NICE Webinar Series

Cybersecurity Education and Training for the Operational Technology Workforce

June 27, 2018

ICS & OT Security are Different than IT

Information Technology	Operational Technology
Lean towards computer science	Lean towards engineering
Cybersecurity savvy	Safety savvy
New computer every 3 years	New ICS every 30 years
Patch the system every day	Expect the vendor to patch for them
Loss of a single client computer is low impact event	Loss of a single controller can be a catastrophic event
Mostly concerned about Confidentiality of data (breaches)	Mostly concerned about Integrity of data and Availability of systems
Everything on the Internet	Everything on the Internet

- OT systems are designed and expected to last decades – IT systems are replaced every few years
- Patching the control systems in a running factory or electrical grid isn't easy

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Obtaining IT Skillz

- In the IT training environment, there is a tendency by some to collect as many certifications as possible (GICSP, CISSP, CISM, CISA, CeH…)
- Employee expected to 'come to the table' with certifications already in hand
- Standards make the certifications relevant and transportable
- Utilize virtualized systems and equipment
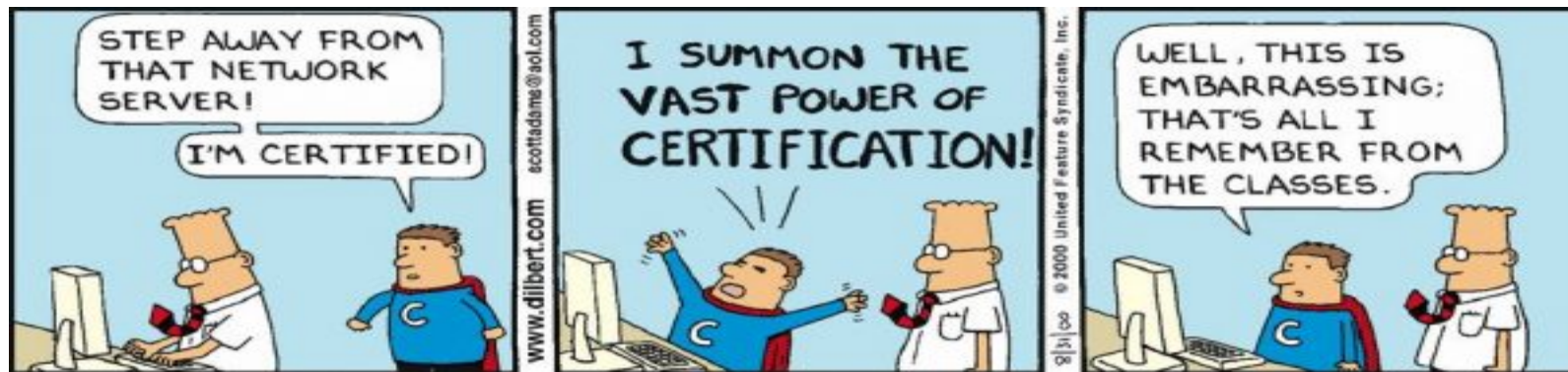
How about ICS / OT Skillz?

- In the OT training environment, it seems that "on the job" training – followed by very specialized vendor training is the norm

- Your company pays for training only on the systems that you need rather than relying on industry wide certifications

- Proprietary, vendor specific systems impede common certification development, although certifications exist from organizations such as ISA (CAP, CCST)

