National Cybersecurity Center of Excellence (NCCoE)
Energy Sector

Energy Provider Community of Interest

25 October 2016

NIST National Institute of Standards and Technology U.S. Department of Commerce

NCCoE NATIONAL CYBERSECURITY CENTER OF EXCELLENCE

Agenda

- NCCoE Energy Sector News
  - Grid Sec Conference
  - Upcoming NCCoE Planned Conferences
- Current Projects
  - Identity and Access Management (IdAM) Project Update
  - Situational Awareness (SA) Project Update
- Oil and Natural Gas Project Concepts
- Dr. Mike Cohen – Supply Chain Risk Management
- Oil and Natural Gas Use Case Development Discussion

NCCoE Out and About:

- GridSecCon Training Workshop (4A)
  - October 17, 2016 in Quebec City
  - Workshop Summary*:* http://www.nerc.com/pa/CI/CIPOutreach/Pages/GridSecCon-Training-Tracks.aspx
  - Highlights:
    - Approx 45 attendees; standing room only
    - Presentations on upcoming cyber trends/challenges from Bob Lockhart, UTC; Mike Prescher, Black & Veatch; Mike Meason; Western Farmers Electric Cooperative

Upcoming Conferences

- 11th Annual Cybersecurity Conference for the Oil & Natural Gas Industry
  - November 9, 2016 in Houston
  - http://www.api.org/products-and-services/events/calendar/2016/cyber#tab_programdetails

CURRENT PROJECTS: IDAM

Challenges we heard from industry:

- Lack of authentication, authorization, and access control requirements for all OT
- Inability to manage and log authentication, authorization, and access control information for all OT using centralized or federated controls
- Inability to centrally monitor authorized and unauthorized use of all OT and user accounts
- Inability to provision, modify, or revoke access throughout the enterprise (including OT) in a timely manner

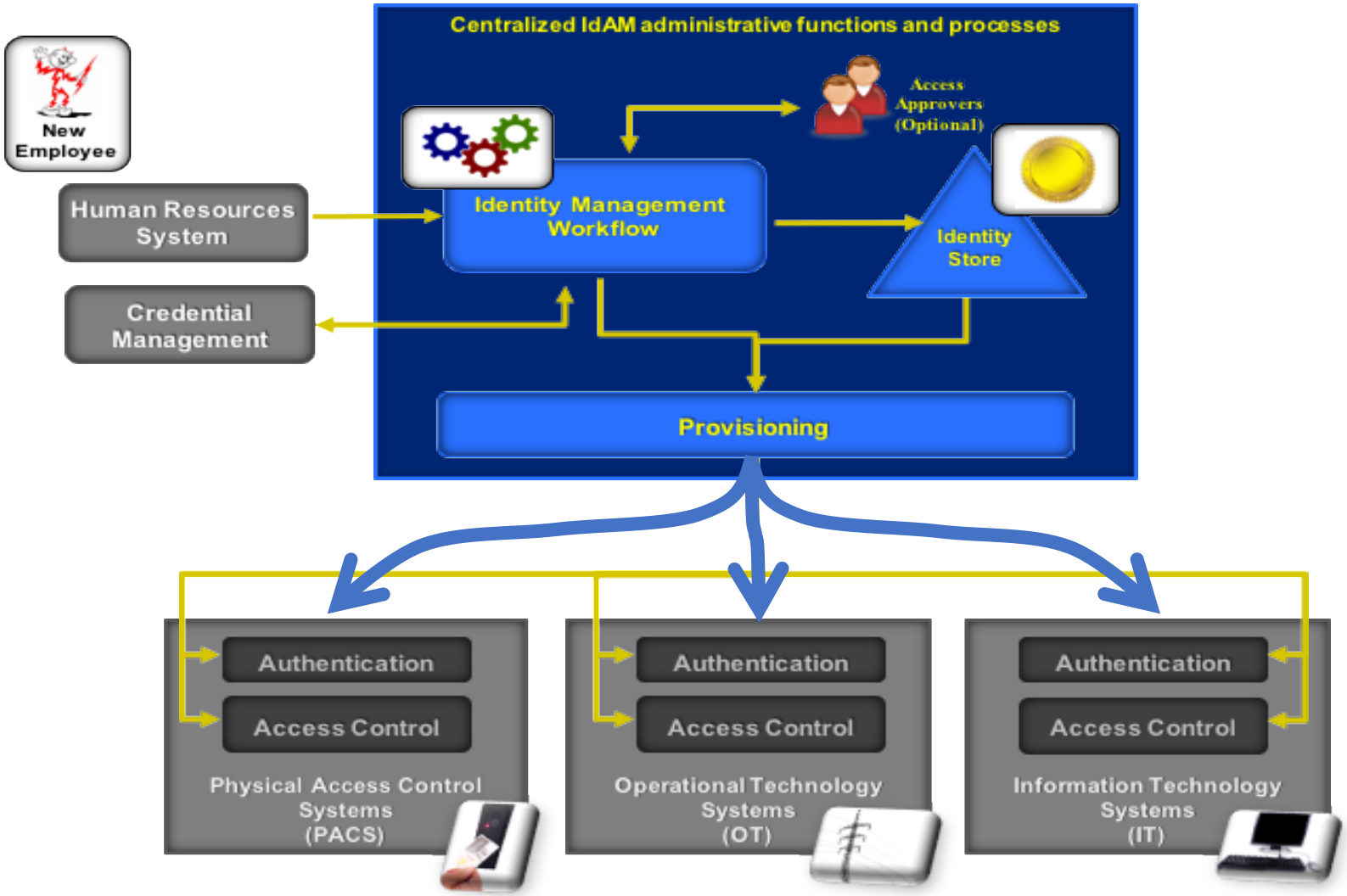
Solution NCCoE built:

