ARC Advisory Group

Industrial Cybersecurity Conference 2018

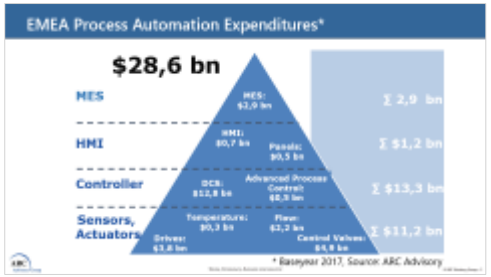
vision experience answers FOR INDUSTRY

"Digitalization – Risk or opportunity?»

Thomas Menze, Senior Consultant
September 21st, 2018

Dmitry Feshin,
ARC Advisory Group representation Russia and CIS

Программа презентации



- **ARC старт операций в России**
- **Рынок автоматизации**
- **Промышленная кибербезопасность сегодня**
- **Промышленная кибербезопасность завтра**
- **Кибер защита: взвесить риск, вероятность и воздействие**

ARC в России!

Serving Technology End Users & Owner/Operators...

Sample of Manufacturing Clients

Braskem, Chevron, Lilly, Saudi Aramco, ExxonMobil, EQUATE, SUMITO, Bapco, Dolphin Energy, Mitsubishi Chemical, bp, Nestlé, Dow, Petroleum Development Oman, ALCOA, Praxair, BASF, Idemitsu Kosan, SRS, Shell, Bayer, Owens Corning, TESORO, nexen, GM, Georgia-Pacific, 3M, Roche, HONDA The Power of Dreams

Sampling of Domain & Industry Expertise

Coverage by Domain

- Analytics and Machine Learning
- Asset Performance Management
- Digital Transformation
- Edge/Cloud
- Industrial Cybersecurity
- Industrial Internet of Things
- Machine Control and Safety
- Industrial Networks and Fieldbuses
- Operations Management
- Automation and Safety
- Product and Service Management
- Product Lifecycle Management
- Sensors, Transmitters, and Actuators
- Supply Chain and Logistics

Coverage by Industry

- Aerospace and Defense
- Automotive
- Chemical, Cement, and Glass
- Communications
- CPG, Food, and Beverage
- Electric Power and Smart Gri
- Heavy Machinery
- High-Tech
- Logistics and Transportation
- Mining and Metals
- Oil and Gas
- Pulp and Paper
- Smart Cities and Infrastructur
- Water and Wastewater

ARC Advisory Group

Customers Validate ARC's Value

"We at Dow feel ARC Advisory Group has the answers necessary to help us with our strategic decisions." — Dow

"The ARC Analyst Team, along with the STAR Selection Process, delivered specialized knowledge that assisted us in making the best possible decision in a strategic selection process." — Irving Pulp and Paper

"Craig Resnick, from ARC Advisory Group, gave a presentation at this year's Ignition Community Conference (ICC) on "Megatrends that Impact Industrial Automation". His insight into industry trends such as the Industrial Internet of Things, open automation systems, IT/OT convergence, and embedded intelligent devices for plant asset management, provided very valuable insight and perspective to our attendees. Inductive Automation has always appreciated the valuable information on our industry provided by ARC and we greatly appreciate Craig's willingness to come and share his knowledge with our Ignition community." — Inductive Automation

"ARC's Forum provides a great opportunity to network, along with interesting presentations about top notch topics." — BASF

ARC Market Research Calendar — August 2018

All studies are available as a PDF, PDF with Charts + Excel Workbook in WW, Regional, and Country Editions

Highlighted studies are recently published.

Enterprise, SCM & Plant Software	Current	'18	'19
3D Scanning Systems	11/16	Q4	
APC & On-line Optimization	8/18		
Asset Integrity Management	10/17	Q4	
Asset Performance Management (APM)	11/17		
Asset Reliability Management Systems	8/17		Q3
Batch Management Software	4/16	Q4	

Automation & Control	Current	'18	'19
Additive Manufacturing	5/18		
Alarm Management Systems	6/17	Q4	
Autonomous & Automated Guided Vehicles	11/17		
Automation Expenditures for Discrete	12/17	Q4	
Automation Expenditures for Process	1/18		Q1
Automation Services, Supplier-Provided	12/17		

ARC Market Research Calendar — August 2018

All studies are available as a PDF, PDF with Charts + Excel Workbook in WW, Regional, and Country Editions

Highlighted studies are recently published.

Motors, Drives, & Electrical Products	Current	'18	'19
AC Drives - Low Power	7/17		
AC Drives - High Power	12/17		
AC Drives - Low Voltage	6/18		
AC Drives - Medium Voltage	8/18		
Geared Motors	8/18		
Industrial UPS	10/17		
Low Voltage Control Gear	9/17		
Motors – Low Voltage (Integral HP)	12/17		
Motors – Medium Voltage (Integral HP)	5/18		
Servo Drives & Motors	3/18		
Sensors & Devices			
Absolute Linear & Rotary Position Encoders	6/18		
Control Valves	9/17	Q3	
Electro-chemical Analyzers	1/17		
Emissions Monitoring Systems	4/18		
Explosive Detectors		Q4	
Fire & Gas Detection Systems for Industry		Q4	
Flowmeters Total	8/17	Q4	
Coriolis, Magnetic, Ultrasonic, Vortex	8/17	Q3	
Force Sensors	2/17		
Gas Chromatography	11/17		
Humidity & Moisture Sensors	4/18		
Intelligent Pumps	12/17		
Level Devices			
Capacitance, Hydrostatic, Radar & Ultrasonic	7/18		
On-Off Valves	9/16	Q3	
Online Process Analyzers	7/18		
Photoelectric Sensors	6/18		
Pressure Transmitters	7/18		
Pressure Relief Valves	5/18		
Proximity Sensors	6/18		
RFID in Manufacturing	8/17	Q3	
Severe Service Valves	9/17		
Smart Sensors		Q4	
Temperature Transmitters	8/18		
Toxic and Combustible Gas Analyzers	1/16	Q3	
Valve Actuators		Q3	
Vibration Sensors	8/18		

