More Accessible Data

for the Millennial and the Skeptic

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Product Manager, AVEVA Group plc

27 April 2018

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Wonderware by Schneider Electric

Millennials

- Assumes no training needed
- Expects an app to just work
- When it doesn’t, try another
- Doesn’t have time (or interest) to “master” it

Skeptic

- Prefers to be in control
- Concerned about security
- Good reasons we’ve always done it that way

Wonderware by Schneider Electric

InSight Vision

Be the “first source” to check for operational information for everyone except the front line operator

- Protects customer intellectual property
- Is frictionless to get started & use
- Delights users
- Makes the abnormal obvious
- Learns from operational & usage history
- Continuously delivers new value
- Includes opportunities for partners to add value

Wonderware by Schneider Electric

Online InSight Feedback

"This software reminds me of Apple".

"Your product sure makes me popular!"

"Already on the first day of the trial we found immense value with Online InSight"

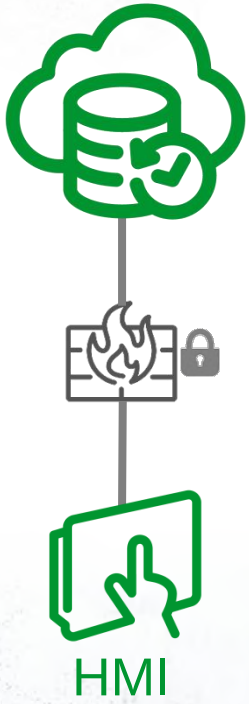
"It's like voodoo, it just works"

"Initially we thought we would give it just to the night-shift operators, but within days the supervisor wanted it, the device calibration contractor wanted it, the maintenance team wanted it…"

Highest Net Promoter Score for Wonderware (2017)

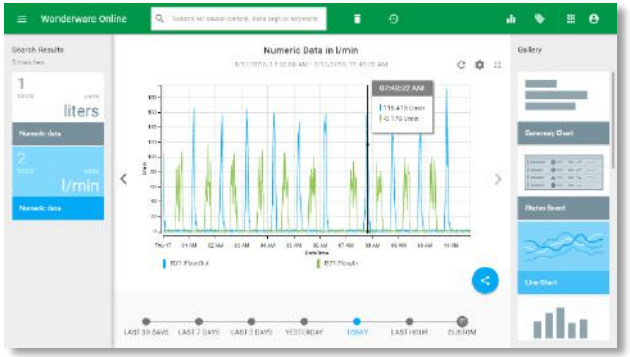
Wonderware by Schneider Electric

Wonderware Online InSight

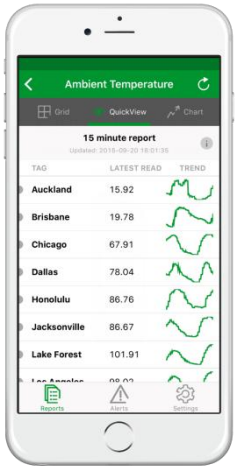


- No assembly required
  - Easily import existing HMI applications
  - Frictionless to find & present the right information
- Cost-effective for small applications
  - HMI-only embedded (OEM) applications
  - Vertical applications (e.g. water, coal seam gas)
  - Small applications in large companies (e.g. 5-tag farm)
- Remove obstacles to a Historian
  - De-skill setup (5-minutes or less, zero training)
  - Eliminate routine maintenance (disk, passwords, etc.)

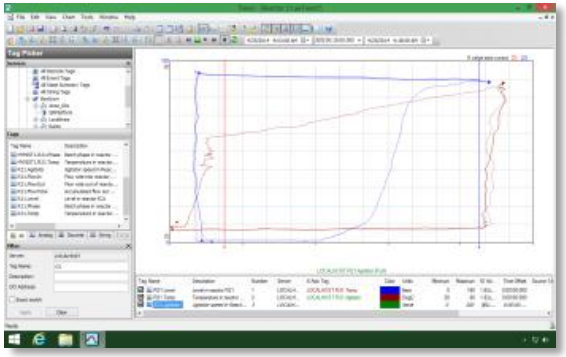
Wonderware by Schneider Electric



Browser-based Tools
(embeddable)



Native Mobile Tools



Rich Desktop Tools

Wonderware by Schneider Electric

Deployment Options

Online Solutions

Consider for future
Next refresh cycle

Hybrid

Supplement on-premises
Realize the value
Minimize risk

Existing Investments

Infrastructure
Applications

Hybrid Opportunities

Supplemental I/O

Low-cost I/O
- Sensors
- Wiring
- Bypass OT

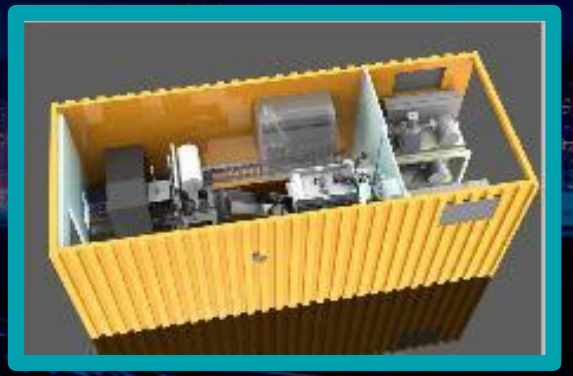
Accessible

Internal
- Outside OT
- Mobile
- Consolidated

Partners
- Suppliers
- Customers

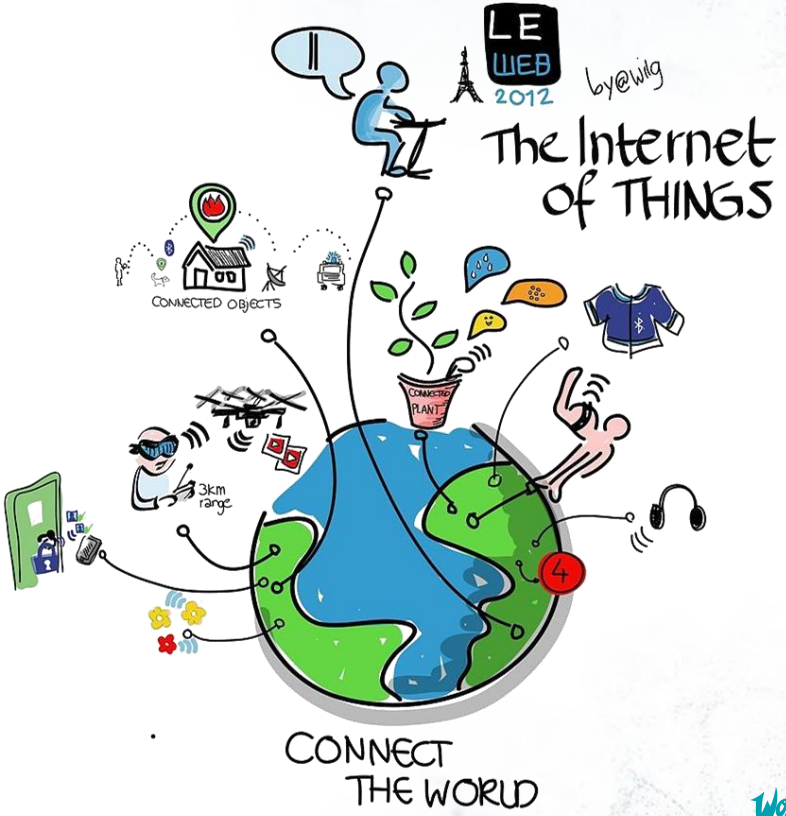
Stranded Applications

Low infrastructure
Scarcity of skilled staff
Emerging economies
Secondary automation



Internet of Things:

Devices & sensors



Wonderware by Schneider Electric

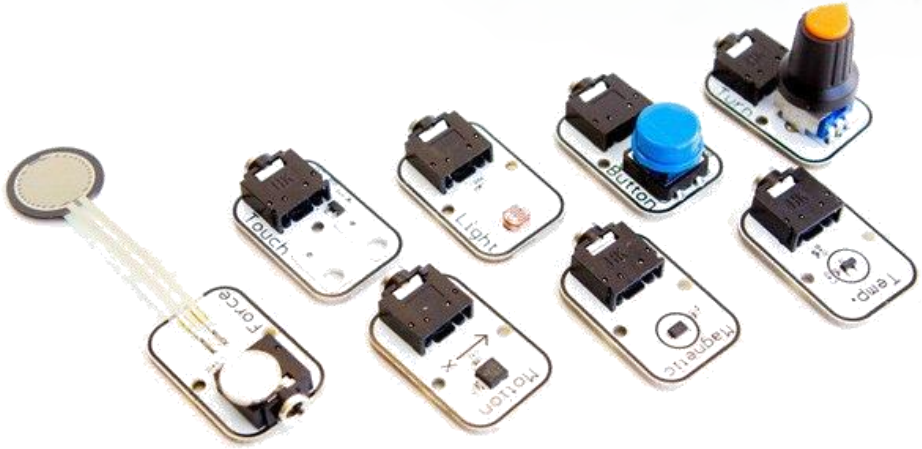
IoT Hype

- As with
  - Object-oriented
  - Web
  - Cloud
- Every Vendor
  - Piling on
  - Making claims
  - Capturing attention
- In Practice: Everything that supports some kind of Ethernet

Wonderware by Schneider Electric

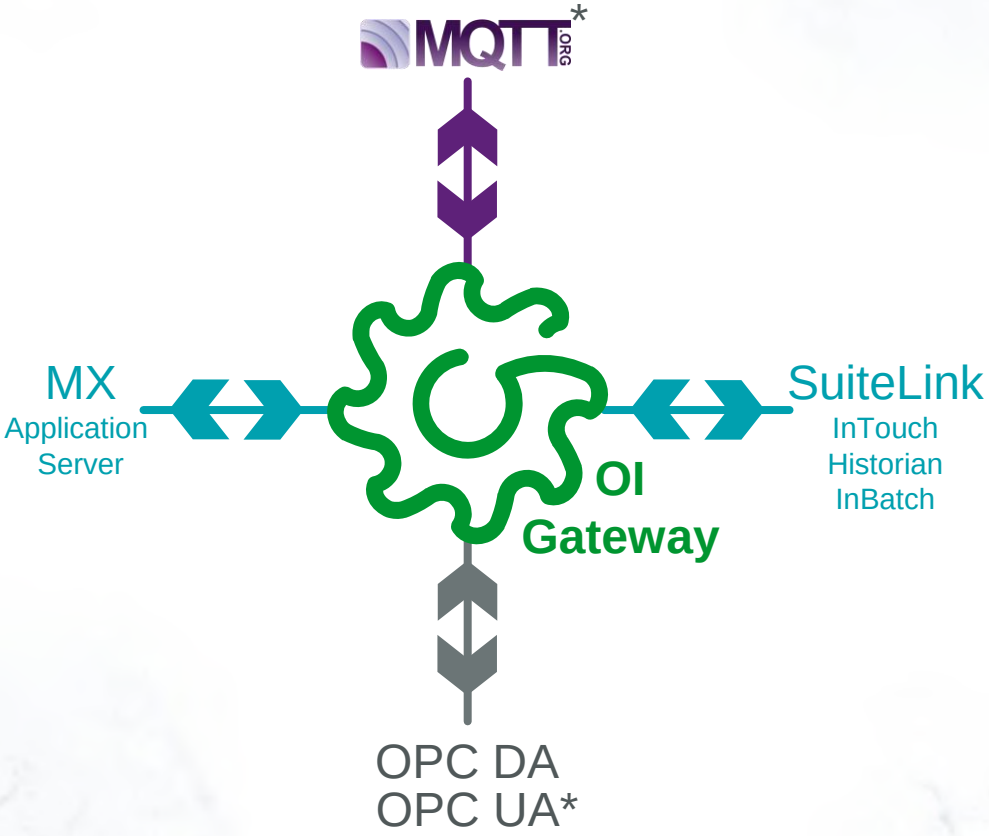
“Consumerized” Instrumentation

- Lower cost to
  - Acquire
  - Apply
  - Own
- “Good enough” for less safety-critical applications
- Radical change in pricing models (~2%)
- MQTT Emerging As Dominant Interface



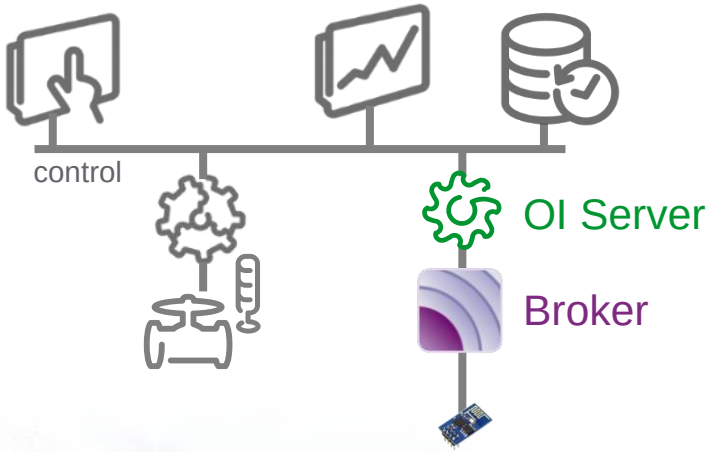
Wonderware by Schneider Electric

Operations Integration Gateway



* New in OI Gateway (vs. FactorySuite Gateway)

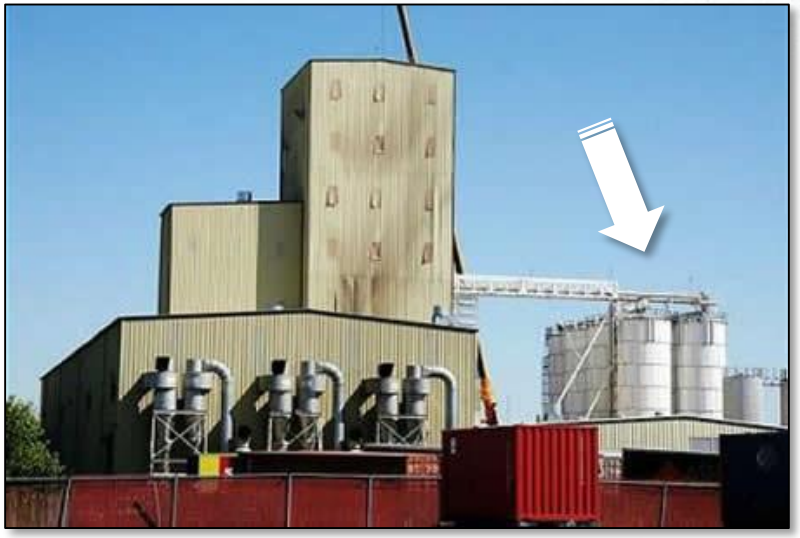
Use Case 1: Supplementary I/O



- Integrate into existing infrastructure
- Add cost-effective I/O
- Use OI Gateway

