Defending the Nation in the 21st Century

The Critical Role of Cyber Educators

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Today's Agenda

Some funny stuff.

Some inspiring stuff.

Some important stuff.

Risk management 101.

Risk.

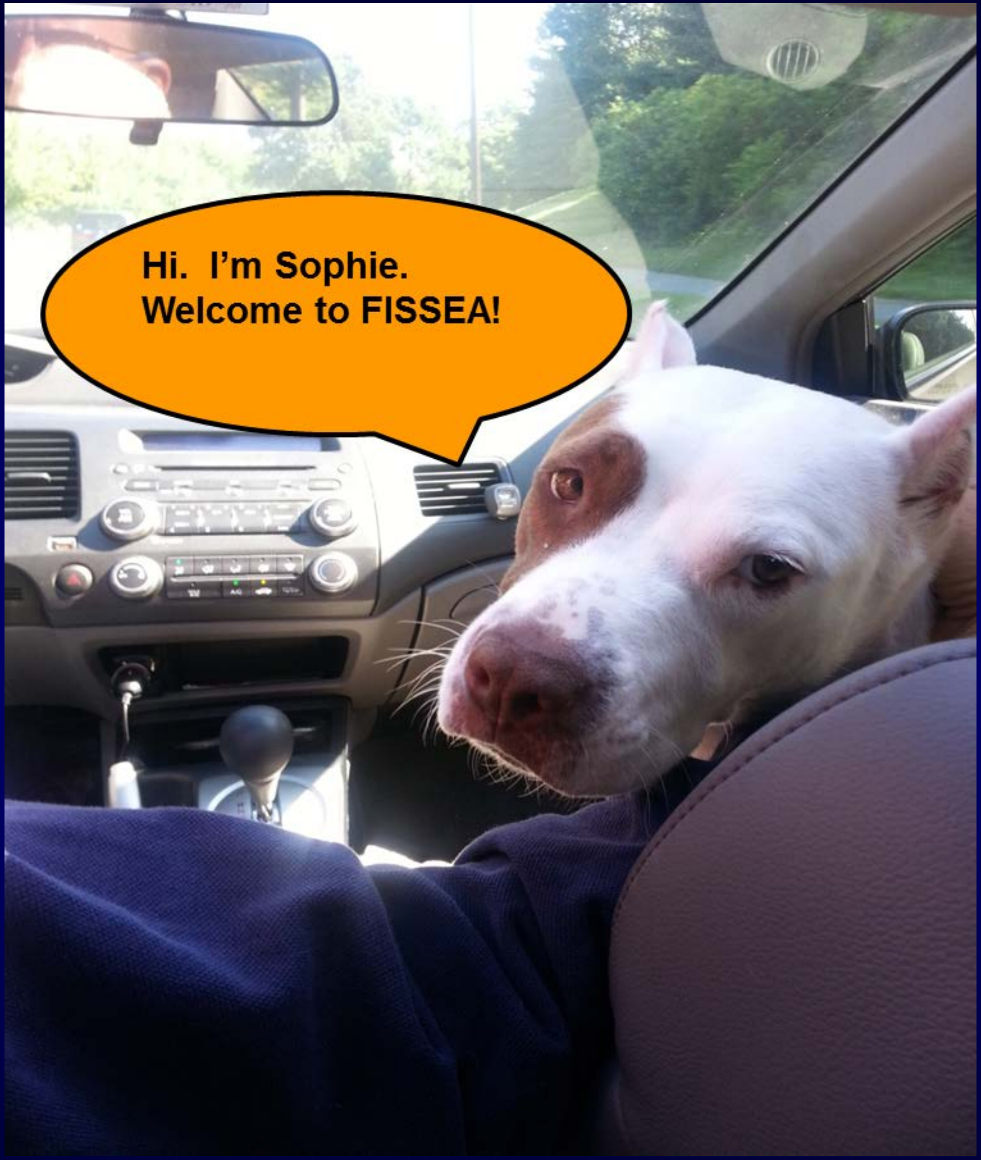
Function (threat, vulnerability, impact, likelihood)

The unlikely threat.

Our two-year old adopted pit bull.

Cute.
Lovable.
Smart.

And *mischievous*.



