

LISTEN.  
THINK.  
SOLVE.®

# The Connected Enterprise

Bringing **people**, **processes**  
and **technology** together.



**Rockwell  
Automation**

 Allen-Bradley • Rockwell Software

# The **Internet of Things** and the future of industry

**The Internet of Things (IoT) is connecting the physical and virtual worlds. It has brought people, processes and equipment together, from sensors and smart devices to entire systems. Connectivity is deepening our understanding of events and sharpening decision-making.**

The proliferation of smarter end points, data analytics, scalable computing, mobility and visualization are reshaping the future of industrial automation. Around the world, forward-thinking companies and governments recognize the potential and understand the need for investment.

In the United States, the Smart Manufacturing Leadership Coalition has focused on implementing '21st Century Smart Manufacturing' best practices.

In Germany, the federal government developed Industrie 4.0 to help industries harness the intelligence generated by the IoT to optimize processes, increase efficiencies and spur innovation.

At Rockwell Automation, we share these visions and call it The Connected Enterprise, where seamless collaboration and integration enable you to use the power of real-time data to make better, more profitable business decisions.



# Introducing The Connected Enterprise

The Connected Enterprise consists of industrial operations that are intelligent, optimized, and secure. Central to achieving The Connected Enterprise is the convergence of information technology (IT) and operations technology (OT) into a single unified architecture to capitalize on operational, business and transactional data for improved enterprise, operations and supply chain performance.

As such, The Connected Enterprise leverages technology to better gather and analyze data, and transform it into actionable, real-time insightful information. It enables the connection of global operations to the enterprise and extended business systems, allowing for better collaboration, faster problem-solving and improved innovation.

Equipment and devices are transformed into intelligent assets capable of reporting a wealth of production information including diagnostics and energy. Having this knowledge enables faster and better business decisions that can help increase productivity, improve quality and help to meet demand more precisely and cost-effectively.

*"We often find that less effective legacy processes are in place that have not been designed to take advantage of the IT/OT convergence and the significant benefits available from The Connected Enterprise. We then help industrial companies establish a strategy that systematically, sequentially, and securely integrates the technologies, processes, and people."*

*Keith Nosbusch, Chairman and Chief Executive Officer,  
Rockwell Automation*



Introducing  
**The Connected Enterprise**  
Watch our short video...



# The **benefits** of The Connected Enterprise

*"The connection of people and processes via technology allows executives and their continuous-improvement teams to implement real-time dashboards and tools that boost productivity and profits."*

*Source: John Nesi, Vice-President, Market Development, Rockwell Automation*



The benefits of  
**The Connected Enterprise**  
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**Our Integrated Control and Information portfolio and solutions break down barriers, securely providing access to data that has traditionally been trapped in operations' historians and contextualizing it to provide the right intelligence to the right people.**

Actionable information is related to key performance indicators and improved business value, including production throughput, process quality, asset health and energy efficiency, and delivers true customer value.



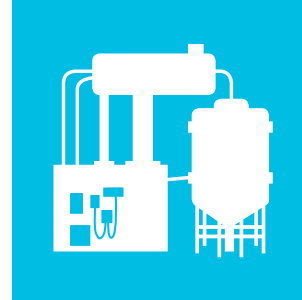
## **Faster time to market**

Design productivity, faster commissioning times with intelligent devices, quicker startup of Greenfields, proven technology around risk mitigation for operations and IT, and the agility to respond to customer trends more quickly.



## **Lower total cost of ownership**

Better life-cycle management, enabling more effective operations, improved energy management, and easier technology migration.



## **Improved asset utilization and optimization**

Improved reliability and quality, and predictive maintenance driven by operational intelligence tools.



## **Enterprise risk management**

Protection of intellectual property and brand image with a safe and secure operating environment, reduced exposure due to poor product quality and internal and external threats.

# 5 Stages to The Connected Enterprise



5 Stages to  
**The Connected Enterprise**  
*Watch our short video...*

**How do you move from discussing and theorizing  
The Connected Enterprise to rationalizing and operationalizing it?**

Achieving a connected enterprise involves driving the decisions and actions that bring together people, processes and technology. The Connected Enterprise Execution Model is based on five key stages. Ideally, each stage should be assessed, designed and implemented with the others in mind. However, you can initiate the process by entering the stage most appropriate for your organization and your unique needs.