Digital Oilfield	Current	'18	'19
Artificial Lift Optimization Systems	12/16	Q4	
Intelligent Pumps for the Digital Oilfields	5/17		
Leak Detection Systems	6/17	Q3	
Multiphase Flowmeters	7/17		
Oilfield Drilling Optimization	5/18		
Oilfield Operations Management Systems	12/16	Q4	
Pipeline Scheduling Software		Q3	
SCADA for Oil & Gas	10/17	Q3	
Subsea Controls		Q4	
Smart Cities & Smart Grid			
Access Control Systems for Buildings & Industry	12/17		
Building & Facilities Automation Expenditures	6/18		
Building Energy Management Systems	5/18		
Electric Vehicle Charging Stations		Q4	
Fire Alarm Systems for Buildings	1/18		
HVAC Control Systems	1/18		
Lighting Control Systems	2/18		
Microgrids		Q3	
Rail Signaling & Train Control Systems	10/17		
Rail Asset Management Systems	12/17		
Rail Rolling Stock	2/18		
SCADA for Power T&D	10/17		
SCADA for Water & Wastewater	2/17	Q4	
Smart Traffic Management	6/18		
Substation Automation	3/18		
Video Surveillance for Buildings & Industry	11/17		
Wireless Sensors for Buildings		Q4	
India Studies			
AC Drives - High Power	12/17		
AC Drives - Low Power	8/17		
AC Drives - Medium Voltage	9/17		
Control Valves	9/17	Q4	
Distributed Control Systems	10/17	Q4	
Flowmeters (Mag., Vortex, Coriolis, Ultrasonic)	10/17		
PLCs	9/17	Q4	
Pressure Transmitters	9/17		
Systems Integrators in India	9/15		
China Studies			
Control Valves	12/17	Q4	
DCS China	5/18		
PLC China	1/18		
Flowmeters		Q4	

ARC

Services for Technology Providers

Support of the strategic business planning – to keep one step ahead!

Market Research

00 Automation
nd Software
opics
Worldwide,
egional and
ountry
tudy Workbook
r easy access to
lobal market
atabase
ountry Analysis
eports

Marketing

- ARC offers a variety of Marketing Services
- White Papers
- ARCViews
- Case Studies
- Strategy Reports
- Custom Market Surveys .
- Promotion and event support for trade fairs and conferences
- ARC hosts its own WebWindow series.

Advisory Services

- keep you on top of the latest industry dynamics, enterprise applications, and plant systems.
- A low client to analyst ratio ensures quick direct access to those who are familiar with your business and the intelligence you need.

Industry Forums

- ARC hosts a number of forums and conferences around the world.
- Our events are the place to be for corporate executives to network with peers and gather industry intelligence to fine tune your strategic vision for the future.

Consulting Services

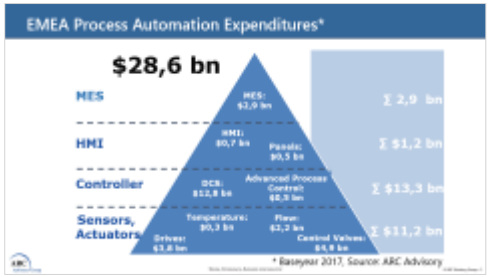
- For manufacturers, supply chain and technology providers and technology investors, our consultants provide the answers for your specific business and industry needs.
- New product introduction, due diligence, and developing a manufacturing and IT strategy.

l Their Hardware, Software, and Services Providers

Sample of Solution Providers

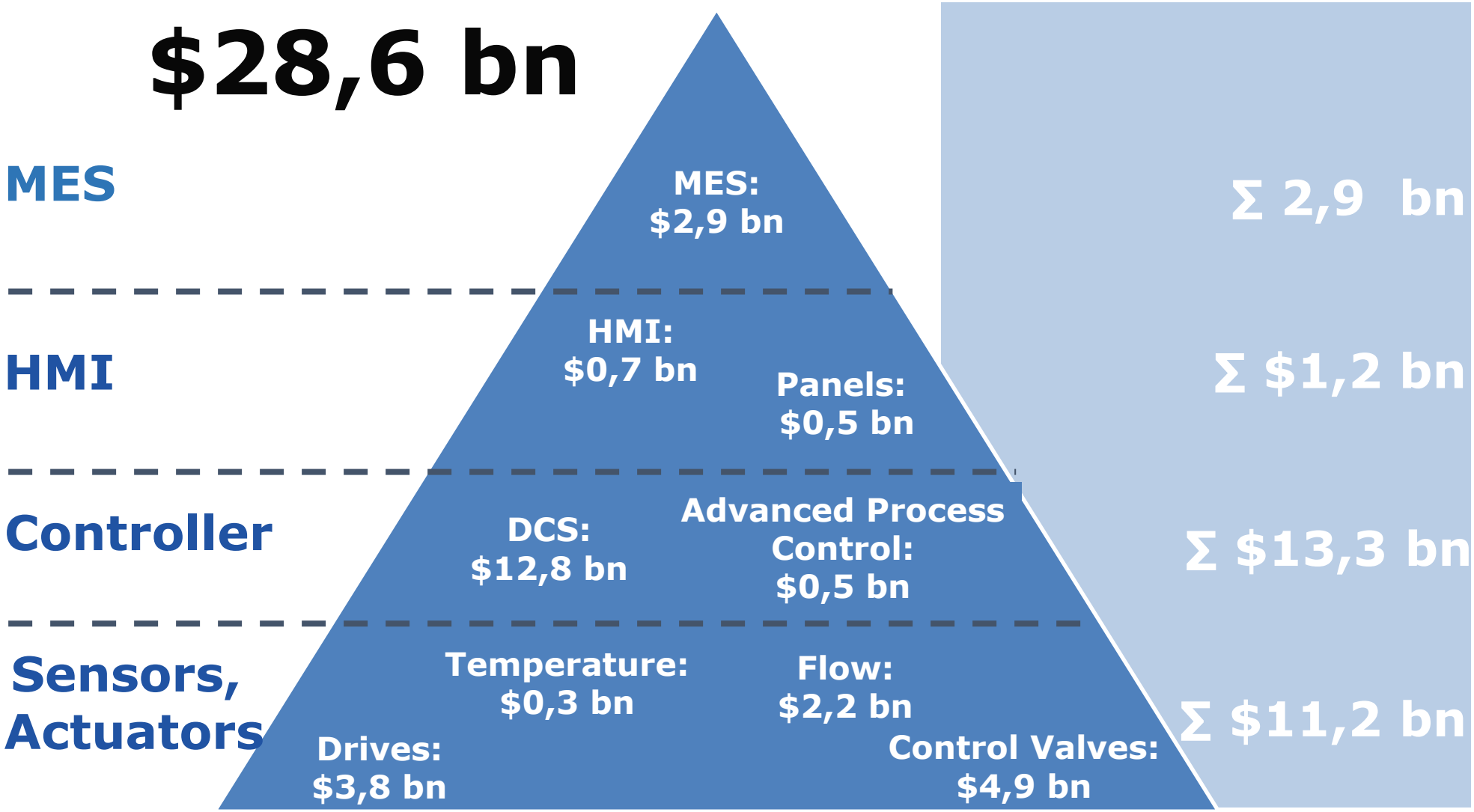
AT&T, Siemens, GE, Dassault Systemes, HighJump, Infosys, infor, Yokogawa, Microsoft, Mitsubishi Electric (Changes for the Better), Cisco, Bentley, Rockwell Automation, Oracle, Schneider Electric, Microsemi, TE connectivity, Fuji Electric, SAP, HSC Semiconductor, azbil, Seeq, Telit, Extreme networks, IBM, aspentech, Descartes, Manhattan Associates, Hitachi, Honeywell, Tata, Voith, Stratus Technologies