The vulnerability.

The impact.

and the likelihood?

100%

Something inspirational.

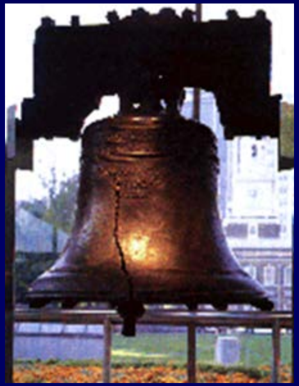
Jim Wiggins.

A cyber educator.

A great American.

Adam Devine
An American
Hero…

The Wounded Warrior Cyber Combat Academy is building the next generation of cyber defenders…



…educating our wounded veterans to they can help protect and defend the nation's critical systems.

Something important.

We the People

Article 1

The United States Constitution

"WE THE PEOPLE of the United States, in Order to form a more perfect Union, establish Justice, ensure domestic Tranquility, *provide for the common defence*, promote the general Welfare, and secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish this Constitution for the United States of America…"

Cybersecurity is critical to the future of the nation.

Cyber educators are on the front line of the fight.

The roots of education are bitter,
but the fruit is sweet.

Aristotle

The task of the modern educator is not to cut down jungles, but to irrigate deserts.

C. S. Lewis

A teacher affects eternity—
he can never tell where his
influence stops.

Henry Brooks Adams

Education is the most powerful weapon which you can use to change the world.

Nelson Mandela

Genius without education is like silver in the mine.

Benjamin Franklin

Cyber educators are building the nation’s next generation of cyber defenders.

Cybersecurity is much more than patching your systems and configuring your firewalls.

It’s about building a team of individuals with the knowledge, skills, and expertise to defend the critical systems upon which the nation depends for our survival.

We need your help in conveying the message.

- We are living in the *golden age* of information technology.
- Ironically, the same information technology that has brought unprecedented innovation and prosperity to millions, has now become a significant vulnerability to nation states, corporate entities, and individuals.

How do we provide for the common defense in the digital age?

- We are vulnerable because our information technology is fragile and susceptible to a wide range of threats including:
  - natural disasters;
  - structural failures;
  - cyber attacks; and
  - errors.

Advanced Persistent Threat

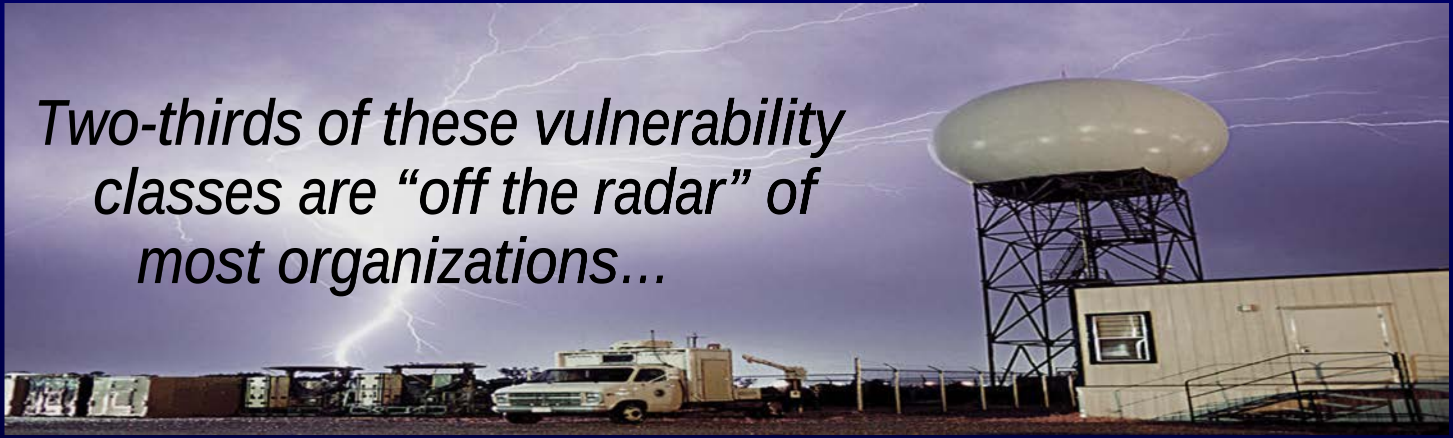
An adversary that —

- Possesses significant levels of expertise / resources.
- Creates opportunities to achieve its objectives by using multiple attack vectors (e.g., cyber, physical, deception).
- Establishes footholds within IT infrastructure of targeted organizations:
  - To exfiltrate information;
  - To undermine / impede critical aspects of a mission, program, or organization; and
  - To position itself to carry out these objectives in the future.