- Require hands on equipment in industrial setting

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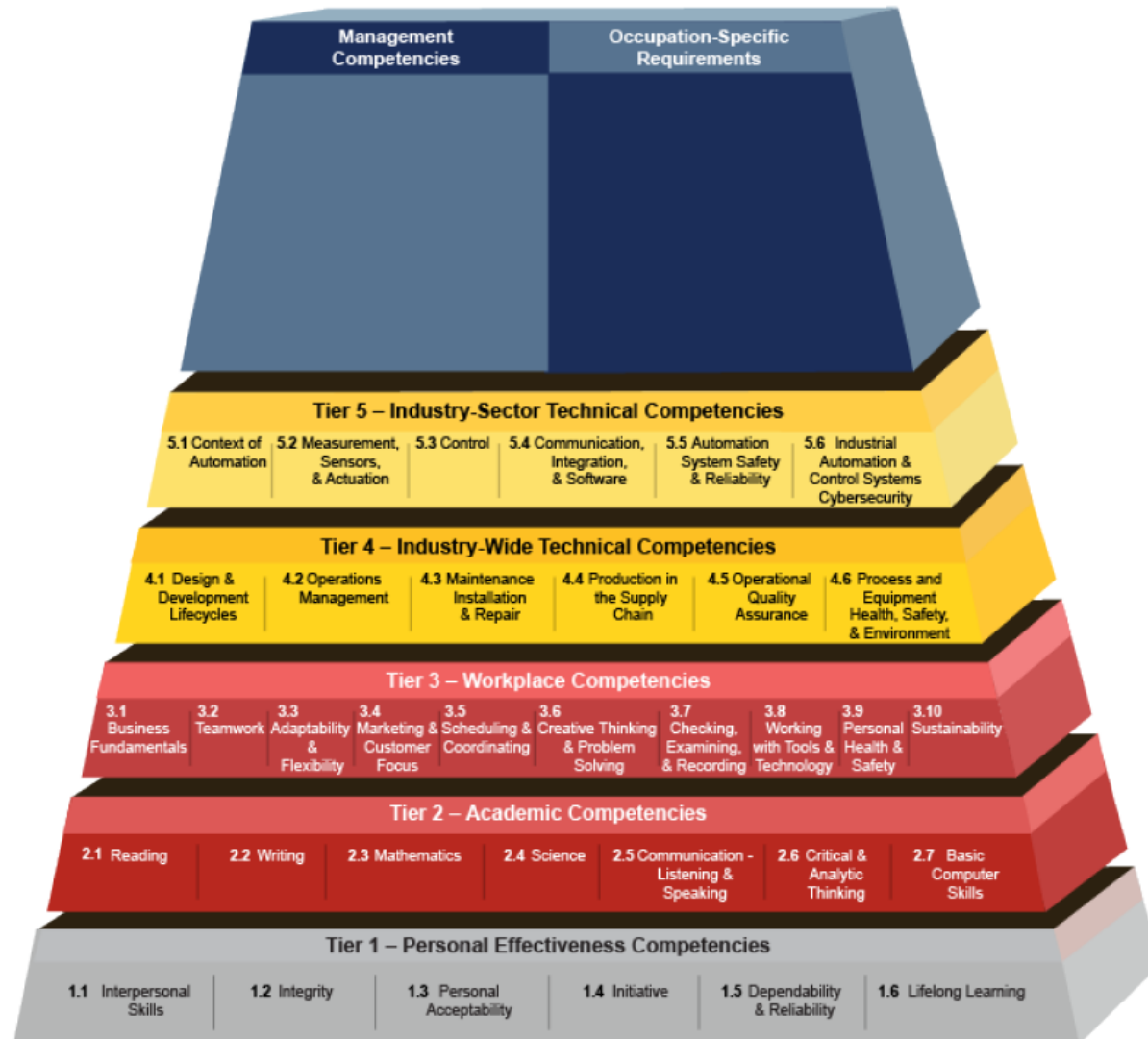*The Voice of Automation*
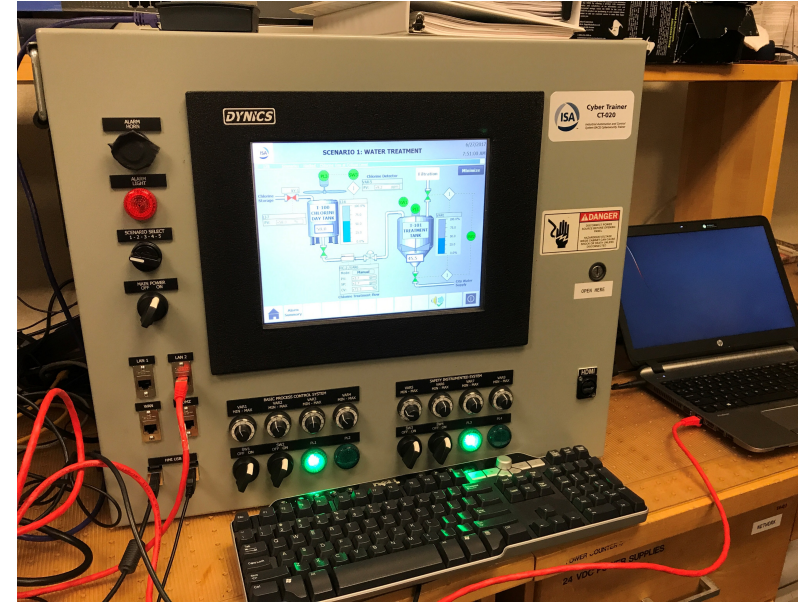
Cybersecurity is a never ending process

