



Smart Manufacturing & the Industrial Internet of Things (IIOT)

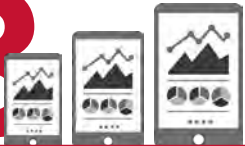
Beth Parkinson
Dir, Market Development
Rockwell Automation
In/elizabethparkinson
@EFParkinson

www.rockwellautomation.com/connectedenterprise

**Rockwell
Automation**

DIGITIZATION

50B



NUMBER OF
DEVICES ON THE
INTERNET BY 2020



SAFE &
COLLABORATIVE
ROBOTS



AI & MACHINE LEARNING
CPS, PREDICT FAILURES
AND REDUCE DOWNTIME

WEARABLES & MOBILE
DEVICES TRANSFORM
WORK FLOWS

OPPORTUNITY



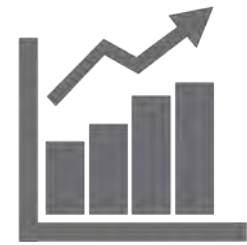
REDUCTION
IN CAPITAL
EXPENDITURES



IMPROVED
TIME TO
MARKET



REDUCTION
IN INVENTORY



IMPROVED
PRODUCTIVITY

Macro Trends and **PRESSURES**



Market

Global Competitiveness

Opportunities and challenges in changing global landscape

220,000 New engineers every year until 2022 to connect the unconnected

The World Bank Studies



Workforce

Talent Shortages & Skills Gap

Global challenge hiring and retaining

70% Suffered a security breach in the last year

2014 Ponemon Institute survey



Risks

Changing Risk Patterns

Highly publicized and expensive incidents worldwide



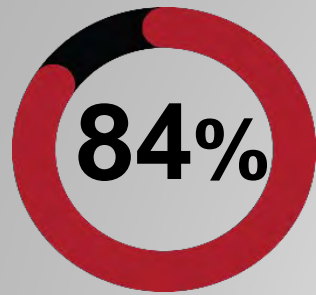
Technology

Industrial Internet of Things

IoT value at stake and growth of internet enabled assets

11% Of worlds economy in 2025 will be provided by IoT

McKinsey & Co 2015



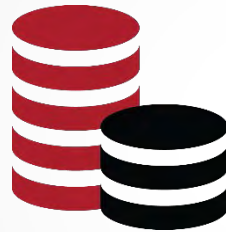
of Executives believe Internet of Things (IoT) will create new income streams for their operations



IoT will deliver:

87% long-term JOB growth

57% long-term REVENUE growth



46% saw improving productivity as the key benefit of IoT



Executives cited digital initiatives as a tool for growth, compared to 31% in 2014.

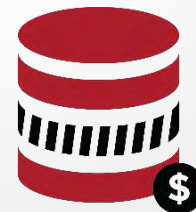


Leaders understand IoT?

38% fully understand it

57% some understanding

4% little at all



ONLY 7% have developed a comprehensive strategy

Industrial IoT Opportunity

\$4.6T

Economic Impact of
Industrial IoT by 2025

McKinsey & Co.

Asset Utilization

Employee Productivity

Supply Chain Logistics

Customer Experience

Innovation

35% MANUFACTURERS at early
adopter stage of IoT use case development

LNS Research

Business Risks & Drivers

Realizing Smart Manufacturing has become a business imperative

\$65B

Automation systems reaching end of life



SOURCE: ARC

~75%

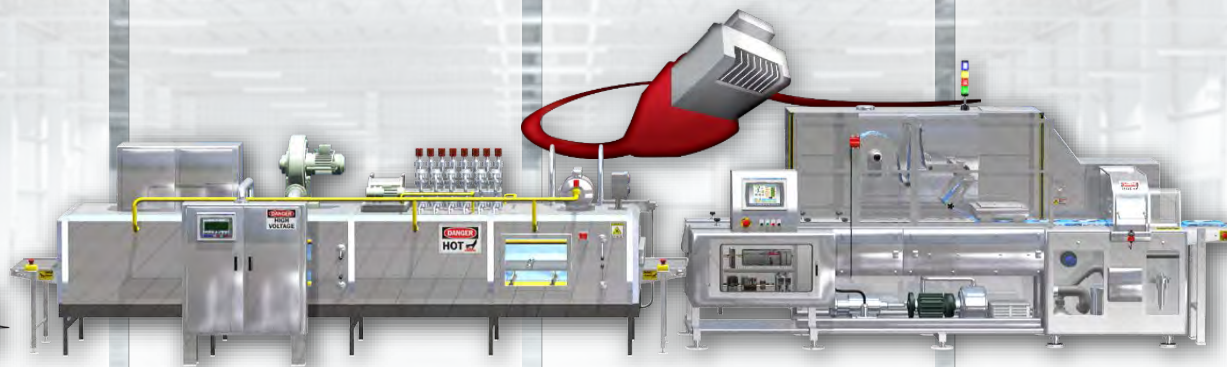
U.S. plants are more than 20 years old



SOURCE: Industry Week

\$20B

cost of unscheduled downtime



SOURCE: ARC

2 Exabytes

Big data generated in manufacturing

SOURCE: McKinsey

<14 %

US Plants completely integrated

SOURCE: Industry Week

21%

Suffered a loss of IP in the past year



SOURCE: Kapersky

SMART MANUFACTURING

- *Highly Responsive to Consumers*
- *Less Supply Chain Risk & Variability*
- *Disaster Forecasting & Recovery*
- *Inventory Reductions*
- *Production Efficiencies*