- ✓ Authenticates individuals and systems
- ✓ Enforces authorization control policies
- ✓ Unifies IdAM services
- ✓ Protects generation, transmission and distribution
- ✓ Improves awareness and management of visitor accesses
- ✓ Simplifies the reporting process

Converged management of silos

Draft guide is online at https://nccoe.nist.gov/projects/use_cases/idam

CURRENT PROJECTS: IDAM SOLUTION



CPS Energy (San Antonio) and NCCoE are collaborating on a case study to document a worked example, lessons learned, and known benefits. Expect to complete by October.

Industry Challenges:

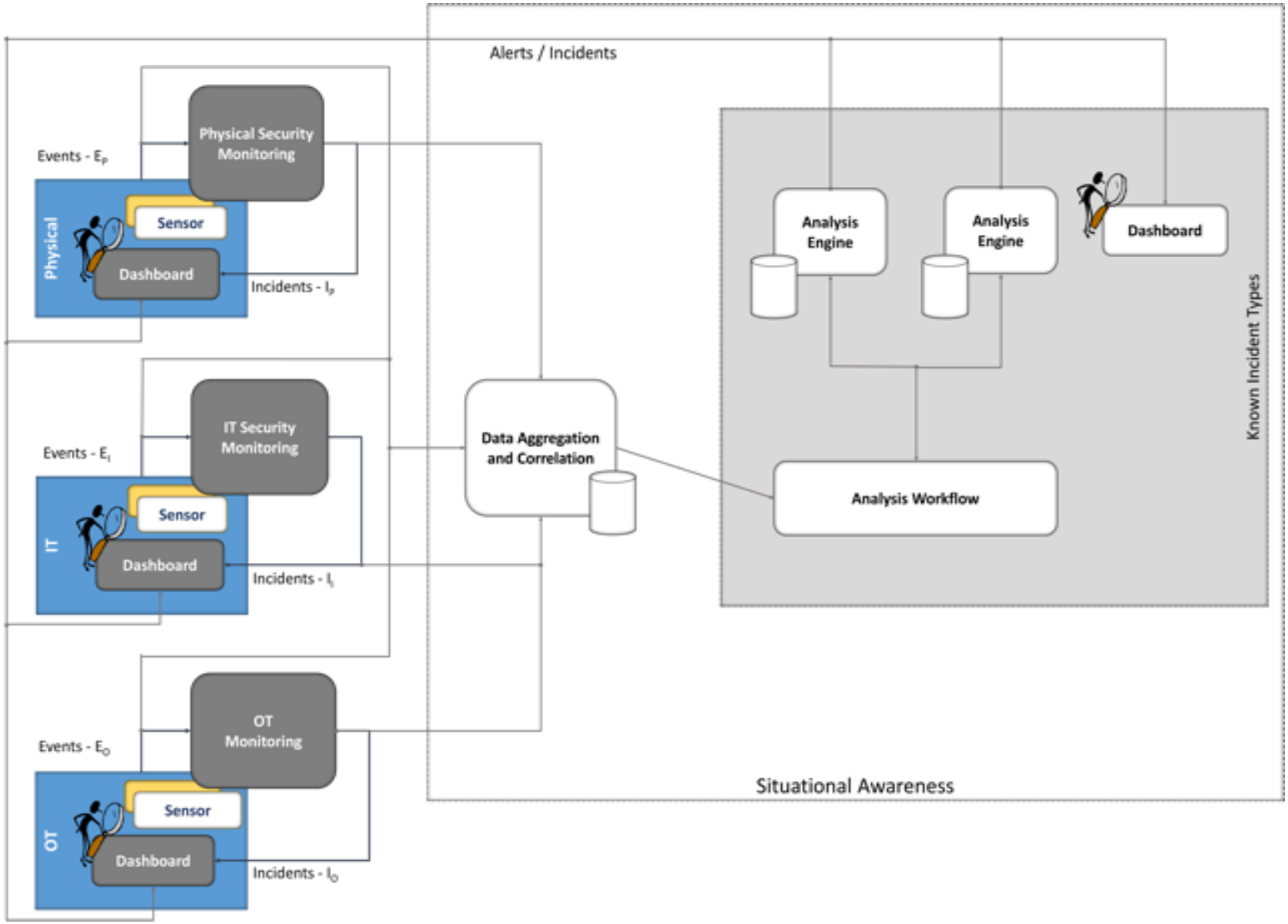