The Agenda



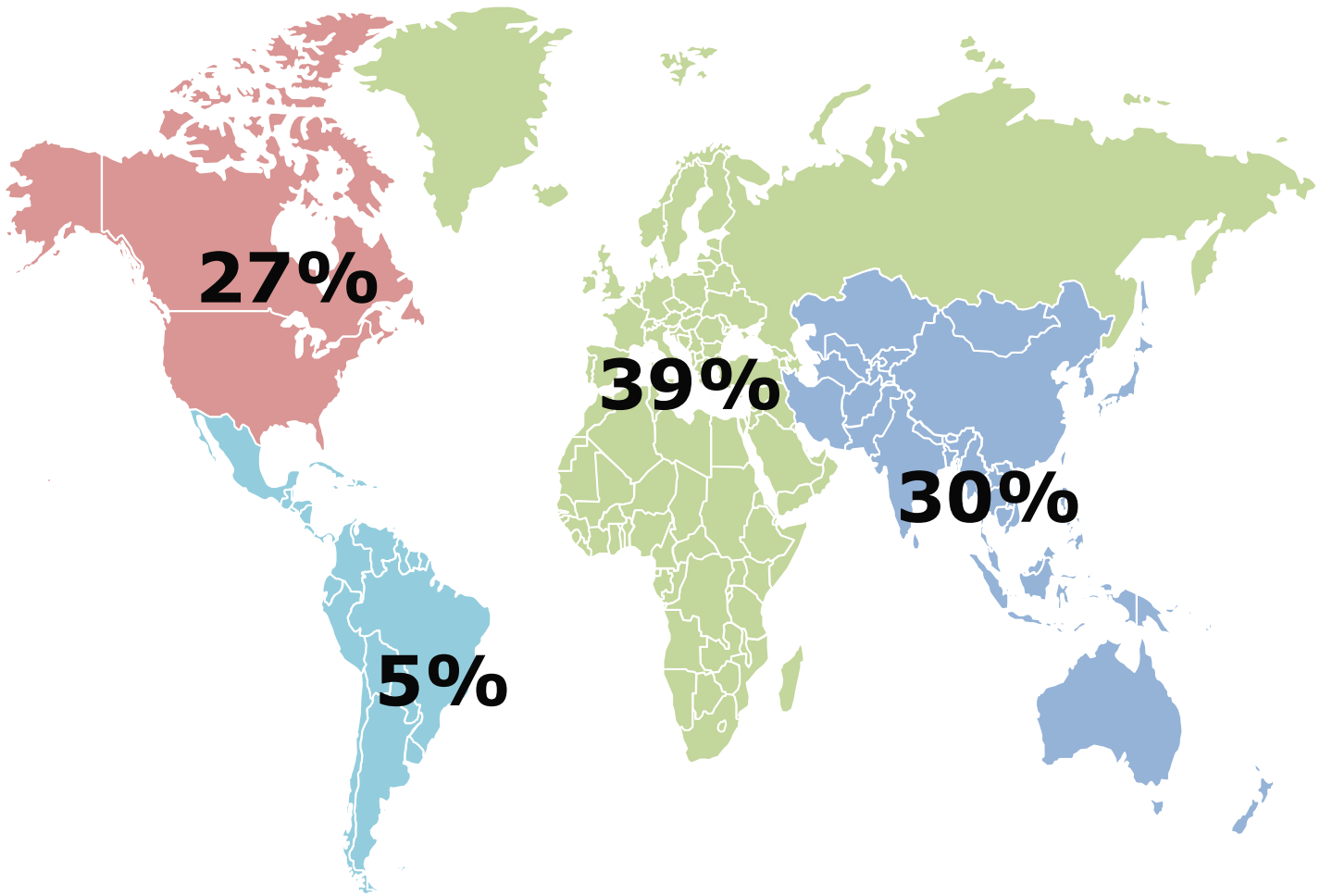
- **Process Automation Market**
- **Industrial Cyber Security Today**
- **Industrial Cyber Security Tomorrow**
- **Cyber Defense: Consider Risk , Probability and Impact**

EMEA Process Automation Expenditures*



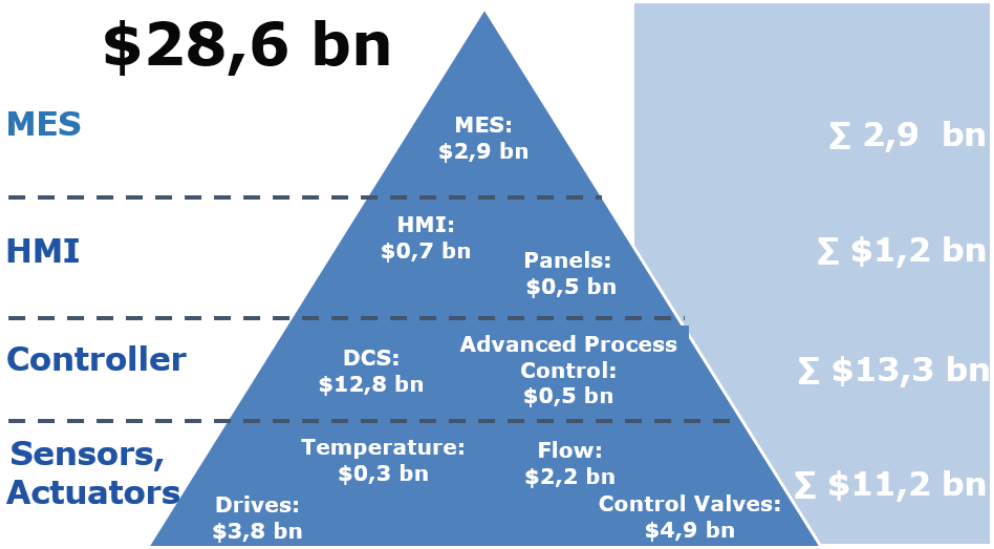
* Baseyear 2017, Source: ARC Advisory

EMEA Process Automation Expenditures



© ARC Advisory Group • 6

EMEA Process Automation Expenditures



EMEA Ratio in 2017:

Investments in Cyber Security* = **$853 mn** / **Process Expenditures** = **$28,6 bn** = **2,98%**

* Cyber Security Expenditures: Endpoint, + Anomaly + Services

© ARC Advisory Group • 7

Secure Plants Require a Proper Strategy

Technology Investments are Not Enough

This is NOT an Effective Defense!