SUSTAINABLE



OPTIMIZED



DEMAND-DRIVEN





Faster Time to Market



Lower Total Cost of Ownership

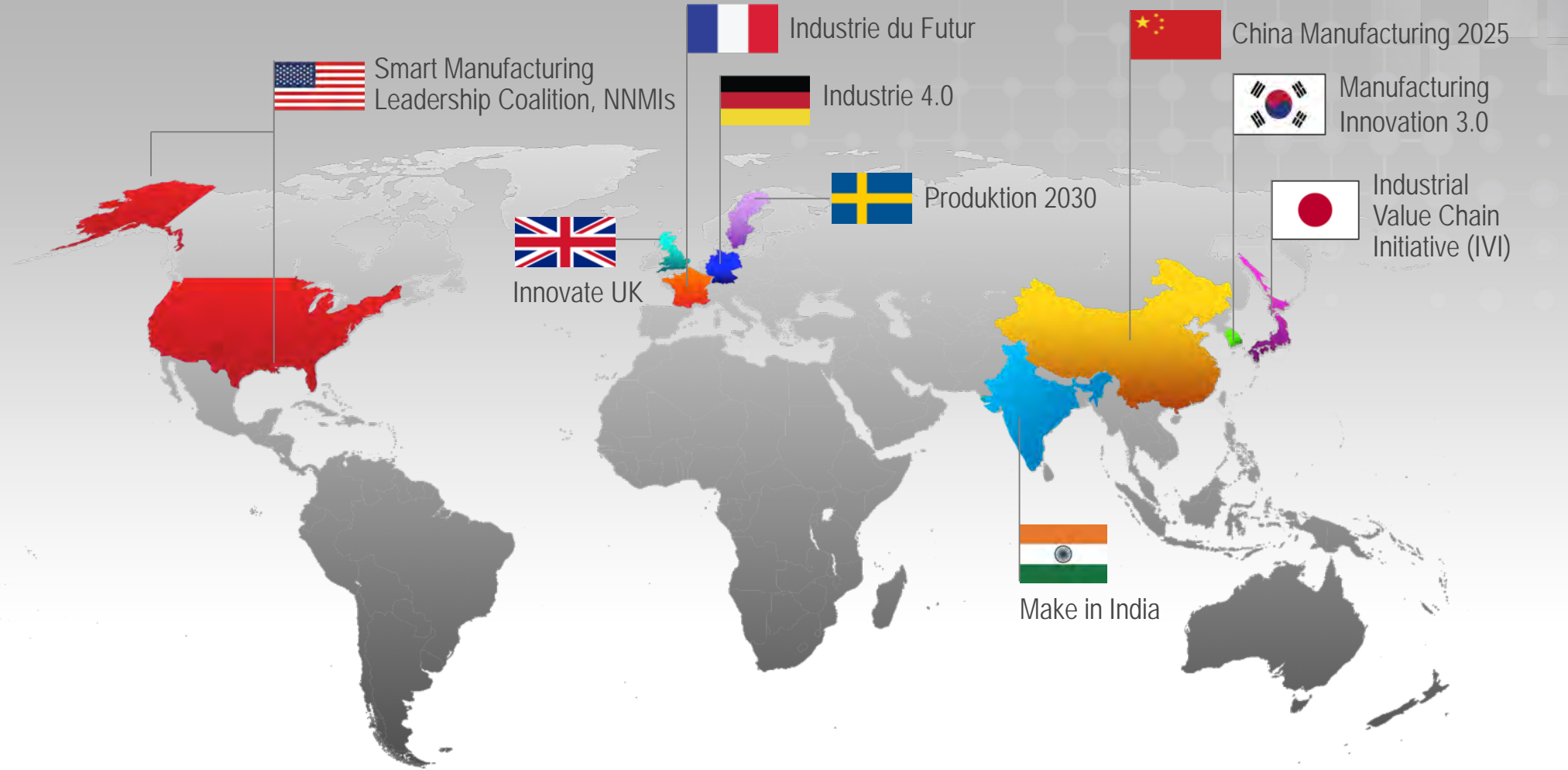


Improved Asset Utilization



Enterprise Risk Management

THE CONNECTED ENTERPRISE DELIVERS



INDUSTRY CONSORTIA



The Digital Thread

Design – Operate – Maintain – Innovate

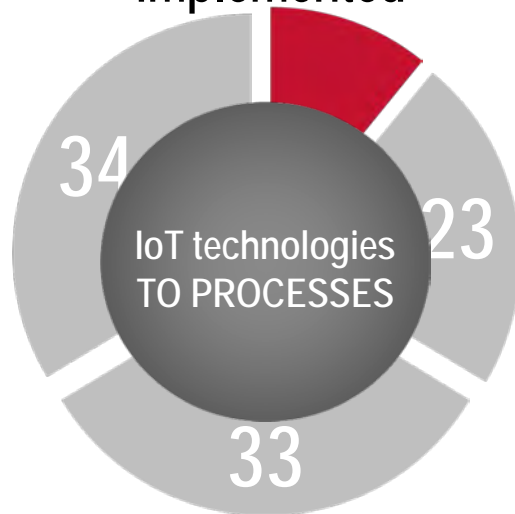


Is Your Company Ready?