- Improve OT availability
- Detect anomalous conditions and remediation
- Unify visibility across silos
- Investigate events leading to baseline deviations/ anomalies
- Share findings

Solution NCCoE is developing:

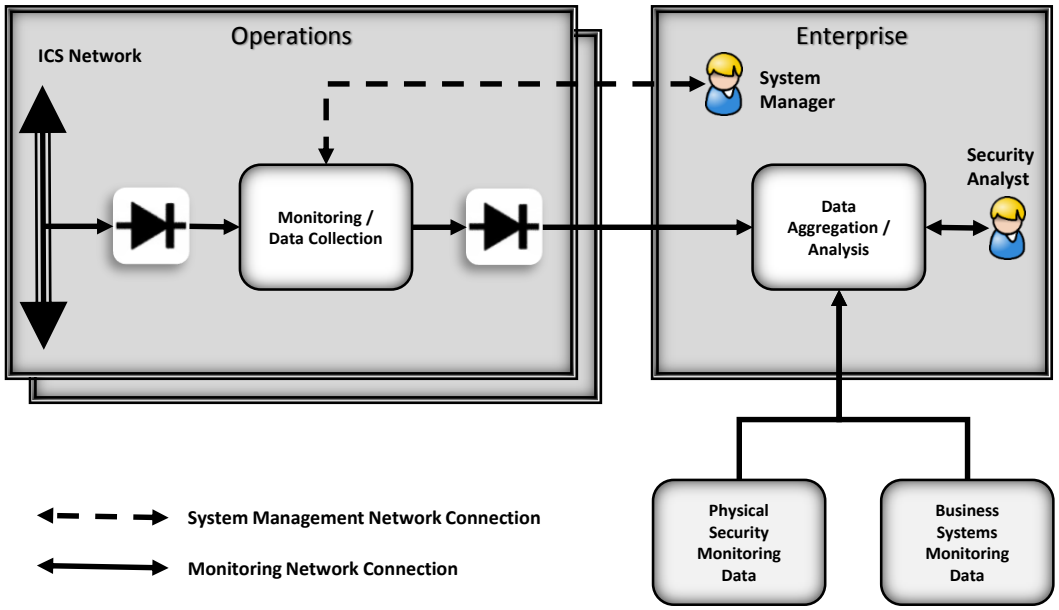
- ✓ Improves the ability to detect cyber-related security breaches or anomalous behavior
- ✓ Improves accountability and traceability
- ✓ Simplifies regulatory compliance by automating generation and collection of operational log data
- ✓ Increases the probability that investigations of attacks or anomalous system behavior will reach successful outcomes