- In the United States, the National Institute of Standards and Technology (NIST) created the Cybersecurity Framework
- This does a good job of defining the process to establish a cybersecurity program

Automation Competency Model (ACM)

Management Competencies	Occupation-Specific Requirements

Tier 5 – Industry-Sector Technical Competencies

5.1 Context of Automation	5.2 Measurement, Sensors, & Actuation	5.3 Control	5.4 Communication, Integration, & Software	5.5 Automation System Safety & Reliability	5.6 Industrial Automation & Control Systems Cybersecurity

Tier 4 – Industry-Wide Technical Competencies

4.1 Design & Development Lifecycles	4.2 Operations Management	4.3 Maintenance Installation & Repair	4.4 Production in the Supply Chain	4.5 Operational Quality Assurance	4.6 Process and Equipment Health, Safety, & Environment

Tier 3 – Workplace Competencies

3.1 Business Fundamentals	3.2 Teamwork	3.3 Adaptability & Flexibility	3.4 Marketing & Customer Focus	3.5 Scheduling & Coordinating	3.6 Creative Thinking & Problem Solving	3.7 Checking, Examining, & Recording	3.8 Working with Tools & Technology	3.9 Personal Health & Safety	3.10 Sustainability

Tier 2 – Academic Competencies

2.1 Reading	2.2 Writing	2.3 Mathematics	2.4 Science	2.5 Communication - Listening & Speaking	2.6 Critical & Analytic Thinking	2.7 Basic Computer Skills

Tier 1 – Personal Effectiveness Competencies

1.1 Interpersonal Skills	1.2 Integrity	1.3 Personal Acceptability	1.4 Initiative	1.5 Dependability & Reliability	1.6 Lifelong Learning

- Defines the competencies – knowledge, skills and abilities required in automation
- Moving up in the model indicates more industry specific skills, not necessarily higher level of skill

www.careeronestop.org/competencymodel/competency-models/automation.aspx

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Apprenticeship as a model

5 **Core Components of Registered Apprenticeship**

	Employer Involvement Is Integral	Employer is the foundation for the RA program and must be directly involved and provider of OJL
	Structured On-the-Job Learning with Mentoring	Minimum of 2,000 hours Structured and Supervised
	Related Training and Instruction	144 hours recommended per year Parallel | Front-loaded | Segmented Options
	Rewards for Skill Gains	Increases in skills brings about increases in earnings
	National Occupational Credential	Nationally recognized credential showing job proficiency. Sponsor certifies individual is fully competent for career.

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ApprenticeshipUSA
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# Apprenticeship concept in ICS / OT

- If you look at OT training – the concept of "hands on" training consistently shows up
- Other skills areas and trades, such as electricians, go through a series of education and hands on training through a progression of apprenticeship, journeyman and master craftsman
- The United Kingdom (UK) and other countries are actively promoting cybersecurity apprenticeship programs
- In general the United States has fewer trades that use apprenticeships than other countries – for example a Journeyman Instrument Technician

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This is a global issue - Get Involved!

