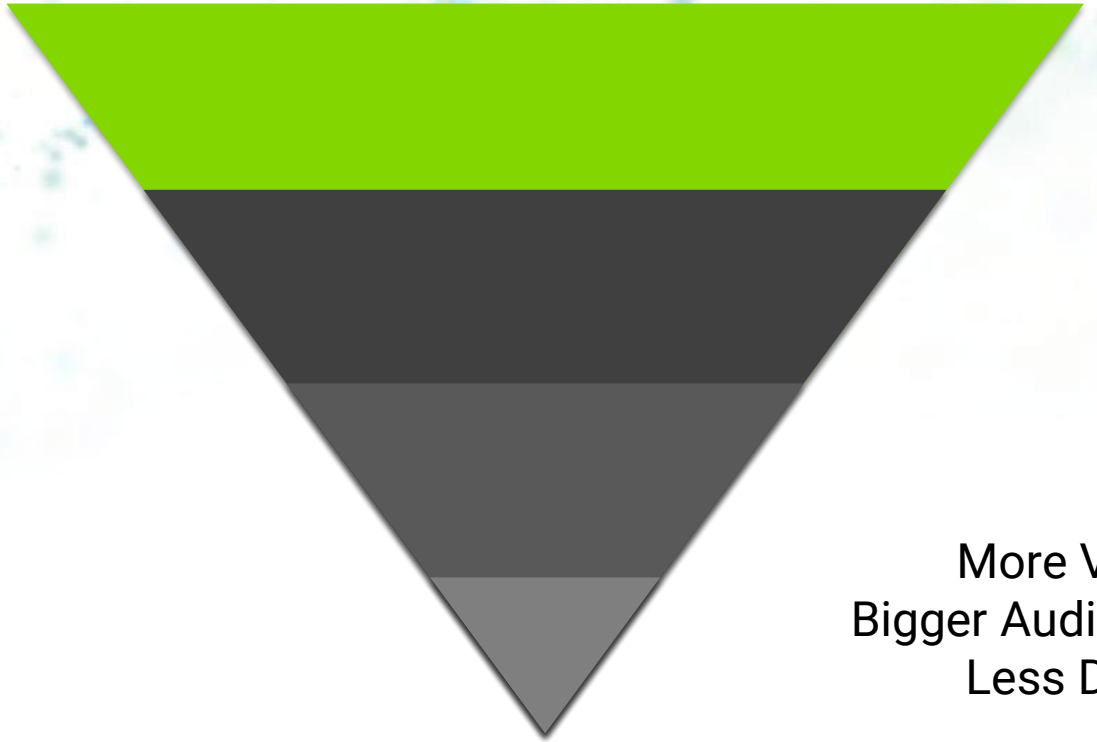
Operational Context

Information Content

Historical Context

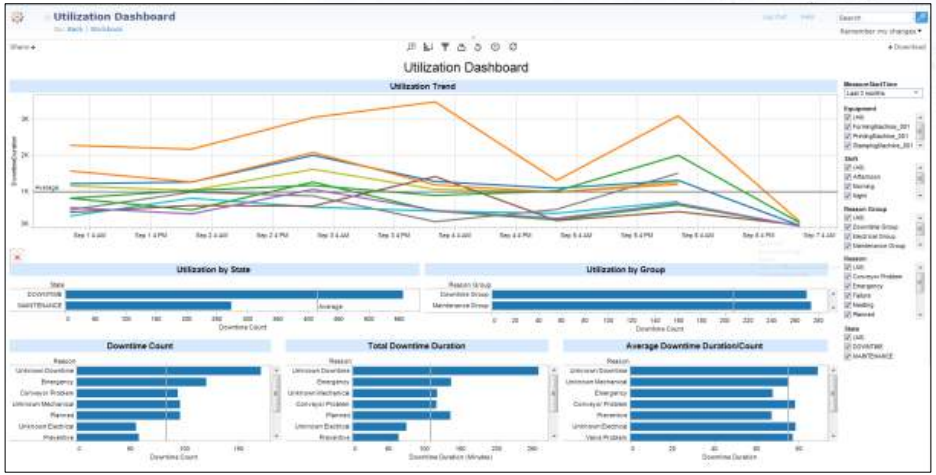
Current Context

Isolated, Current Values



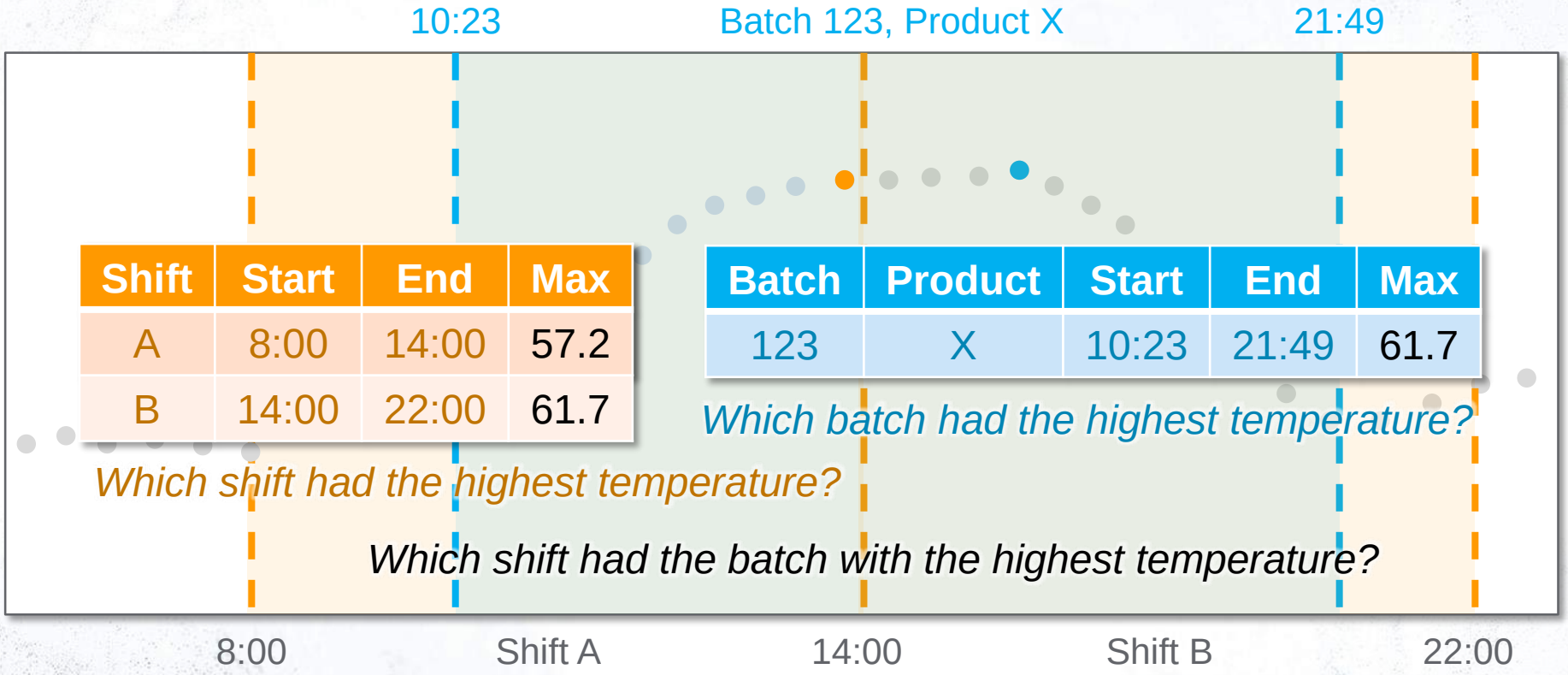
More Value
Bigger Audience
Less Detail

Wonderware Intelligence



- Range Of Users
  - Serious analysis
  - Dashboards for broader use
- Powerful
  - Filtering
  - Layout
  - Grouping
- Powered by “time slicing” engine
  - Spans multiple types of data
  - Integrates with process historians (Wonderware Historian, eDNA, OSISoft PI)
- Supports many different BI tools