Use Case is online at https://nccoe.nist.gov/projects/use_cases/situational_awareness

CURRENT PROJECTS: SITUATIONAL AWARENESS SOLUTION



CURRENT PROJECTS: SITUATIONAL AWARENESS



- Collect data from an Operations facility that includes Industrial Control Systems (ICS)
  - Ensure data can only flow OUT of the ICS Network into the monitoring and collection hardware / software
- Send data collected from Operations to an Enterprise data aggregation and analysis capability
  - Operations data is aggregated with business systems monitoring data and physical security monitoring data
  - Ensure data can only flow OUT of Operations into Enterprise
- Use the aggregated data to provide converged situational awareness across Operations and Business systems as well as physical security of buildings and other facilities
- Provide a limited-access remote management path from Enterprise to Operations to manage monitoring / data collection hardware and software

PROJECT MILESTONES

PROJECT NAME: IdAM	Upcoming Milestone Dates
Publish Special Publication	11/2016

PROJECT NAME: Situational Awareness	Upcoming Milestone Dates
Completed Build	10/2016
Release Draft Practice Guide for Public Comments	11/2016
Publish Special Publication	05/2017

PROJECT PHASES

ONG - we are here

Situational Awareness – we are here

IdAM – we are here

Pre-Process
We strategically identify, select, and prioritize projects that align with our mission.

P1: Concept Analysis
We partner with industry to define, validate, and build business cases for the most challenging cybersecurity issues.

P2: Develop Use Case
Using a collaborative method with industry partners, we develop a full Use Case that outlines a plan for tackling the issue.

P3: Form Build Team
We unite industry partners and technology companies to build a qualified team to execute the Use Case.

P4: Design & Build
The Use Case team plans, designs, and builds the system in a lab environment and documents it in the Practice Guide.

P5: Integrate & Test
The team test the system and make refinements as necessary. The system may be validated by our partners. The final solution system is documented in the Practice Guide.

P6: Publish & Adopt
We, alongside our partners, publish, publicize and demonstrate the Practice Guide. This solution provides a reference architecture that may be implemented in whole or in part.

NEW PROJECTS: ONG SUB SECTOR FOCUS

- NCCoE recognizes
  - Oil & Natural Gas (ONG) industry challenges dovetail with those of electric utilities
- NCCoE has compiled
  - Emerging cybersecurity themes:
    - Asset inventory and management
    - Information sharing (Situational Awareness foundational to this)
    - Supply chain risk management
- NCCoE seeking:
  - Project ideas based on industry cybersecurity challenges

As discussed on the 09/22/2016 EPC Call:

1. ONG Information Sharing "Map and Match"
   - Correlates operator's assets to vulnerability info from various sources (i.e. DNG-ISAC, ICS-CERT)
   - Provides ability for operators to coordinate threat/vulnerability/mitigation information in a non-attributional manner
2. Identity Federation for ONG
   - Identity information brokered between operators for surge requirements
   - Reduce delays in provisioning access (add new, modify, revoke)