Cost-effective Instrumentation

- Where can you benefit from additional instrumentation?
- What about peripheral areas?
  - Raw material silos?
  - Remote areas?
- Information Needs
  - Share raw material inventory levels with select vendors
  - Visibility to raw material environmental factors



sigfox

Node-RED

libelium

MOXA
Reliable Networks ▲ Sincere Service

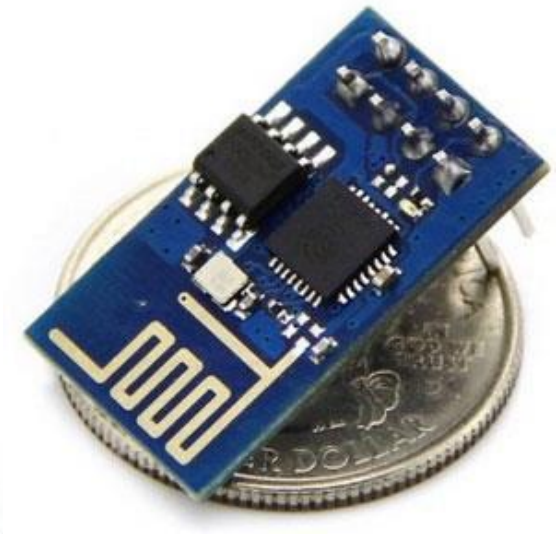
Schneider Electric

Raspberry Pi

ADVANTECH

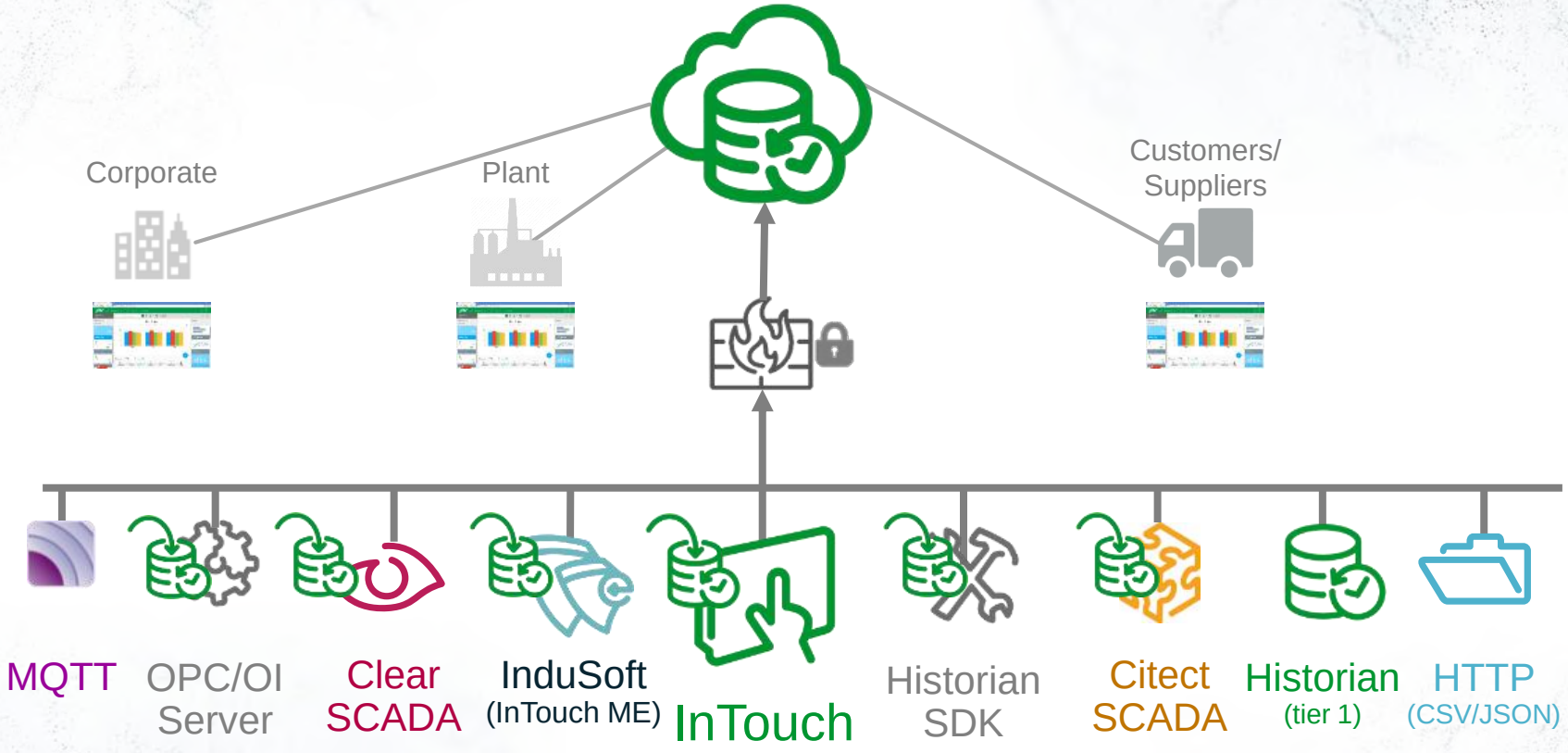
Wonderware
by Schneider Electric

System on a Chip (SoC): ESP8266



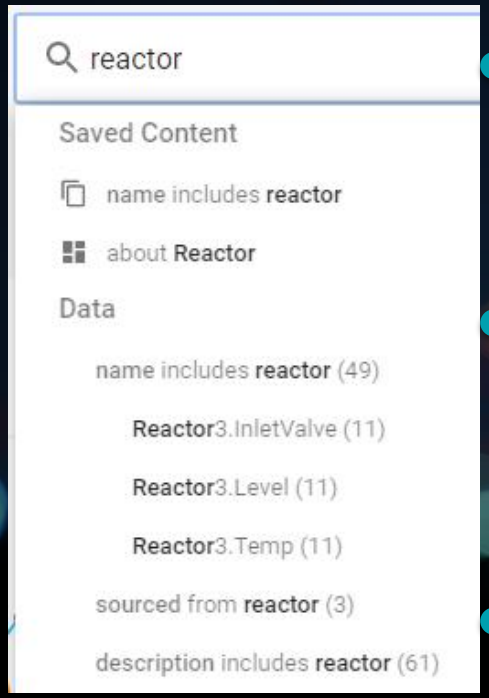
WiFi
Serial
1 x Analog-digital
8 x Digital I/O
Arduino/MQTT Support
$ 3.00

Wonderware by Schneider Electric



Wonderware
by Schneider Electric

Search



Today

Saved charts
Tag names, descriptions, units

This Year

Assets
Batches
Work Orders

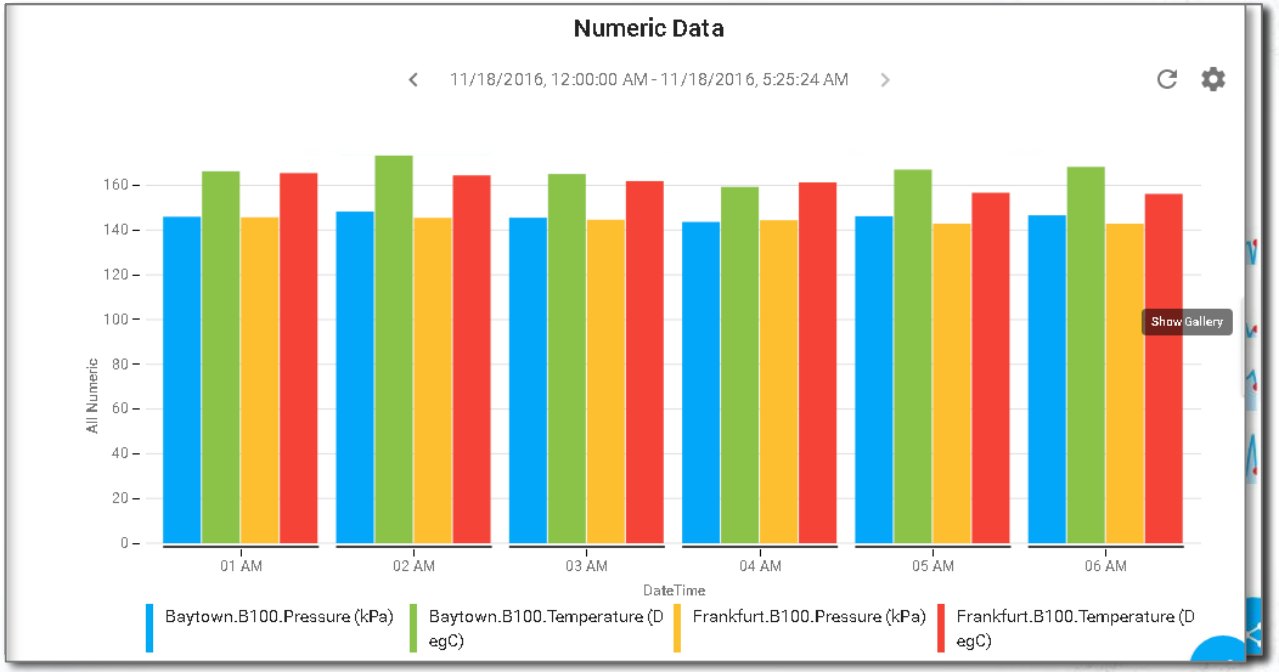
Beyond

“Best”, “Top”
Geo-location

Wonderware Online InSight
Content
Wonderware
Online InSight
Search for saved content, tags, or keywords.
SUGGESTED CONTENT (4)
DASHBOARD (3)
NEWS
Reactor 21 Profile
None
l/min
liters
DegC
9/26/2017 3:07:41 pm
9/26/2017 4:07:41 pm
Backwash Status Today
30
25
20
15
10
5
0
Not Backwashing
Begin Air Agitation
High Flow and Air...
8 other states
TI401.PV was higher than usual
100
80
60
40
20
0
-20
Wed
Thu
Fri
Sat
Sun
posted 5 hours ago
MORE
Tracker-BaytownWithoutReactors-1 was lower than usual
80K
60K
40K
20K
0K
Tue
Wed
Thu
Fri
Sat
posted 1 day ago
MORE
Turbidity
This slide includes an embedded video