Time Series Aggregation: Maximum



Shift	Start	End	Max
A	8:00	14:00	57.2
B	14:00	22:00	61.7

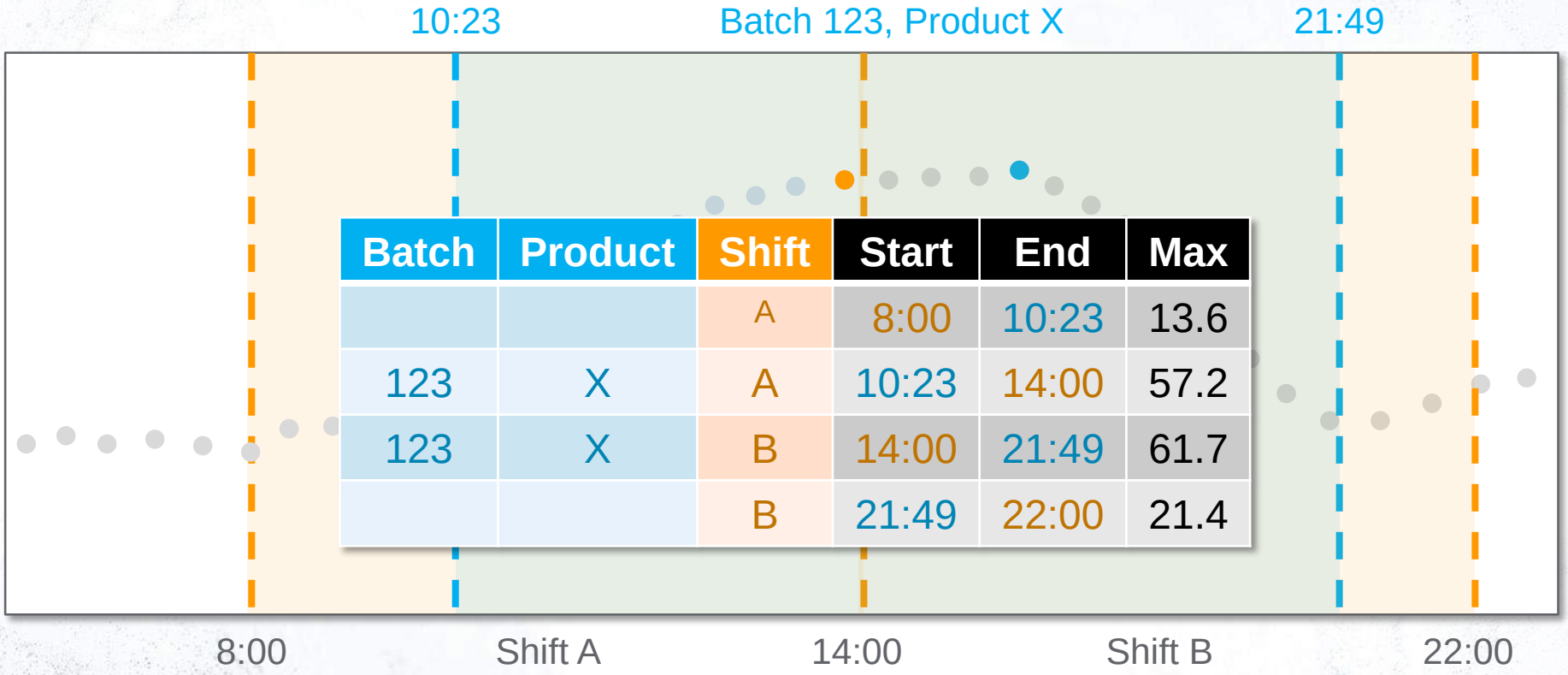
Batch	Product	Start	End	Max
123	X	10:23	21:49	61.7

Which batch had the highest temperature?

Which shift had the highest temperature?

Which shift had the batch with the highest temperature?