Introducing Third Possibility on Today's Call

3. Supply Chain Risk Management (Presentation)

Potential NCCoE Supply Chain Risk Management (SCRM) Use Case

OCTOBER 2016

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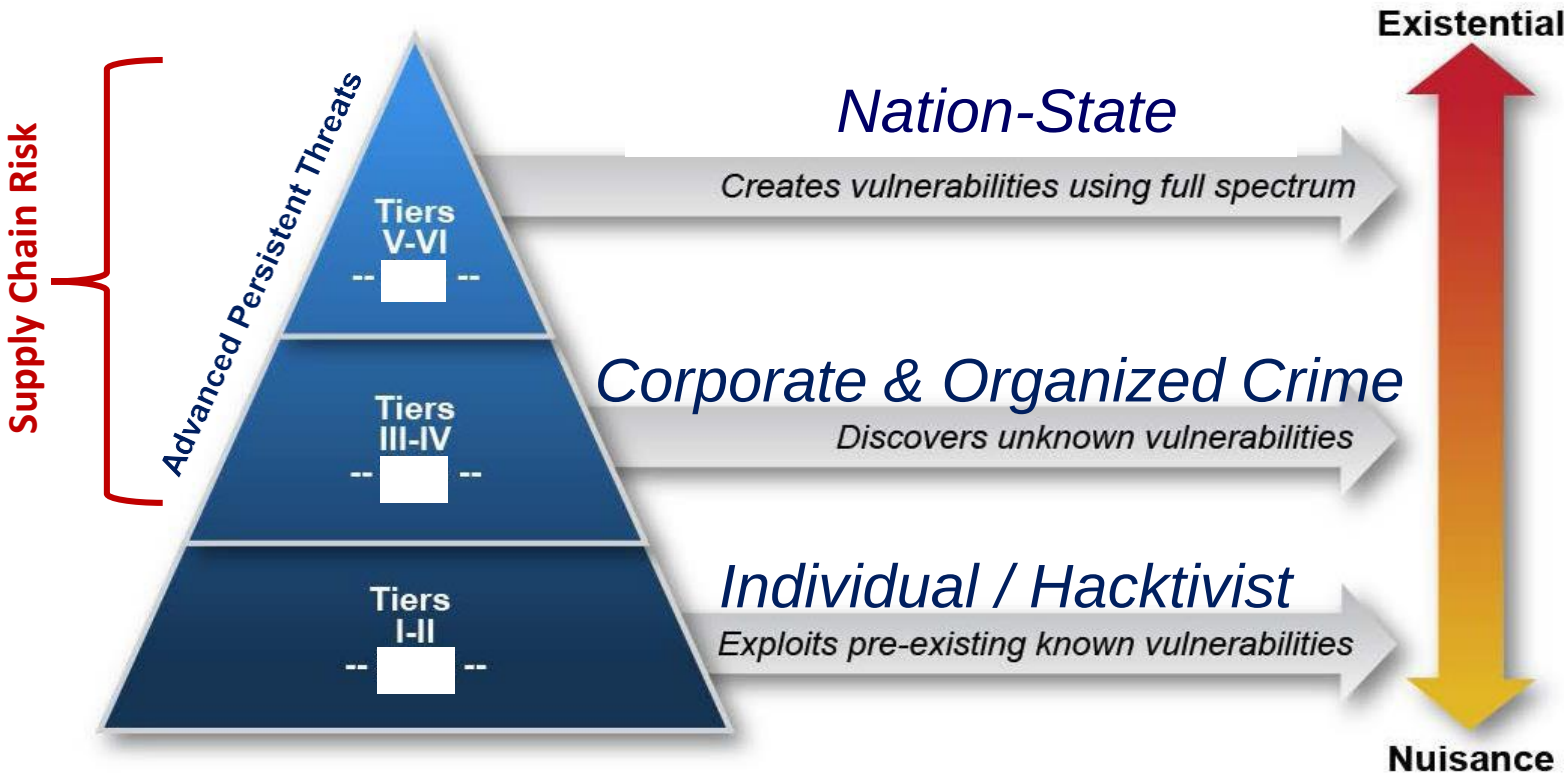
Supply Chain Threat Model



Defense Science Board Report *Resilient Military Systems and the Advanced Cyber Threat* Feb 2013

Proliferation of cheap, readily available, and effective Cyber Network Operation tools increasingly gives less capable actors the means to conduct cyber attacks.

