T15: Operational Excellence by Leveraging Internet of Things Technologies

Mike Hannah – Market Development
By 2020

1 billion new middle class consumers will add
$8T to consumer spending

Increased Demand on Industrial Production

GLOBAL POPULATION TRENDS INCREASE DEMAND FOR

- Manufacturing
- Resources
- Infrastructure

EMERGING MARKET CONSUMERISM

- 30% More Water
- 100% More Vehicles
- 80% More Steel
- 50% More Energy

RESOURCE PRODUCTIVITY INVESTMENT

- $1T Annually

Source: McKinsey
Internet of Things will help us improve the **standard of living** for everyone

**MORE productive sustainable**

- **Manufacturing**
  - Safer, more accessible food supply
  - More efficient wastewater treatment
  - Better energy management in production facilities

- **Resources**
  - Safer, more cost-effective mining
  - More affordable oil & gas production
  - More accurate & efficient emissions monitoring

- **Enhanced protection** from catastrophic production failures
  - More personalized pharmaceuticals
  - Less waste in production processes
THE CONNECTED ENTERPRISE

Optimized for Rapid Value Creation and Enabled by IoT Technologies
5 Drivers Fuel IoT Value

$19T VALUE AT STAKE

INDUSTRIAL Internet of Things

$3.9 Trillion

Asset Utilization
Employee Productivity
Supply Chain Logistics
Customer Experience
Innovation

SOURCE: CISCO
Enabling Technologies

INDUSTRIAL Internet of Things

- Machine to machine coordination – high speed
- Mission critical assets – safety
- Integrated Control and Information

Smart Things
Data Analytics
Scalable Computing/Cloud
Mobility
Security
The Connected Enterprise
The Industrial IoT at work for Industrial Applications

Contextualizing and analyzing data
Smart devices create more ‘things’ to be analyzed

Reliability, support, and disaster recovery
Shift from CapEx to Flexible & Scalable OpEx

Access to actionable information
Workforce is Mobile during typical work day
What’s the new care about?

Source: http://www-informationisbeautiful.net/visualizations/worlds-biggest-data-breaches-hacks/
What is more valuable than your own information?

“The very technologies that empower us to lead and create also empower individual criminal hackers, organized criminal groups, terrorist networks and other advanced nations to disrupt the critical infrastructure that is vital to our economy, commerce, public safety, and military,”

- the White House
The Connected Enterprise
Starts with Network Convergence

From Basic Connectivity…
...to a Critical Part of the Infrastructure

From Proprietary Standards…
...to Open Standards

From Disparate IT and OT Networks…
...to Converged, Secure and Collaborative Operations
IT-OT CONVERGENCE

Transactional information: orders, supply network, product design …

IT

Common Secure Network Infrastructure

OT

Real-time data: alarms, events, states, energy, diagnostics, …

ERP  FINANCIALS  HR  LOGISTICS  QUALITY  WAREHOUSE

CISCO

INDUSTRIAL “THINGS”  PLCs & SCANNERS  MATERIAL & TRANSPORT  MACHINES & TESTERS  SHOP FLOOR PERSONNEL  PRINTERS & LABEL SERVICES
IT/OT Convergence Drives Business Values

- Right Data/Right Time/Right Person
- Modern Optimization Techniques
  - Cameras in tanks, on machines
  - Video download of product changeover instructions
  - Audio/video for troubleshooting
  - Remote access & monitoring
  - Automatic ordering of consumables

Converged Plantwide Ethernet (CPwE) Architecture Connects Assets
Integrated Control and Information

Subscribe to my status updates.

My yield will meet today’s production needs.

Just plug me in! I am online and ready for configuration with the line. Here is my configuration.

Clean me next shift.

Industrial IoT Enhances The Connected Enterprise
Industrial IoT Application

Production Optimization: Global Food Company

- 5 Days of raw materials on-hand
- Oven Temp 350˚ F
- Recipe Stored can reuse
- Machine uptime: 92%
  - Batch ID: 4531980
- 80 psi drying range good
- 1100 kWh of energy used today
Delivering Operational Benefits

90% ON TIME

Top performers achieved 18% better on-time performance to NEW PRODUCT INTRODUCTION

LOWER Cycle & Change Over Times

16% INCREASE in annual financial improvements \( \times 2 \) better than average

Source: MESA Research

Quality Improvement
- Fewer product defects
- Upstream supplier activities

Flexible Operations
- Faster change over
- Performance increase

Information Anywhere
- Contextualized data
- Smarter, more productive

Protected Assets
- Safe & secure operations
- Protect Intellectual Properties

Connecting People, Process & Technology
The Connected Enterprise

**THE ROCKWELL AUTOMATION JOURNEY**

- **20 PLANTS**
- **200 PARTS AVG ORDER**
- **20 YEARS AVG PRODUCT LIFE**
- **387,000 SKUS**

**PRODUCT TYPES**
- Stock + Configure to Order
- Engineered to Order
The Connected Enterprise

Proven Results

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<th>LOWER COST</th>
<th>FASTER TIME TO MARKET</th>
<th>ENTERPRISE RISK</th>
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<tr>
<td>PLANT BEHAVIOR</td>
<td>SUPPLY CHAIN / LEAD TIMES</td>
<td>CUSTOMER SERVICE</td>
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<td>Inventory 120 days to 82 days</td>
<td>Delivery Mid-80s to 96%</td>
<td>Time to Want 82% to 98%</td>
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<td>CapEx 30% per year in capital avoidance</td>
<td>Lead Times Reduced 50%</td>
<td>Quality 50% reduction in PPM</td>
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Productivity ➤ 4% to 5% per year