This IS!

Inventory Assets
- Endpoints (PC and Non-PC)
- Networks and Interfaces

Evaluate Risks
- Likelihood & Impact
- All kinds of attacks

Select Defenses
- Applicability of Technology
- Effectiveness for Risks of Concern

Implement
- Sequence
- Readiness

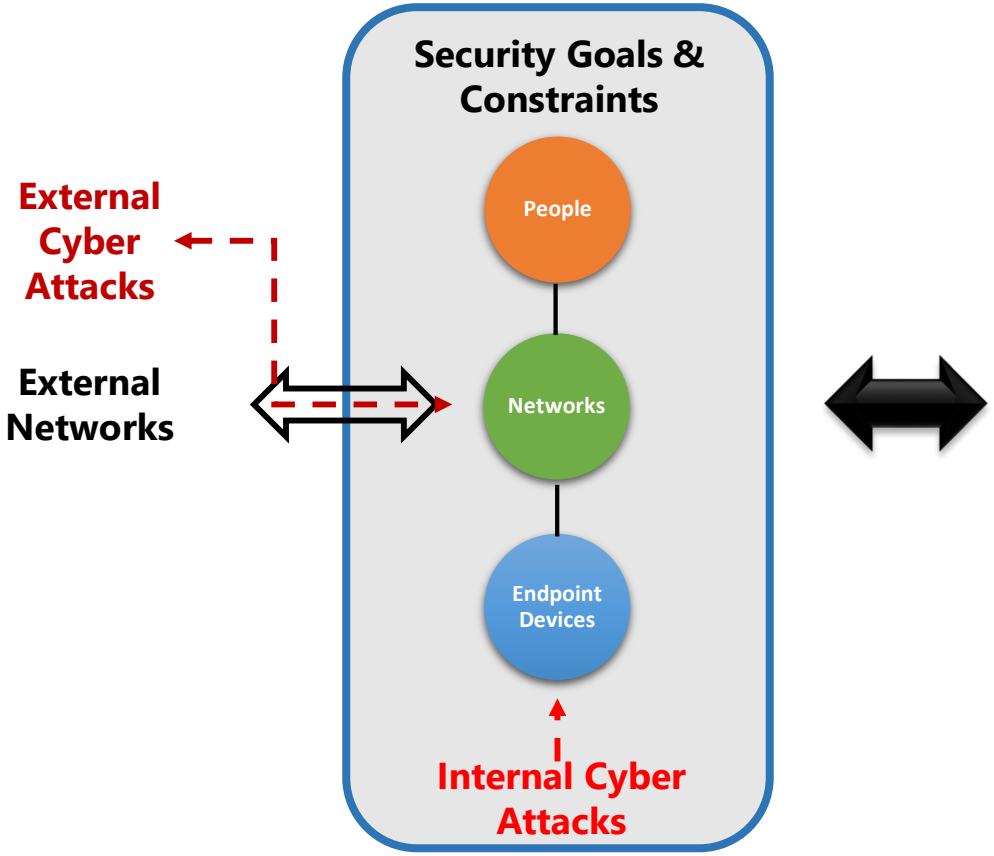
Use and Maintain
- Analyze Information
- Patches & Updates

ARC Research Shows that Implementation and Use/Maintain are the Biggest Challenges …

