

# Harnessing the Potential of the Industrial Cloud

How Rockwell Automation is driving value into the industrial supply chain through design and deployment of low-risk, high-reward cloud solutions



## Executive Summary

Commercial technologies like cloud, mobility and big data are quickly migrating onto facility floors, and driving industrial companies towards an inflection point where their value proposition surpasses the complexities involved in implementing them. Recognizing the broad industrial potential afforded by this burgeoning technology, Rockwell Automation is spearheading the development of powerful software and analytic tools built on standard technologies and standard, unmodified Ethernet. These tools, combined with new service models delivered through a combination of unique solutions and standard off-the-shelf service and support options, are helping its customers move to the cloud.

By leveraging its deep domain expertise, worldwide reach and Windows Azure from Microsoft – one of the worlds’ largest and most secure cloud platforms – Rockwell Automation is engineering right-sized, business-driven cloud solutions that are configured for customers’ unique industry and market drivers.

LISTEN.  
THINK.  
SOLVE.

## The Growth Of The Cloud

Every cloud has a silver lining, or so the proverb goes. While the expression certainly wasn't intended to reference an enabling technology, companies increasingly are finding it rings true for cloud-based solutions. For industrial companies, cloud technology quickly has morphed from an elusive concept into a dynamic solution – one that reduces the operational costs associated with self-managed server farms and IT infrastructure, while delivering business value across the enterprise. Fundamentally, the cloud gives industrial companies the flexibility to subscribe to the level of service required at any point in time, rather than buying and maintaining resources based on future needs.

*Cloud computing is increasingly seen as a key transformative technology for industry. The cloud simplifies and speeds up implementations, provides a standard secure means of communications and data sharing, is readily scalable, and supports other transformative technologies such as mobile computing, Industrial Internet of Things, and analytics.*

Greg Gorbach,  
Vice President, ARC Advisory Group

Just as the cloud has helped revolutionize banking, telecommunications and back-office business services over the last decade, experts predict it will help catapult industrial automation into a new era of global interconnectivity and increased productivity. The transformation already is under way:

- Oil and gas companies are using cloud-based solutions to remotely monitor production and machine health at disparate locations to maximize uptime and increase output. Real-time analytics alert operators about the need for maintenance – before a shutdown.
- Food and beverage makers are using the cloud to capture and mine data from a multitude of machines to help them track and trace patterns of alarms and other production glitches. These companies have achieved optimized asset performance, minus the capital cost of owning, maintaining and managing more IT assets.
- Original equipment manufacturers (OEMs) are using wireless to capture and share vital diagnostic information with customers via the cloud, allowing optimal maintenance. The result is improved uptime and productivity for customers, and a competitive advantage for OEMs.

## Cloud Considerations And Benefits

Today, the working definition of cloud computing is summed up by the National Institute of Standards and Technology (NIST) as “a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”

Many industrial producers have had hesitations about embracing cloud technology, largely because of lingering concerns that they would be introducing more complexity and risk into their industrial architectures, without reaping substantial gains. The fact is, however, that the security and simplicity of the cloud has advanced along with the technology itself.

The move to cloud-based computing helps eliminate a significant portion of the risk by converting the infrastructure, cloud platform and software to managed services, offered in three forms: public, private or semi-private cloud. Depending on the type and sensitivity of the data an organization works with, it can consider deploying its own cloud infrastructure, and working with a third party on portions of the system as appropriate.

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Compared to security developed for a proprietary protocol, the ability to utilize standard, unmodified Internet Protocol (TCP/IP), such as EtherNet/IP, capitalizes on a much broader application engineering community focused on ensuring that data is fully protected as it flows from devices up into the cloud and back to the production site.

Rockwell Automation applies a defense-in-depth security approach addressing both internal and external security threats in every cloud project it designs and implements. This helps customers establish a common, secure environment to protect industrial systems and seamlessly link end-point devices – from a sensor on the plant floor to a mobile device in the field – with the enterprise.