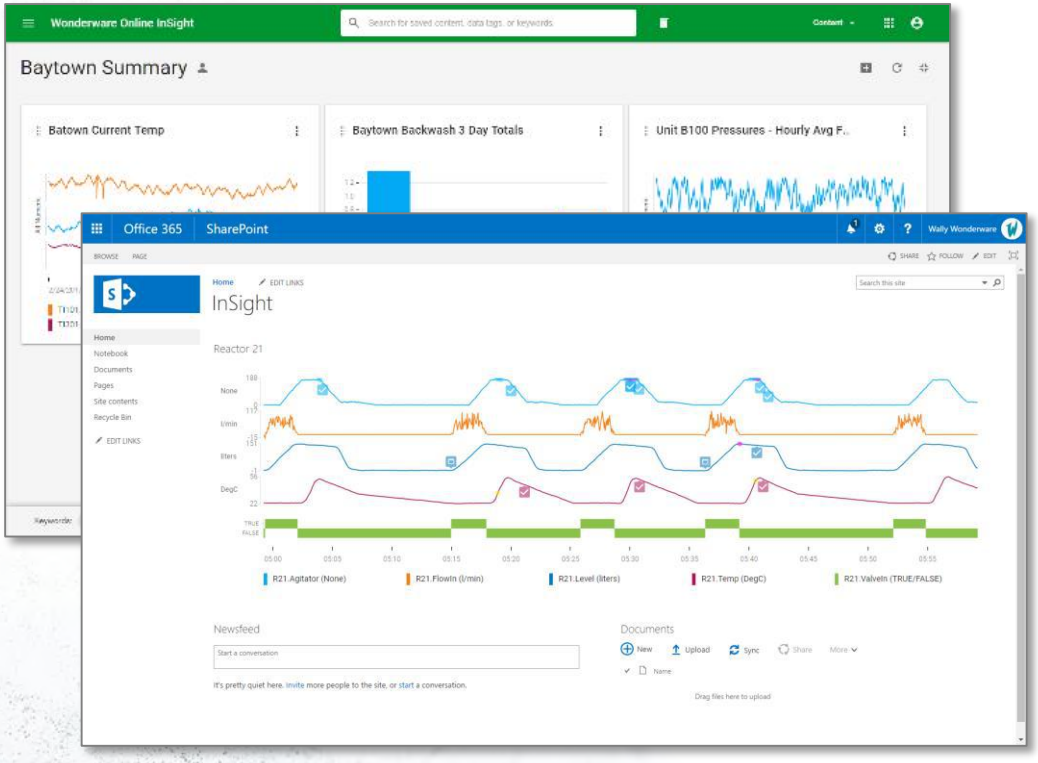
Simple Browser Access: InSight

- Trends with context
- Pareto charts
- Status Boards
- Summary statistics



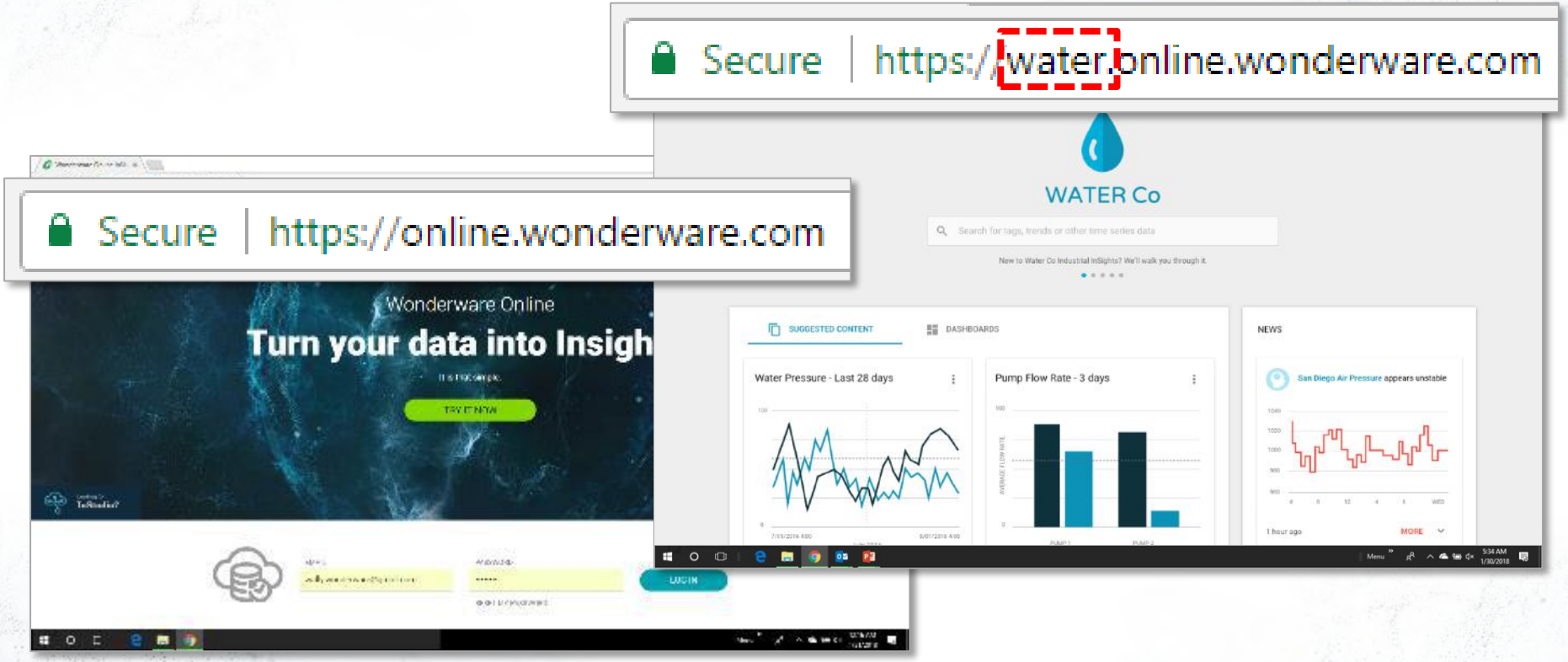
Wonderware by Schneider Electric

InSight Dashboards



- Simple dashboards
- Drill through
- Embed in other portals

Vanity Landing Pages & Themes (OEM)



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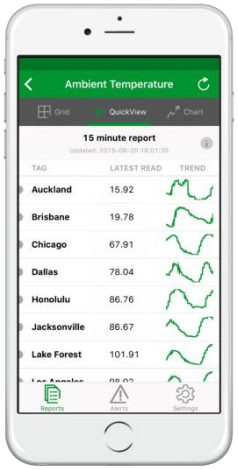
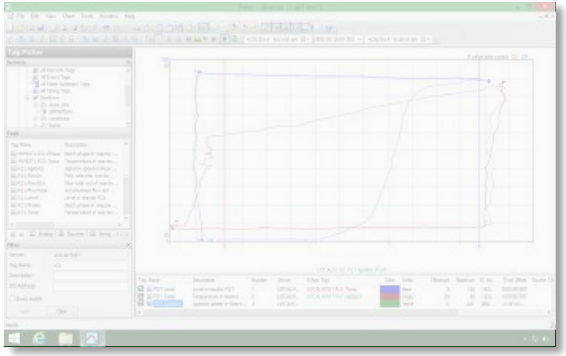
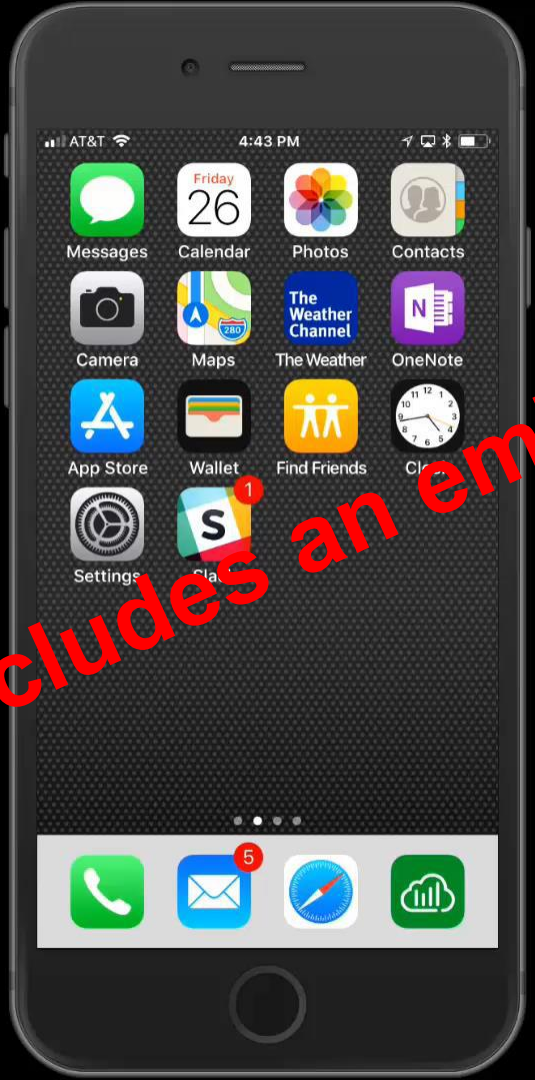


Native Mobile Tools



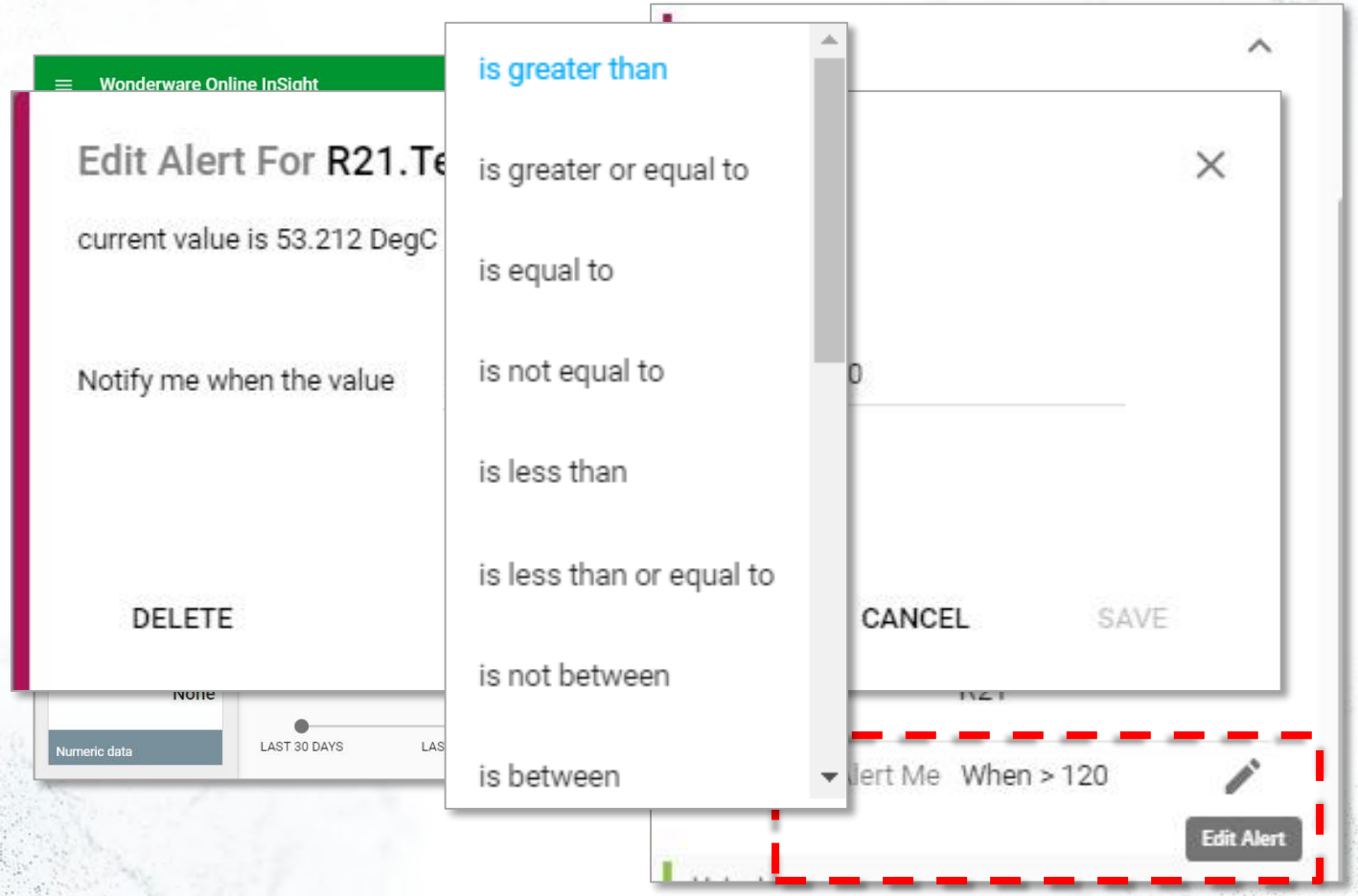
Rich Desktop Tools

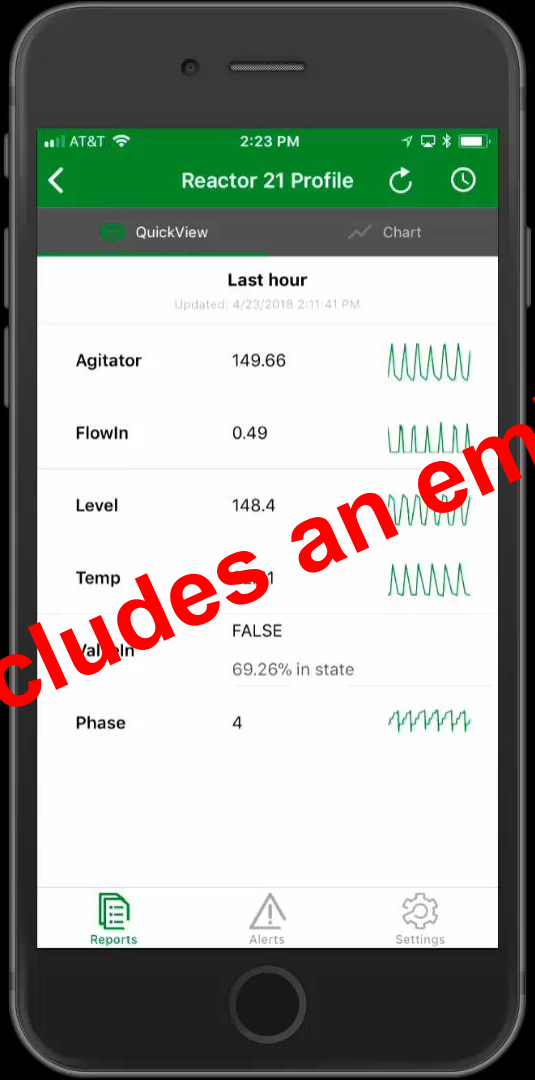
Wonderware by Schneider Electric



This slide includes an embedded video

Alerts In Browser





This slide includes an embedded video

Alerts

Today

Personal

>
<
between
…

Simple Rules

Mobile Notification

2018

Team

Advanced Rules

Application Integration

Wonderware by Schneider Electric

Online Maturity

2010 2011 2012 2013 2014 2015 2016 2017 2018

SmartGlance

Historian Online

Wonderware Online

Newsfeed

Hybrid

Utilization

Visualization

Maps Visualization

First managed solution

Customer Fast Shared Hybrid Solution Integrated Historian

Flexible Hybrid Solution Integrated Historian

Fast Shared Hybrid Solution Integrated Historian

Flexible Hybrid Solution Integrated Historian

Roles

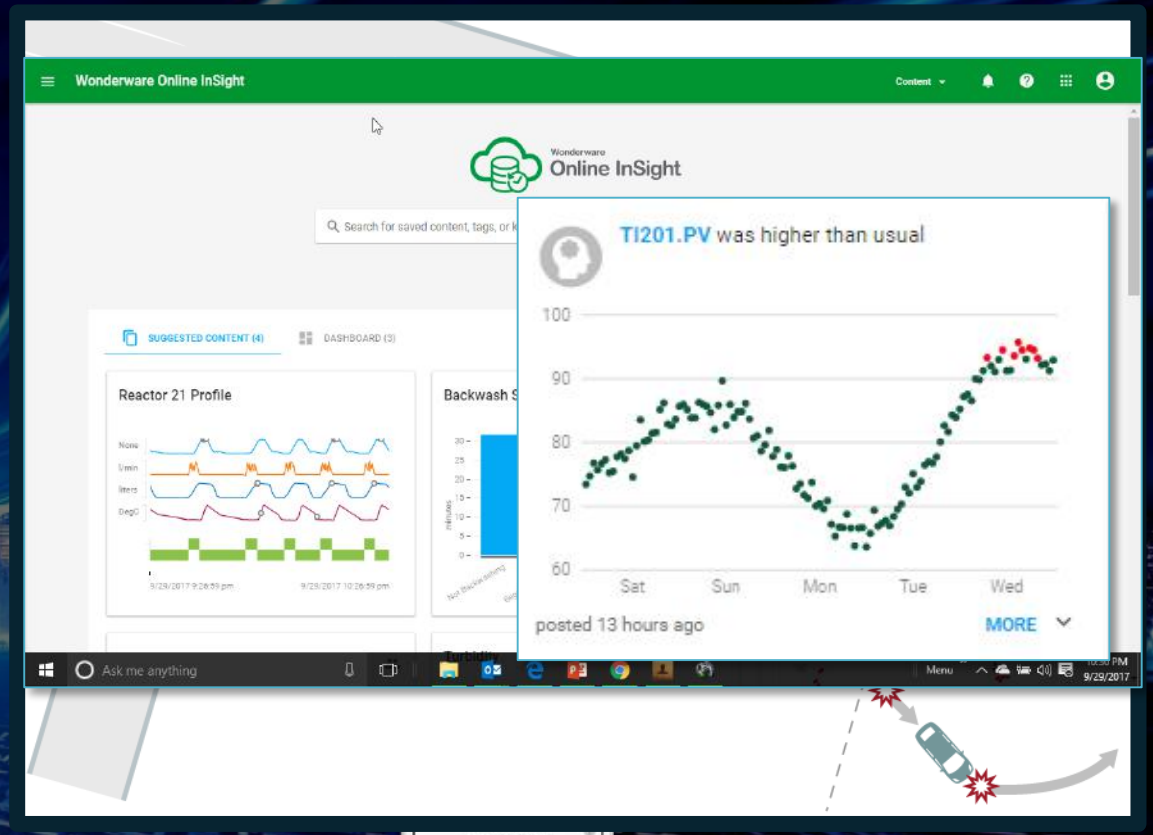
Machine Learning

Prerequisites

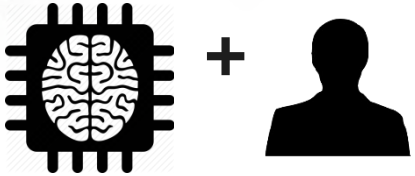
Data Scientists
Real Data
- Normal
- Exceptions