“Time Slicing”



Batch	Product	Shift	Start	End	Max
		A	8:00	10:23	13.6
123	X	A	10:23	14:00	57.2
123	X	B	14:00	21:49	61.7
		B	21:49	22:00	21.4

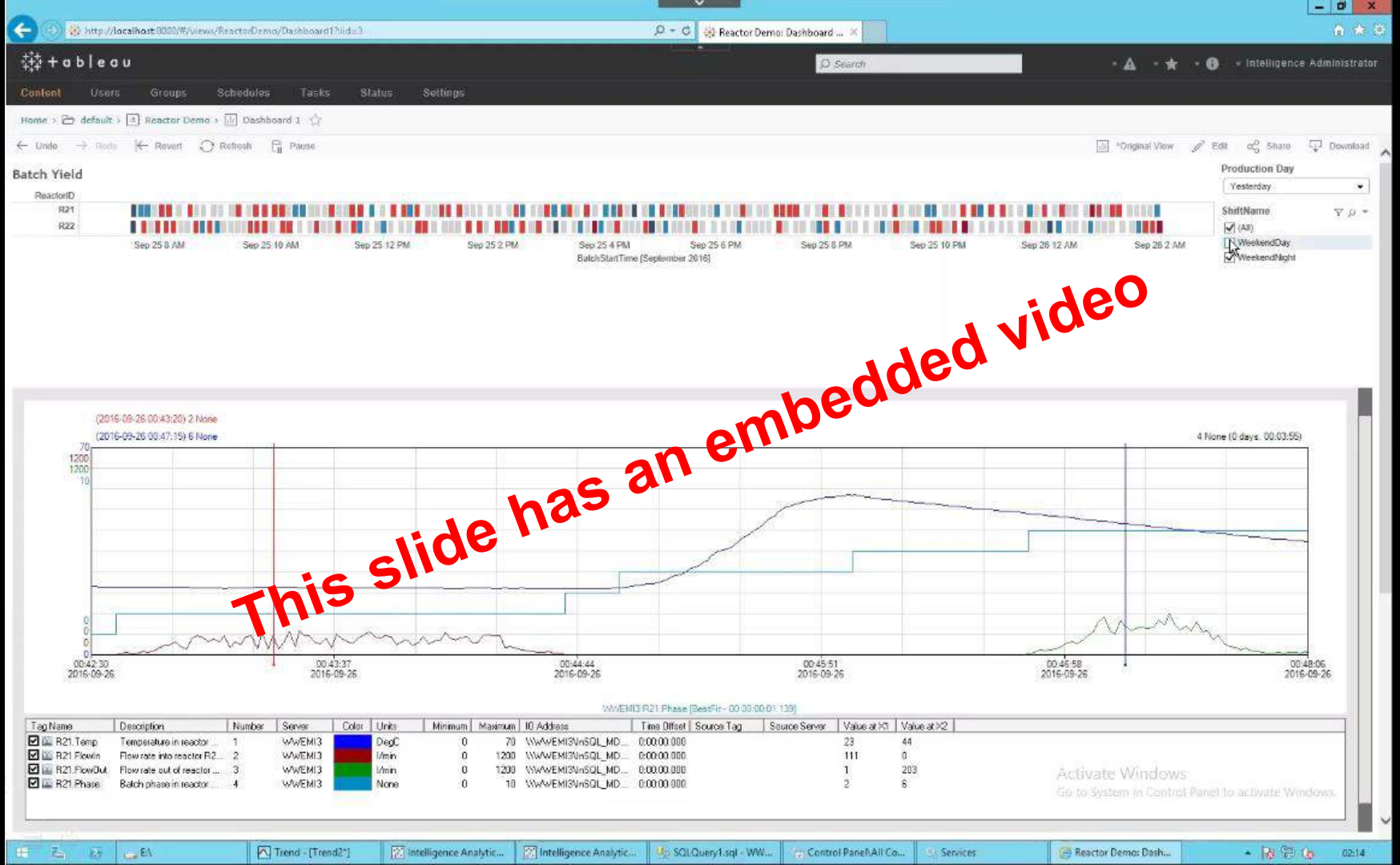
Wonderware by Schneider Electric

Intelligence Time Slicing

Even more value with your Historian data

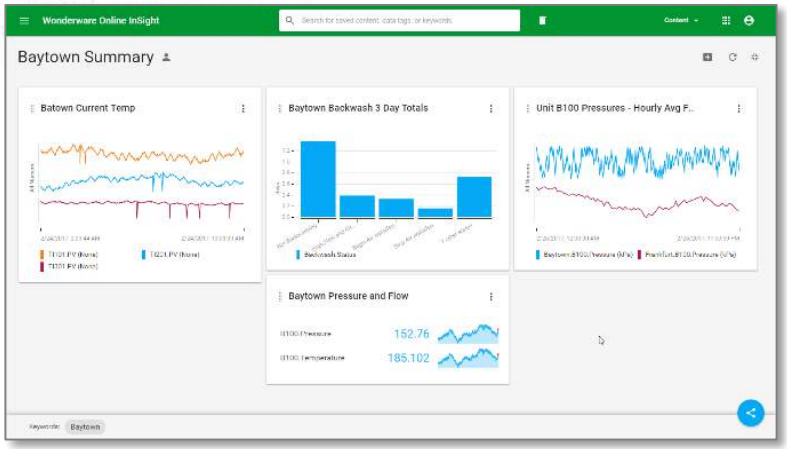
- Slices data by batch and computes metrics
  - Volume In and Out = Integral for Flow In & Out
  - For each batch
- Gantt chart
  - Each bar represents a batch
  - Color of bar represents Yield (%)

Wonderware by Schneider Electric


Reactor Demo: Dashboard ...
tableau
Search
Intelligence Administrator
Content
Users
Groups
Schedules
Tasks
Status
Settings
Home › default › Reactor Demo › Dashboard 1
Undo
Redo
Revert
Refresh
Pause
*Original View
Edit
Share
Download
Batch Yield
ReactorID
R21
R22
Sep 25 8 AM
Sep 25 10 AM
Sep 25 12 PM
Sep 25 2 PM
Sep 25 4 PM
Sep 25 6 PM
Sep 25 8 PM
Sep 25 10 PM
Sep 26 12 AM
Sep 26 2 AM
BatchStartTime (September 2016)
Production Day
Yesterday
ShiftName
(All)
WeekendDay
WeekendNight
This slide has an embedded video
(2016-09-26 00:43:20) 2 None
(2016-09-26 00:47:15) 6 None