Classes of Vulnerabilities

A 2013 Defense Science Board Report described—

- Tier 1: Known vulnerabilities.
- Tier 2: Unknown vulnerabilities (zero-day exploits).
- Tier 3: Adversary-created vulnerabilities (APT).



Two-thirds of these vulnerability classes are "off the radar" of most organizations…

Good cyber hygiene is necessary…

But not sufficient.

You can’t count, configure, or patch your way out of this problem space.

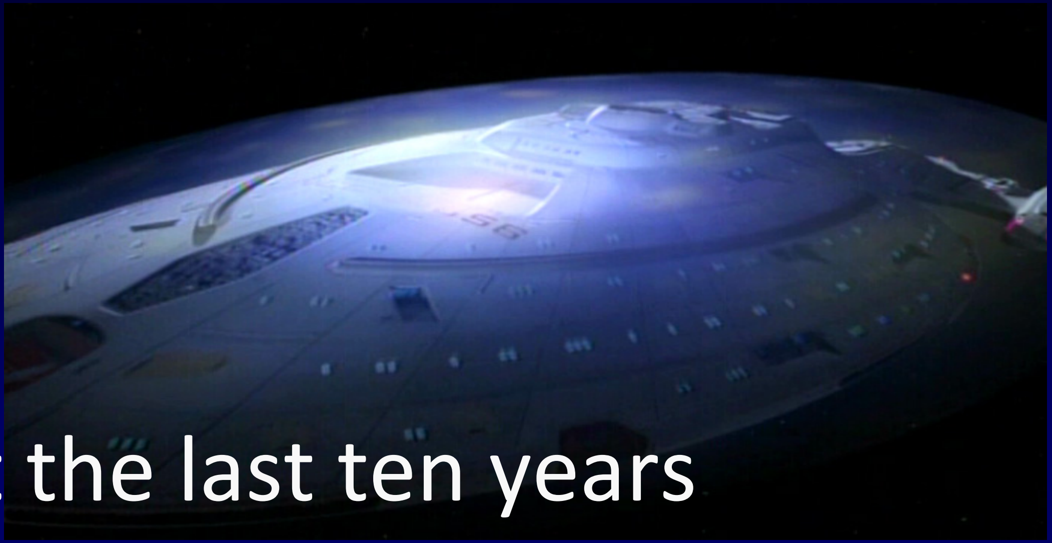
Tough decisions ahead.

The United States Federal Cyber Security Strategy…

Build It Right, Continuously Monitor

The Cyber Security Toolset

- NIST Special Publication 800-39
  Managing Information Security Risk:
  Organization, Mission, and Information System View
- NIST Special Publication 800-30
  Guide for Conducting Risk Assessments
- NIST Special Publication 800-37
  Applying the Risk Management Framework
  to Federal Information Systems
- NIST Special Publication 800-53
  Security and Privacy Controls for Federal
  Information Systems and Organizations
- NIST Special Publication 800-53A
  Guide for Assessing the Security Controls
  in Federal Information Systems and Organizations

