



# AutomationWorld<sup>®</sup> TACTICAL BRIEF

## Real-time Operational Intelligence (RtOI)

Mobility • Analytics • Geo-Intelligence

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# Real-time Operational Intelligence

Leveraging Mobility, Analytics and Geo-Awareness to Optimize Operations

For decades, companies have used command and control centers as part of a standard automation model. It was, and in many cases still is, one place to control all of a company's industrial systems with a wall of monitors to oversee operations.

Limited by our past technology, the central control concept didn't match how companies actually operate. The action happens on the plant floor, and people need to be able to have control and information anywhere, anytime.

Fortunately, technology has matured enough to better match how we operate in plants, across all industries. Today, Real-time

Operational Intelligence (RtOI), leveraging mobile technologies and industrial software apps, makes it easier to run plants and run them even better.

## Centralized Control, Data Everywhere

In the past, our command centers may have been centralized, but the data has been everywhere. Each system feeding into the control room creates significant data.

As an example, take a command and control center in a small food packaging plant.

This command center has 13 underlying systems that drive the monitor screens – including SCADA, work process management, historian, vision systems, and more. The vision system alone takes



Real-time Operational Intelligence

## Put the Right Information in the Right Hands

Proficy Mobile delivers a single powerful app for Real-time Operational Intelligence across your organization. Turn vast amounts of raw data into simple, actionable knowledge. Use current and proven mobile technologies to empower workers according to their role and location – in real time. Features GE-patented geo-intelligence – and puts the right information in the right hands, improving efficiency and productivity. Compatible with your existing SCADA, MES, historian and other systems.



When the  
57th alarm  
is the only  
one that  
matters...



Put the right information in the right hands.



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## Continued Real-time Operational Intelligence

pictures of a single line every second while other systems determine out-of-spec conditions and trigger alarms.

The data is everywhere in those 13 systems and largely resides independently from one another. The problem is not ever having too little data – we have tons of data but have trouble filtering it and making it actionable.

### Reacting to Data

Traditionally, companies have made the disparate data actionable by reacting to it on screens. An operator sees a list of alarms on the control room screens, identifies a critical alarm and reacts to it. In most cases, the control room is reactionary rather than predictive, which results in higher downtime and inefficiencies.

Additionally, in reacting to alarms, operators often must leave the control room. Staffing must be high enough to maintain operations in the control room

as well as to meet the needs for the actions on the plant floor or in the field, which raises the costs of operations.

In some cases, critical field work can't be completed because an operator must stay in the control room. Or, conversely, the control room is empty while operators must conduct imperative field work – and the list of alarms grows while the control room is not managed.

### Action and Knowledge Anywhere

With new mobile technologies and

#### Actionable Knowledge, Anytime, Anywhere

- Information in context
- Delivered by role
- Location based
- Intelligent notification
- Optimal actions
- Increased collaboration

## Continued Real-time Operational Intelligence

### Trusted Data from Anywhere to Anywhere

Proficy Agent gives you a trusted, scalable and secure-by-design way to forward monitoring and diagnostic data from remote agents to a central repository over an intranet or the Internet – replacing the need for dedicated VPN connections. Reduce your network complexity, leveraging real-time encryption and decryption – scalable to 1000s of agents. Designed to easily support the collection, recording and transmittal of data from any source in a reliable, secure and highly configurable manner.



and real-time information have changed our personal lives, mobile devices and RtOI are changing our industrial world.

innovative software apps, companies can drive Real-time Operational Intelligence – taking the data from the underlying plant systems and pushing it to operators, engineers and managers in an intelligent way. Operators no longer have to be watching screens while sitting in a control room. The right operator can receive the right information at the right time and place.