4 None (0 days, 00:03:55)
00:42:30
2016-09-26
00:43:37
2016-09-26
00:44:44
2016-09-26
00:45:51
2016-09-26
00:46:58
2016-09-26
00:48:06
2016-09-26
Tag Name
Description
Number
Server
Color
Units
Minimum
Maximum
IO Address
Time Offset
Source Tag
Source Server
Value at X1
Value at X2
R21.Temp
Temperature in reactor ...
1
WWEMI3
DegC
0
70
\\WWEMI3\InSQL_MD...
0:00:00.000
23
44
R21.FlowIn
Flow rate into reactor R2...
2
WWEMI3
l/min
0
1200
\\WWEMI3\InSQL_MD...
0:00:00.000
111
0
R21.FlowOut
Flow rate out of reactor ...
3
WWEMI3
l/min
0
1200
\\WWEMI3\InSQL_MD...
0:00:00.000
1
203
R21.Phase
Batch phase in reactor ...
4
WWEMI3
None
0
10
\\WWEMI3\InSQL_MD...
0:00:00.000
2
6
Activate Windows
Go to System in Control Panel to activate Windows.
Trend - [Trend2*]
Intelligence Analytic...
Intelligence Analytic...
SQLQuery1.sql - WW...
Control Panel\All Co...
Services
Reactor Demo: Dash...
02:14

Dashboard Comparison

InSight



- All data is time-series
- Super-simple, self service
- Independent charts
- Basic layout

Intelligence

- Virtually any data
- Leverages time-slicing engine
- Knowleadgable user enables self-service
- Enables chart interaction