ONLY 11%

Strategy in place –
implemented

*No plans to
develop strategy*



IoT technologies
TO PROCESSES

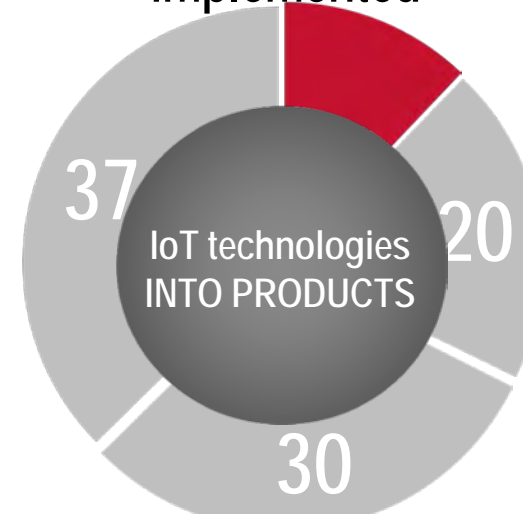
Strategy in place
– *not yet
implemented*

*Plan to
develop* strategy

ONLY 12%

Strategy in place –
implemented

*No plans to
develop strategy*



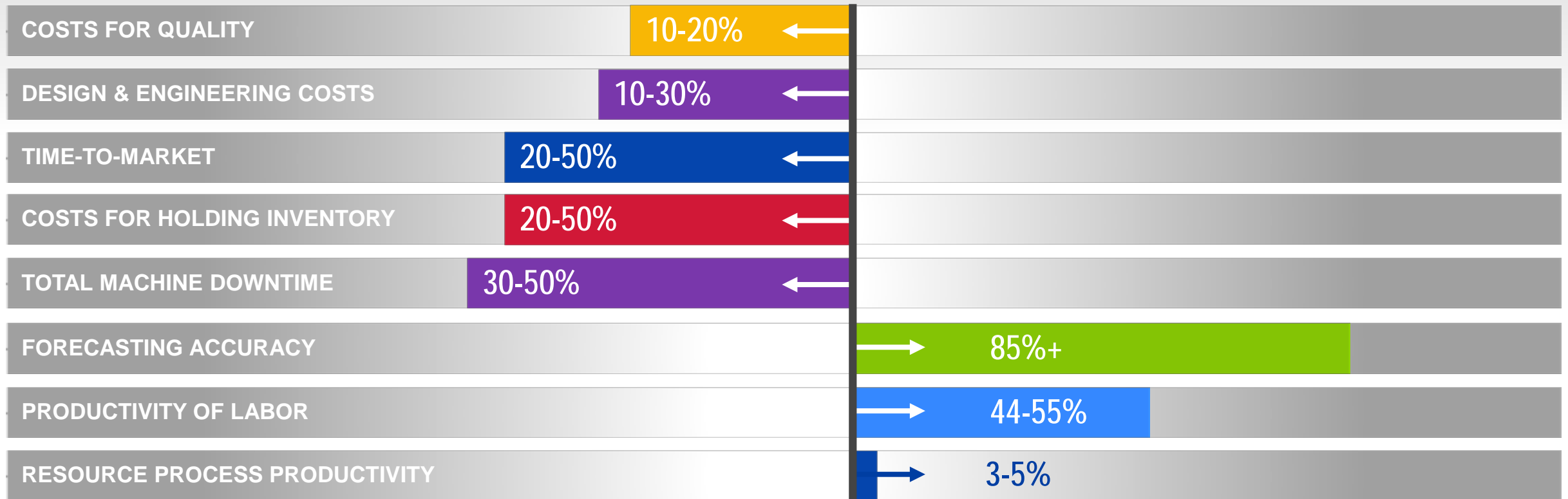
IoT technologies
INTO PRODUCTS

Strategy in place
– *not yet
implemented*

*Plan to
develop* strategy

DIGITAL OPPORTUNITIES