## 1. ASSESSMENT

- Evaluate all aspects of your existing IT/OT infrastructure
- Examine legacy processes/workflows that haven't been designed to take advantage of IT/OT convergence



## 2. SECURE AND UPGRADE

- Securely update IT/OT network and control to modern, information-enabled technologies
- Deploy an IT/OT backbone that will deliver secure, adaptable connectivity from operations to enterprise business systems



## 3. WORKING DATA CAPITAL

- Define and organize available data in order to improve decision making
- Determine how to utilize data for improving business processes



## 4. ANALYTICS: OPERATIONAL BENEFITS

- Leverage predictive capabilities to improve planning and asset management, order execution and quality



## 5. OPTIMIZE AND COLLABORATE

- Create an environment that drives continuous improvement while improving collaboration within a site and across the enterprise, including suppliers and customers
- Securely increase visibility and access to assets, processes and subject matter experts for improved operations







## Stage 1 Assessment

Conducting a baseline assessment is a critical first step. Take into account an operation's current and future states, and consider goals regarding quality, downtime, productivity and overall equipment effectiveness (OEE), among other things. Identify key objectives, problems and metrics that need addressing, and examine where greater efficiencies can be sought.

*Areas of examination should include:*

### Information infrastructure

- Understanding how data is collected and later presented. Identifying potential shortfalls in data collection and distribution.

### Controls and devices

- Itemizing every connected device, down to sensor level that feeds or receives data. Updating or replacing those that don't fully integrate.

### Networks

- Rationalizing current networks and identifying numbers of integrated equipment and machines that communicate with each other. Assessing the level of communication between operations and business systems.

### Security

- Looking at current physical and electronic defenses, security policies and procedures, and levels of enforcement. Deciding on who has access to what data.

***"71% perceive their control systems threat level as moderate to severe, yet 24% have never performed a vulnerability assessment."***

**Source:** Control Engineering  
2014 Cyber Security report

### Looking ahead

*It's critical that the assessment process goes beyond what's happening now to also consider future operations. With The Connected Enterprise, it becomes easier to incorporate intelligent assets as they appear, and take advantage of mobility and remote capabilities. Data analytics are more predictive, and virtualization and cloud computing capabilities provide the scalability to address changing needs.*



**Assessment  
Cheatsheet**  
**Download it here...**





## Stage 2. Secure and Upgrade

As a result of the Assessment stage, weaknesses may be identified in the current networks and operations. Implementation plans and upgrades begin with a long-term view that contemplates facility expansions and new technologies. Essential to these upgrades is the establishment of an IT/OT backbone that will deliver secure, adaptable connectivity from operations to business systems.

**The Connected Enterprise** is built on a common network infrastructure using standard Internet and Ethernet protocols like EtherNet/IP (Common Industrial Protocol). This enables you to incorporate and take advantage of modern information-enabled control technologies, helping to enable secure, real-time information between equipment, systems and enterprises.

Connecting smarter assets means better control of your complex processes, helping to increase efficiency and performance. It can help to reduce downtime by replacing obsolete or hard to replace automation systems, and exposes data such as equipment status to analytic, visualization, and exception-based reporting. And, of course, you need to do this securely. Modern control systems, networks, and software can all help defend against security threats and risks.

*"Cisco and Rockwell Automation have been working on advanced security functionality appropriate for the industrial marketplace. We have a much more integrated approach."*

**Rick Esker**, Senior Director of the Industry Solution Group at Cisco

*"70% of companies have suffered a security breach in the last year, yet only 28% ranked security as a top five strategic priority."*

**Source:** 2014 Ponemon Institute survey



**Secure and Upgrade**  
Cheatsheet  
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## Stage 3

# Working Data Capital

The Connected Enterprise resolves the many problems that companies experience with their operational data. A key concern is being able to separate the 'good' data from the 'bad' data, or how to convert data into meaningful information. Manual reporting can be cumbersome to produce, prone to human error and may not provide information in the time required. Collaboration with other locations, suppliers and customers in the form of information sharing, may also be compromised.

The Connected Enterprise makes the best use of data, transforming it into actionable, insightful business information on which better decisions can be based.