For The Rest Of Us

Zero Configuration
Personalized Curation
Accessible Results



Machine Learning



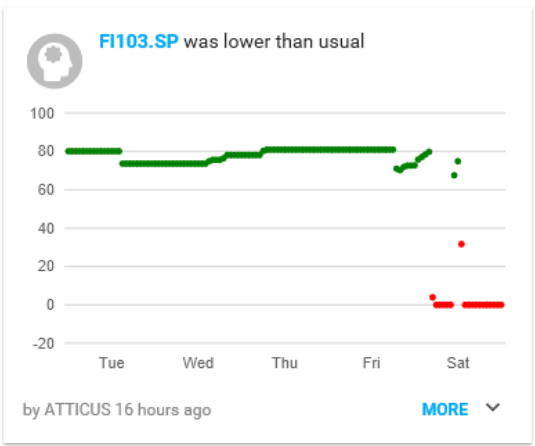
- Supervised
  - A human expert guides/configures
  - Higher-value results
- Example: PRiSM
  - Engineer identifies evaporator as high-value equipment
  - Finds related instruments
  - PRiSM reports anomalies

- Unsupervised
  - Automatically configured
  - May report insignificant discoveries
- Example: Newsfeed
  - No configuration required
  - Reports anomalies
  - Feedback part of training

Wonderware by Schneider Electric

Newsfeed Updates

- Anomaly Detection
  - Flatlined data
  - Change in value range
  - Change in cycle times
  - Change in distribution
- Curator
  - Assigns significance “score” to each report
  - Filters reports based on user interests



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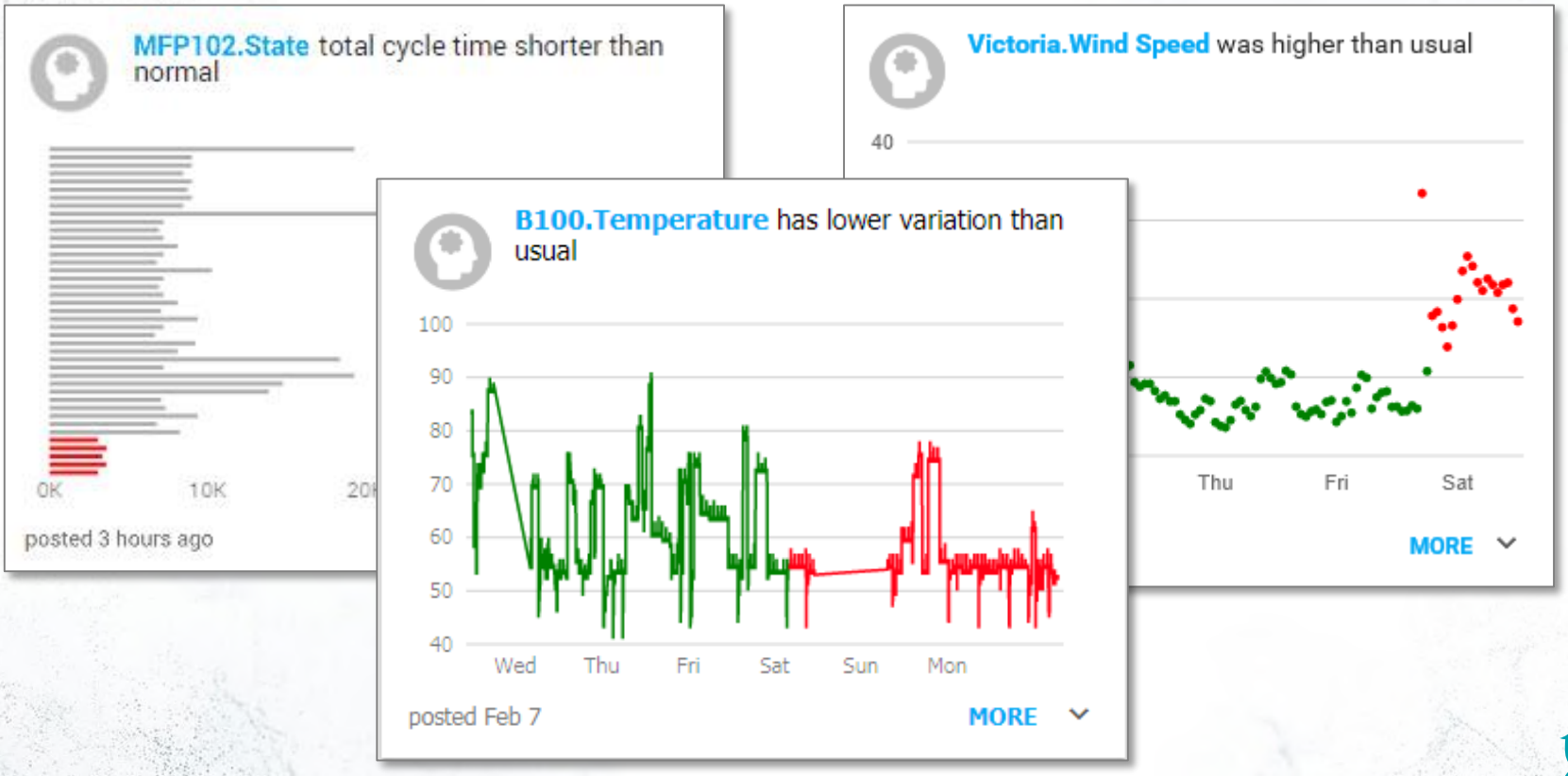
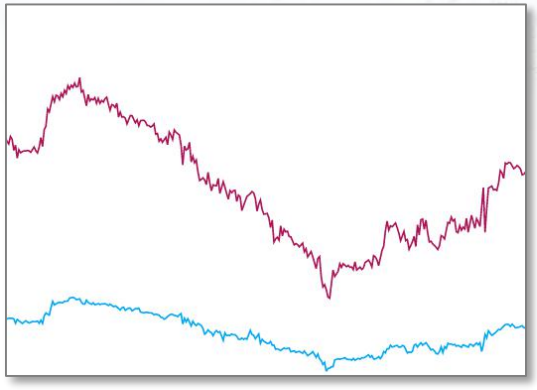
Anomaly Detection: News



News: Next Up

- Automatically Detect “Systems”
  - Interrelated tags
  - Examples: Control loops, boiler temp/pressure
- Model & Detect System Anomalies
- Integrate
  - Alerts
  - News
  - Collaboration (Teams, Slack, etc.)?



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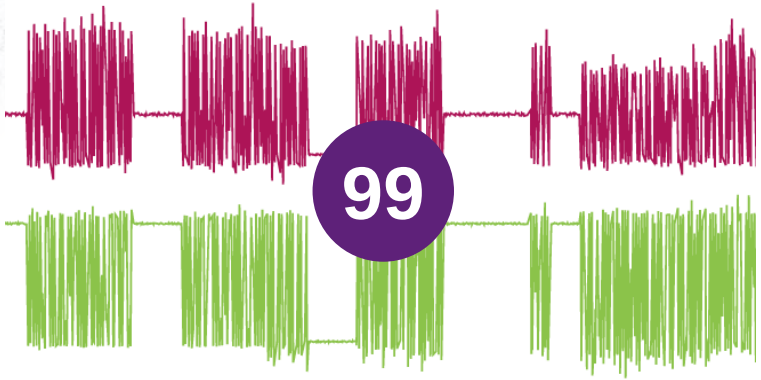
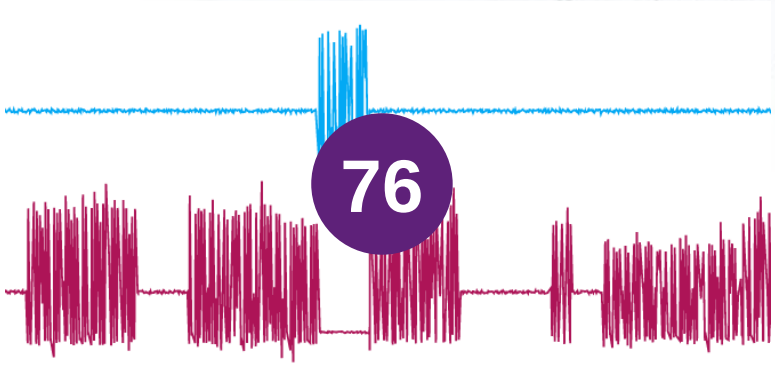
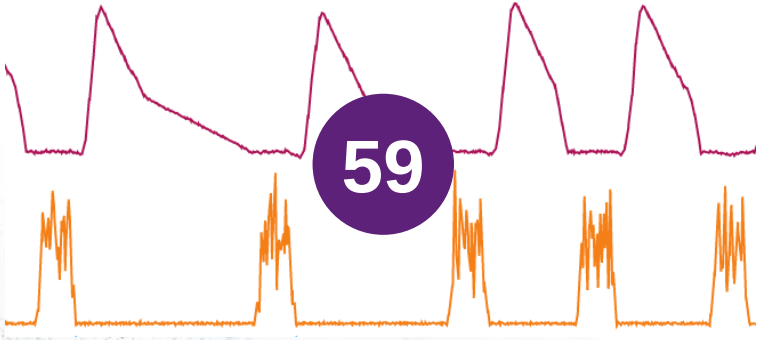
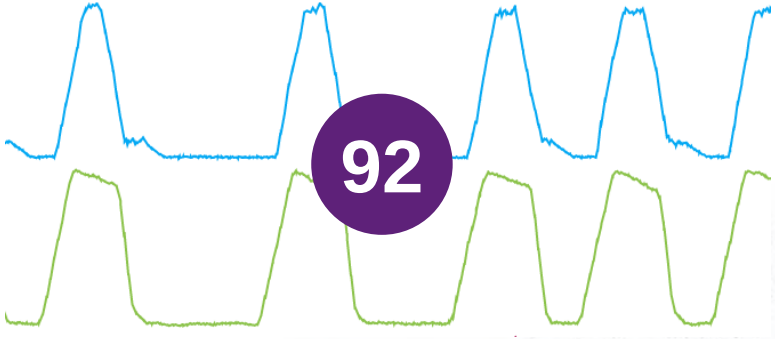
Newsfeed “Systems Detection”