That Reduce Cost within Operations



SOURCE: McKinsey

The Connected Enterprise

CREATING HIGH-QUALITY PRODUCTS, BETTER, FASTER, AND MORE ECONOMICALLY THAN EVER BEFORE



OPERATIONS
STABILITY



SECURE
INFRASTRUCTURE



IMPROVE
PRODUCTION

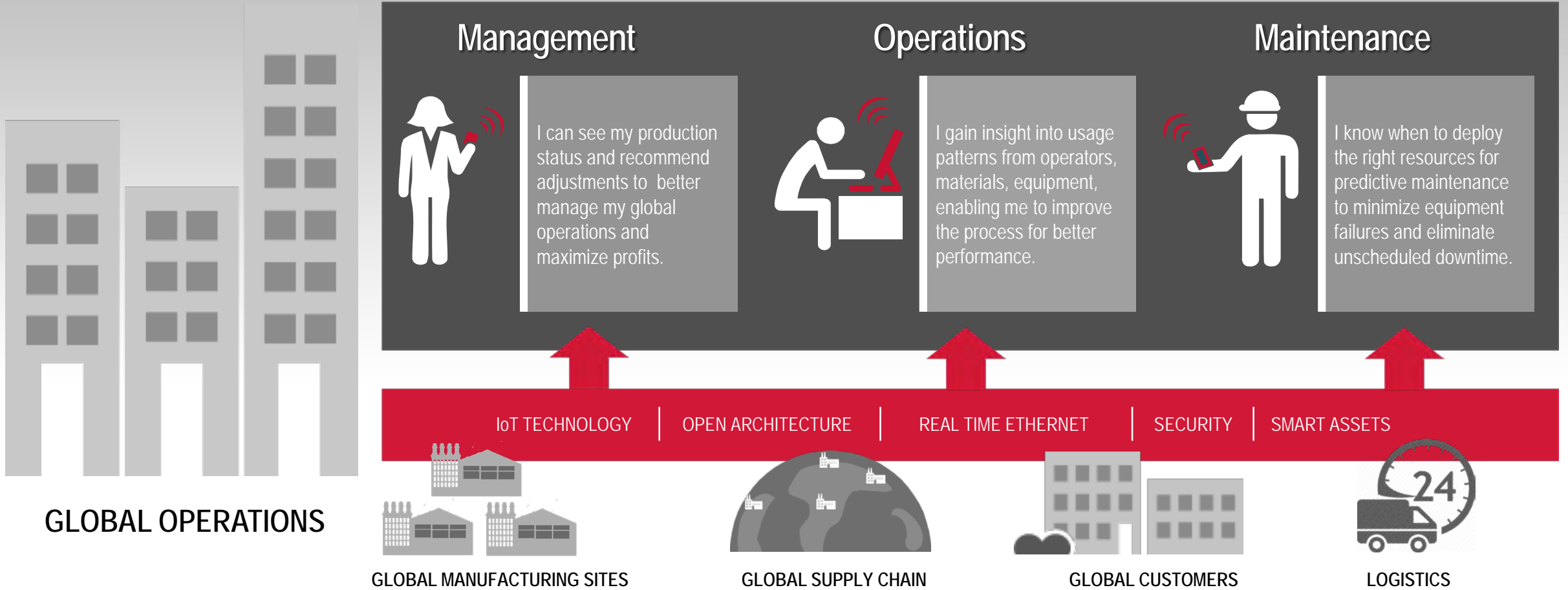


MAKE BETTER
DECISIONS

Improving processes, products, and business performance

The Connected Enterprise

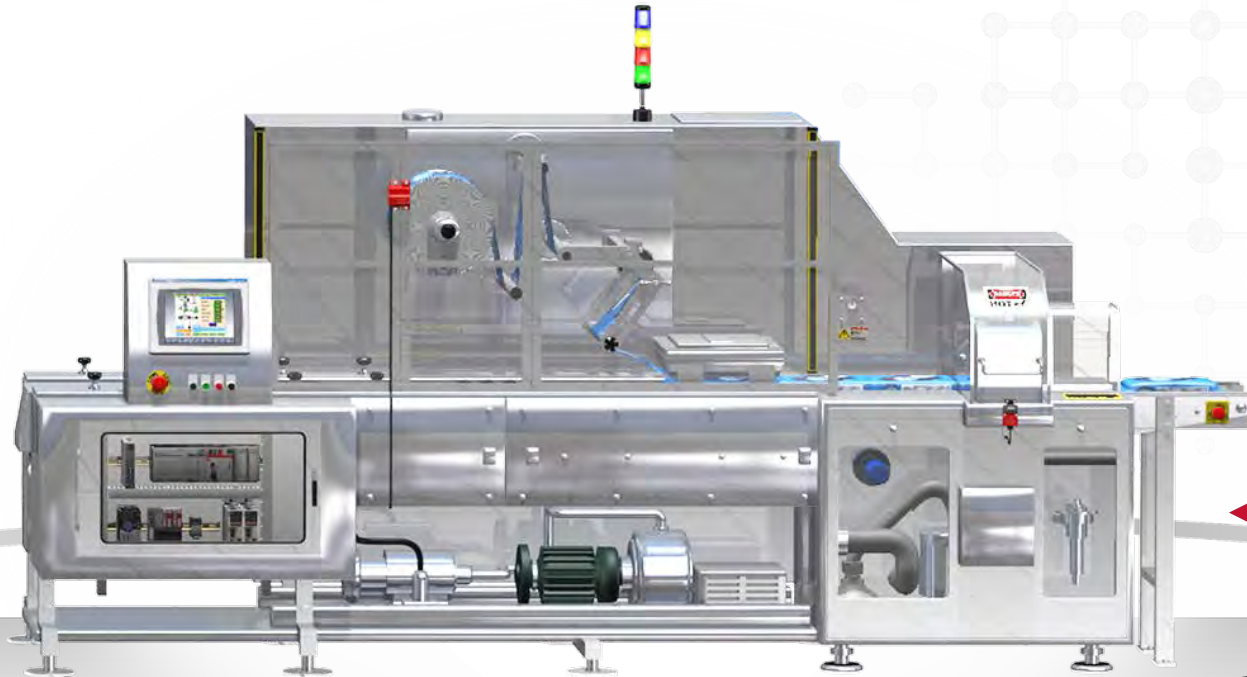
Highly Connected knowledge-enabled operations