T18 - Achieving Operational Excellence Through a Connected Enterprise
Room 210A 2:00 Wed & Thurs
The Connected Enterprise

CHALLENGES

Organizational Alignment
Competency, Talent
Technology Adoption
Data Security, Privacy
Interoperability Standards
The Connected Enterprise

EXECUTION MODEL

- Assessment
- Secure, Upgrade
- Working Data Capital
- Analytics
- Collaboration
Stage 1: Assessment

14% MANUFACTURERS in the US have completely INTEGRATED plant floor information to the enterprise

12% Have NO integration at all

Perceive their control systems threat level as moderate to severe

24% Have NEVER performed a vulnerability assessment

Increase VALUE and Reduce RISK
ASSESSMENT

PROTECTION against security breaches

VALIDATE network performance and reliability

DATA MANAGEMENT reconcile disparate data sources

FUTURE PROOF for expanded use & advancements in technology - CLOUD, MOBILITY, SECURITY

First step in developing the "BLUEPRINT" to a CONNECTED ENTERPRISE
Drilling Technology Company

Assess, Secure and Standardize network architectures

Performed security and network assessment – set the baseline
Developed and deployed an architecture inclusive of an IDMZ & secure remote access capability
Standardized multiple processing and production facilities

- Simplified technology migration
- Reduction in labor costs with secure remote access
- Authenticated access policy to identify and track user access and activities
- Centralized service to distribute virus signatures
Stage 2: Secure & Upgrade

Of companies SUFFERED a security breach in the last year

Yet… only **28%** ranked SECURITY as a top five strategic priority

Source: 2014 Ponemon Institute survey

13% ORGANIZATIONS that have implemented “Smart Manufacturing”

**DO:** 82% experienced improved EFFICIENCY in their operations

49% experienced fewer DEFECTS in their products

Source: 2013 American Society for Quality (ASQ) Survey

Threats will continue to evolve…is your architecture ready?
SECURE & UPGRADE
Automation and Networks

SINGLE, UNIFIED network technology for both OT and IT

PERFORMANCE INCREASE by replacing or isolating untrusted legacy systems

REDUCE DOWNTIME leveraging the data from smarter devices & systems

AUTHENTICATE, AUTHORIZE & ACCOUNT for who has access, and to what

Better protect assets by SECURING the all the way to the end points
"With more than 11 machines required for our production process, we need an integrated control architecture…"

Mike Williams, Director of Engineering, King’s Hawaiian
Stage 3: Working Data Capital – Define & Organize

BIG DATA

2 Exabytes

Manufacturing generates more BIG DATA than any other sector.

24% Average annual IMPROVEMENT in Total Cost per Unit for Top performers better than average

Source: MESA Research

Data is there, Are you using it to gain a COMPETITIVE ADVANTAGE?

Transform DATA into INFORMATION
WORKING DATA CAPITAL – DEFINE & ORGANIZE

**DELIVER** actionable information in real time to all levels of the business

**SHARE** data securely across global operations

**LEVERAGE** one of your greatest assets – your OWN data

**UNLEASH THE VALUE** of the stranded data from devices in and around operations
**Plantwide Visibility and Analytics**

Visibility into loss of production faults lead to root cause identification

Allows all to access EPA data

Oven temperatures accessed real-time

# of Re-coats reduced due to real-time alerts

>$300k/yr Eliminated by Contract Dispatch
Stage 4: Analytics – Operational Benefit Realization

80% Top performers achieved 10% higher overall equipment efficiency

14% Increase in annual Financial Improvements (5X BETTER than average)

60% Lack the necessary equipment connectivity to capture the data

30% Have NO integration at all

Source: MESA Research

Source: 2013 Industry Week Study

Transforming INFORMATION into KNOWLEDGE
ANALYTICS: OPERATIONAL BENEFIT REALIZATION

UNDERSTAND process performance in real time

RESPOND quickly to changes in the process

INCREASE uptime and reduce waste

Check Performance As If You Were There

Improve PRODUCTION EFFICIENCY and PRODUCT QUALITY
Improves Yield by 100,000 Pounds With Manufacturing Intelligence Strategy

Yield Improvement

0.10% or over 100,000 pounds of sausage = significant return in cost of goods sold

System ROI
Less than ONE YEAR
Stage 5: Collaboration

Anticipate activities throughout the ENTERPRISE and through the SUPPLY & DEMAND chain

LOWER
Customer Rejects & Returns

INCREASE
Supplier Incoming Quality (& Higher 1st Pass Yields)

KNOWLEDGE & EXPERIENCE will shrink significantly over the next 5 years

Leverage centrally located DOMAIN EXPERTS across operations, sharing best practices and enlisting the knowledge base of an entire supply chain

Transforming KNOWLEDGE into WISDOM
**COLLABORATION**

**IMPROVE** inventory by managing your supply chain
- right parts, right time, right place

**CONTROL BUDGET** by knowing the cost of goods produced - material, labor & energy

**REMOTE ACCESS** to PEOPLE, ASSETS and DATA in real time
- securely, anytime & anywhere

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**INNOVATION** that creates **ACTIONABLE INSIGHT**
Real-time Visibility to Remote Assets
Rockwell Automation now offers an exclusive opportunity to become a certified Cisco Industrial Networking Specialist.

- Achieve skills to install, maintain and troubleshoot industrial network systems
- Interpret design and drawings to recognize industrial topologies and access reference materials
- Help ensure network availability, reliability and cyber security

Visit the Solutions & Services booth for more information
THE CONNECTED ENTERPRISE

delivers transformational value in *productivity and global competitiveness*

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