These steps are the Focus of ARC's Industrial Cybersecurity Maturity Model

© ARC Advisory Group • 8

Industrial (ICS) Cybersecurity Challenges

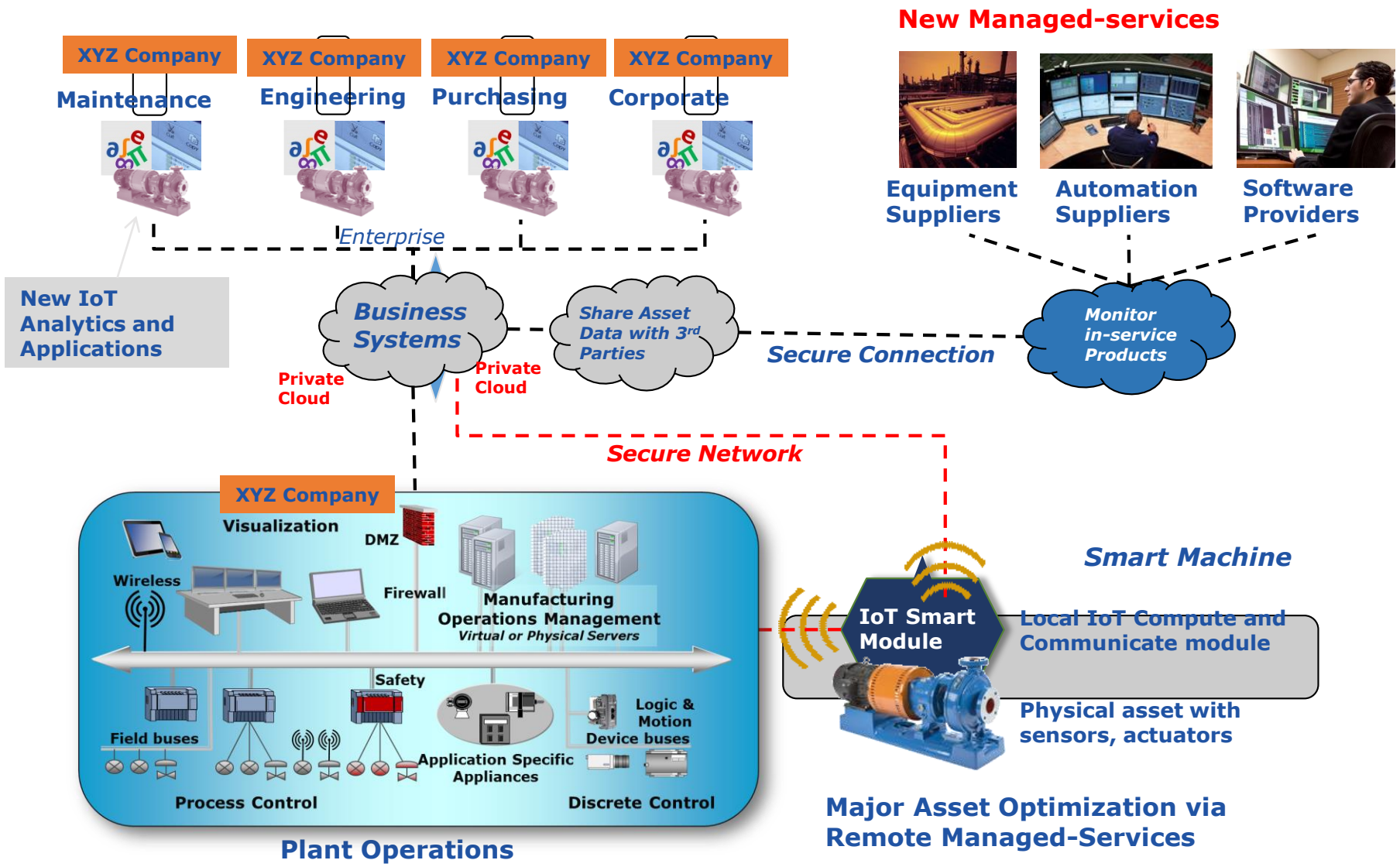


Issue	IT Cybersecurity	ICS Cybersecurity
Endpoints	PCs, Servers	PCs, Servers, Industrial Devices
Networks	TCP/IP	TCP/IP, Modbus, DNP3, Etc.
People	Admin People	Operators, Engineers, etc.
Goals	Protect Information	Safety, Availability, maybe Information
Constraints	8 to 4, Short disruptions	24x7, No disruptions

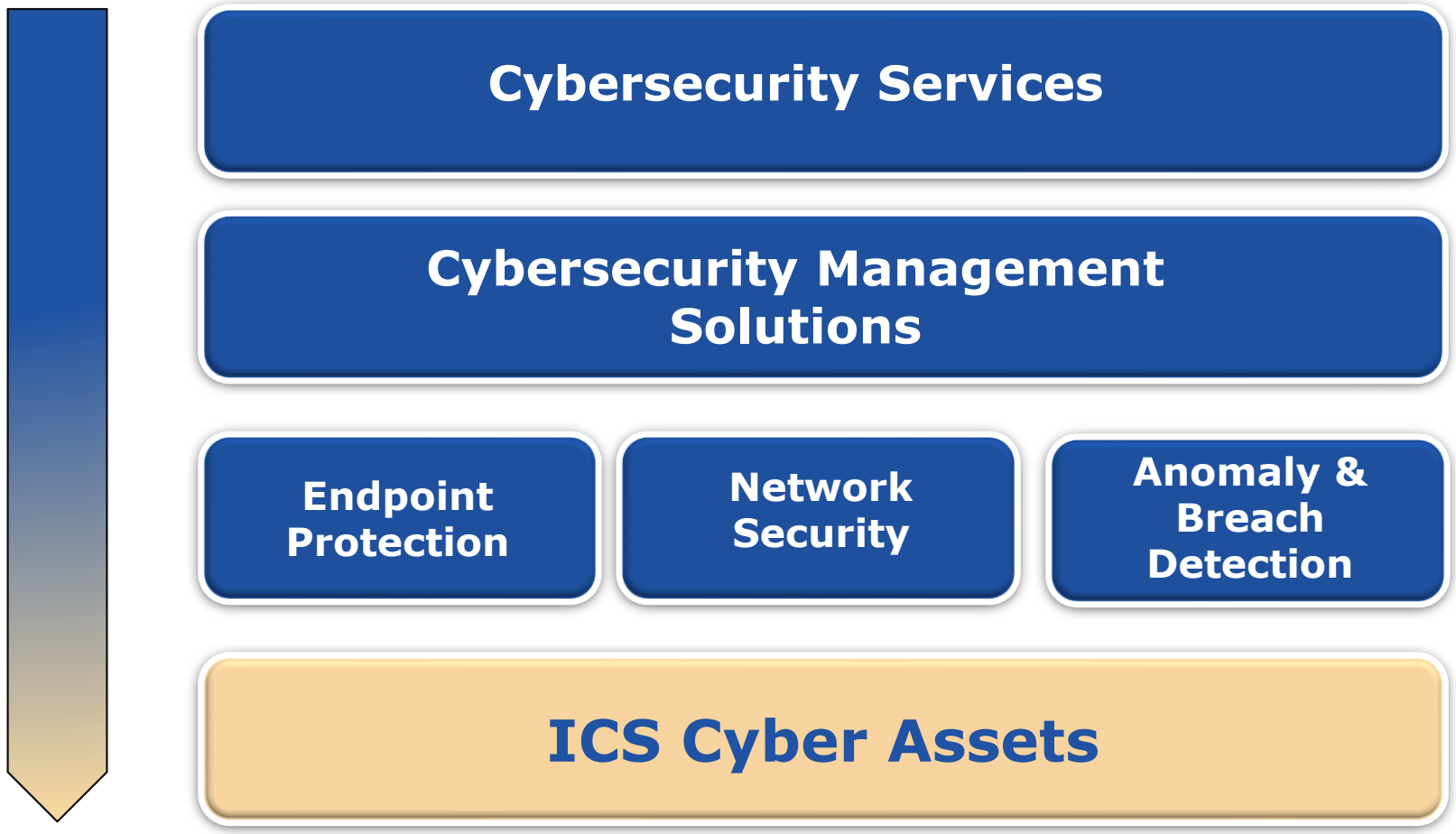
Industrial Cybersecurity Involves a Unique Set of Endpoint Devices, Network Protocols, People, Goals, and System Management Constraints

© ARC Advisory Group • 9

Industrial Cybersecurity Tomorrow



ARC ICS Cybersecurity Market Categories



This presentation may be not be reproduced without prior permission from ARC.