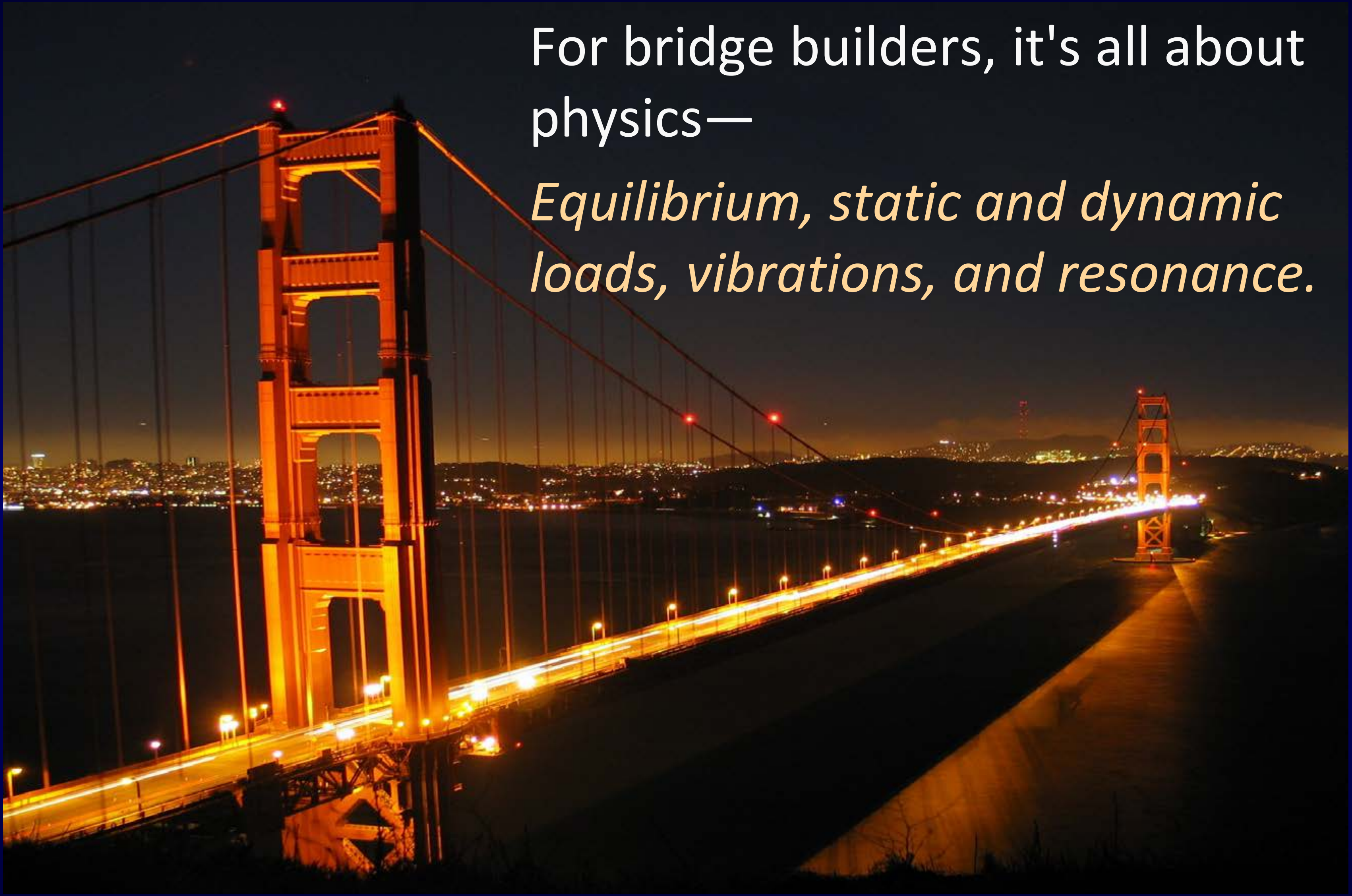


We have spent the last ten years developing and refining our information security *toolset* but have not focused on the most effective ways to use the tools, techniques, and technologies.

TACIT security focuses on the *organizational* aspects of cyber security…that is, how to effectively use the security tools, techniques, and technologies to achieve desired solutions.

TACIT security **addresses institutional and cultural issues that help organizations**

"Build It Right"



For bridge builders, it's all about physics—

Equilibrium, static and dynamic loads, vibrations, and resonance.

For information system developers, it's all about mathematics, computer science, architecture, and systems engineering—

Trustworthiness, assurance, penetration resistance and resilience.

The national imperative for building stronger, more resilient information systems…

Software assurance.

Systems and security engineering.

Supply chain risk management.

Security should be a by-product of good design and development practices.