It sounds idealistic – yet, it is happening now with today’s mobile devices and industrial software. The same way mobile devices

### The Right Information for Mobility

Going mobile, however, doesn’t mean replicating your control room on a mobile device. For certain applications, a company might want to put every piece of data and all 10,000 tags, as an example, onto their iPads, iPhones or Android devices. But, in general, technology allows us to be much smarter now about how we filter and serve information.

Drive the data to the device that makes sense and identify the particular data that would mean something to the mobile user. In some cases, that could be all of the display tags in the SCADA system. In most cases, the ideal would be to deliver the key performance indicators that make sense for an asset– such as, perhaps, voltage or temperature.

By selecting the right data, users can access information in a mobile fashion to make better sense of it instead of sifting through hundreds of different pieces of raw data about a particular pump or machine.

### More than Just Mobility

Companies can also use this technology to funnel the data into KPIs and trends. The information is easier to access and understand. This is a key difference between simply mobilizing SCADA versus driving toward RtOI. The value is not just mobility – it is taking the mass of raw data, turning it into better information and making it available in a KPI method on a mobile device.



## Continued Real-time Operational Intelligence

Additionally, RtOI leverages the availability of geographical information. Mobile devices have inherently built in geo-awareness, which adds tremendous value not just in dispersed applications such as water/wastewater or power but also even for a small manufacturing facility.

Whether the signal is coming from a GPS, Wi-Fi or being triangulated through cell phone networks, RtOI helps deliver the appropriate information to the user's location.

### Geo-Intelligence Technology

As an example, GE has patented geo-intelligence technology that takes all of the underlying systems' data and assigns it to particular assets, puts context to it, and then applies a geo-location to that asset. Now, when operators go up to equipment, they don't navigate through all of the plant assets to identify the particular equipment.

Because it is geo-aware, the mobile device knows that the equipment is Pump 2 in the South River Pump Station and automatically flips to the appropriate screen, instantly displaying data such as KPIs. In addition, the device knows which other assets are close to the operator, according to an adjustable radius – or field of view, and can, for example, display all of the pumps located within three miles.

In a manufacturing environment, geo signals are even more accurate using Wi-Fi than they are using GPS and cell technology. Operators can be in a noisy factory and use the geo-intelligence and navigation



Alarms to the Closest Person, by Role and Location, for Faster Response

to have the right information at their fingertips based on their specific location. Beyond automatic screens and navigation, the benefits of geo-intelligence multiply when applied to alarms and analytics.

### Alarms to the Right Person, at the Right Place

With geo-intelligence, companies can deploy alarms to an operator, engineer or manager based on physical location. As an example, an engineer is standing on Floor 4 in front of a mixer and an alarm goes off related to a machine on Floor 1, which is 25 minutes away. Does it make sense to deploy the alarm to that engineer? The geo-intelligent

## Continued Real-time Operational Intelligence

system determines that a colleague is standing 100 feet away from the machine in alarm – and instead sends the signal to the closest engineer for faster, more efficient response.

By adding geo-awareness to alarming, companies can make intelligent notifications possible and deploy alarms in a geo-context. The right information finds the right person in the right location, which is drastically different from the traditional SCADA world and goes far beyond simply mobilizing data and tag names.

### Reducing Alarm Noise

In addition to deploying alarms based on location, Real-time Operational Intelligence also filters alarms to increase efficiency. According to analysts, 75% of all alarms are noise, and many companies want to examine their systems and reduce the number of alarms. However, this is often an endless cycle – with more alarms being added by integrators and in-house engineers before a project is even completed to reduce the number of alarms and flags in the system.

Too often, companies are forced to accept that there is a level of noise from alarms, and operators must know what to pay attention to and what not to pay attention to. A problem arises with temporary staff operating machines or new operators coming on board. The temporary or new personnel don't have the experience to filter through the alarm noise and make sense of it.



RtOI Helps Predict Events and Drives Preventive Action

### Analytics on Alarms

With Real-time Operational Intelligence, companies can take all of the raw alarms in the underlying systems and apply a level of analytics to them. The system delivers the right alarm, perhaps even a derived or intelligent alarm, to the mobile devices rather than confusing raw data.