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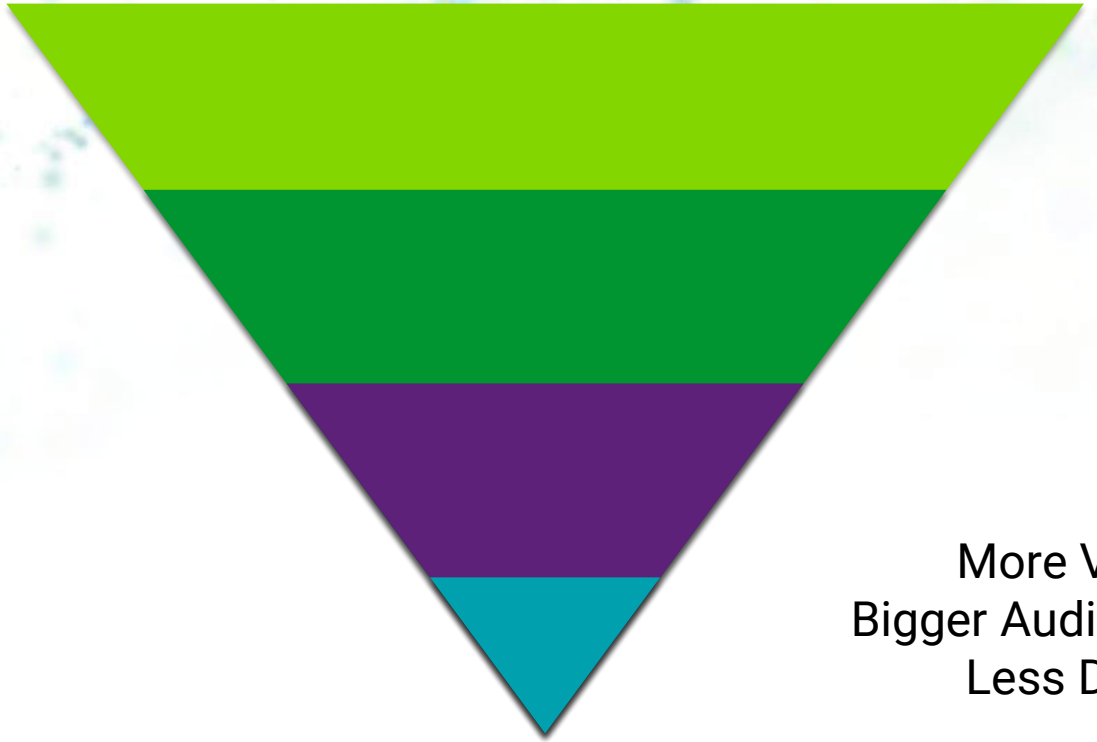
Operational Context

Information Content

Historical Context

Current Context

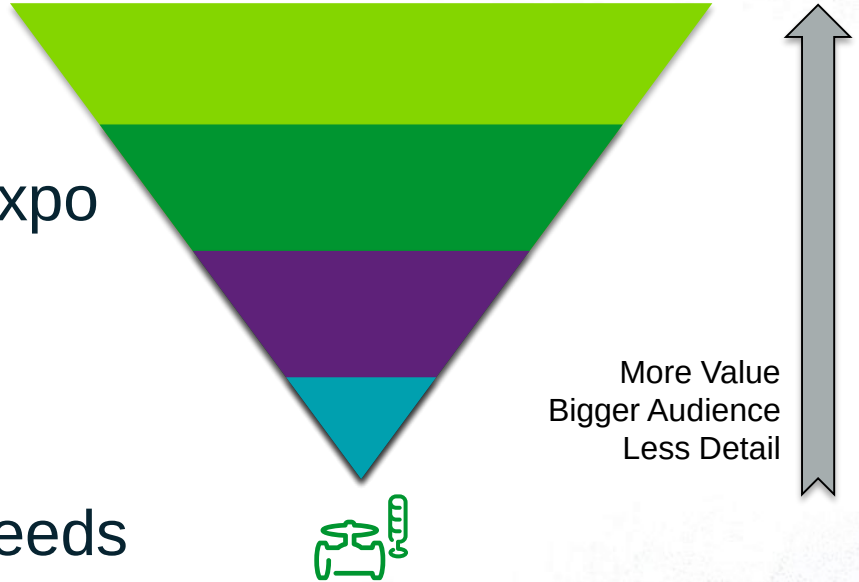
Isolated, Current Values



More Value
Bigger Audience
Less Detail

Now What?

- Identify current information gaps
  - Data collection
  - Information delivery
- Learn more here: breakouts & expo
- Find the “low hanging fruit”
  - Underutilized, but available solutions
  - Available skill sets
- Create a plan for higher value needs
  - Quantify business value
  - Identify requirements



THANK YOU

Wonderware
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