Assessing Supply Chain Risk

Existing SCRM Guidance and Initiatives

Energy SCRM

- FERC Order 829, "Reliability Standard addressing supply chain risk management for industrial control system hardware, software, and computing and networking services associated with bulk electric system operations."
- NERC Standard Drafting Team underway
  - NCCoE/MITRE invited to participate
- DOE
  - Cybersecurity Procurement Language for Energy Delivery Systems
- ODNI Report, "Identifying and Mitigating Supply Chain Risks in the Electricity Infrastructure's Production and Distribution Networks"

Non-Energy SCRM

- NIST SP 800-161, "Supply Chain Risk Management Practices for Federal Information Systems and Organizations"
- US-CERT
  - Advisory, TA16-250A,

    "6. Validate Integrity of Hardware and Software"
- DHS
  - DHS Sensitive Systems Policy Directive 4300a
- DOD
  - Instruction 4140.67, DoD Counterfeit Prevention Policy
  - DoD Instruction 5200.44, Protection of Mission Critical Functions to Achieve Trusted Systems

Potential Use Case Build – Part I

Opportunities for Automating Energy SCRM

- NERC SCRM SDT

  Example of a potentially automated control:

  - "Address logging and controlling all third-party (i.e., vendor) initiated remote access sessions. The objective covers both user-initiated and machine-to-machine vendor remote access. Additionally, applicable entities' controls must provide for rapidly disabling remote access sessions to mitigate a security event, if necessary. (FERC Order No. 829 at P 51 and 52)"

- US-CERT: TA16-250A

  Examples of potentially automated controls:

  - Validate serial numbers from multiple sources
  - Download software, updates, patches, and upgrades from validated sources.
  - Perform hash verification and compare values against the vendor's database to detect unauthorized modification to the firmware.
  - Monitor and log devices, verifying network configurations of devices on a regular basis

Potential Use Case Build – Part II

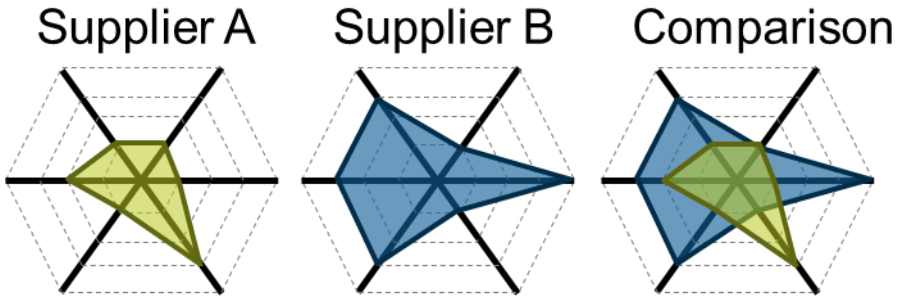
Opportunities for Automating Energy SCRM

- DARPA Research Prototypes
  - VET: Vetting Commodity IT Software and Firmware
  - IRIS: Integrity and Reliability of Integrated CircuitS (IRIS)
- COTS Products
  - Market research yet to be conducted

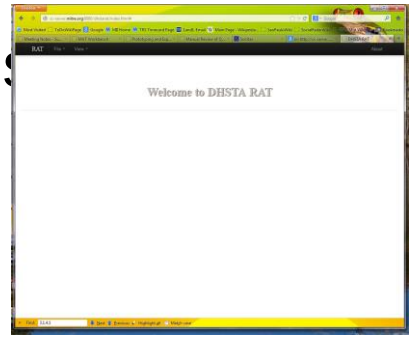
Potential Use Case Build – Part IV

Opportunities for Automating Energy SCRM

- MITRE/FFRDC LENS/SURE Research Prototype
  - "TSA Pre-check“- like tool for comparing bidding suppliers/vendors