Furthermore, Real-time Operational Intelligence can add a layer of proactive analysis to deliver predictive intelligent alarming. Today's technology isn't just about delivering the right information after an event has happened, it is also about delivering information before a

## Continued Real-time Operational Intelligence

catastrophic issue occurs and preventing it from taking place.

### Predictive Knowledge and Action

Consider if a plant monitors a temperature, which exceeds the upper control limit and an alarm goes on. Traditionally, an operator would now react to the alarm. Analytics have made it possible to evolve from being reactionary to now predicting when the event will occur and taking steps in advance.

As an example, a food manufacturer can monitor the temperature data point, put an analytic on it and predict the temperature based on a statistical model. The company can push an alarm to an operator to ensure that action is taken faster, before a batch is ruined.

This applies to other industries as well, such as pharmaceutical with multi-million-dollar batches of product, as well as maintenance events on discrete equipment. The application of predictive knowledge, delivered as an intelligent alarm in a geo-aware context is far reaching and offers new possibilities for consistently optimized operations.

### Conclusion

Technology available today makes it possible to evolve from centralized control and masses of raw data in disparate systems. With Real-time Operational Intelligence, companies can use mobile devices combined with proven apps for the industrial environment that layer on top of existing systems.

RtOI leverages mobility, analytics and geo-awareness to deliver the right information to the right person at the right place and time. With advanced alarming, predictive notifications and geo-context, companies can speed response, lower costs, protect their brand and achieve peace of mind with actionable knowledge, anytime, anywhere.

### Web Visualization in a Single Environment

Gain timely and relevant cross-enterprise insights with GE's Proficy Vision software – a powerful operational dashboard that brings together web-based content from the Proficy portfolio and third-party web displays into one environment. That means one view of data from multiple systems at your fingertips – organized the way you want it, where and when you need it. Make better, faster decisions through increased operational visibility.



# Smarter – and on the Move!

Real-time Operational Intelligence improves operations by taking the data from your underlying systems and making it actionable. The actions don't happen in the control room, and RtOI frees operators, technicians, managers and engineers to be where they need to be, at the right time, and with the right information. As the following examples demonstrate, RtOI offers benefits across diverse industries.

## Case in Point: Food Industry Supplier Improves Quality with RtOI

### Challenges

- Lack of real-time data for production testing and diagnostics
- Inability to rationalize and visualize data
- High costs of data storage

### Financial and Operational Benefits

- Faster response and improved quality by monitoring key KPIs
- Lower warranty costs through improved system diagnostics
- Faster resolution of critical manufacturing alarms

### Results

- ▲ quality
- ▼ warranty costs
- ▼ downtime



Faster Response Across the Plant with RtOI

In the food industry, safety and economy are critical, and suppliers are being held more and more accountable to their customers and regulatory agencies. This industry supplier of edible and non-edible products has plants around the world and was looking for a new



When field  
reps must  
do more and  
train less...



Put the right information in the right hands.



imagination at work

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## Continued Smarter – and on the Move!

SCADA partner to improve production data availability.

Working with GE, the company developed a plan to gather data for on-line testing and diagnostics, along with low-cost data storage and visualization. With RtOI, operators can respond faster to manufacturing alarms – and have the right information at their fingertips to correct problems, anywhere, anytime.

By having information electronically transmitted, automatically captured, and inputted at the point of production using mobile devices, operators have increased efficiency and have more time for critical tasks. RtOI also means that operators can make the right decisions fast enough to reduce problems that occur.

With mobility, the company has a new way to run the plant without sacrificing traditional SCADA capabilities. Proficy Mobile makes it easy to

monitor key KPIs such as temperature, pressure and speed, helping to increase quality.

Additionally, with mobile system diagnostics, the company can achieve lower warranty costs – as well as less waste and improved brand protection for themselves, their customers and the extended food industry.