© ARC Advisory Group

Industrial Cyber Security Global Market Size & Growth

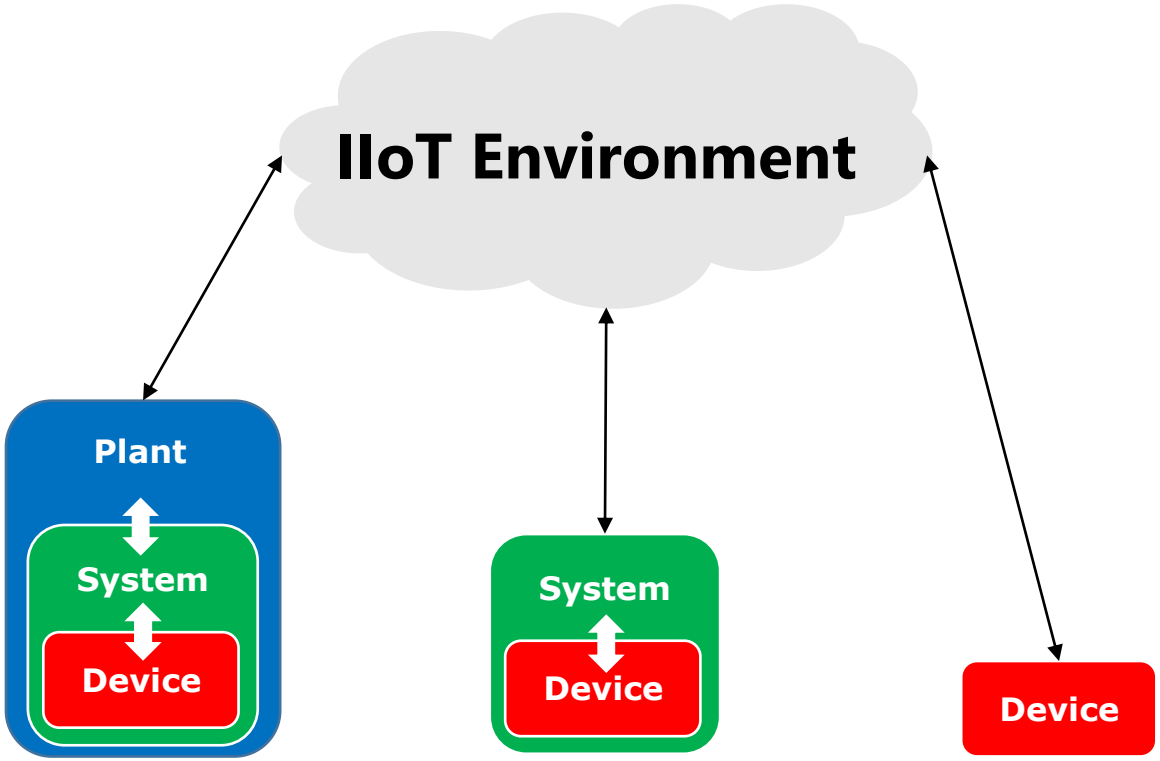
Category	2017 Size MUSD	2015-20 CAGR
Endpoint Protection Solutions	422.1	8.4%
Cybersecurity Services	1,060.1	17.9%
Network Security Solutions	114.5	8.5%
Anomaly & Breach Detection	85.7	12.3%
Security Management Solutions	85.9	12.6%
Total	2,939.4	12.3%

This presentation may be not be reproduced without prior permission from ARC.

© ARC Advisory Group

IIoT will be a significant ICS Disrupter

Three Most Common "Things" to Expect in the IIoT



Plants (complex control systems, with multiple systems)

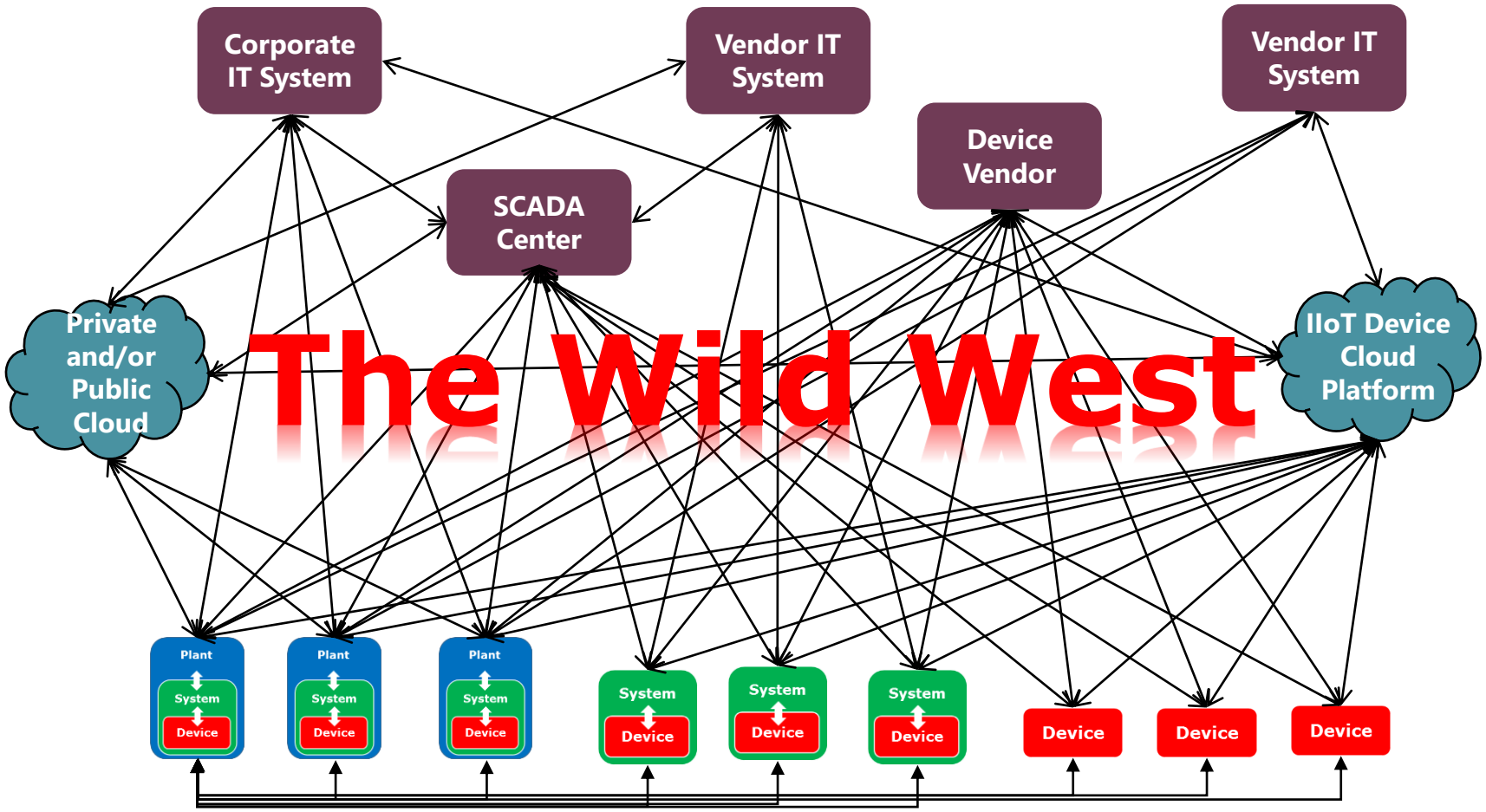
Systems (Simple control systems with embedded smart devices, SCADA remotes, RTUs)

Device (Smart Sensors/ Controllers, Drives, etc.)

