Next Generation Risk Management

Information Security Transformation for the Federal Government

5th Annual Security Automation Conference

October 28, 2009

Dr. Ron Ross

Computer Security Division
Information Technology Laboratory

The Fundamentals

Combating 21st century cyber attacks requires 21st century strategies, tactics, training, and technologies…

- Integration of information security into enterprise architectures and system life cycle processes.
- Common, shared information security standards for unified cyber command.
- Enterprise-wide, risk-based protection strategies.
- Flexible and agile selection / deployment of safeguards and countermeasures (maximum tactical advantage based on missions / environments of operation).
- More resilient, penetration-resistant information systems.
- Competent, capable cyber warriors.

Strategic Initiatives

The Long-term View

- Build a unified information security framework for the federal government and support contractors.
- Integrate information security and privacy requirements into enterprise architectures.
- Work with industry to develop more secure information technology products.
- Employ systems and security engineering techniques to develop more secure (penetration-resistant) information systems.

A Unified Framework

For Information Security

The Generalized Model

Unique Information Security Requirements

The "Delta"

Common Information Security Requirements

Intelligence Community	Department of Defense	Federal Civil Agencies	Private Sector State and Local Govt

Foundational Set of Information Security Standards and Guidance

- Standardized risk management process
- Standardized security categorization (criticality/sensitivity)
- Standardized security controls (safeguards/countermeasures)
- Standardized security assessment procedures
- Standardized security authorization process

National security and non national security information systems

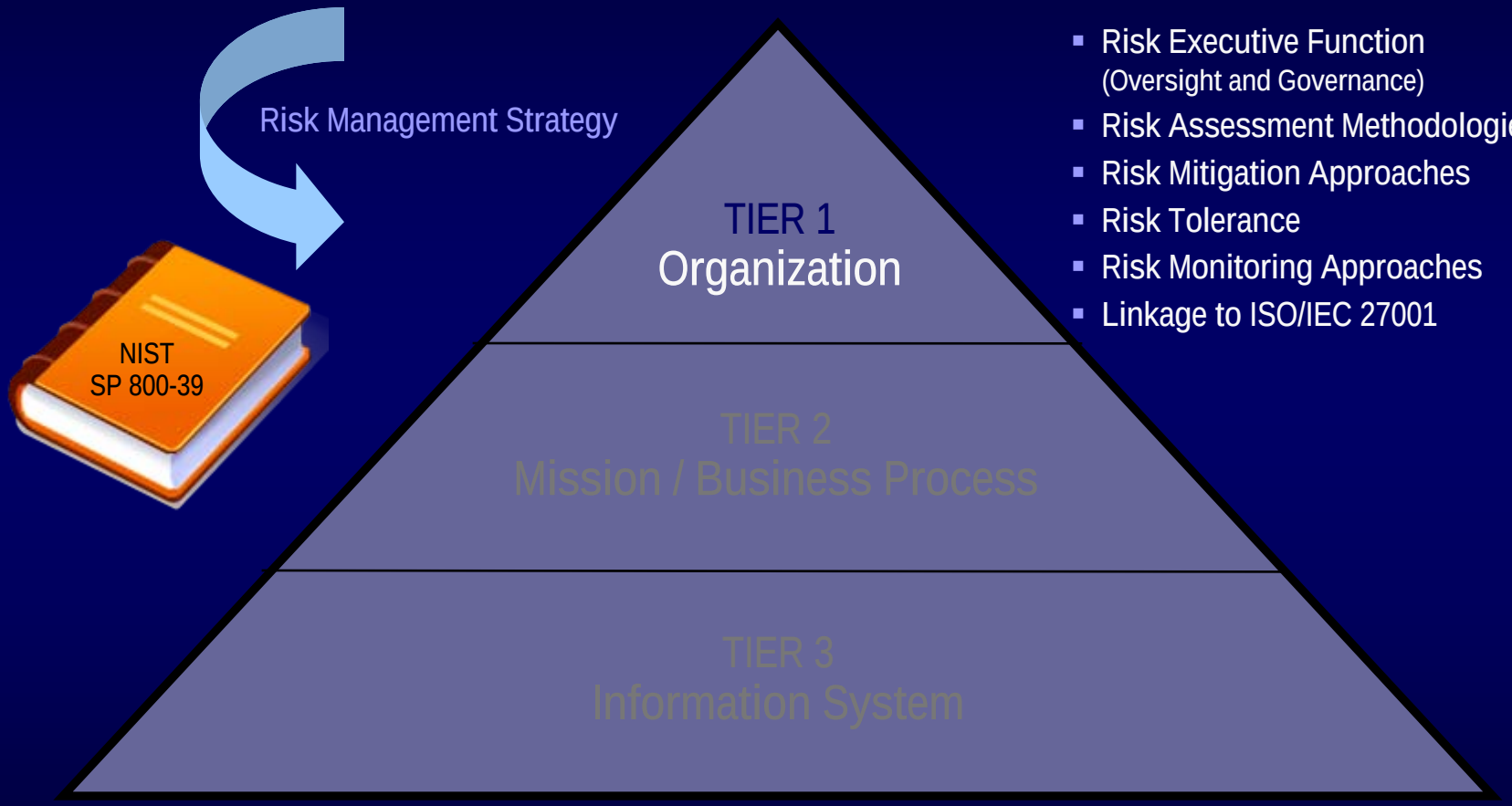
Risk Management Hierarchy

- Multi-tiered Risk Management Approach
- Implemented by the Risk Executive Function
- Enterprise Architecture and SDLC Focus
- Flexible and Agile Implementation