### Case in Point: Natural Gas Storage Goes Mobile to Help Meet Regulations

#### Challenges

- New Department of Transportation control room requirements
- Tight time limit for field work
- Inability to predict compressor issues and downtime
- Lack of operator collaboration across shifts



## Continued Smarter – and on the Move!

### Financial and Operational Benefits

- Ability to achieve compliance without increasing labor costs
- Higher operational reliability and less downtime
- Greater efficiency with improved collaboration
- Increased visibility through easy, flexible display of process data

### Results

- ↓ downtime
- ↑ efficiency
- ↓ costs associated with compliance

### Bringing mobility, collaboration and prediction into operators' hands with RtOI.

Like many in the natural gas industry, this gas storage company faced challenges with meeting Department of Transportation control room requirements. Among other issues, the company needed to ensure that an operator, known as a controller in this industry, would be available to monitor the control room – with a standard set at an absence of no more than 15 minutes. However, that 15-minute limit presented some problems.

As an example, consider when a compressor goes down. The control room operator gets an alarm and leaves the control room to check the compressor. The operator determines how to fix the com-

pressor and can do the repair – but the repair will take 30 minutes to complete, which exceeds the company's 15-minute limit. In this situation, the operator would have to call for a shift replacement in order to have the time away from the control room to fix the compressor. This means additional compressor downtime waiting for the shift replacement and additional cost.

### Mobile Intelligence and Control

With RtOI technology from GE, the gas storage company can provide operators with mobile intelligence and control, allowing them to leave the physical control room and instead take a powerful virtual control room with them.

Operators can receive alerts automatically using Proficy Mobile on an iPad with a Class I Div II enclosure that meets specifications. This provides a mobile solution that minimizes the need and cost for shift replacements and helps the company meet standards and regulations.

Additionally, this solution integrates with the company's legacy third-party HMI/SCADA system. It provides field support with geointelligence, combining knowledge with geographical location information. The team can pinpoint issues and know where to go – in real time.

Just like a GPS in a car provides directions, Proficy Mobile can

## Continued Smarter – and on the Move!

determine where an operator in the field should go and assist with getting there – as well as provide the step-by-step set of tasks to take upon arrival.

The software can also model and predict compressor issues as part of advanced alarming. Furthermore, with GE's Notes capability, the operators can enter notes from their mobile location and collaborate across shifts.

With this powerful set of capabilities, the company integrated RtOI into its Standard Operating Procedures – helping to meet federal regulations and improving day-to-day practices with faster response, less downtime and lower costs.

### Case in Point: OEM Uses RtOI to Create New Revenue Stream

#### Challenges

- High warranty costs
- Expensive engineering site visits for support
- Lack of real-time visibility into installed machines

#### Financial and Operational Benefits

- Improved visibility into end-user process data – with analytics to make it actionable

- Faster parts and service response time – with lower costs through remote support
- 24x7 digital process safety management
- Higher asset availability and improved capacity management

#### Results

- ↑ equipment efficiency
- ↓ costs through remote support
- ↓ energy and water usage
- ↑ asset availability



Insight to Improve End User Performance

For any OEM, end-user uptime is critical. In this OEM's industry – like many others – issues with uptime can have consumer safety and brand protection implications, making it even more important.

Recently, this international OEM turned to GE's RtOI solution to decrease

## Continued Smarter – and on the Move!

the company's high warranty costs and provide a way to warn against possible failures. The new system runs diagnostics against real-time performance data from its machines installed at remote end user facilities.

### Speeding Response to Service Calls

With predictive capabilities, the OEM can speed response to parts and service needs as well as provide significant remote support, decreasing the costs associated with on-site engineering visits. Asset availability has improved along with end user uptime.