Wonderware by Schneider Electric









Wonderware
by Schneider Electric

Online Maturity

2010 2011 2012 2013 2014 2015 2016 2017 2018

SmartGlance

Historian Online

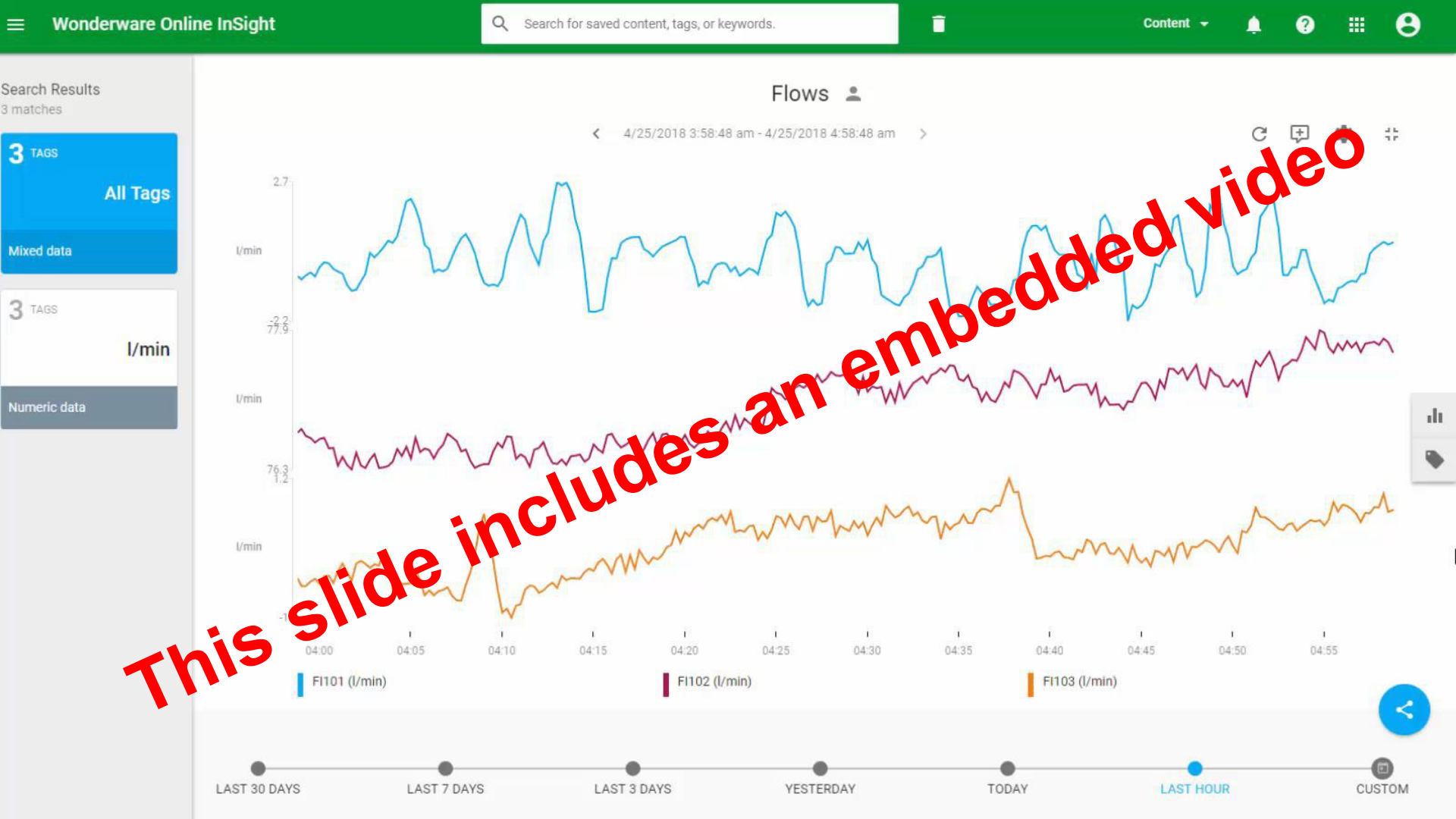
Wonderware Online

Newsfeed

Hybrid

Utilization

Visualization

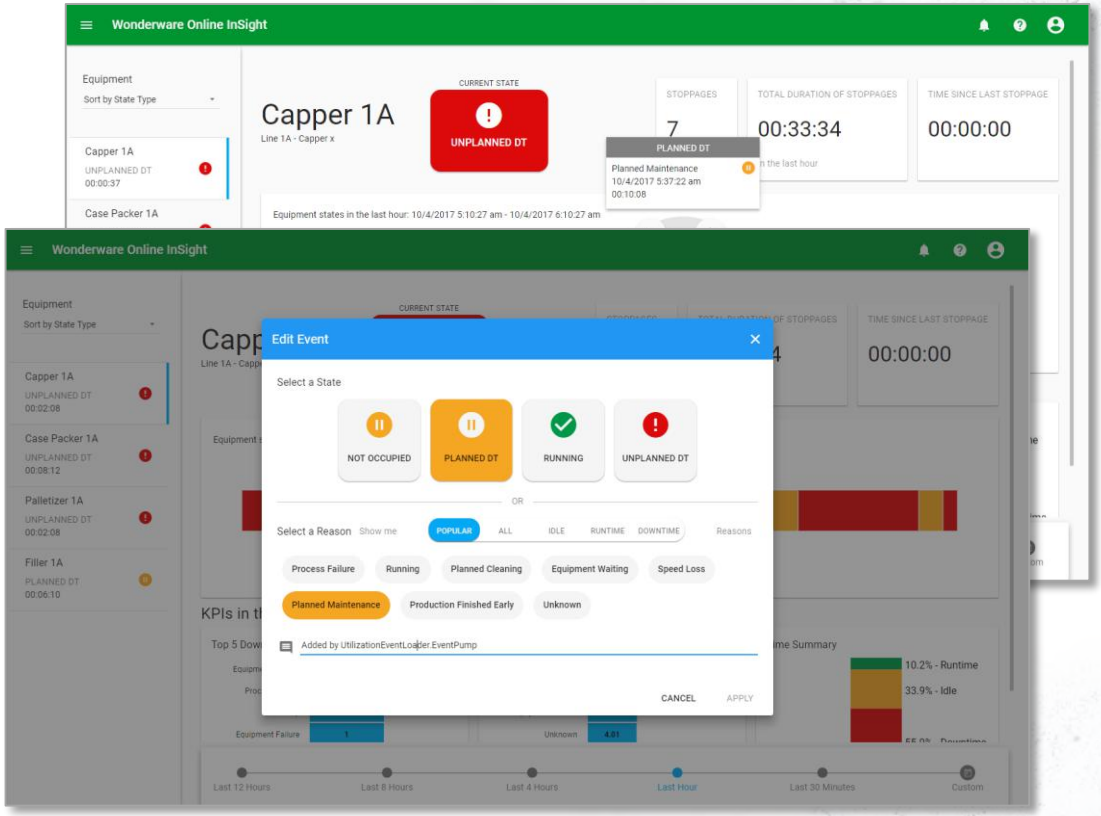

Wonderware Online InSight
Search for saved content, tags, or keywords.
Content
Search Results
3 matches
3 TAGS
All Tags
Mixed data
3 TAGS
l/min
Numeric data
Flows
4/25/2018 3:58:48 am - 4/25/2018 4:58:48 am
2.7
l/min
-2.2
77.9
l/min
76.3
1.2
l/min
-1
04:00
04:05
04:10
04:15
04:20
04:25
04:30
04:35
04:40
04:45
04:50
04:55
FI101 (l/min)
FI102 (l/min)
FI103 (l/min)
LAST 30 DAYS
LAST 7 DAYS
LAST 3 DAYS
YESTERDAY
TODAY
LAST HOUR
CUSTOM
This slide includes an embedded video

OEM: Irrigation Management

- Provides
  - Water rights reporting
  - Optimize water usage
- Data
  - Water usage
  - Soil moisture
  - Telvent Weather: historic/forecast

Utilization/Performance

- Optional add-on to InSight
- December: all manual
- May: automatic data collection from InSight



InSight Performance Module

- Equipment Performance for “Industry 4.0”
  - Browser-based access
  - Lightweight deployment
  - “Edge” deployment
- Reduces the “TCO” and “Time to Value”
- Compliments on-premise OEE/Performance

InSight Performance

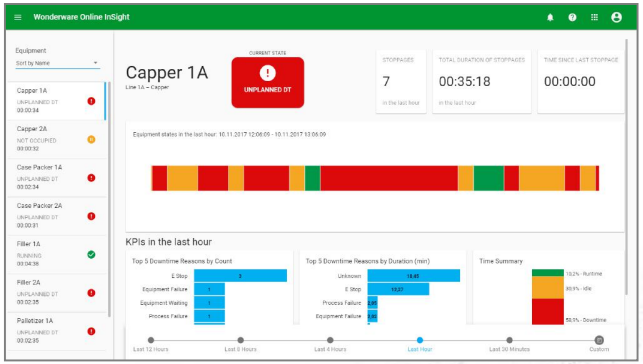
MES Performance

Wonderware by Schneider Electric

Equipment Performance

Ideal For Customers:

- Focused on visibility vs. process enforcement
- Require simple, fast deployment/time-to-value
- Comfortable with cloud-based solutions



InSight Performance: Equipment Monitoring

Equipment Monitoring

CURRENT STATE

Capper 1A

Line 1A – Capper

UNPLANNED DT

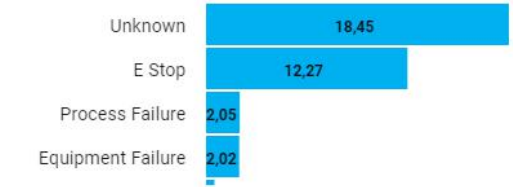
STOPPAGES	TOTAL DURATION OF STOPPAGES	TIME SINCE LAST STOPPAGE
7	00:35:18	00:00:00
in the last hour	in the last hour	

Equipment states in the last hour: 10.11.2017 12:06:09 - 10.11.2017 13:06:09

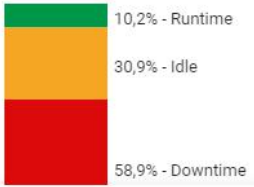
KPIs in the last hour

Top 5 Downtime Reasons by Count

Top 5 Downtime Reasons by Duration (min)



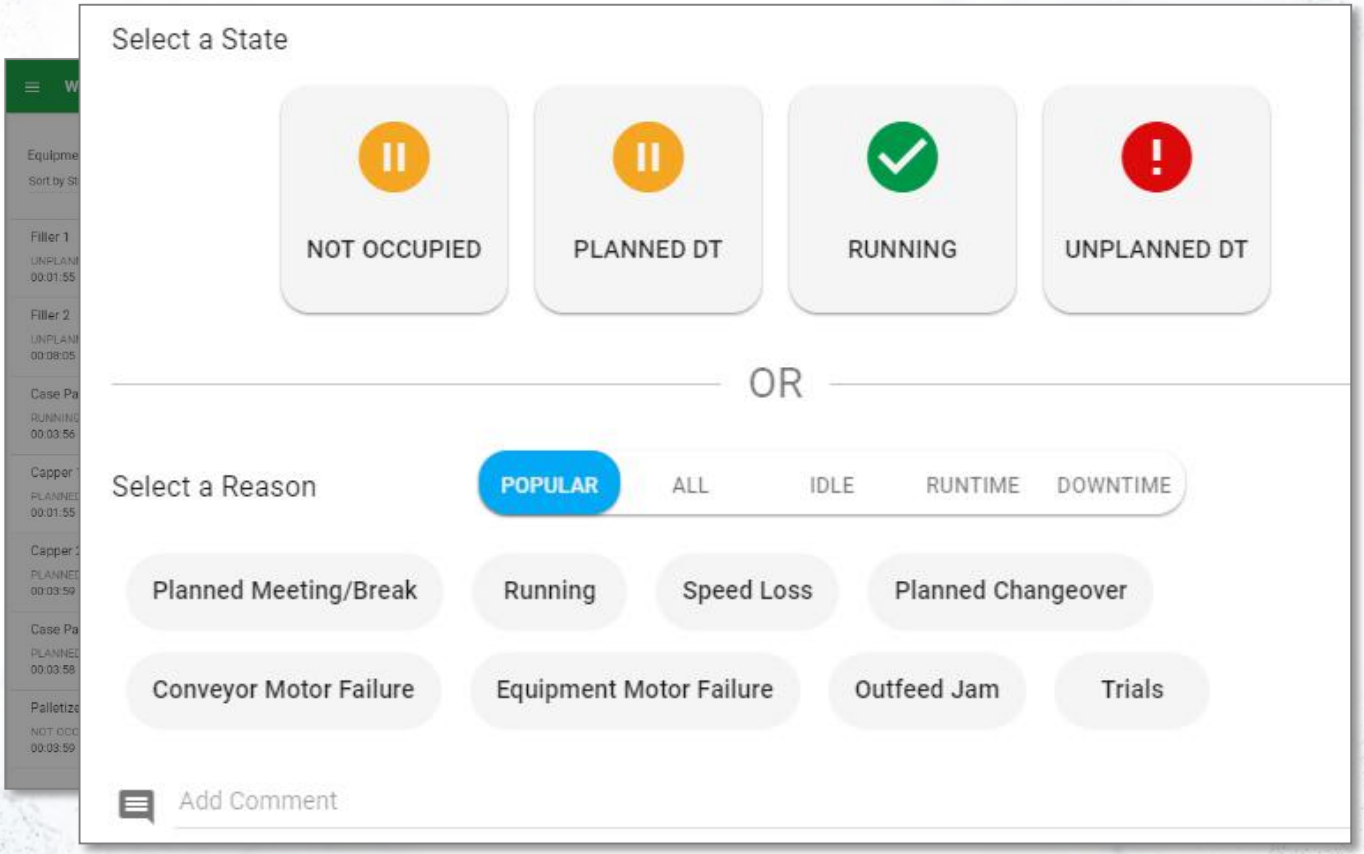
Time Summary



Wonderware by Schneider Electric

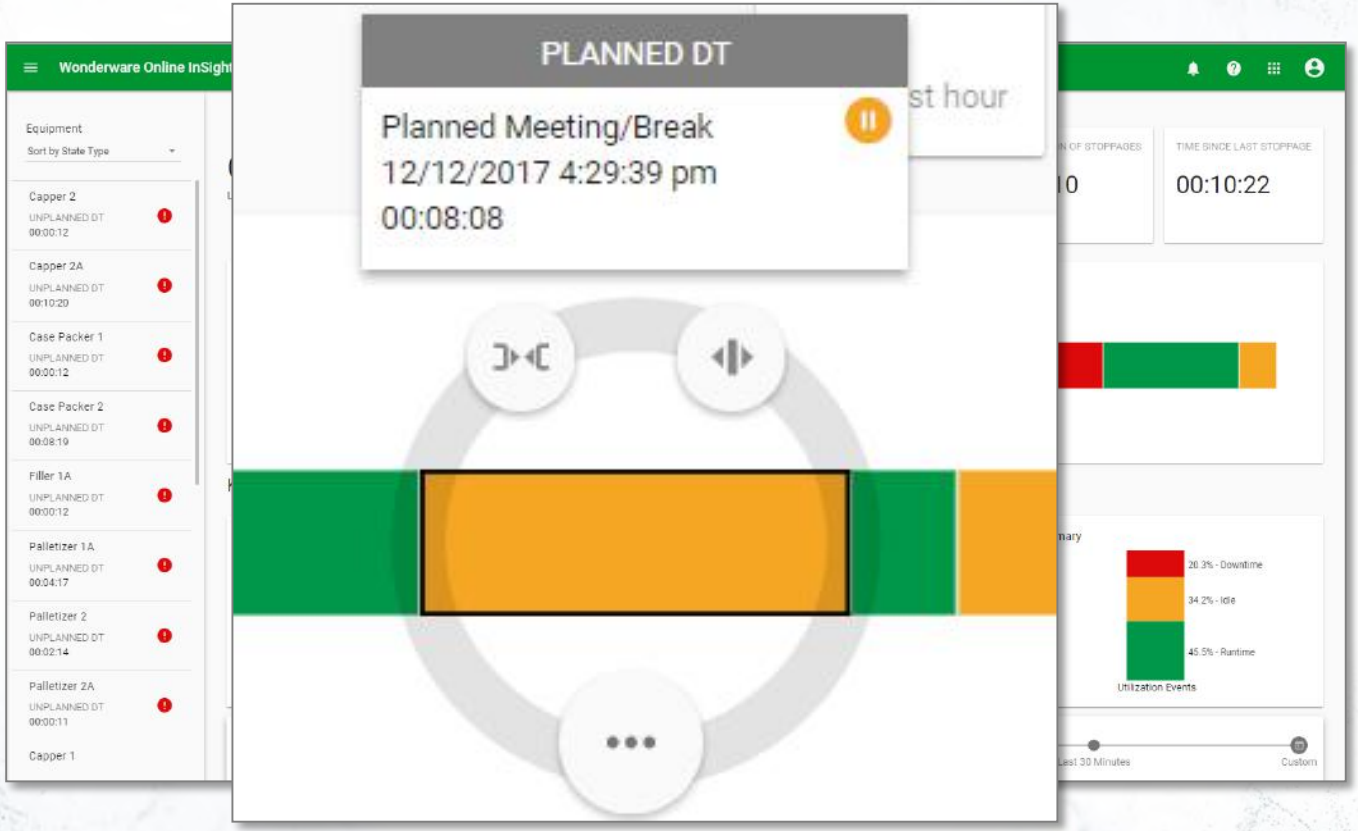
Insight Performance – Equipment Monitoring Experience…