Smarter Machines & Equipment

Real-time Data

Voltage, Kwh, Running Time,
Temperature



Information

CONTEXTUALIZATION
Energy/Product, OEE

Knowledge

ANALYTICS
Predict bearing will fail in 10 hours

Wisdom

OPTIMIZE
More efficient process workflows

Smarter Plants & Operations

TANK 1	TANK 2	TANK 3
SALT	EGG_POWDER	BAKING_SODA
998.4 kg	993.7 kg	994.6 kg

Yield will meet today's production needs

7100KWh of energy used today

ALERT
Maintenance
Line #1

Time to reach temperature is longer than normal



VISIBILITY

See deeper into operations and logistics, with new ways to link processes and facilities to suppliers and customers.



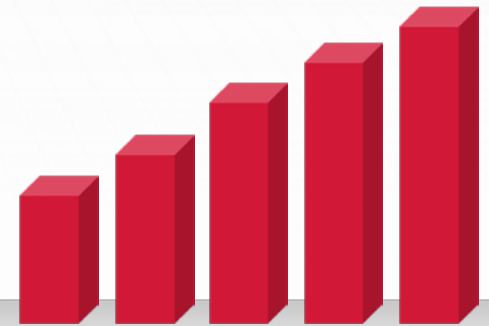
COLLABORATION

Between people, between teams and departments, and even between the machines themselves.



EFFICIENCY

Transform information into insight. Increase ROI, get to market faster, and dramatically reduce waste.



MODERNIZE



MOBILITY AND
VISUALIZATION



INFORMATION
MANAGEMENT &
ANALYTICS



SCALABLE
COMPUTING



MULTI-DISCIPLINE
CONTROL AND
INFORMATION



SECURE NETWORK
INFRASTRUCTURE

Business Systems – Transactional

ERP - MRP FINANCIALS HR LOGISTICS QUALITY CRM ...

IT

CONVERGENCE

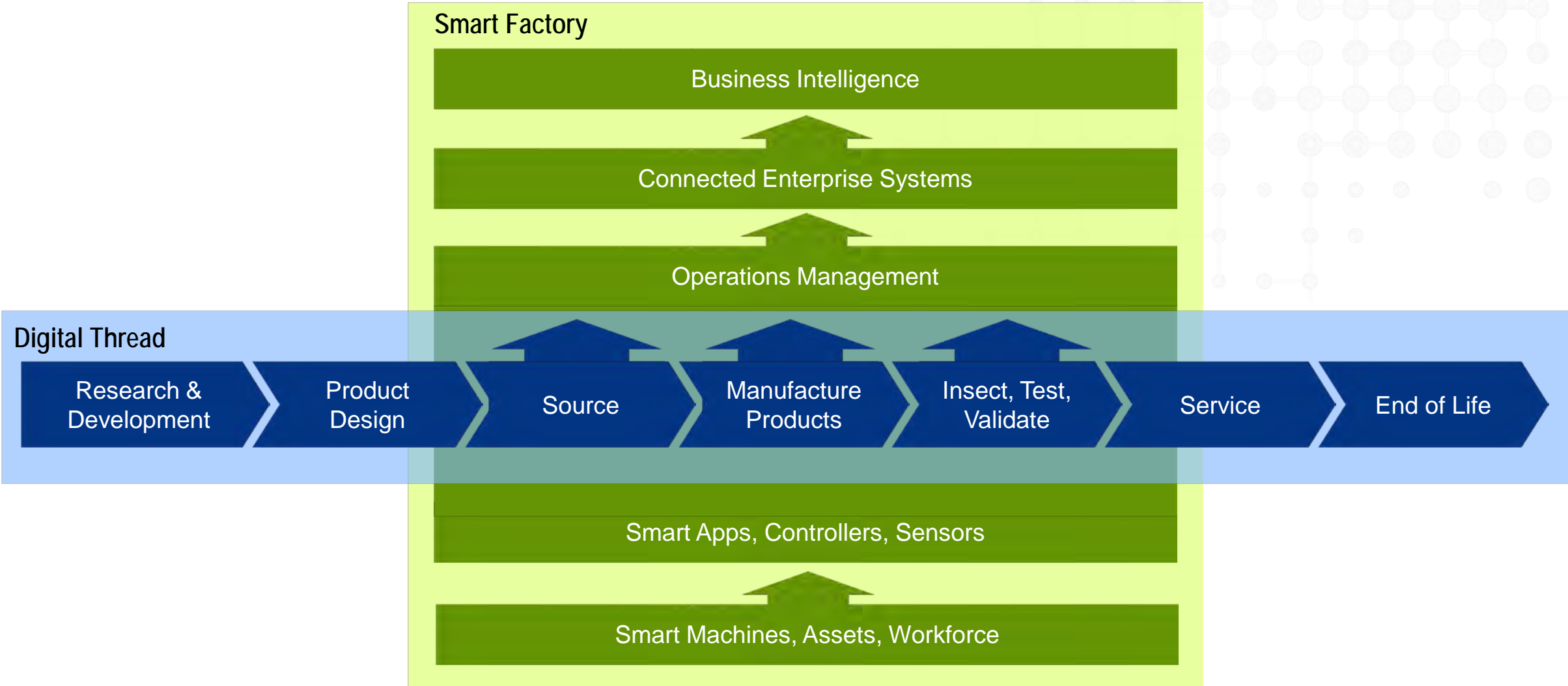


Operations - Real-time

SENSORS, ACTUATORS CONTROLLERS MATERIALS & TRANSPORT MACHINES & EQUIPMENT ...