In addition to monitoring availability and predicting failures, the GE software provides insight into how to improve end user performance – which this OEM has turned into a new revenue stream. Armed with real-time process intelligence, the OEM uses its engineering and industry expertise to improve end user system efficiency, decrease energy consumption, and minimize water usage. This is a win for the OEM and the end user customers.

### Case in Point: Water Treatment Plant Mobilizes Workforce to Increase Efficiency

#### Challenges

- Tight budget – with high municipal demands
- Need to facilitate remote field and plant assets

#### Financial and Operational Benefits

- More efficient operations – not tied to a physical station
- Greater accuracy in Predictive Maintenance, based on real-time data
- Visualization and control by role

#### Results

- ↑ operations efficiency
- ↓ equipment downtime
- ↑ faster response to maintenance issues
- ↓ time required for documentation to meet regulations

Day-to-day operations at a water treatment plant do not happen from the control room. Operators and supervisors must be able to leave their desk. However, while SCADA on a handheld device has made this easier, typical applications do not pull together underlying systems and deliver critical intelligence to drive action.

#### Critical Requirements, Little Budget

This medium-sized municipality, with a small core team, wanted to increase efficiency at its water treatment plants by mobilizing its workforce with the right information – but faced tight budget constraints. Working with a GE partner, the municipality was able to use a typical,

## Continued Smarter – and on the Move!

single-signature PO to implement an RtOI solution on iPads that integrates system instrumentation and controls with intelligent software.

Even with this modest investment, the benefits of RtOI can be significant – starting with consistent, efficient and accountable operations that help to lower costs, increase regulatory compliance and boost the utilization of aging municipal assets.

### Filtering Information

With RtOI, the team can filter through complex situations and sets of circumstances, managing the data from many sources and understanding what the next steps should be. Experienced operators can use the intuitive solution immediately while newer operators only require minimal training.

The municipality appreciates the easy interface and KPI display, since it faces imminent retirement of several key workers and has frequent turnover of its younger operators.

Proficy Mobile makes it easy to understand real-time and historized data – with analytics, alarming and task management capabilities guiding operators from being reactive to instead taking steps that are preventive – regardless of level of experience.

### Best Practices, Better Information Sharing

The solution's Notes capabilities allow for quick field documentation,



Dispatch Operators Based on Their Location

helping to meet regulatory requirements and Standard Operating Procedures, while facilitating information sharing across the team. With role-based displays, operators have access to control capabilities while managers are served only high-level views.

Additionally, new geo-intelligence allows the municipality to dispatch a field operator to take action based on a specific asset's

## Continued Smarter – and on the Move!

### The Right Actions, Every Time

Make every operator an expert with interactive, step-by-step instructions from GE's Proficy Workflow and Mobile Tasks. Guide operators through the right actions to reduce variation in performance. Capture the knowledge of your best operators, using an easy admin tool to digitize work processes. Interface with your CMMS for condition-based asset management, automatically moving from condition detected to work request to action. That means less downtime, maintenance, risk – and lower costs.



geographical location. The operator can know not only which asset, such as a pump, needs immediate attention but can also receive the alerts and notifications necessary to understand which specific component to address and the step-by-step tasks to complete. This intelligence significantly speeds response and allows for more consistent plant operations.

### KPIs on Demand

Furthermore, by using KPIs displayed on a simple, secure-by-design app built for consumer devices, plant managers can optimize the operations of the municipality's aging assets. They can also prioritize equipment replacement based on intelligent metrics, instead of age or other basic criteria.

While this municipality knew that RtOI was the right step to take, the team thought that budget constraints would make it impossible to implement. However, their modest investment has taken their operations to the leading edge of technology – and will continue to provide

returns for many years.

The case in point scenarios are based on customer interactions and GE expertise. Customer results will vary. Contact your local GE representative to value map RtOI in your organization and estimate benefits to secure project approval.