Manual Utilization Event Creation

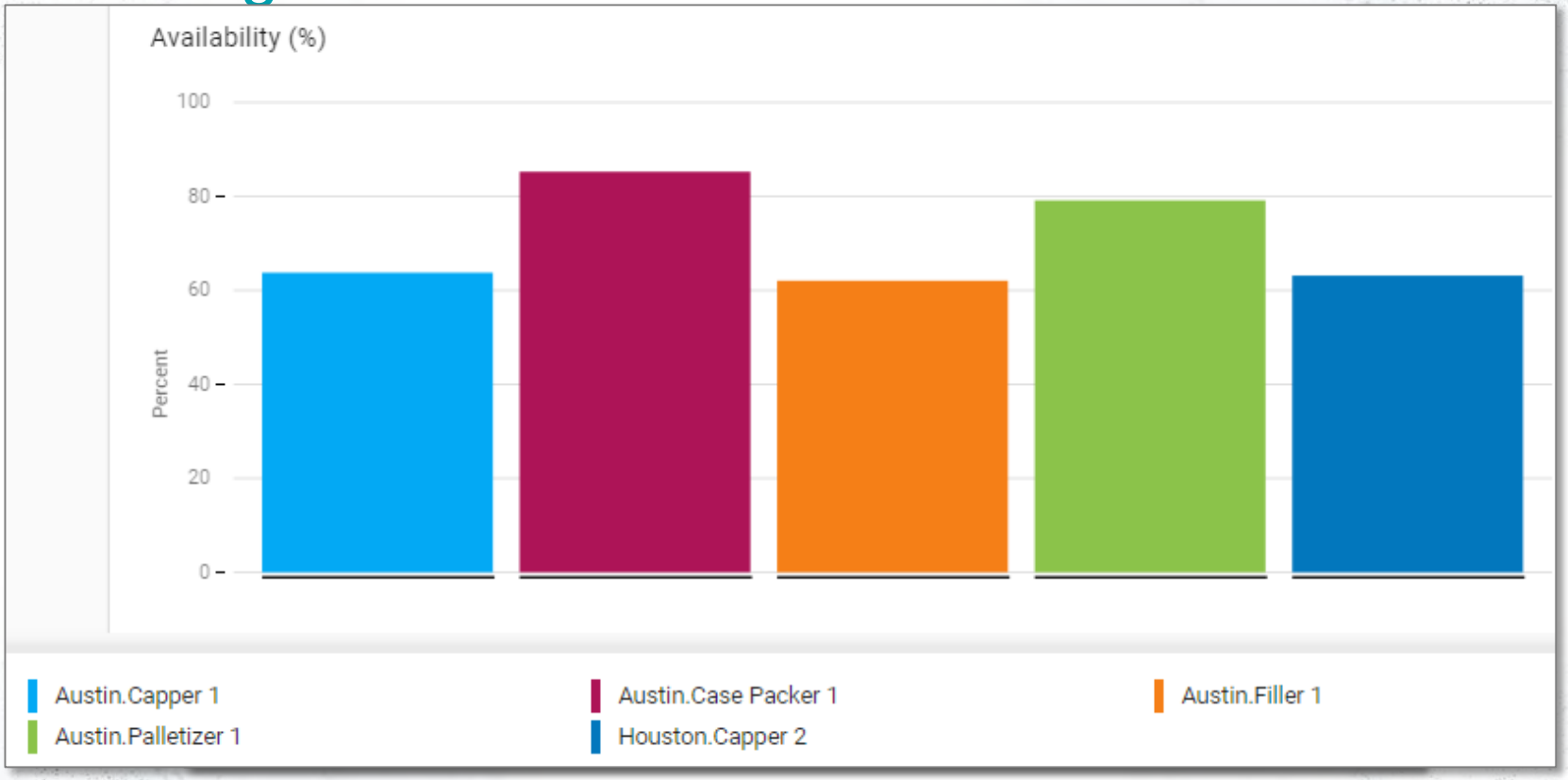


Insight Performance – Equipment Monitoring Experience…

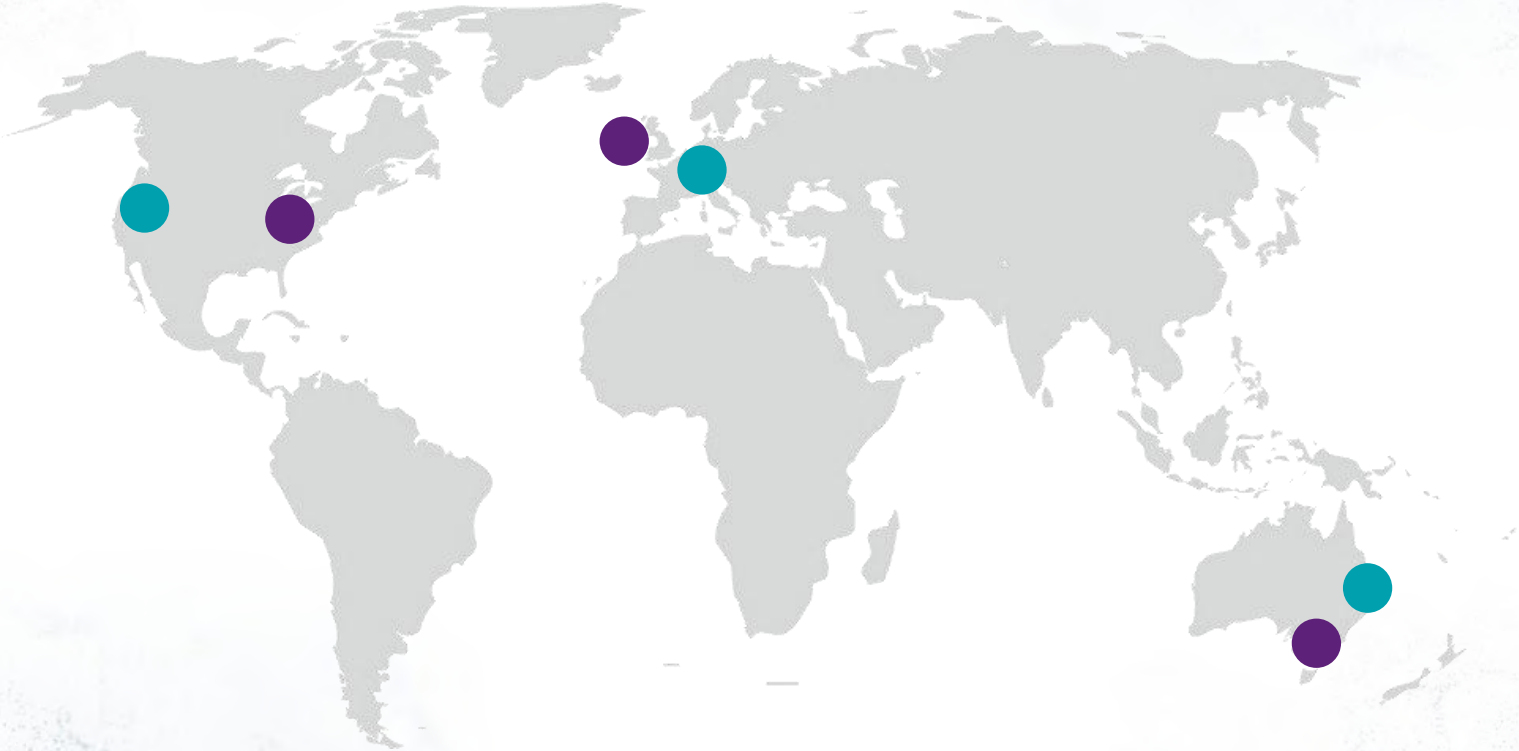
Utilization Event Reconciliation



Value: Insight Into Utilization



Paired Data Centers In North America, Europe & Australia



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OEM: Bus Fleet Monitoring

- Batch upload from depot
- Traditional Architecture
  - On-premises Wonderware Historian
  - Custom data collection infrastructure
- New Architecture
  - Wonderware Online InSight
  - Direct to Internet upload

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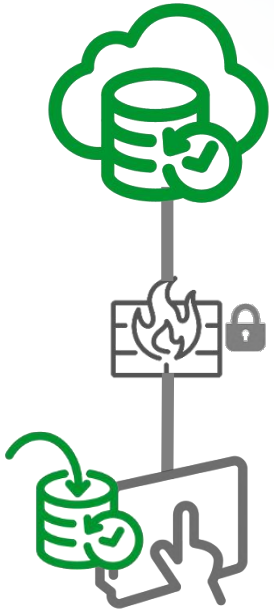
A Holistic Approach to Security

Security Across The “Stack”

- At Rest: Segregated, Encrypted
- In Motion:
  - HTTPS/TLS with trusted certificate
  - Only outbound connections
  - Limited, well-defined endpoints (3)
- Data Source Authentication
  - Initially registered by a user
  - Permanent credentials locked to machine



InTouch

- User Authentication
  - XAML/Oauth
  - External identity provider
  - Azure AD (soon)

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Security In Wonderware Online InSight

- Expected
  - Encryption “at rest” and “in motion”
  - Mitigate common browser exploits
- Methodology
  - ISASecure Certification (IEC 62443-4-1)
  - Detailed threat modeling
  - “Defense in depth” strategy (assume 1+ layers get compromised)
  - Externally-managed credentials (we can’t get yours)
- External Expertise
  - Outside audits
  - Penetration testing: access denied
  - Open access granted: no customer data compromised

ISASecure®

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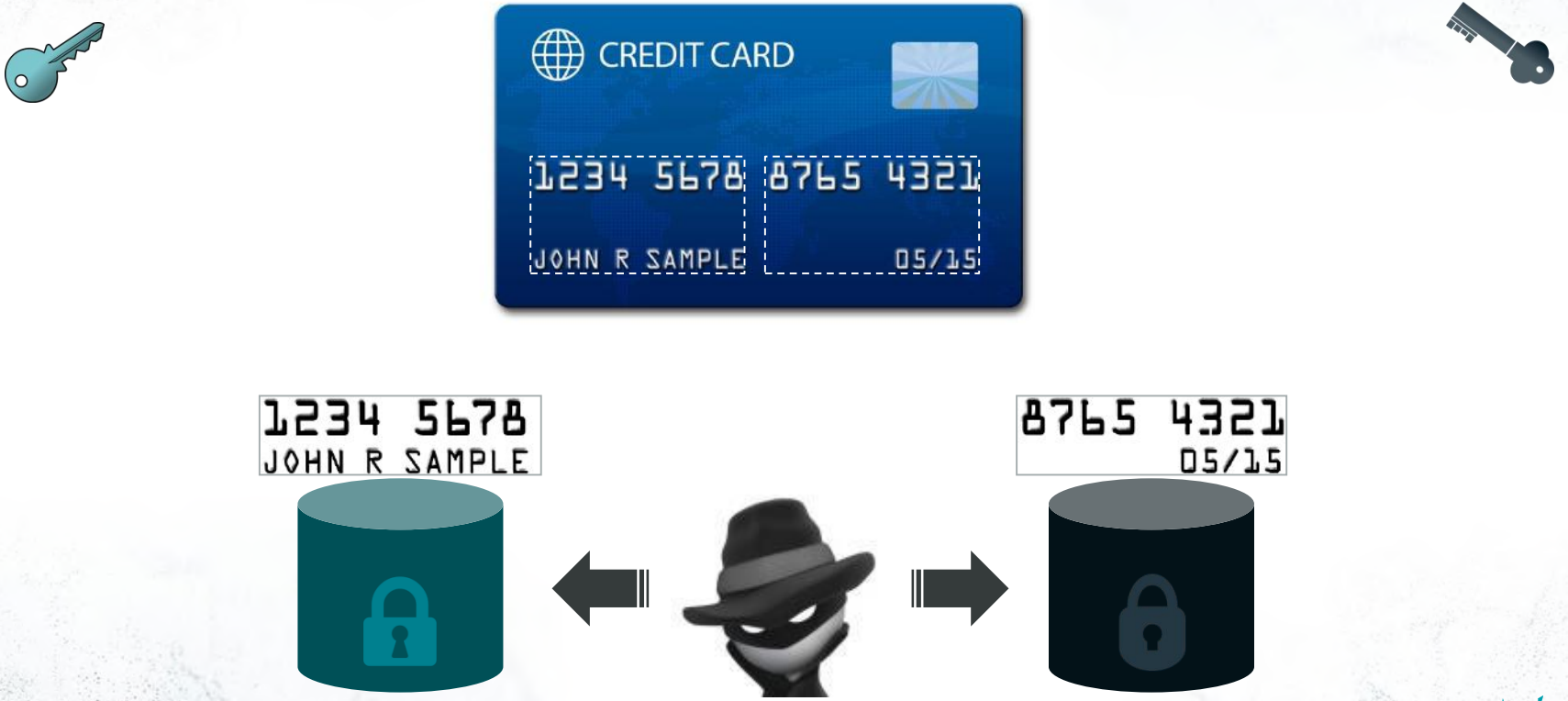
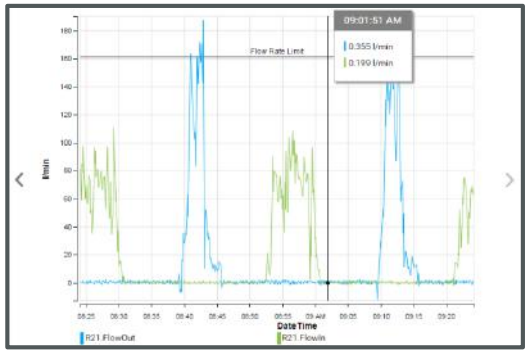
Merchants Securing Credit Card Data



Securing Industrial Data



186.3512

Tag-specific encoding

5d6e0705-dde2-4b2e-9ac4…
2018-03-17T16:22:54.434Z
0.346565
192

5d6e0705-dde2-4b2e-9ac4…
20.0 - 500.0
R21.Level
Liters
...

Only applications generated & only
Applications generated & only

What's Next?