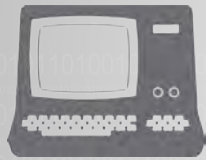
OT

Smarter Operations



Source: MESA Smart Manufacturing Working Group

CHALLENGE



ANTIQUAINTED
TECHNOLOGY

CORPORATE
MISALIGNMENT

TALENT
SHORTAGES

PERCEIVED LACK
OF ROI

76% Concerned about
NETWORK SECURITY

74% Concerned about
DATA PRIVACY

Business Drivers



GREATEST ROI IMPACT?



SMART
ASSETS



PREDICTIVE
EQUIPMENT



COMPLIANCE & LABOR/
CUSTOMER PROCESSES



OPERATIONS &
SUPPLY CHAIN VISIBILITY

The Connected Enterprise

Rockwell Automation Transformation

Inventory

120 days to 82 days

Delivery

Mid-80s to 96%

Time to Want

82% to 98%

CapEx

30% per year in capital avoidance

Lead Times

Reduced 50%

Quality

50% reduction in PPM

Productivity ▶ 4% to 5% per year

[Rockwell Automation Journey Video](#)

Real-time Prediction of Potential Failures

Monitor > Analyze > Predict > Optimize



Windows Azure

PREDICTING Failure Modes
Minimizes Unscheduled Downtime

Pump Fillage Optimization
IMPROVES Well Production

Real-Time Plant & Equipment Monitoring



Time	Tag Name	Description	Alert State	Action Type
2020/11/18 09:41:59	ESP_SUPPLY_TEMP_HIGH_100	EXPRESSOR SUPPLY TEMPERATURE HIGH (100)	Alert	Alert
2020/11/18 09:41:59	ESP_SUPPLY_TEMP_HIGH_100	EXPRESSOR SUPPLY TEMPERATURE HIGH (100)	Alert	Alert
2020/11/18 09:41:59	COND_TEMP_LOW_100	CONDENSER TEMPERATURE LOW (100)	Alert	Alert
2020/11/18 09:41:59	COND_TEMP_LOW_100	CONDENSER TEMPERATURE LOW (100)	Alert	Alert
2020/11/18 09:41:59	COND_TEMP_LOW_100	CONDENSER TEMPERATURE LOW (100)	Alert	Alert
2020/11/18 09:41:59	COND_TEMP_LOW_100	CONDENSER TEMPERATURE LOW (100)	Alert	Alert
2020/11/18 09:41:59	COND_TEMP_LOW_100	CONDENSER TEMPERATURE LOW (100)	Alert	Alert
2020/11/18 09:41:59	COND_TEMP_LOW_100	CONDENSER TEMPERATURE LOW (100)	Alert	Alert
2020/11/18 09:41:59	COND_TEMP_LOW_100	CONDENSER TEMPERATURE LOW (100)	Alert	Alert
2020/11/18 09:41:59	COND_TEMP_LOW_100	CONDENSER TEMPERATURE LOW (100)	Alert	Alert

Cloud storage of machine data for compliance and R&D



PlantPax

Brewing Capacity  25%

Time of Each Brew Cycle was **CUT IN HALF** 



Cut Raw Material Costs  by 5% Annually

VISIBILITY & INSIGHT

20 VARIETIES

 One Million Gallons of Water Saved (predicted)



Optimize Brews Real-time



PEPSICO



Tropicana



Offsite Advanced
Technologies
Support



OT Infrastructure as a Service (IaaS)

A subscription for plant network, virtual server instance and 24x7x365 infrastructure monitoring

24x7 Proactive Support

led to **90%** Reduction in Troubleshooting Time

Virtually Eliminating Network & Server Issues

ELIMINATED
100%
OF CAPEX



with Redundant Expandable Architecture and a Fully Managed Support Contract

Iron Pipe Manufacturer-Improved OEE

RESULTS



ALL OPERATORS, shifts and production modes can now be analyzed for Improvements in OEE



TIME in state reporting is in place to identify process delays



DOWNTIME events are tracked and reported (top 5 stop reasons), including drill-down capability for further analysis

Steel Producer – Energy Management

RESULTS



PROVIDES role-based, unified access to business and operations systems data



SYSTEM PULLS in over 3,000 points of energy data, allowing operators to adjust energy supply parameters based on production goals

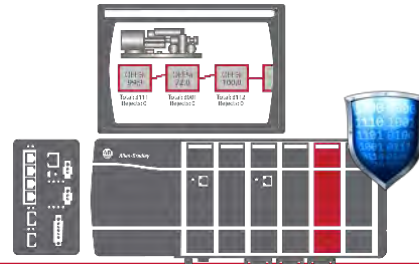


MANAGEMENT HAS ABILITY to review trends across the enterprise to optimize energy use for larger-scale savings