- Extract good data and turn it into actionable information
- Move from manual reporting
- Connect siloed facilities, suppliers and customers

### **Information visibility means:**

- Improved ability to respond to changing customer needs and improved time-to-market
- Better management of workflows for more demand-driven production

- Deeper insight into supplier deliveries that can help improve inventory costs

An effective IT/OT infrastructure incorporates data from OT assets across the enterprise to deliver performance-critical contextualized information that can be used for real-time decision-making. Contextualized information helps to optimize life-cycle processes, that better respond to changing customer needs, better manage workflows and reduce inventory.

# 24%

The average annual improvement in Total Cost per Unit when leveraging the data that is available

Source: MESA

Sources of actionable data fed to key decision makers in an organization.



**Working Data Capital**  
Cheatsheet

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## Stage 4 **Analytics**

**Data and analytics are central to collaboration, improved decision-making and meeting customer needs more precisely. By analyzing real-time production data, hidden inefficiencies can be discovered, and changes implemented faster to improve productivity and product quality, and overall customer service.**

Data-based analytics can be viewed in real-time and can be monitored alongside other real-time data, and against historical performance data.

At an operational level, analytics will help to pinpoint the greatest needs for real-time information, and the data can be securely disseminated and presented across your organization using KPI dashboards.

Beyond providing crucial information on KPIs, such as quality, productivity, OEE and machine downtime, the data can be used by other enterprise systems such as ERP or BI for correlation with enterprise data and can help to inform and improve asset management

***“The IT/OT network has evolved into an ecosystem... it allows executives to optimize their global plant operations and achieve significant long-term savings via capital-avoidance. They can make better decisions on which plants produce which products, and when.”***

**Sujeet Chand**, Senior vice president and chief technical officer, Rockwell Automation



**Analytics**  
Cheatsheet  
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## Stage 5

# Optimize and Collaborate

**New IoT technologies incorporate powerful tools to help drive easier, more scalable and more flexible converged systems than ever before. These are enhanced by more scalable computing options on the edge of the plant and within the cloud.**

Within the enterprise, predictive capabilities emerge that make more efficient production planning and asset management possible, with timely and leveled order execution, improved quality and streamlined site-to-site performances, as well as improved vendor documentation for regulatory compliance.

Integration of operations with enterprise business systems with manufacturing execution systems help to drive and track consistent workflows, materials consumption and inventories, helping to ensure that the right parts are delivered to the right place at the right time.

Mobile devices on the plant floor give workers access to real-time production information such as Overall Equipment Effectiveness. Mobile devices can also provide valuable diagnostics data to maintenance personnel when a downtime event occurs, so they immediately know where a problem is happening, what the issue is and where they can get the tools they need to fix it. Mobile devices also offer a breadth of functionality that simplify tasks and help fewer staff to do more in less time.

From a wider perspective, remote, centrally located domain experts, both internal and external, can be leveraged across locations and companies, optimizing the entire enterprise by instantly sharing best practices and enlisting

# 82%

of companies using smart manufacturing have experienced increased efficiency, 49 percent experienced fewer product defects, and 45 percent experienced increased customer satisfaction

**Source:** ASQ 2014 Manufacturing Outlook Survey, American Society for Quality, Dec 2013

the knowledge base of the entire supply chain to address challenges in real-time. This environment of continuous improvement is critical to ensure that not only does the business optimize its operations right now but continues, through better visibility and processes, to improve decision making from plant floor to the boardroom in the future enabling the business to stay ahead of its competition.



**Collaboration**  
**Cheatsheet**

***Download it here...***



# Summary

**Every manufacturer and industrial operator will enter and progress through the stages of The Connected Enterprise Execution Model that is most appropriate for it, at a pace determined by its own needs, infrastructure, readiness, and resources.**

At Rockwell Automation we have worked with organizations that are in relatively advanced positions, are already leveraging their Working Data Capital and collaborating with suppliers. We also have worked with companies at the beginning of their IT/OT intelligence journeys. There are significant opportunities and profits for both.

Alongside new technology, the process is about creating a culture of continuous improvement. Success requires commitment from senior leadership, strategic investments, and collaboration with stakeholders. There is tremendous value at stake, and a careful assessment of your current state will be critical to realize the real value and reduce your risks along the way. Based on our own experience and codification of the five stages, organizations with which Rockwell Automation now works experience accelerated advancement via The Connected Enterprise Execution Model.

***To discuss how The Connected Enterprise can benefit your operations, call a Rockwell Automation sales office or [click here](#) for more information.***