- Automation Federation, and our member organizations such as ISA and SANS – are working with global government departments and agencies – in countries such as the United States, Japan, Germany, Sweden and others
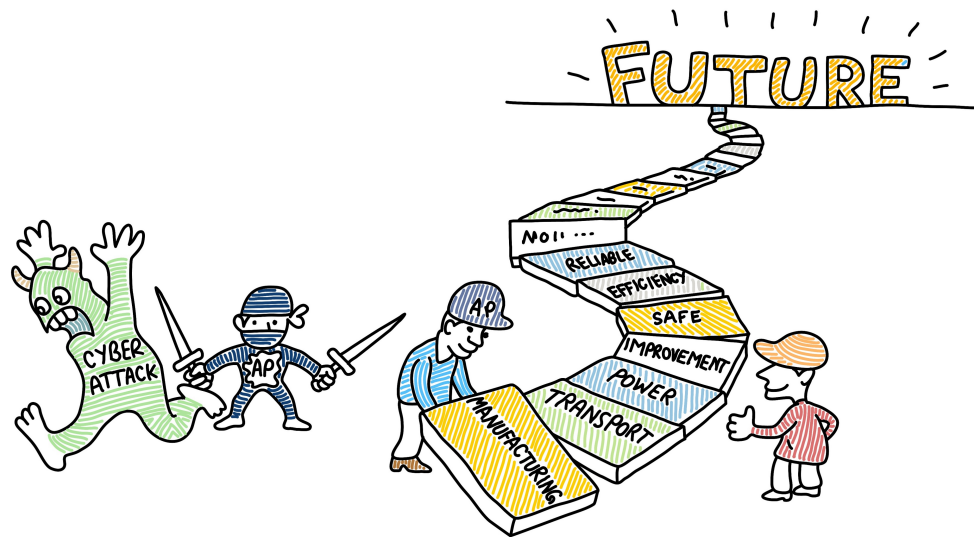
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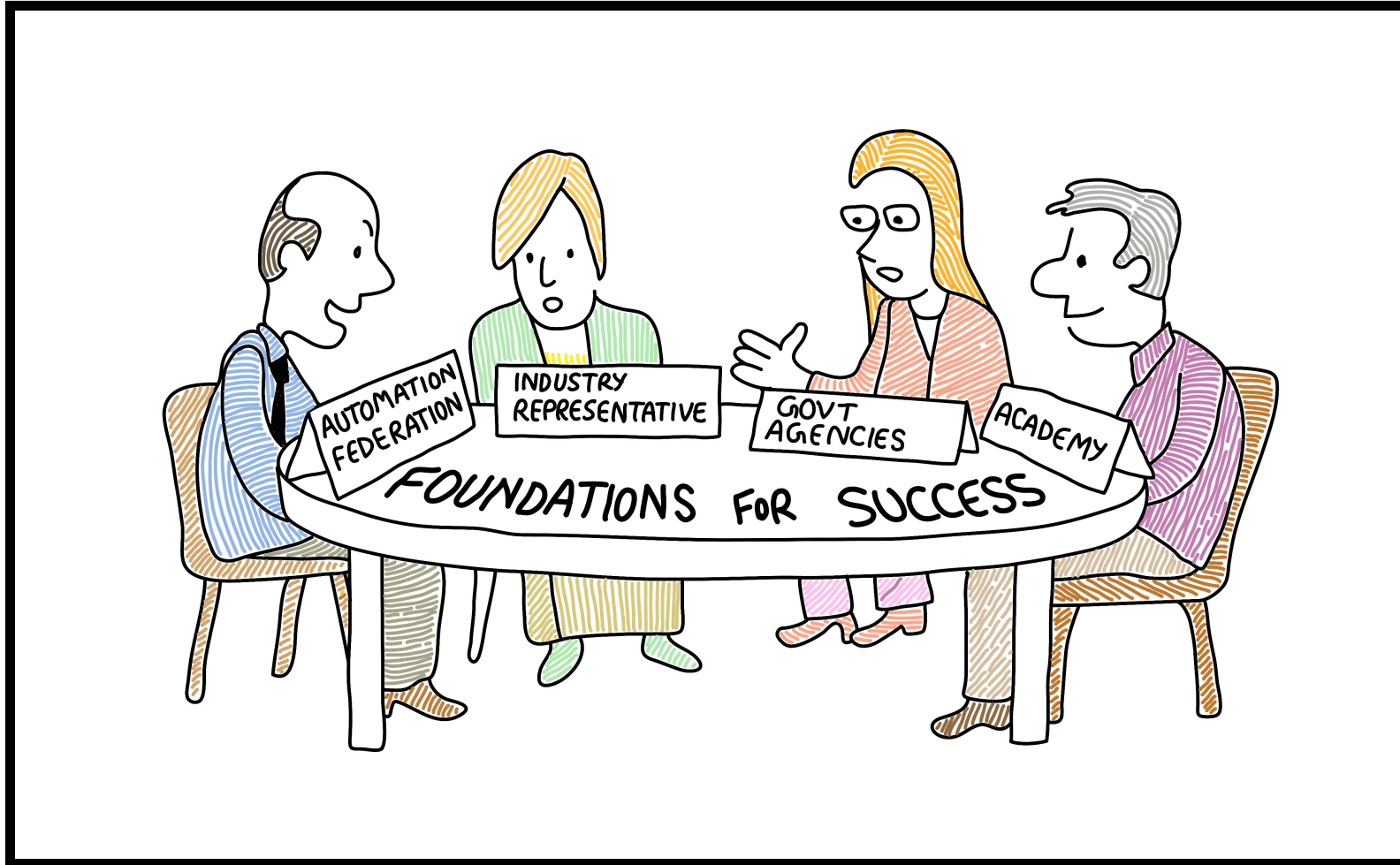
Follow the ICS discussion and get involved !