EXECUTION



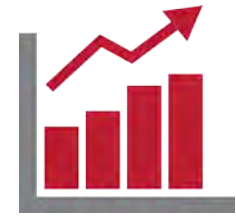
ASSESS &
PLAN



SECURE &
UPGRADE



DATA &
ANAYTICS



OPTIMIZE &
COLLABORATE

Assess and Plan

Develop the blueprint for success

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Information
infrastructure



Automation controls
and devices



Network
Infrastructure



Security
policies

75%

Plants in the US are
over 20 years old

Sources: Industry Week

>14%

US Manufacturers have
completely integrated plant
floor information to the
enterprise

Source: IndustryWeek

24%

have NEVER
performed an ICS
vulnerability
assessment

Source: Control Engineering 2014 Cyber Security report



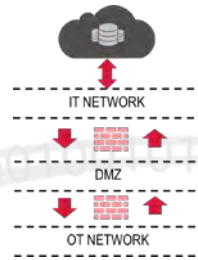
Secure and Upgrade

Technology & threats are evolving

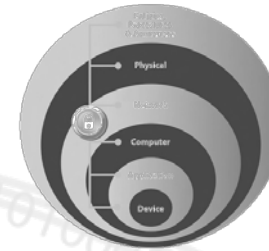
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Smart, Secure &
Safe Assets



IoT enabled
Infrastructure



Defense-in-Depth
approach

\$65B

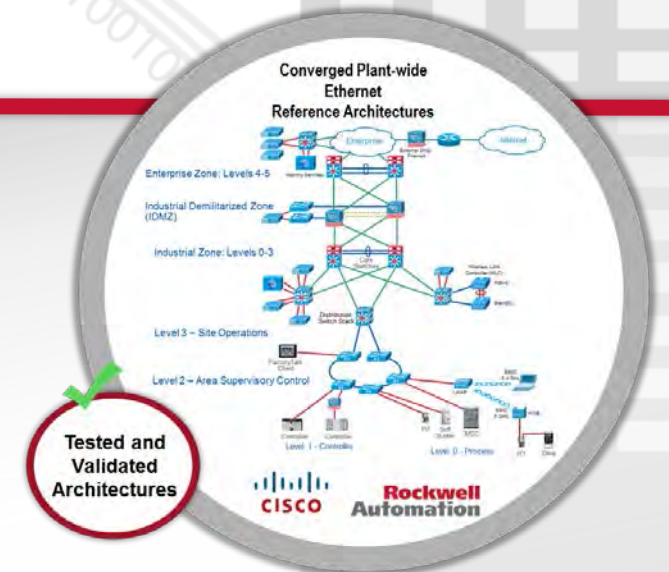
Automation systems
reaching end of life

Source: ARC

70%

of companies have suffered a security
breach in 2014, yet only **28%** rank
security as a top 5 strategic priority.

Source: 2014 Ponemon Institute survey

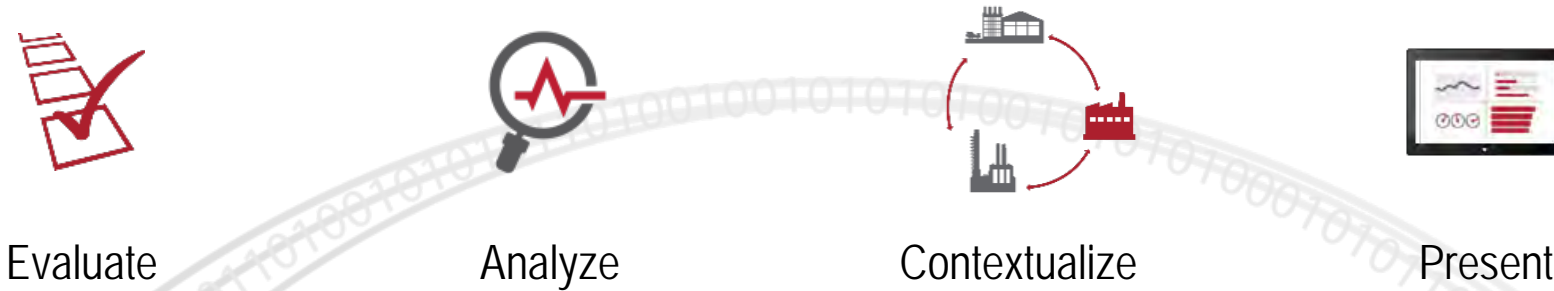


Tested and
Validated
Architectures

Data and Analytics

Information driving business improvements

Rockwell
Automation



24%

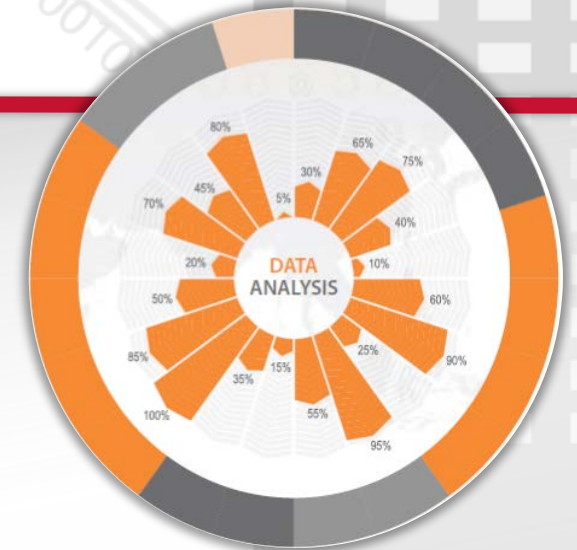
Average annual improvement in Total Cost per Unit

Source: MESA

40%

Reduction in maintenance costs & unplanned downtime cut in **HALF**

Sources: McKinsey & Co.