© ARC Advisory Group

IIoT is Designed to Enable Innovation

Tomorrow's Use Cases Have Yet to Be Defined



No Clear Use Cases for Strategy Development …

No Natural Boundaries for Segregating ICS and IT Cybersecurity Responsibilities!

A Future View of Industrial Control Systems
Everything Connecting with Everything

Suppliers & Service Providers

Enterprise Systems

Smart Consumer Devices

Cloud Services

Remote Intelligent Assets

Ubiquitous Connectivity

Mobile Devices

DER

Power Plants

In-Plant Intelligent Assets

© ARC Advisory Group • 15

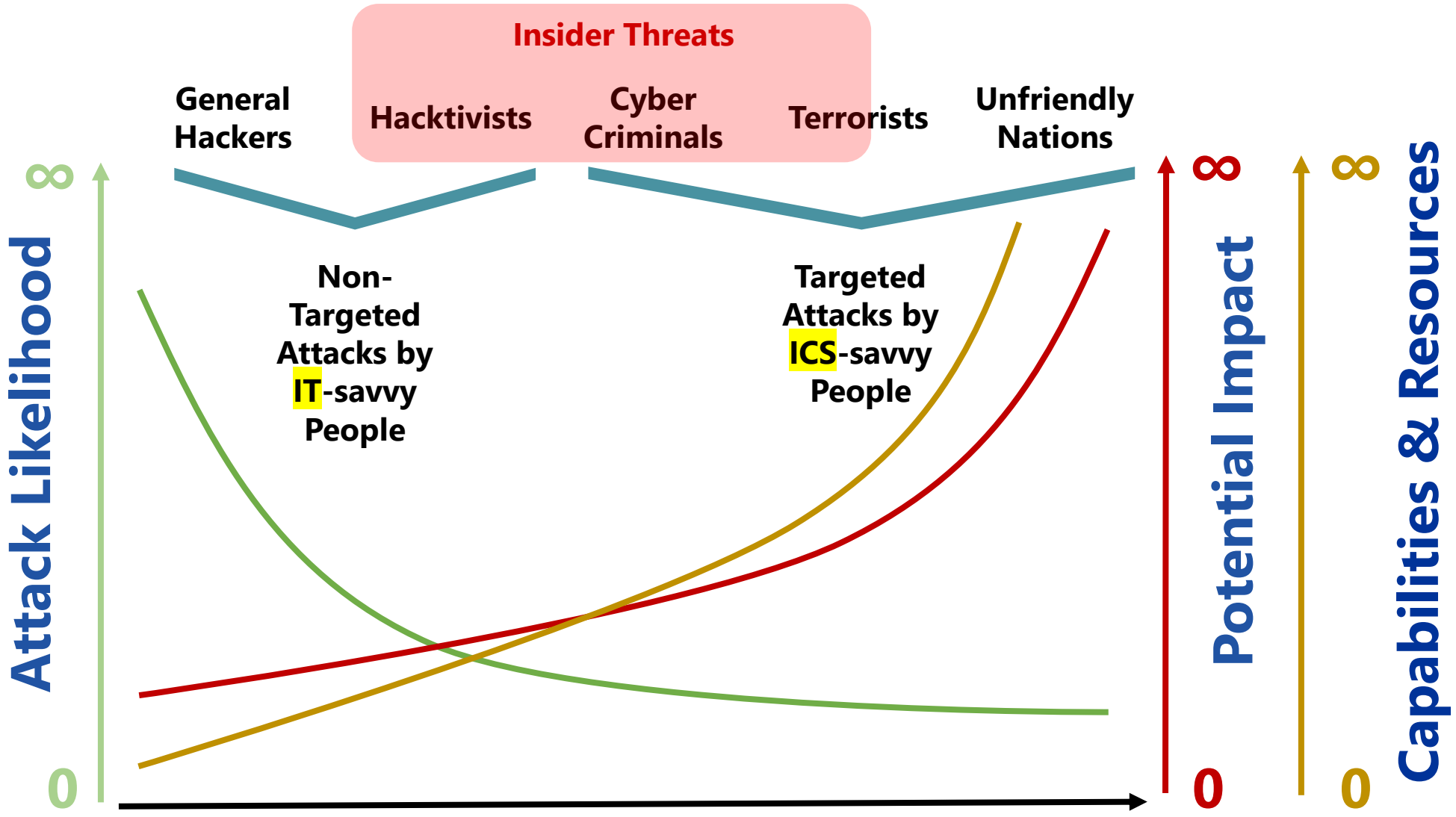
ICS Cybersecurity Has to Embrace These Developments