Twitter or LinkedIn

 @ics_marty
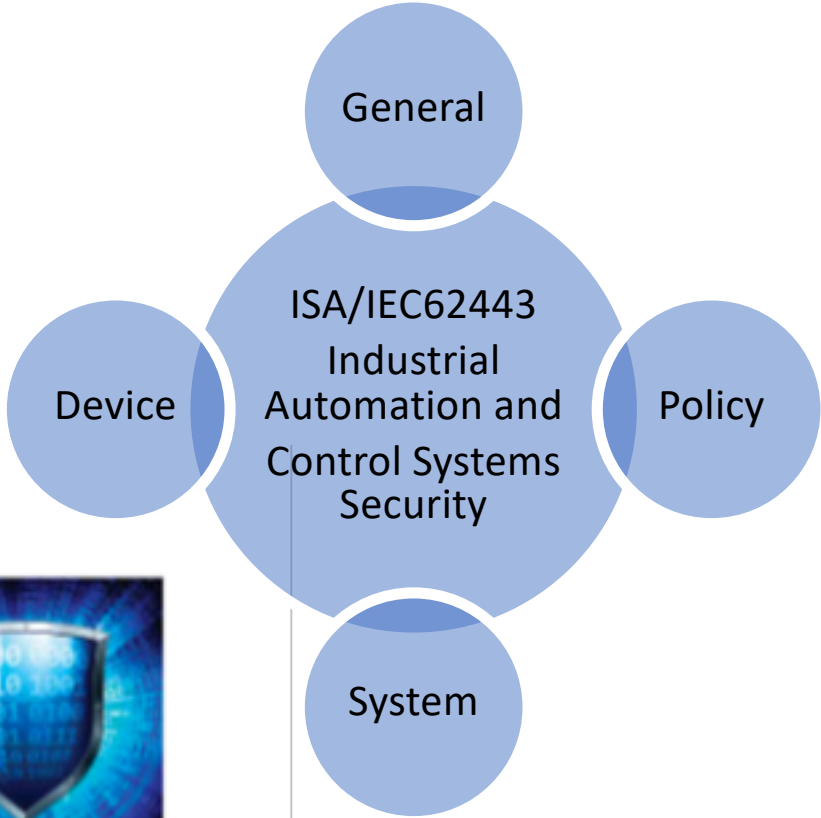
Q & A

Steve Mustard

CEO

National Automation, Inc.

Existing resources – ISA/IEC62443 certificates

International Society
of Automation (ISA)

The road to...