### The Top Benefits of the Cloud

The practical, cost-efficient advances made possible by a cloud solution are byproducts of characteristics unique to this non-traditional IT platform. Cloud solutions will benefit industrial producers in several ways:

- **Cloud lowers total cost of ownership.** Cloud-based solutions virtually eliminate hardware and software infrastructure costs. In-house software maintenance costs are minimized as well. Through virtualized systems, system updates, revisions, the operating system and patches can all be managed through a service provider.
- **Cloud transforms a traditional capital expense into an operational line item.** Deploying an application, like remote monitoring of a critical asset, by purchasing everything – platform, software and support – as a service makes it easier to justify as part of an operations budget.
- **Cloud “elasticity” makes infinite processing power affordable.** An industrial producer can scale simply from one to thousands of assets and users while minimizing capital expenditures to support IT infrastructure. Multi-tenant access allows for a single instance of software, running in the cloud, to serve multiple client organizations. As a result, producers can give OEMs, customers and the supply chain customized access to a shared application at required levels of security, reliability and performance consistency.
- **Cloud computing shifts risk from the user to service providers.** By converting the infrastructure, cloud platform and software to managed services, producers are no longer responsible for deploying and maintaining systems. At significantly lower risk, the producer captures the value of cost-efficient cloud computing, plus the specialized, performance-enhancing domain expertise offered by a vendor-partner.
- **Cloud opens the door to better decision making.** The cloud makes it easy to monitor asset health and improve reliability by collecting data over time. This information can be used to create profiles and predict performance issues. What’s more, producers gain access to outcome-relevant data external to traditional production sources, such as energy costs and weather data, which can be used to optimize production. This new production intelligence can be used to enable new services and content-based business models based on actual, real time and historical access to the equipment, process and product data.

## Providing A Proven Path

Deploying a successful cloud solution requires a disciplined process. Rockwell Automation relies on experienced subject-matter experts, a broad portfolio of technology, and teaming with other industry-leaders such as Microsoft and Cisco to build right-sized solutions based on its customers' business goals. The proven methodology used by Rockwell Automation is delivered through a combination of unique solutions, and standard off-the-shelf service and support options. Rockwell Automation collaborates with industrial producers as they move to the cloud by helping determine 1) whether a cloud-enabled solution is the appropriate approach to answer the customer's need, and 2) the optimal way to deploy that solution, and drive quality and efficiency throughout the project.

Not all vendors have the expertise and capability to implement and support secure cloud-based systems. The following considerations can make it easy to find and select a best-in-class vendor:

- **Security.** No single product, technology or methodology can fully secure a control system network. Protecting industrial assets requires a defense-in-depth security approach that helps mitigate various types of security threats – both internal and external.
- **Expertise.** A best-in-class team provides experience in both designing and implementing cloud-based systems, along with deep domain expertise in a variety of industries.
- **Longevity.** A vendor that has been in business a long time is generally a good indicator of stability – and minimizes risk that the vendor will shift businesses or experience financial difficulties that could compromise your project.
- **Interconnectedness.** The connectivity and data accessibility achieved as industrial control systems become part of larger corporate networks and enterprise systems, works best when based on open architectures using the common networking technologies of Ethernet and Internet Protocol (TCP/IP) to facilitate interoperability with various other systems and applications.
- **Lifecycle management.** After your system is designed and implemented, it's important to protect your investment. Consider a vendor that can deliver value through your automation lifecycle. Services and support offerings such as remote monitoring, preventive maintenance, training, asset management and lifecycle extensions can help maximize your systems.

### Windows Azure

In the cloud, the Rockwell Automation defense-in-depth approach to security is fully augmented through the use of the Microsoft Windows Azure platform, which provides Rockwell Automation customers with robust cloud security and availability. Windows Azure's globally-distributed and redundant cloud environment provides defense-in-depth at multiple levels. Other benefits of a solution that leverage Azure include:

- On-demand computing, storage, networking and content delivery through Microsoft data centers around the world.
  - Advanced analytics and access to more valuable information delivered at a lower cost because production data is made available to a broader class of users once it is in the cloud.
  - Geographically dispersed data centers comply with key industry standards, such as ISO/IEC 27001:2005, for security and reliability.
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- 24/7 continuity achieved by data centers that are managed, monitored and administered by Microsoft operations staff who have years of experience in delivering the world's largest online services.
- In addition to data center, network and personnel security practices, Windows Azure incorporates security practices at the application and platform layers to enhance the safety of IP.