# Taking the Right Steps for RtOI

## Guidelines to Achieve Actionable Knowledge, Anytime, Anywhere

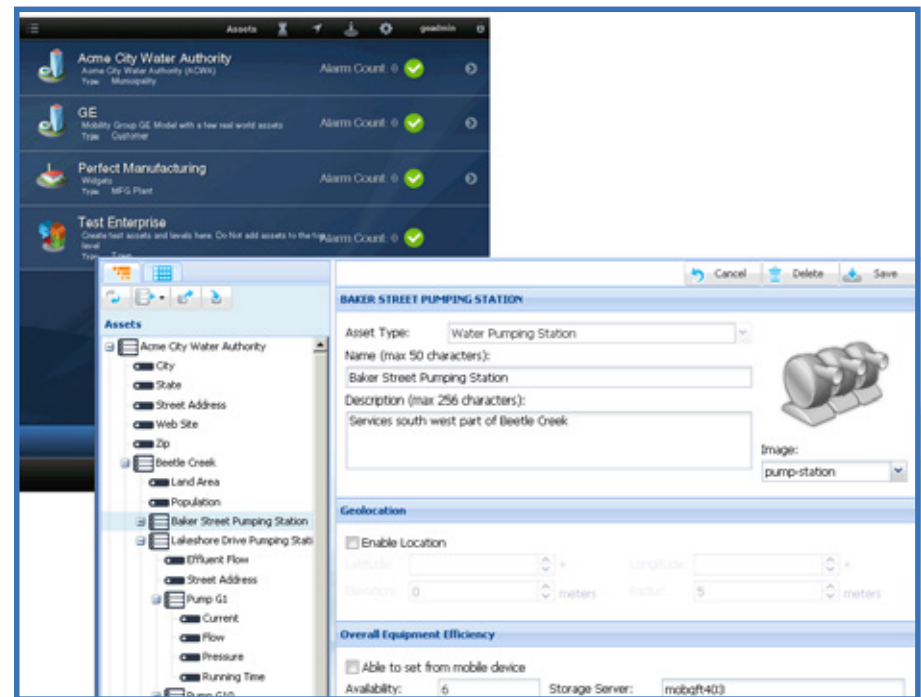
Real-time Operational Intelligence layers on top of existing plant systems to transform and mobilize intelligence. RtOI is much more than simply deploying existing SCADA tags and screens on a tablet or phone. Companies need to consider several steps to achieve the true value of RtOI and maximize the benefits of this new technology.

### Giving Structure to Data

RtOI brings users intelligence based on underlying plant systems. However, the data in these systems is largely unstructured. These existing systems have tag databases, flat files, images, and many other types of data, in many cases not associated with a particular physical asset.

The first step to achieve RtOI is to map data to a structured model, which brings data from the relevant underlying systems and starts transforming it. Looking at a physical asset in a CPG plant, for example, the team might have a mixer with many tags associated with the mixer but only identified by the facility's tag name structure.

With RtOI, an equipment model drives structured navigation. In this case, My Assets contains multiple physical locations, each building or manufacturing facility having different groups, then actual assets within groups. From this structure, users easily configure data to the



Using an Equipment Model Drives Structured Navigation

level of entry that makes sense.

In a water treatment plant, for example, an operator or engineer accessing from an iPad, could click on a pump and display the five

## Continued Taking the Right Steps for RtOI

pieces of relevant data associated with the pump - three pieces of data coming from the HMI/SCADA, one from the CMMS, and another from the historian.

The sources of the data are transparent to the user – and it is now all easily and intuitively associated with the piece of equipment.