Fundamental
Specialist IC32
+
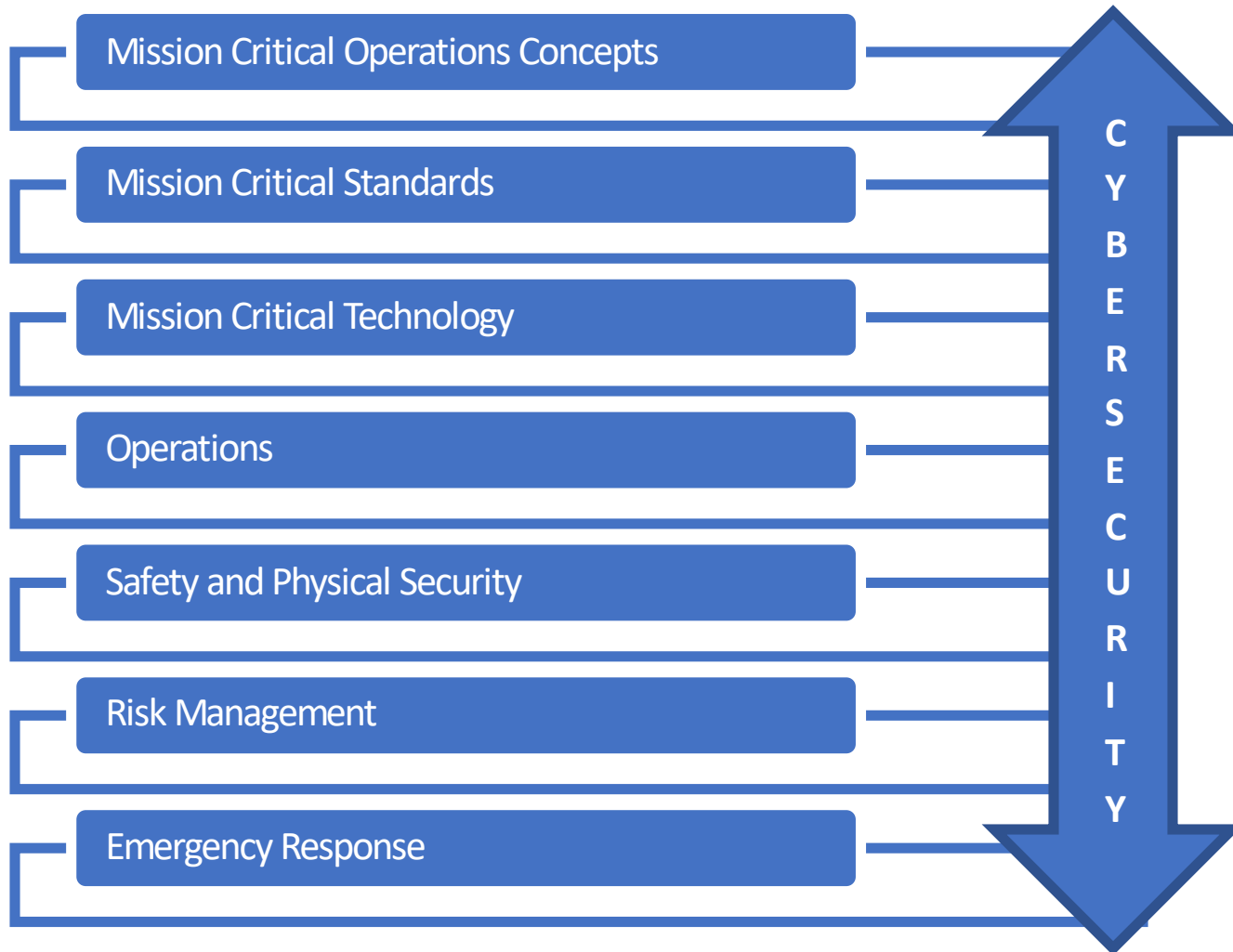Risk Assessment
Specialist IC33
+
Design
Specialist IC34
+
Maintenance
Specialist IC37
=
**Cybersecurity
Expert**

General

ISA/IEC62443
Industrial
Automation and
Control Systems
Security

Device

Policy

System

Existing resources - CMCP

Mission Critical Operations Concepts

Mission Critical Standards

Mission Critical Technology

Operations

Safety and Physical Security

Risk Management

Emergency Response

CYBERSECURITY

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OT Cybersecurity within other certifications

CYBERSECURITY

Q & A

Thank You for Joining Us!

Upcoming Webinar:

State Governments Pursuing New Tactics in the War for a Skilled Cybersecurity Workforce

When:

Wednesday, July 18, 2018 at 2:00pm – 3:00pm ET

Register:

https://nist-nice.adobeconnect.com/webinar-jul2018/event/registration.html

nist.gov/nice/webinars