## Following A Proven Execution Model

### Step 1: Define Success

For Rockwell Automation, the first step in developing the best solution – with the least risk – is discovery. Upfront analysis involving stakeholders across the production enterprise helps create a comprehensive understanding of business and project goals. From these discussions, the project team documents the framework of the solution, always staying mindful of the need to support the customers' future state.

### Asking the Right Questions

In a typical manufacturing facility, a Rockwell Automation team will walk the floor and ask in-house engineers and operators a variety of questions during the discovery phase:

- What data is being moved throughout the various processes?
- What are the reporting needs for that data?
- Are you getting the information you need?
- Is it timely enough to make business decisions?

The most important outcome of a cloud-enabled solution is making relevant data quickly and easily accessible to the people who need it, from the plant floor, to maintenance, to the executive suite. Rockwell Automation accomplishes this by:

- **Understanding business rules and security requirements.** The team steeps itself in the specific rules and requirements needed to implement the solution.
- **Prioritizing data.** The team collaborates with IT specialists at the customer company to prioritize data, and make educated decisions on what and how much data should be pushed to the cloud platform. Armed with this knowledge, the team can determine how much server power will be required, and design a solution that manages data appropriately.
- **Collaborating cross-functionally.** The team deploys technical leads from various departments within the enterprise to establish common measures of success, and conducts weekly meetings with these stakeholders throughout the project to stay closely on course.
- **Identifying new opportunities.** The team seeks to uncover opportunities to implement cloud-enabled solutions that will offer new analytic capability to generate business insights, as well as helping define the potential benefits, including ROI or operational savings.

## Step 2: Define Functional Requirements

The next step after discovery is defining the functional requirements of implementing the cloud-based system. This includes documenting each of the decisions made during the discovery phase. In many cases, the Rockwell Automation project team implements a pilot project or smaller implementation during the requirements stage. This exercise creates a proof-of-concept before a larger scale deployment. In the case of the cloud, for example, an automotive manufacturer might want to pull data from an asset up into it. The team would start by connecting a handful of assets before completing the full-scale project.

The detailed up-front definition of requirements allows the team to create a comprehensive framework for the scale and goals of the project that can be easily translated into a system design and architecture, minimizing risk by helping ensure established goals are achieved with minimal rework throughout the process.

### Key Elements of a Requirements Document

- A successful requirements document must extend beyond a textual description of the system, and also should accomplish the following:
- Provide an outline of the overall goals of the project
- Provide high-level system architecture
- Specify line-by-line – based on the application – each identified requirement for the system, including security, business rules, user-interface requirements, data retention, etc.

## Step 3: Streamline implementation & testing

In traditional software implementations, the line between testing and deployment is well defined - programmers write code, run a build, test it, assess the results, fix the code, run it and continue the cycle. With the cloud, testing becomes a continuous part of the whole building and deployment process, with the customer involved throughout. Customers continuously see progress and informally test the application, rather than waiting for a build to be fully completed before testing begins. This involvement helps make users more familiar with the system, eases adoption of new applications and makes ongoing administration more natural.

The cloud allows systems to be installed without any facility-level downtime. During a traditional software installation, a new system must be physically rolled out on every single machine that needs to access it. This creates downtime for the plant and the process. But with a cloud installation, facility staff continue work as usual during installation – when they log into the cloud to access a dashboard or report, the changes are already incorporated.

### System support

The value Rockwell Automation provides customers doesn't end when the system is deployed and tested. Rockwell Automation helps industrial producers maximize their investment throughout the automation lifecycle. A global infrastructure of support centers and subject matter experts provide services and support – from turnkey remote monitoring and support enabled by the cloud, training facility managers to utilize new data analytics or providing technical support, and more.