TACIT Security

- Threat
- Assets
- Complexity
- Integration
- Trustworthiness

MERRIAM-WEBSTER DICTIONARY

tac·it *adjective*

: expressed or understood without being directly stated

Threat

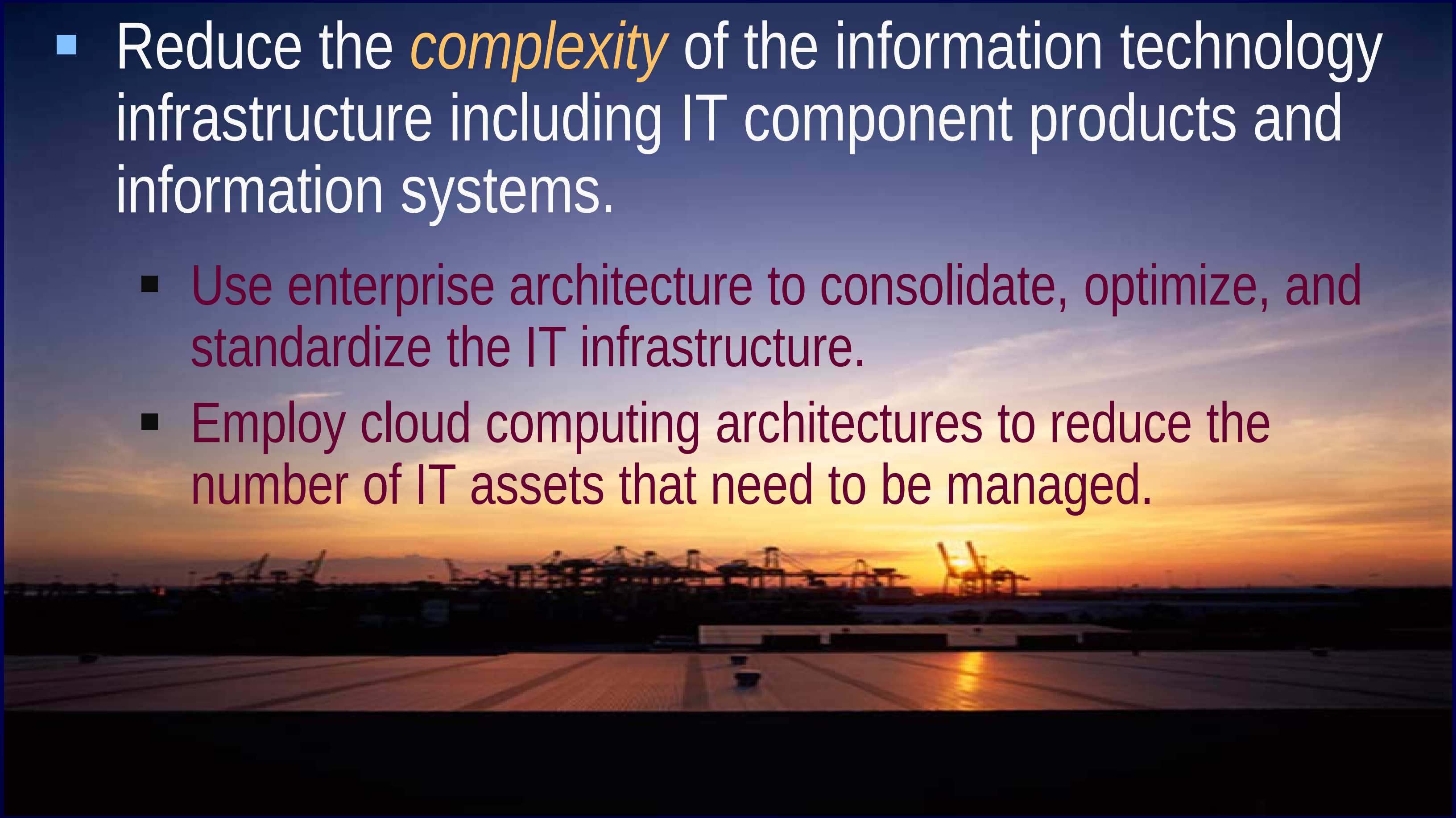
- Develop a better understanding of the *modern threat space*, including the capability of adversaries to launch sophisticated, targeted cyber-attacks that exploit specific organizational vulnerabilities.
  - Clear key organizational personnel at Top Secret and/or TS SCI levels for access to classified threat data.
  - Include external and insider threat assessments.