- Increase the value of information you have
  - Make it more accessible to staff
  - Look beyond control network & workstations
  - Consider equipment & raw material suppliers
- Look for new data collection opportunities
  - Peripheral areas using cost-effective IoT sensors
  - Leverage IoTView for "edge" & embedded applications
  - Extend HMI-only applications with Wonderware Online InSight

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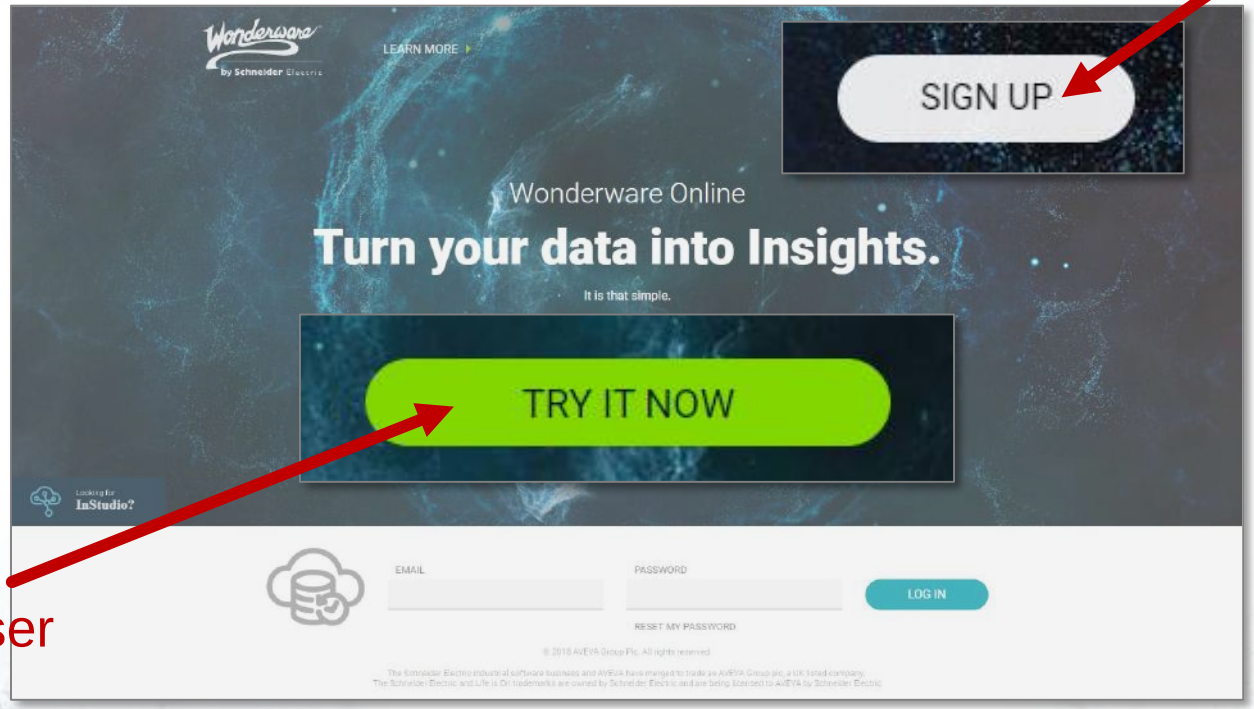
Interested?

Free 45-day trial
With your data

https://online.wonderware.com



Experience most end-user features

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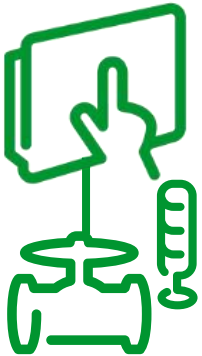
THANK YOU

Wonderware
by Schneider Electric

What If You Only Have InTouch?



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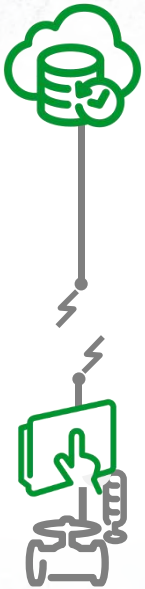
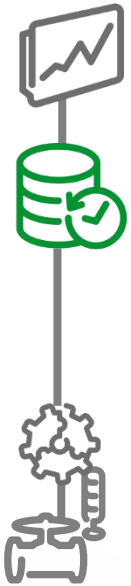
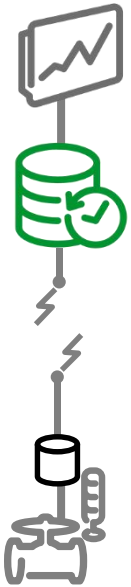
Historian Deployment Options



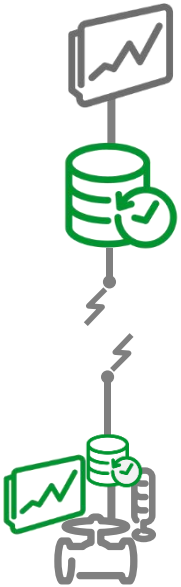
1. Wonderware Online
(no infrastructure)



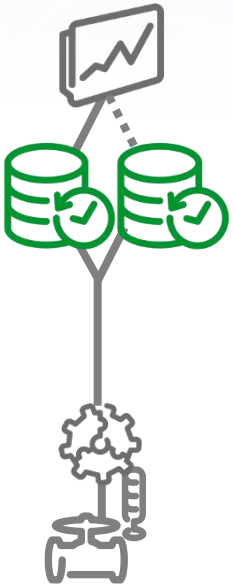
2. Simple On-Premise



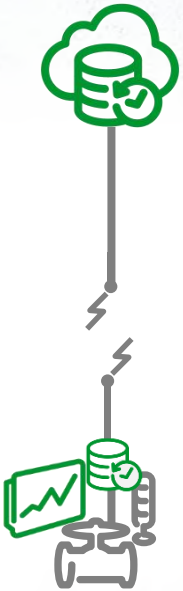
3. Remote IDAS
(no local clients)



4. Local Edition
(local & central clients)



5. Redundant
(reliable access)



6. On-Premise + Online

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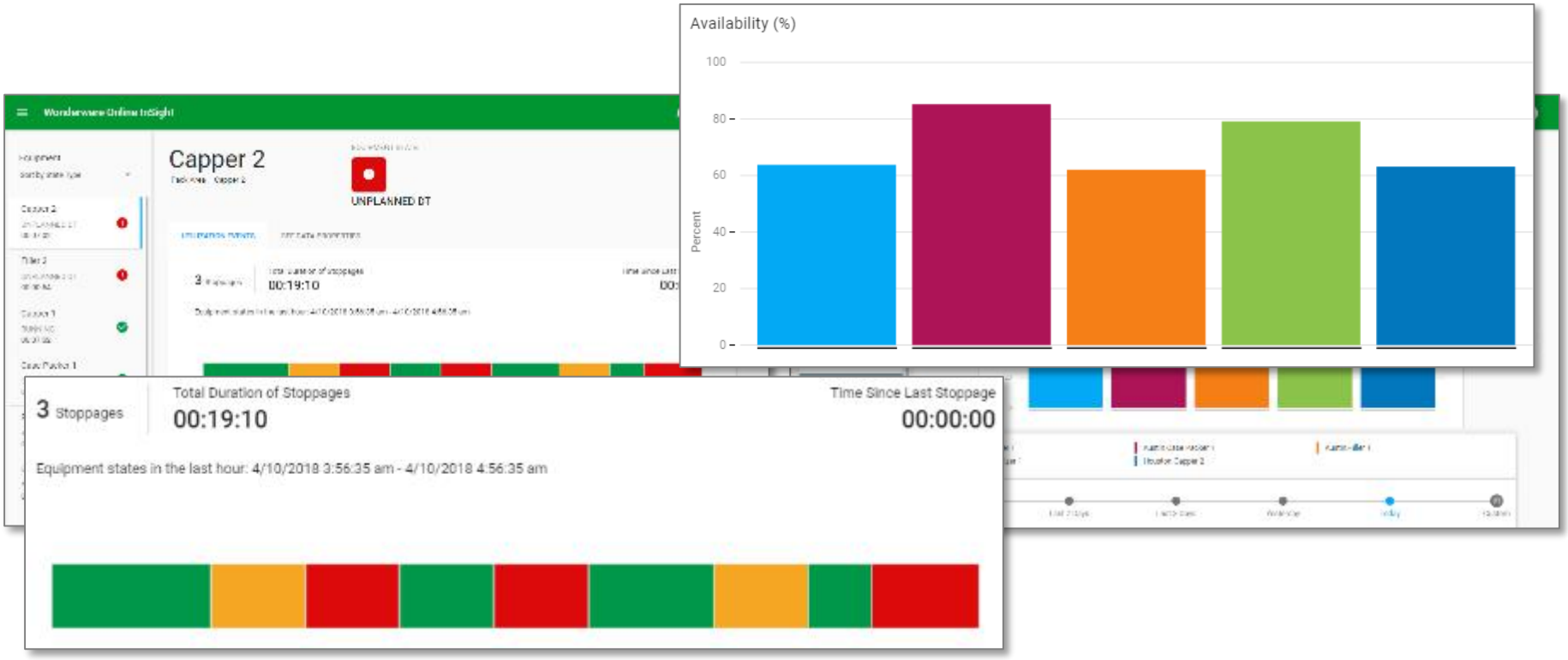
"Wonderware Online has enabled Ballard to rapidly and securely implement a cloud-based approach to monitoring our fuel cell products in operation globally. The real-time data and insights that we retrieve, combined with the analytic capabilities, are supporting sound decision-making for Ballard and for our customers."

Kevin Colbow
VP Technology & Product Development
Ballard Power Systems

Wonderware by Schneider Electric



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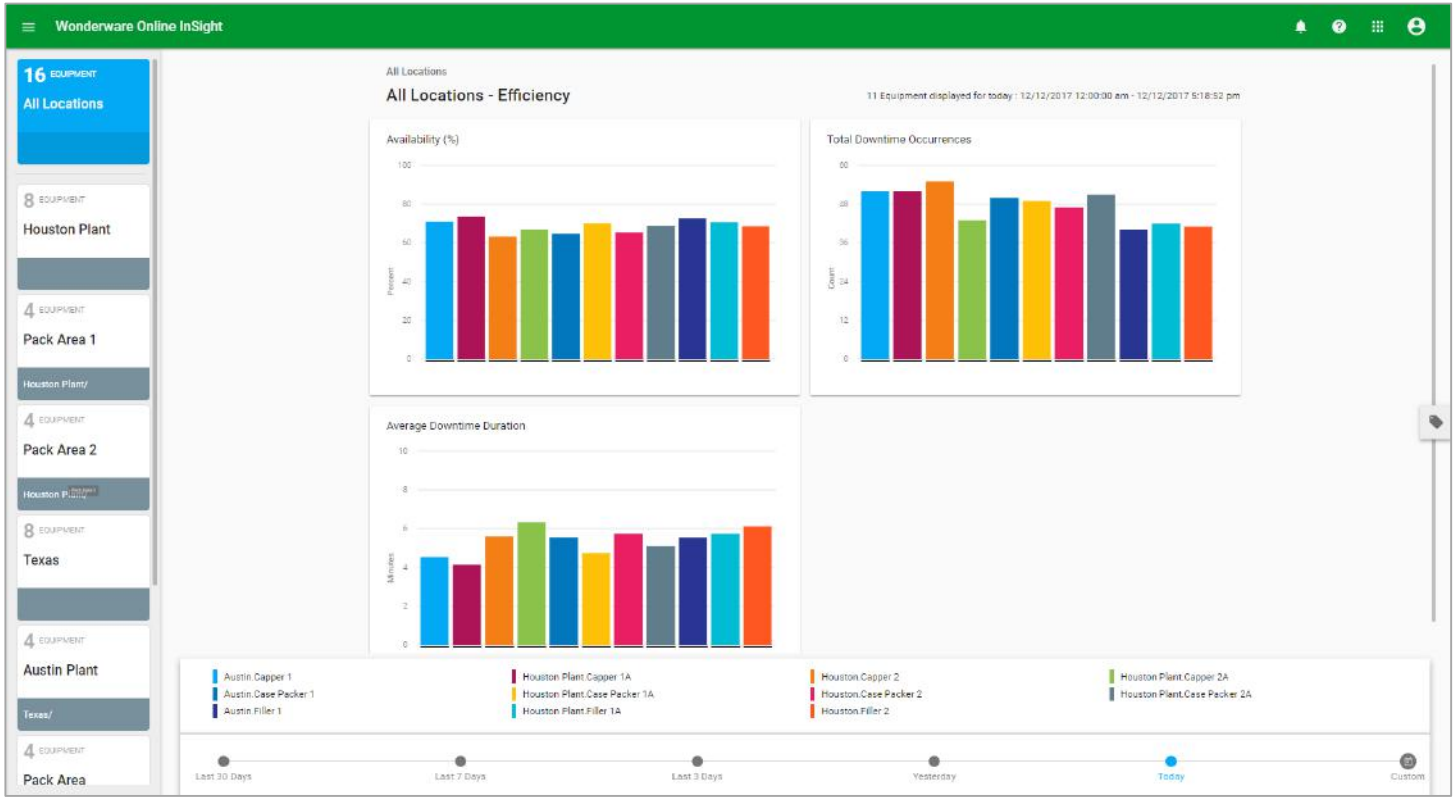
Insight Performance – Reporting & Analysis Experience…

Efficiency Analysis



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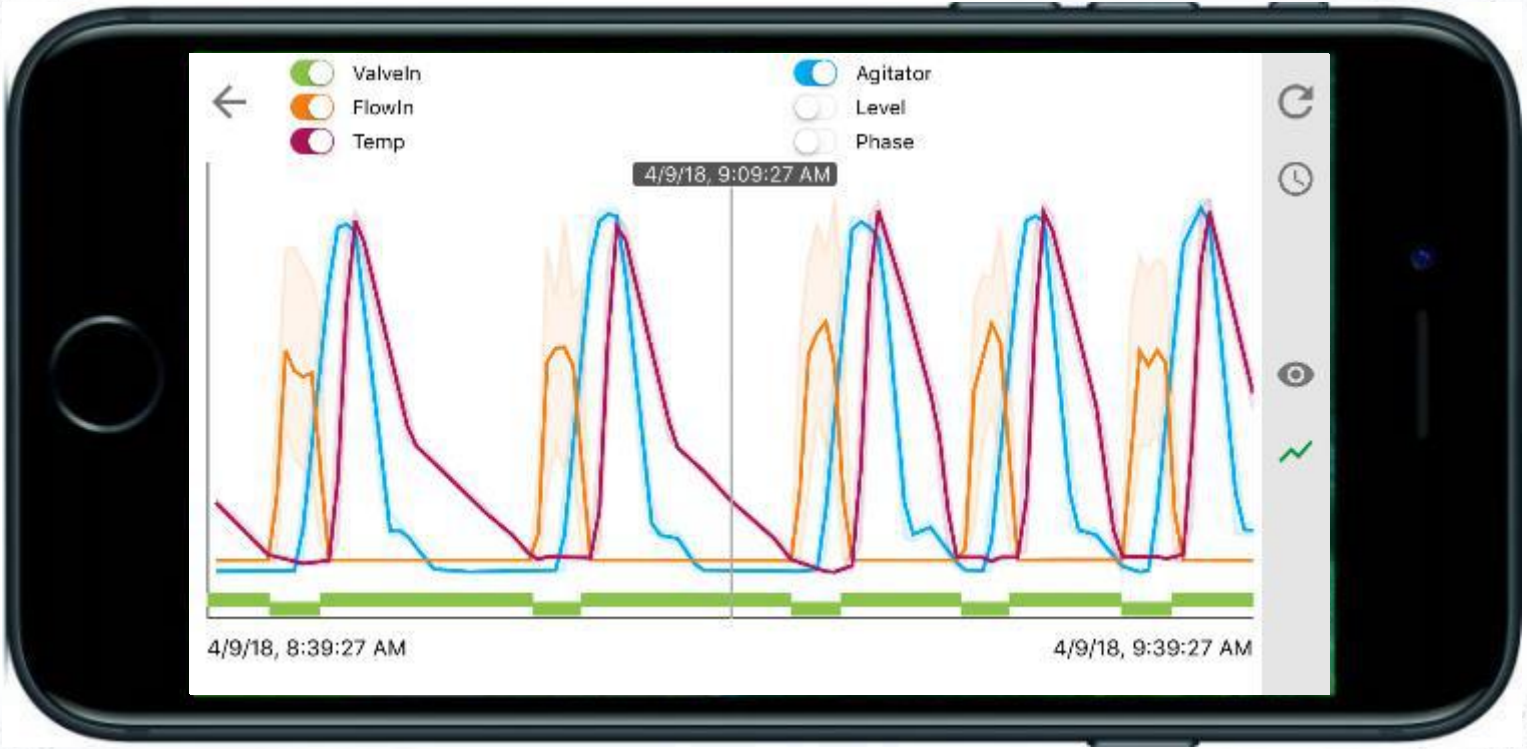