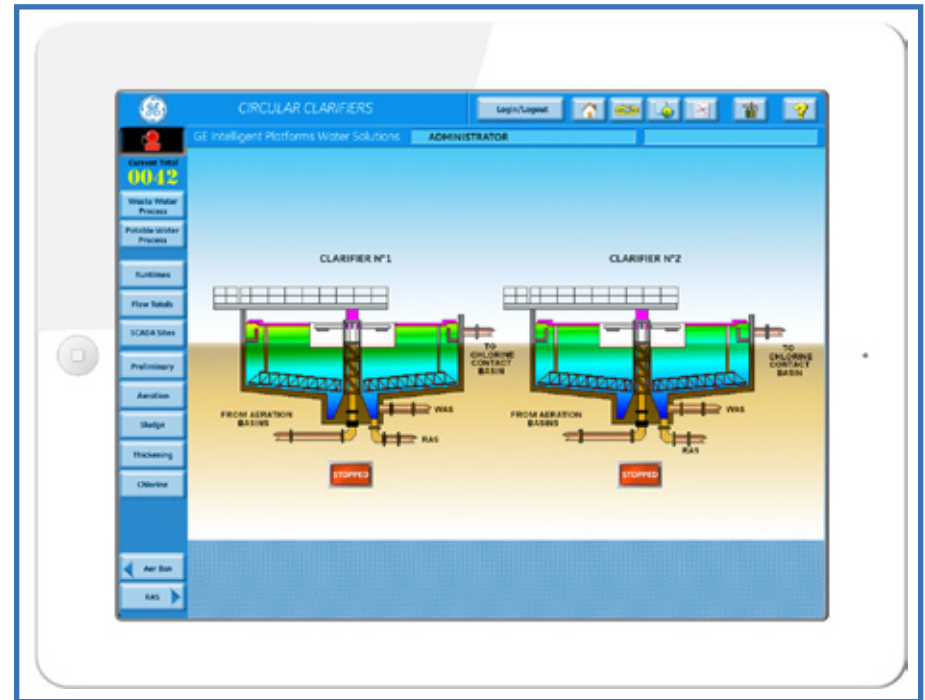
### Real-Time Operational Intelligence

1. Structured navigation based on the physical organization of assets
2. Alarms... to analytics... to action
3. Available anytime, anywhere – securely
4. Geo-intelligence
5. Simple pro-active analysis and integrated insight
6. Getting the right alarms – even in the context of location
7. Seamlessly transition to supervisory control and other systems
8. Fast implementation with no changes to existing systems

takes the relevant data from the underlying systems and provides a structure to it, so the data can become actionable information in a physical world.

### Delivering Context

Once the data is in a navigable structure, users can now easily apply analytics that create a context for action. A perfect example is applying analytics to alarms. Every industrial organization has a variety of alarms – and usually an overwhelming amount on a daily basis.



Seamlessly Move to SCADA and Other Systems

With a centralized advanced alarming platform, Real-time Operational Intelligence can apply the analytics to rationalize the alarms, taking away the noise, and only delivering the relevant alarms to the appropriate person by role – and based on location.

Operators, engineers and managers receive the right alarms in the context of the right piece of equipment. The cost- and time-



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today's  
metrics



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## Continued Taking the Right Steps for RtOI

savings are tremendous – with an estimated 20% or more increase in operator efficiency.

### Making Transitions Seamless to Drive Action

Now that a user has a navigable structure and analytics for context, the next step is driving the appropriate action. To lead a user to action, RtOI delivers seamless transitions back to the underlying systems such as SCADA, building



Secure-by-Design Implementations Make RtOI Possible

## Continued Taking the Right Steps for RtOI

management, work process management, or other systems. If an operator receives a critical alarm, the mobile device leads the user back to the right application to take action.

### Secure by Design

Lastly, companies must implement RtOI using secure-by-design methodologies. Users must maintain the confidentiality, integrity and availability of systems and data. With RtOI, users consider how to deliver information in a staged fashion, how to limit control, and how to expose data for accessing information, anytime, anywhere.