Assets

- Conduct a comprehensive criticality analysis of *organizational assets* including information and information systems.
  - Use FIPS Publication 199 for mission/business impact analysis (triage).
  - Subdivide high, moderate, and low impact levels to provide greater fidelity on risk assessments.

Complexity

- Reduce the *complexity* of the information technology infrastructure including IT component products and information systems.
  - Use enterprise architecture to consolidate, optimize, and standardize the IT infrastructure.
  - Employ cloud computing architectures to reduce the number of IT assets that need to be managed.



Integration

- Integrate information security requirements and the security expertise of individuals into organizational *development* and *management processes*.
  - Embed security personnel into enterprise architecture, systems engineering, SDLC, and acquisition processes.
  - Coordinate security requirements with mission/business owners; become key stakeholders.

Trustworthiness

- Invest in more *trustworthy* and *resilient* information systems supporting organizational missions and business functions.
  - Isolate critical assets into separate enclaves.
  - Implement solutions with greater strength of mechanism.
  - Increase developmental and evaluation assurance.
  - Use modular design, layered defenses, component isolation.

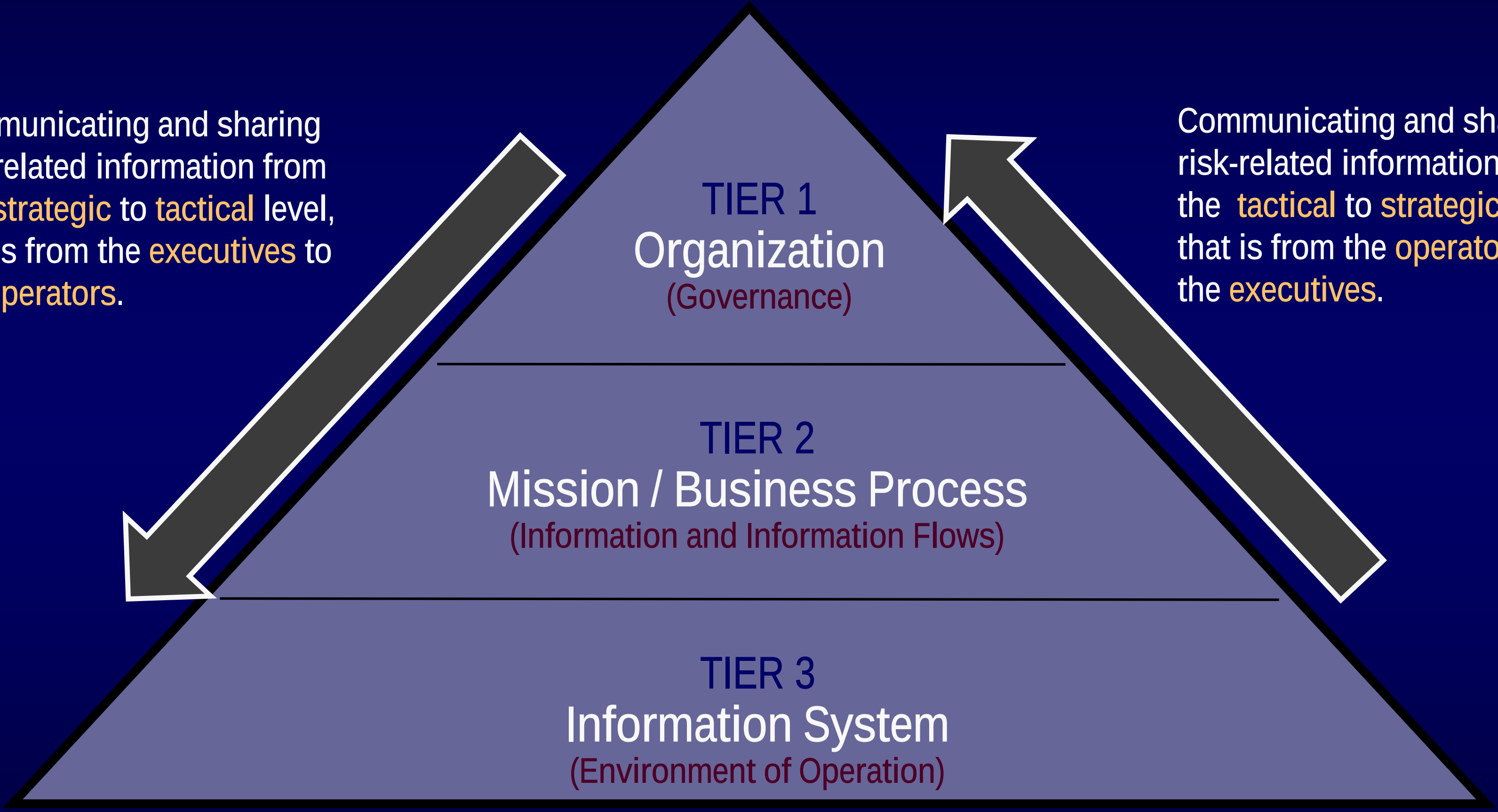
Summary – TACIT Security

- Understand the cyber threat space.
- Conduct a thorough criticality analysis of organizational assets.
- Reduce complexity of IT infrastructure.
- Integrate security requirements into organizational processes.
- Invest in trustworthiness and resilience of IT components and systems.

Concepts supporting TACIT.