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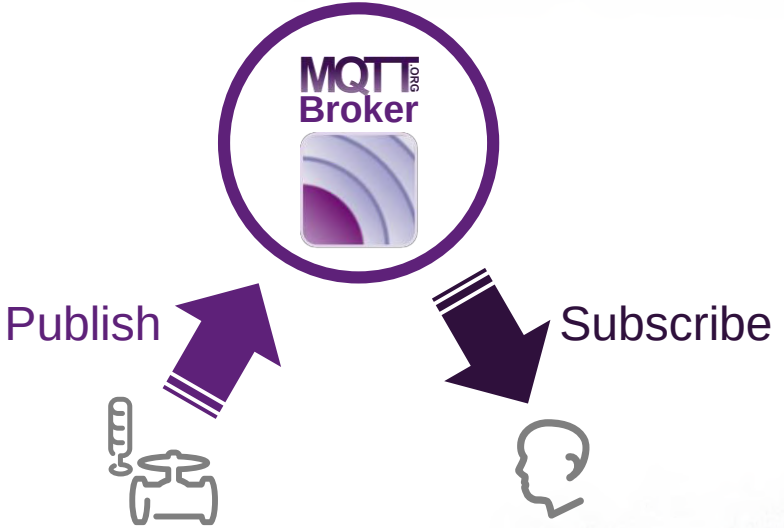
Message Queue Telemetry Transport (MQTT)

- Clients
  - Publish
  - Subscribe
- Broker
  - Manages subscriptions
  - Can be secured
  - Runs on-premises, online
- Loosely organized by “topic” (hierarchical path)



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MQTT Topics

- Topic Syntax
  - Delimiter: /
  - Single-level wildcard: +
  - Multi-level wildcard: #
- Message Format
  - Application-specific text
  - JSON common

`site3/+/speed`

✓	site3/line1/speed
✗	site3/line1/mixer/speed
✓	site3/line2/speed
✗	site3/line2/mixer/speed

`site3/#/speed`

✓
✓
✓
✓

```
{
"d":27.123,
"dt"4,
"ts":"2016-10-03T14:21:57.341000Z",
"q":192
}
```

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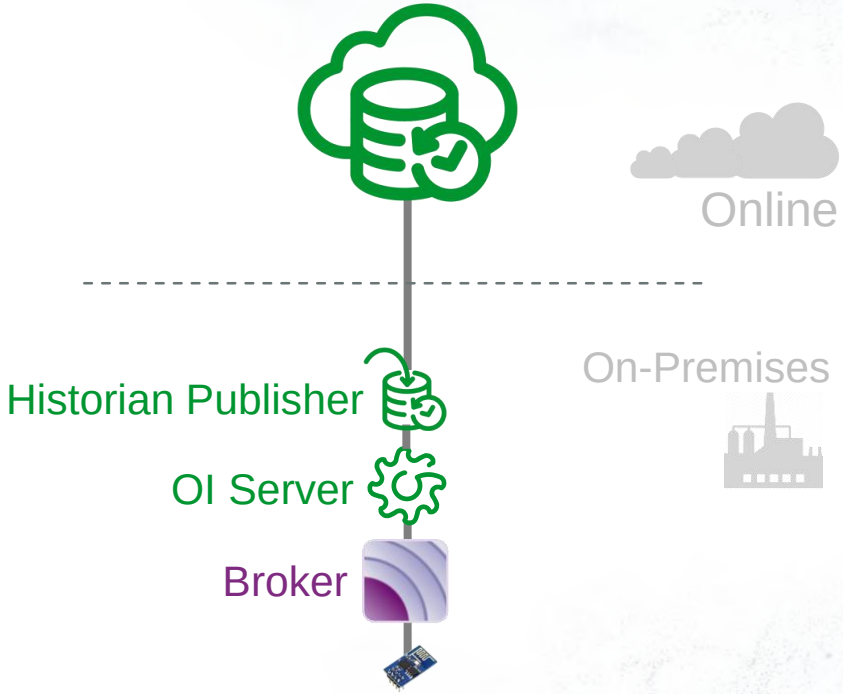
Use Case 2: New Application

- Minimal existing infrastructure
  - Wired/wireless network
  - Internet
- Cost-effective I/O
- Add
  - Historian Publisher
  - OI Gateway
  - Broker



Use Case 3: Pure IoT

- No existing infrastructure
- Secure, private communications
  - SigFox (Europe, Australia)
  - LoRa (North America)
- Cost-effective I/O
- Direct to Wonderware Online InSight

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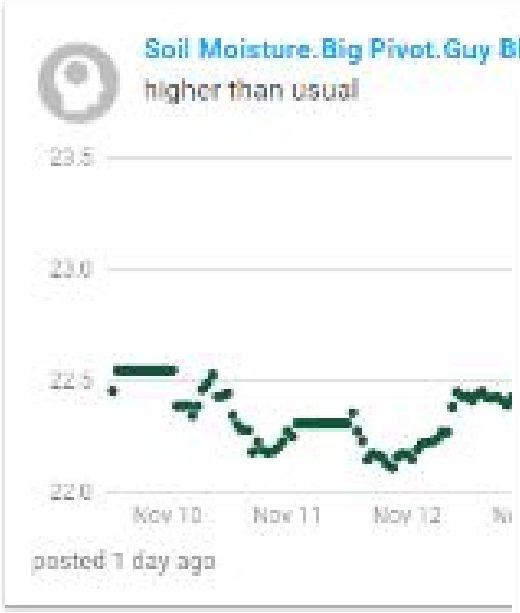
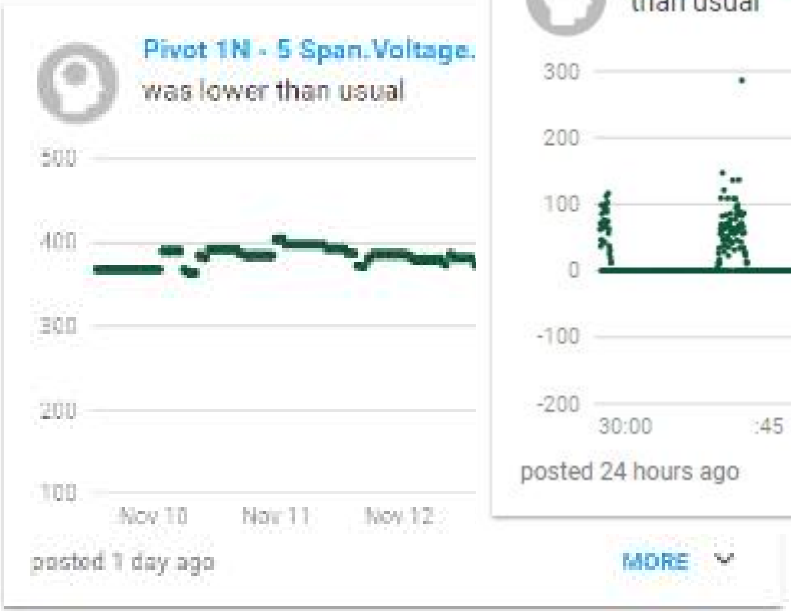
Recent Entropy Example





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DIY

"We're doing it ourselves with _____"

(Hadoop, MongoDB, Data Lake…)

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Proof Of Concept

Uses Wonderware Online InSight

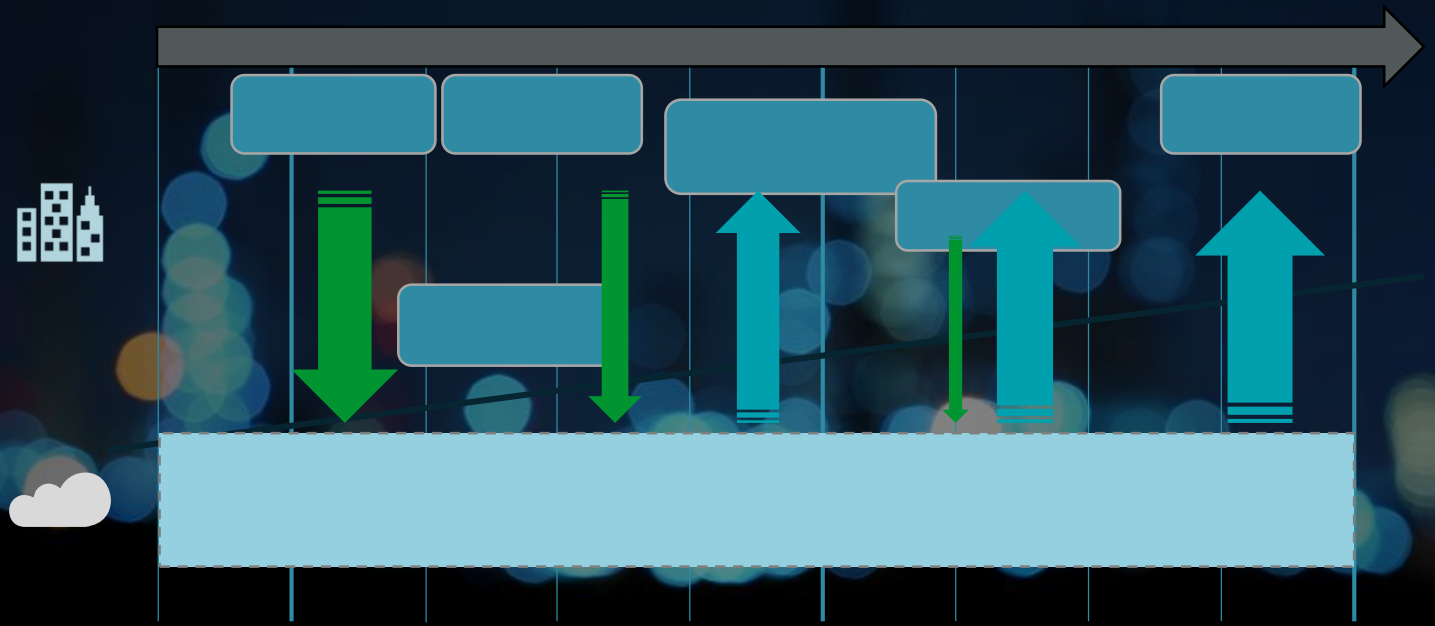
Current Interactions

Anything unusual happened? (Newsfeed)

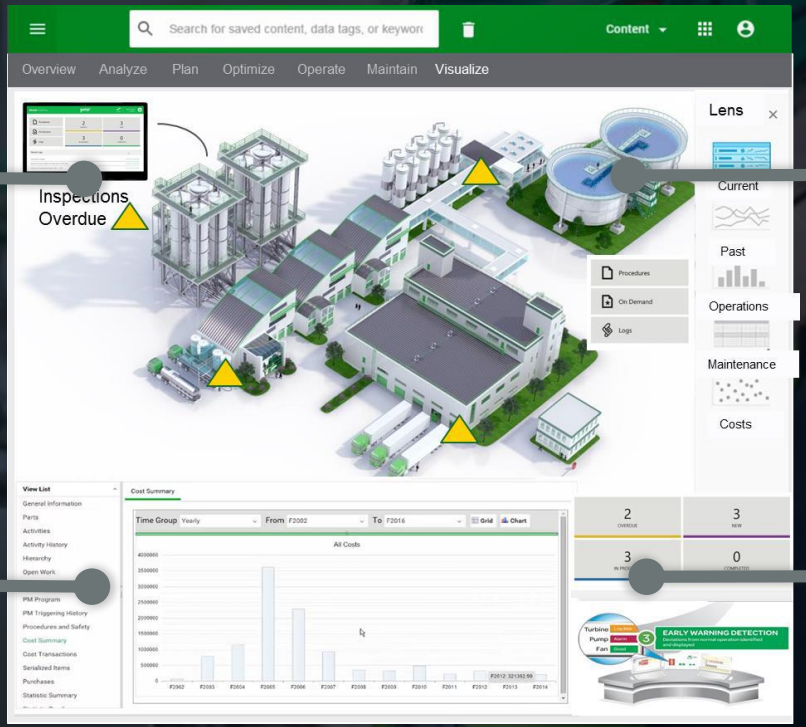
Selected data sets (Compares averages 24-hours ago)

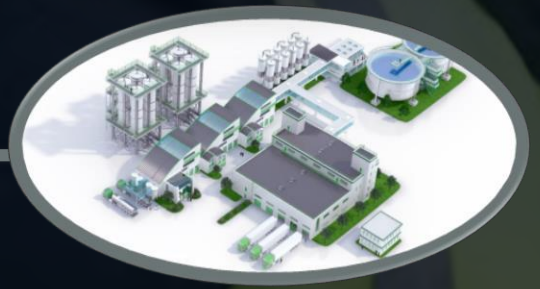
“Idea,” not yet a “Plan”

Information Roadmap Emphasis



Roadmap – Hybrid Cloud Solutions





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