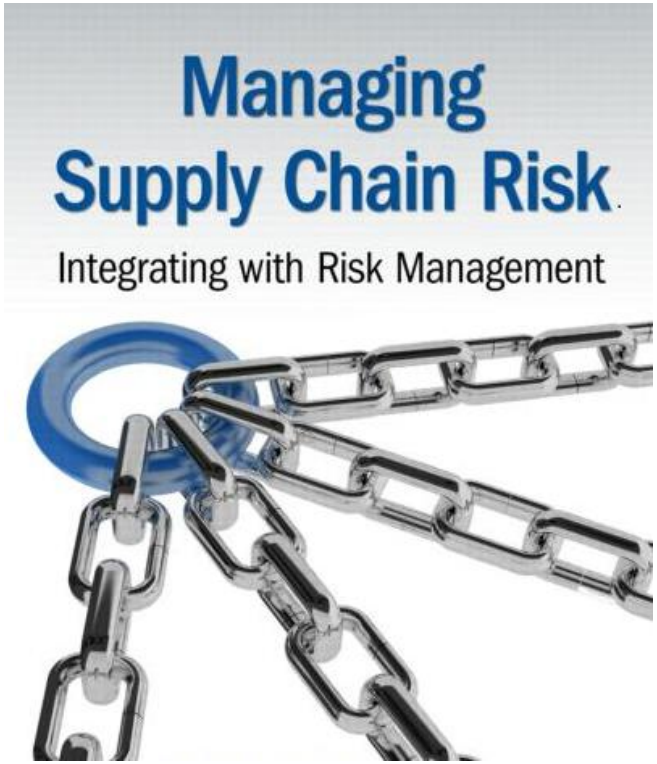


- MITRE/FFRDC Requirements Analysis Prototype
  - Scans and evaluates bidder proposals against RFP SCRM requirements
  - Video Demo: RAT.mp4



Summary

- NERC is actively developing a SCRM Standard (CIP-0XX) to meet FERC's SCRM Order 829
  - NCCoE could be an observer
- Several NERC-mandated and NIST/US-CERT recommended security controls can be automated
- Research prototypes for meeting some SCRM requirements have been developed by DARPA and FFRDCs
- An NCCoE SCRM Use Case Build would be useful for both regulated BES and non-regulated Smart Grid industries



Source: https://www.crcpress.com//Managing-Supply-Chain-Risk-Integrating-with-Risk-Management/

- Your thoughts?

- Open Discussion

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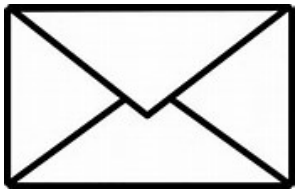

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Thank You

ABOUT THE NCCOE

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U.S. Department of Commerce

Information Technology Laboratory

MARYLAND OF OPPORTUNITY.®
Department of Business & Economic Development

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WHO WE ARE AND WHAT WE DO

VISION

ADVANCE CYBERSECURITY

A secure cyber infrastructure that inspires technological innovation and fosters economic growth

MISSION

ACCELERATE ADOPTION OF SECURE TECHNOLOGIES

Collaborate with innovators to provide real-world, standards-based cybersecurity capabilities that address business needs

GOAL 1

PROVIDE PRACTICAL CYBERSECURITY

Help people secure their data and digital infrastructure by equipping them with practical ways to implement standards-based cybersecurity solutions that are modular, repeatable and scalable

GOAL 2

INCREASE RATE OF ADOPTION

Enable companies to rapidly deploy commercially available cybersecurity technologies by reducing technological, educational and economic barriers to adoption

GOAL 3

ACCELERATE INNOVATION

Empower innovators to creatively address businesses' most pressing cybersecurity challenges in a state-of-the-art, collaborative environment

The NCCoE seeks problems that are:

- Broadly applicable across much of a sector, or across sectors
- Addressable through one or more reference designs built in our labs
- Complex enough that our reference designs will need to be based on a combination of multiple commercially available technologies

Reference designs address:

- Sector-specific use cases that focus on a business-driven cybersecurity problem facing a particular sector (e.g., health care, energy, financial services)
- Technology-specific building blocks that cross sector boundaries (e.g., roots of trust in mobile devices, trusted cloud computing, software asset management, attribute based access control)

TENETS

Standards-based

Apply relevant local, national and international standards to each security implementation and account for each sector's individual needs; demonstrate reference designs for new standards

Modular

Develop reference designs with individual components that can be easily substituted with alternates that offer equivalent input-output specifications

Repeatable

Enable anyone to recreate the NCCoE builds and achieve the same results by providing a complete practice guide including a reference design, bill of materials, configuration files, relevant code, diagrams, tutorials and instructions

Commercially available

Work with the technology community to identify commercially available products that can be brought together in reference designs to address challenges identified by industry

Usable

Design usable blueprints that end users can easily and cost-effectively adopt and integrate into their businesses without disrupting day-to-day operations

Open and transparent

Use open and transparent processes to complete work, and seek and incorporate public comments on NCCoE documentation, artifacts and results