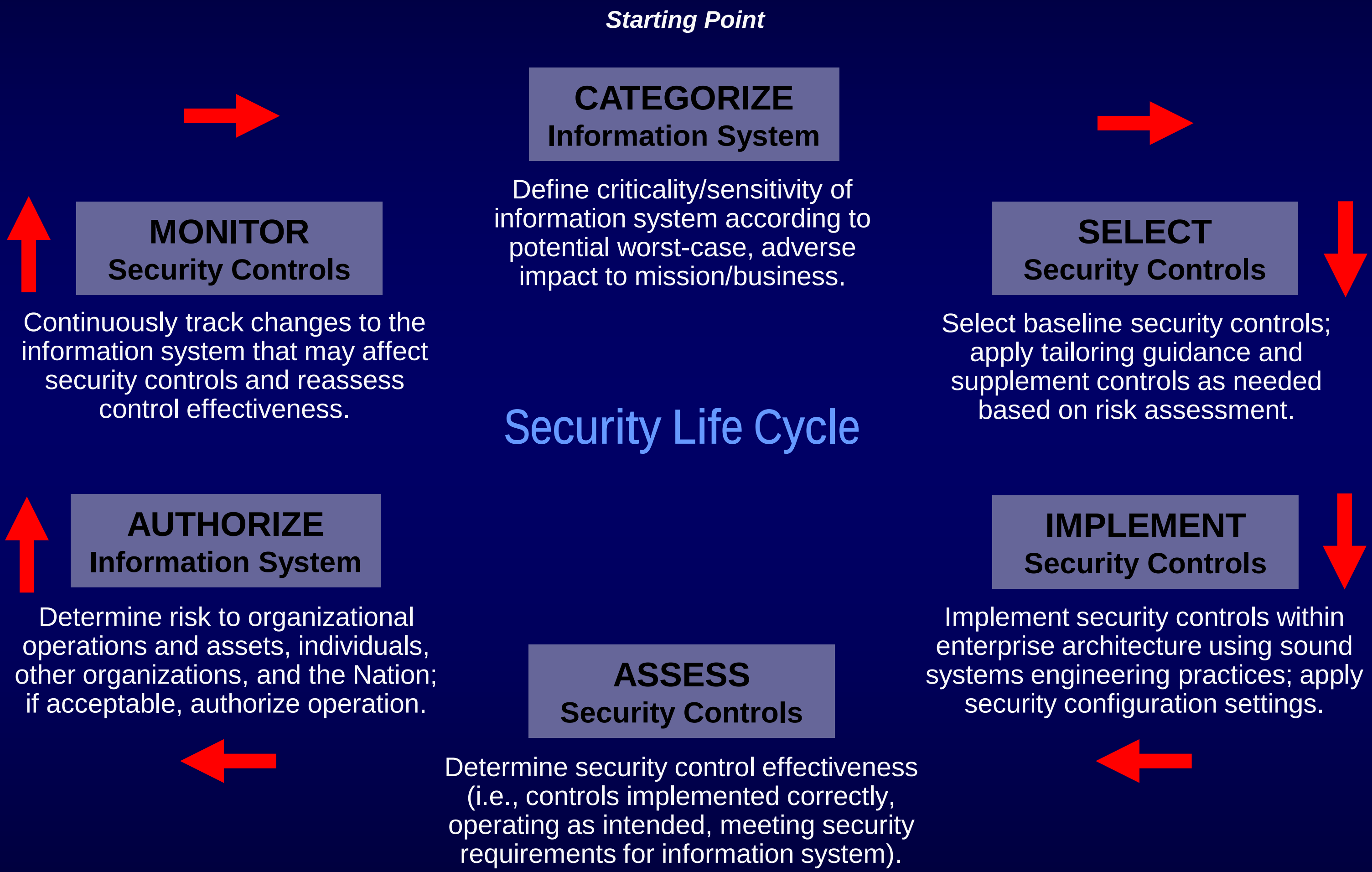
Institutionalizing Risk-Based Security

Communicating and sharing risk-related information from the strategic to tactical level, that is from the executives to the operators.


TIER 1
Organization
(Governance)
TIER 2
Mission / Business Process
(Information and Information Flows)
TIER 3
Information System
(Environment of Operation)

Communicating and sharing risk-related information from the tactical to strategic level, that is from the operators to the executives.

RMF Support – TACIT Security



Starting Point

CATEGORIZE
Information System

Define criticality/sensitivity of information system according to potential worst-case, adverse impact to mission/business.

SELECT
Security Controls

Select baseline security controls; apply tailoring guidance and supplement controls as needed based on risk assessment.

IMPLEMENT
Security Controls

Implement security controls within enterprise architecture using sound systems engineering practices; apply security configuration settings.

ASSESS
Security Controls

Determine security control effectiveness (i.e., controls implemented correctly, operating as intended, meeting security requirements for information system).

AUTHORIZE
Information System

Determine risk to organizational operations and assets, individuals, other organizations, and the Nation; if acceptable, authorize operation.

MONITOR
Security Controls

Continuously track changes to the information system that may affect security controls and reassess control effectiveness.

Security Life Cycle

Key Publications – Built It Right

- NIST Special Publication 800-53, Revision 4 New