Fortunately, encryption technology and secure-by-design implementations have advanced in such a way that secured outside one- or

two-way connections are now possible. This is largely through the introduction of software agents that use the latest encryption methods to get data outside of the control and/or business network to a cloud server and a philosophy, which is about exposing data elements, not entire systems. There are proven technologies that enable iOS, Android, Windows RT, and BlackBerry apps to use encrypted communications to and from the content servers, hardware fiber isolation solutions that ensure plant data communications are always 100% outbound—all of which, if implemented correctly, can effectively minimize the exposure to malicious attacks and maximize the benefits of Real-time Operational Intelligence.

# Glossary

**Agent** – A software entity that is capable of acting with a degree of autonomy in order to complete tasks on behalf of its host – such as encrypted transport.

**Android** – A Linux-based, open-source operating system released by Google and designed for touchscreen mobile devices. Android is the world’s most widely used smartphone platform with 75% market share, 900 million devices activated as of May 2013 and 1.5 million activations per day.

**ANSI/ISA 18.2** – Standards for the “Management of Alarm Systems in the Process Industries.” Provides requirements and recommendations for alarm management lifecycle. A key principle of the standards is that an alarm is an event that requires a response from the operator.

**ANSI/ISA-95, or ISA-95** – Standards for the development of an automated interface between enterprise and control systems. Defines the Equipment hierarchy model used

for the definition of the asset relationships.

**FIPS 140-2** – The Federal Information Processing Standard (FIPS) Publication 140-2 is a security standard issued by the National Institute of Standards and Technology (NIST) to coordinate the requirements and standards for cryptography modules.

**Foursquare** – A social networking website for mobile devices. Users receive points for “check in” at nearby venues, based on their location.

**Geo-intelligence/ Geo-awareness** – Knowledge and awareness, respectively, in the context of a physical location.

**Gingerbread** – Name for Android Versions 2.3-2.3.2, released December 2010, and Versions 2.3.3-2.3.7, released February 2011 – used on nearly 40% of all Android-based devices.

**Ice Cream Sandwich** – Name for Android Version 4.0.x, released

December 2011 – used on nearly 30% of all Android-based devices.

**iOS** – A proprietary operating system released by Apple and designed for the company’s touchscreen mobile devices such as the iPhone, iPad and iPod touch. iOS is the second most widely used smartphone mobile operating system and is number one for mobile data usage with 61% of mobile data traffic.



# Glossary

**Jelly Bean** – Name for Android Version 4.1.x, released July 2012, and Version 4.2.x, released November 2012 – used on nearly 30% of all Android-based devices.

**Kerberos** – A computer network authentication protocol based on a Ticket Granting Service, allowing nodes to prove their identity in a secure manner.

**Phablet** – A smartphone with a screen ranging between 5.0-6.9 inches (12.7- 17.5 cm), combining a smartphone and tablet.

**RDP** – Remote Desktop Protocol is a Microsoft-proprietary protocol to connect a user with a graphical software interface to another computer over a network connection.

**RtOI** – Real-time Operational Intelligence is a platform for transforming operational and enterprise data from disparate underlying systems into actionable knowledge. RtOI delivers intelligence to users based on organizational context, geo-awareness, mobility, role filtering, and integrated analytics.

**Secure by design** – A software design methodology that prioritizes security best practices

due to the possibility of malicious attacks. **SSL** – Secure Sockets Layer is a security protocol that provides communications privacy over the Internet. The protocol allows client/server applications to communicate-by-design to prevent eavesdropping, tampering, or message forgery. SSL has been succeeded by Transport Layer Security (TLS).

**TLS** – Transport Layer Security is a cryptographic protocol for communications security over the Internet and the successor of Secure Sockets Layer (SSL). The protocol allows client/server applications to communicate-by-design to prevent eavesdropping and tampering. The client can indicate to the server that it wants to set up a TLS connection by using a different port number for TLS connections, such as Port 443.

**X.509 Certificates** – A security

device designed to bind a name to a public key value.

**Yelp** – An online local business directory service and review site. The name is a derivative of Yellow Pages.