IIoT Demands a Broader View of ICS Cybersecurity

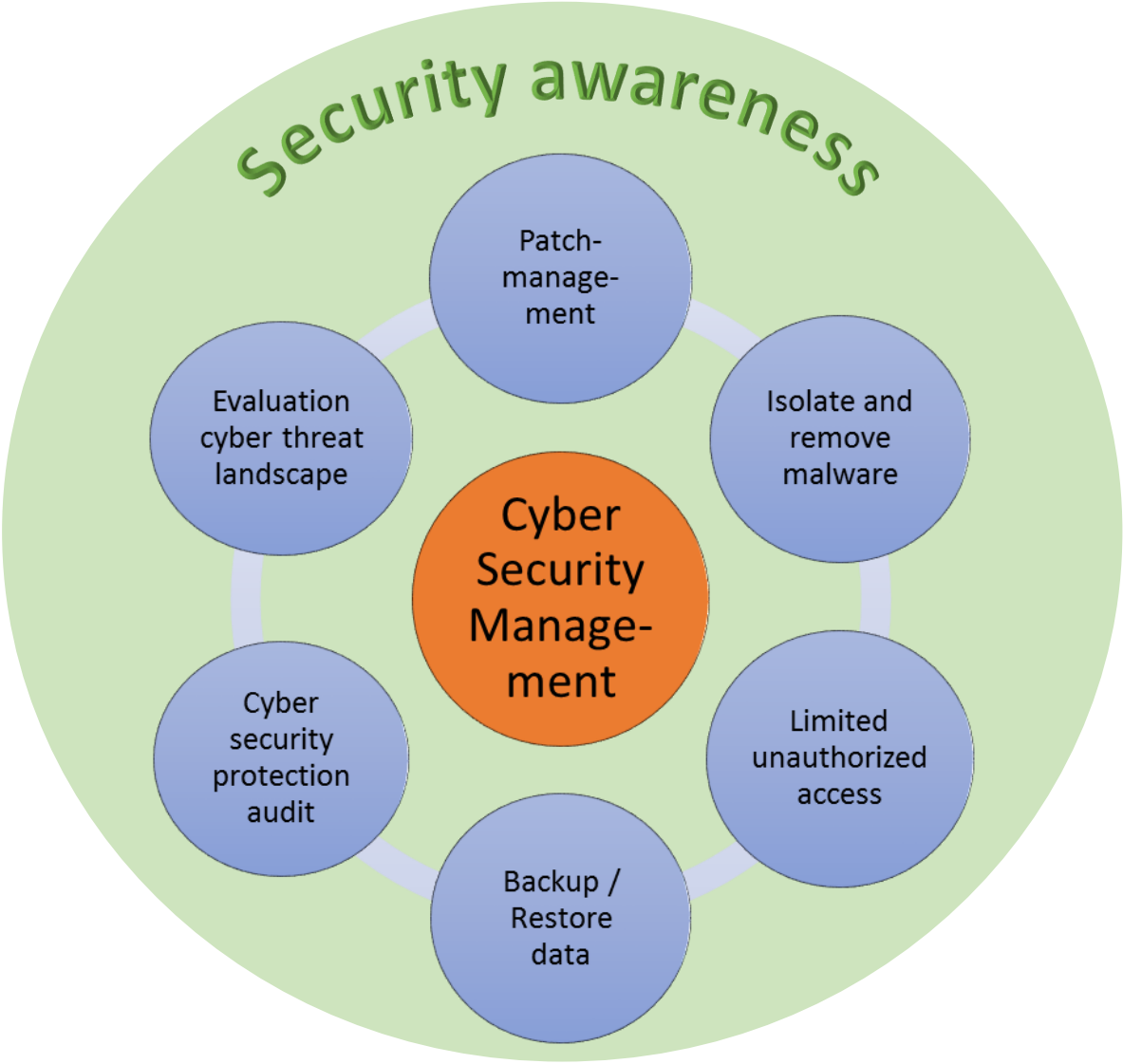
- Cybersecurity is "the" key concern for companies that want to (need to) begin their IIoT journey
- Companies need general guidelines to ensure that they can securely roll out new innovative business strategies
- While security is important, it's naïve to think that companies will continue to delay deployments
- The time has come for the ICS Cybersecurity community to acknowledge and address these future ICS/IIoT cybersecurity challenges!

© ARC Advisory Group • 16

Cyber Defense: Consider Risk , Probability and Impact



Cyber Security Management

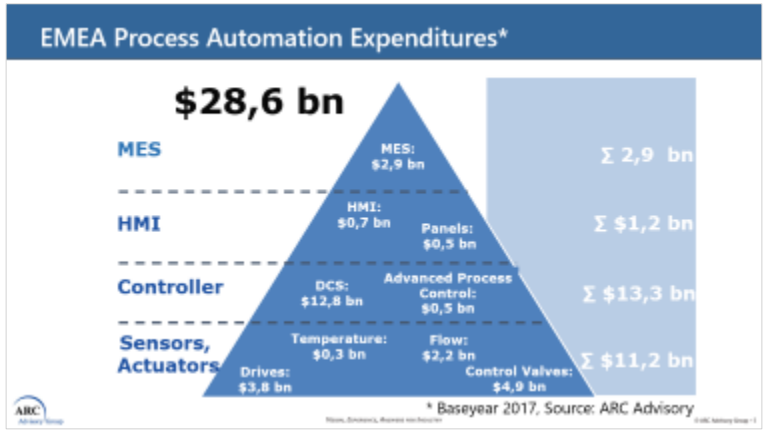


ARC Advisory Group

vision experience answers FOR INDUSTRY

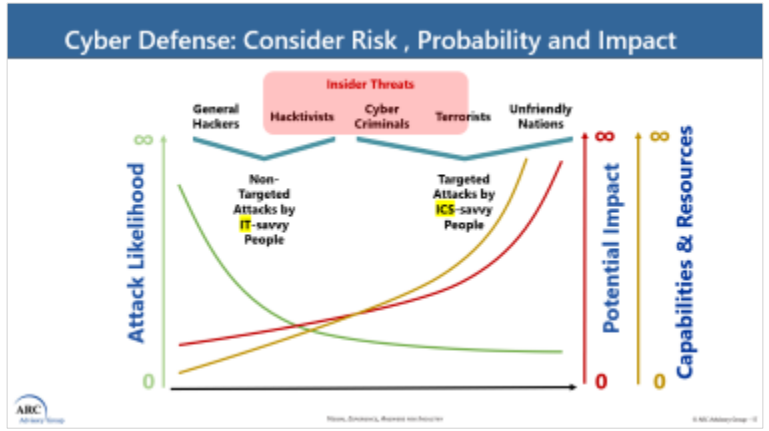
Let us talk.

For more information, contact the author at tmenze@arcweb.com or dfeshin@arcweb.com visit our web pages at www.arcweb.com


EMEA Process Automation Expenditures*
$28,6 bn
MES
HMI
Controller
Sensors, Actuators
MES: $2,9 bn
HMI: $0,7 bn
Panels: $0,5 bn
DCS: $12,8 bn
Advanced Process Control: $0,5 bn
Temperature: $0,3 bn
Flow: $2,2 bn
Drives: $3,8 bn
Control Valves: $4,9 bn
Σ 2,9 bn
Σ $1,2 bn
Σ $13,3 bn
Σ $11,2 bn
* Baseyear 2017, Source: ARC Advisory

Secure Plants Require a Proper Strategy
Technology Investments are Not Enough
This is NOT an Effective Defense!
This IS!
• Endpoints (PC and Non-PC)
• Networks and Interfaces
• Likelihood & Impact
• All kinds of attacks
• Applicability of Technology
• Effectiveness for Risks of Concern
• Sequence
• Readiness
• Analyze Information
• Patches & Updates
ARC Research Shows that Implementation and Use/Maintain are the Biggest Challenges ...
These steps are the Focus of ARC's Industrial Cybersecurity Maturity Model

Industrial Cybersecurity Tomorrow
New Managed-services
Secure Connection
Secure Network
Smart Machine
Plant Operations
Major Asset Optimization via Remote Managed-Services


Cyber Defense: Consider Risk , Probability and Impact
Insider Threats
General Hackers
Hacktivists
Cyber Criminals
Terrorists
Unfriendly Nations
Attack Likelihood
Non-Targeted Attacks by IT-savvy People
Targeted Attacks by ICS-savvy People
Potential Impact
Capabilities & Resources
∞
0