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### Reaping the Benefits of a Proven Process

Clearly defining functional requirements up-front offers several benefits:

- **Reduced risk.** During the testing phase, the team knows exactly which scenarios need to be tested, reducing the risk of bugs or missing requirements later in the project.
- **Meeting all project goals.** With cloud systems, the testing phase may occur remotely, but a detailed, well-documented process helps ensure the project meets all requirements defined earlier.
- **Thorough testing.** During testing, the Rockwell Automation team numerically identifies all functional requirements so they can be individually traced, tracked and tested. Not only does this keep the team organized, but it means all scenarios and requirements documented earlier in the process are fully tested, and lower priority items are not overlooked.

### A Bright Future

In the coming years, cloud-based systems will give industrial companies expanded ability to perform analytics on the data that's already being collected, displayed and consolidated. Industrial companies will be far less concerned about what data is collected and stored, and much more focused on providing analytics-based decision making in their processes and employee practices for better decision-making at all levels. Strategies like refining the predictive business logic, the predictive event detection and the predictive exception reporting algorithms will enable producers to dramatically improve asset utilization, and reduce risk and cost for the operation.

Today, Rockwell Automation offers customers a suite of intelligence technologies and capabilities that provide the ability to crunch and compare multitudes of data points from various devices, revealing new business opportunities. Using this technology in tandem with the proven processes employed by Rockwell Automation domain experts, companies already are finding new ways of identifying product failure, controlling energy use with pinpoint accuracy and identifying risks before downtime events occur.

As industrial systems continue their journey to the cloud, companies will have the opportunity to further enhance production intelligence through insights gleaned from increased connectivity to remote data as well as data connectivity across plants, all while reducing infrastructure and support costs. Rockwell Automation is well-prepared to help customers make this shift and convert the vast amount of data made available through the cloud into useful information and knowledge. Its open-standards-based intelligence tools and proven process for implementing cloud solutions, when paired with an Integrated Architecture system built upon standard, unmodified Ethernet, creates future-proof, cloud-and-mobility enabled solutions that Rockwell Automation will continue to deliver to customers across industries.

### **Hilcorp Remotely Monitors Critical Assets via The Cloud**

Hilcorp Energy Company, which operates oil-drilling platforms off Alaska's rugged Kenai Peninsula recently upgraded its pump controls using medium-voltage drives, which are remotely managed by Virtual Support Engineer from Rockwell Automation. This standard off-the-shelf service helps ensure this critical piece of equipment operates within specified parameters.

- **Real-time monitoring speeds troubleshooting.** Data from Hilcorp's drives comes directly to a Rockwell Automation global support center via the cloud where it is analyzed in real time, 24/7/365. If an issue is detected, Rockwell Automation support engineers contact Hilcorp to report the problem and guide operators in resolving it.
- **Industry expertise provides peace of mind.** Rockwell Automation support centers are hubs of deep domain expertise that help fill in gaps in in-house knowledge and experience.
- **Data analysis reduces costs.** Rockwell Automation engineers not only aggregate and analyze historical data, but also develop additional algorithms and logic to help the oil producer deploy cost-saving, preventative maintenance programs to reduce the effects of future downtime.

### **M.G. Bryan Pioneers Cloud-Computing Asset Performance Management**

M.G. Bryan, a leading heavy-equipment and machinery supplier to the oil and gas industry, knew it needed a way to remotely monitor the performance of its trucks in real time, from anywhere. The company gained real-time visibility into remote-asset data with a unique cloud-based, remote asset management and fleet management system designed and implemented by domain experts at Rockwell Automation. M.G. Bryan's story demonstrates many of the industrial benefits that come with migrating to the cloud:

- **Monitoring asset health and improving reliability.** Remote dashboards detail the condition and process performance of an individual vehicle, as well as maintenance trends related to entire fleets.
- **Scalability with lower upfront overhead.** Fleet can grow from dozens to hundreds of assets/users with little-to-no additional IT capital expenditures
- **Multi-tenant access.** The OEM, its customers and vendors across the supply chain have access to specific content based on security permissions, enabling truck operators in the field to directly interact with suppliers
- **New services and content-based business models.** This enables proactive maintenance scheduling and more creativity with leasing options.
- **Minimized in-house software maintenance.** Remotely receive software updates and operating system (OS) patches
- **Competitive advantage.** M.G. Bryan has differentiated itself in this market because its innovative cloud approach reduces project risk and cost of ownership, while improving time-to-value

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