SCALABLE ANALYTICS



DEVICE

- Information from smart assets
- Third party device integration
- Machine/fleet management for remote assets



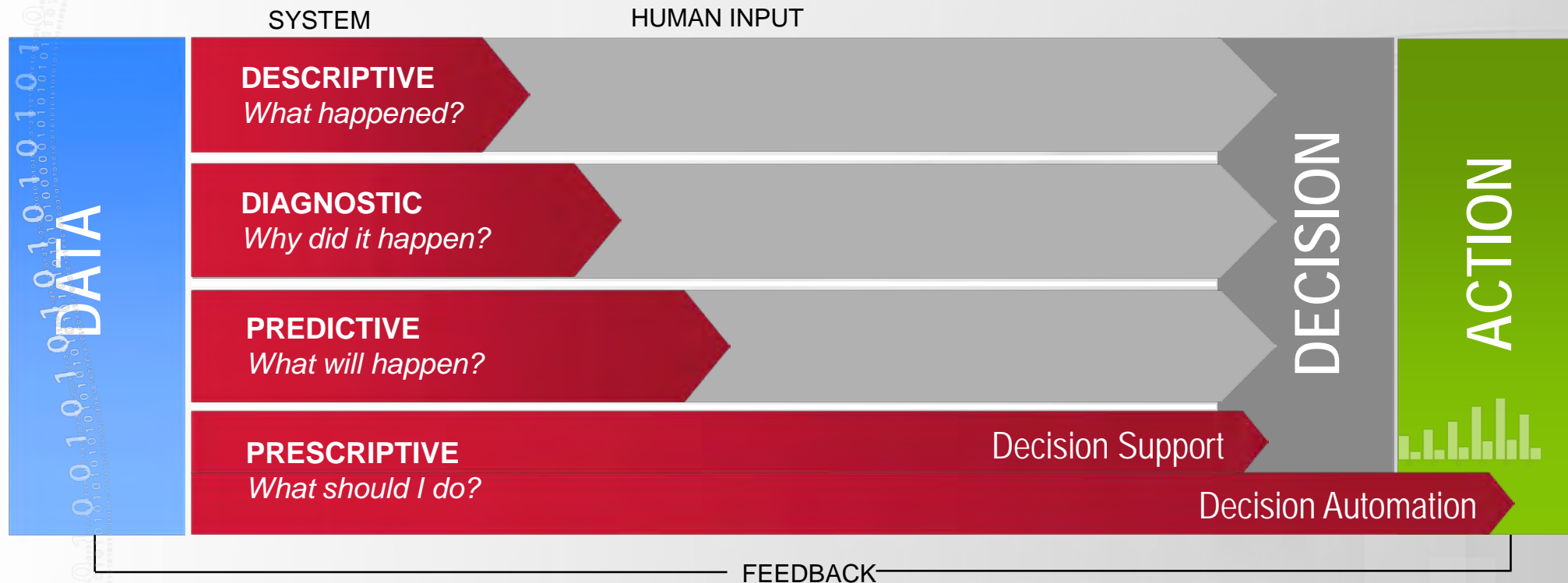
SYSTEM

- Real-time optimization of machines, processes & plants
- Predictive maintenance
- Abnormal system awareness & action



ENTERPRISE

- Site to site benchmarking
- Operational analytics
- Integration to/from business systems
- Data visualization & discovery



Optimize and Collaborate

Innovation creating insights to your operations

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Mobility



Scalable Compute
& Cloud



Remote Monitoring
& Support

80%

Top Performers OEE

10% higher than average

Source: MESA

1%

Data used from 30,000
sensors on a typical oil rig to
drive process improvements

Source: McKinsey & Co

\$20B

Cost of unscheduled
downtime

Source: ARC



TAKEAWAYS

- Senior Management Sponsorship
- Don't Underestimate the Culture Change
- Create a "Win" - Others Will Follow
- Must be Tied to Business Strategy
 - Not a Stand Alone Initiative
- Focus on Critical KPI's vs Data
- Never Ending Journey



The Connected Enterprise delivers transformational value in *productivity and global competitiveness*



Faster Time to Market



Lower Total Cost of Ownership



Improved Asset Utilization



Enterprise Risk Management



*Where are you innovating?
How are you gaining value for your customers?*

Industrial IoT

- | CONTEXTUALIZE
- | SECURE
- | ACTIONABLE



LISTEN.
THINK.
SOLVE.®

THE CONNECTED ENTERPRISE

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