  Security and Privacy Controls for Federal Information Systems and Organizations
  April 2013

- NIST Special Publication 800-161 New
  Supply Chain Risk Management Guideline
  Initial Public Draft – August 2013

- NIST Special Publication 800-160 New
  Security Engineering Guideline
  Initial Public Draft – Spring 2014

Build It Right – Continuously Monitor

- State-of-the-practice security and privacy controls to protect federal missions and business functions.
- Overlays tailored to missions/business functions, environments of operation, and technologies.
- Greater situational awareness from continuous monitoring.

Some final thoughts.

We choose to go to the moon in this decade and do other things. Not because they are easy, but because they are hard.

-- John F. Kennedy, 1961

Cybersecurity is the great challenge of the 21st century.

Cybersecurity problems are hard—not easy.

We depend on cyber educators to help us get over the goal line.

Critical assets must be protected differently than non-critical assets.

Critical organizational missions and business functions are at risk...

Be *proactive*, not *reactive* when it comes to protecting your organizational assets.

Necessary *and* Sufficient Security Solutions…

Cyber Security Hygiene

COUNTING, CONFIGURING, AND PATCHING IT ASSETS

Strengthening the IT Infrastructure

SYSTEM/SECURITY ENGINEERING, ARCHITECTURE, AND RESILIENCY

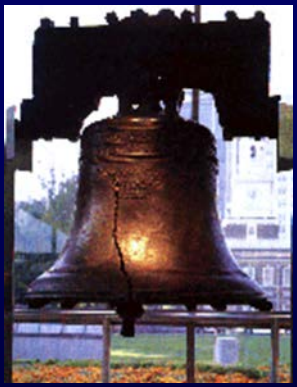
Has your organization achieved the appropriate balance?

The clock is ticking—

the time to act is now.

Failure is not an option…

when freedom and economic prosperity are at stake.



We the People

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