STRATEGIC RISK FOCUS

TACTICAL RISK FOCUS

Risk Management Hierarchy



- Risk Executive Function
  (Oversight and Governance)
- Risk Assessment Methodologies
- Risk Mitigation Approaches
- Risk Tolerance
- Risk Monitoring Approaches
- Linkage to ISO/IEC 27001

Risk Management Hierarchy

Risk Management Strategy

TIER 1
Organization

TIER 2
Mission / Business Process

TIER 3
Information System

- Mission / Business Processes
- Information Flows
- Information Categorization
- Information Protection Strategy
- Information Security Requirements
- Linkage to Enterprise Architecture

Risk Management Hierarchy

Risk Management Framework

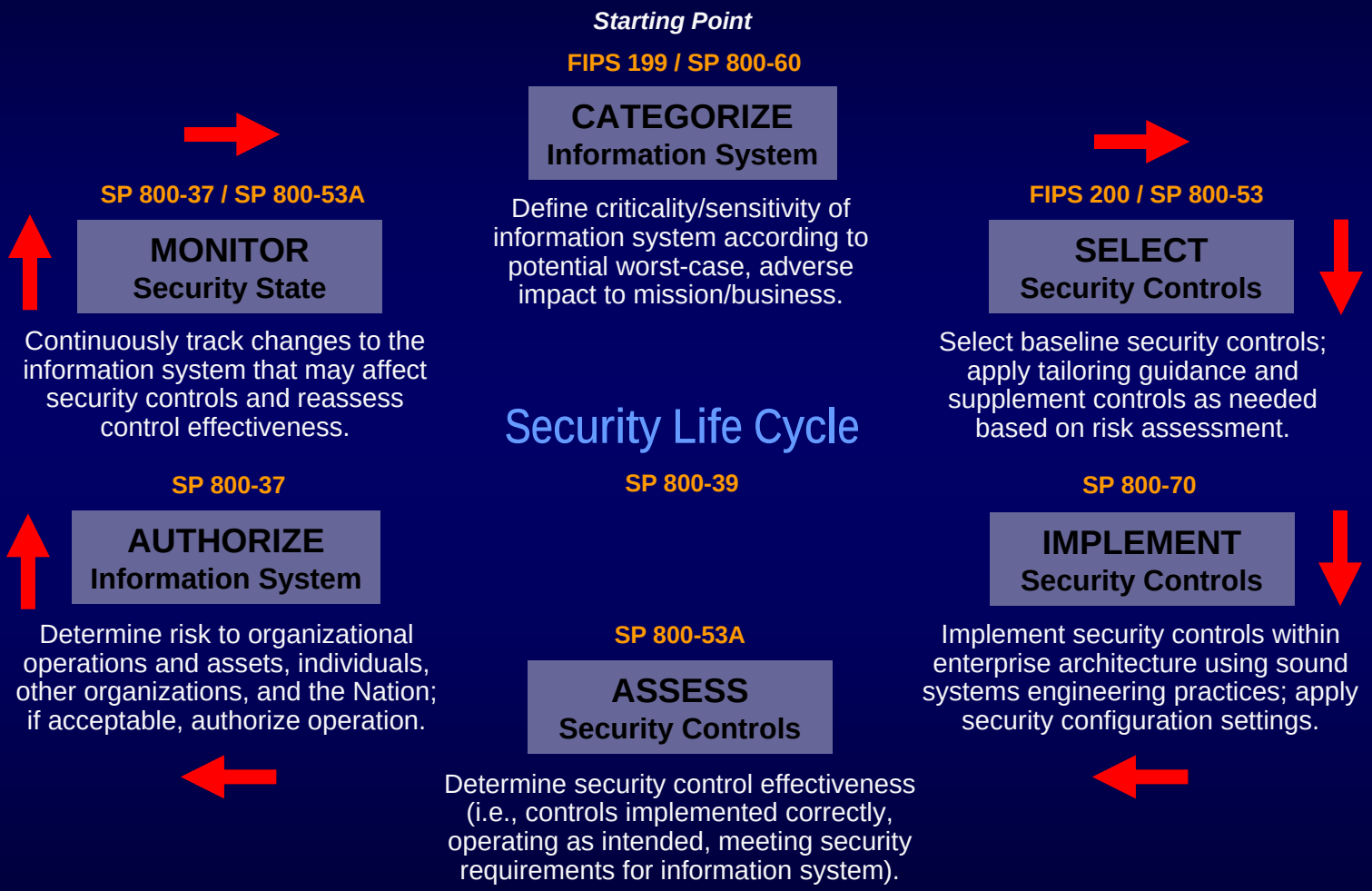
TIER 1
Organization

TIER 2
Mission / Business Process

TIER 3
Information System

- Linkage to SDLC
- Information System Categorization
- Selection of Security Controls
- Security Control Allocation and Implementation
- Security Control Assessment
- Risk Acceptance
- Continuous Monitoring

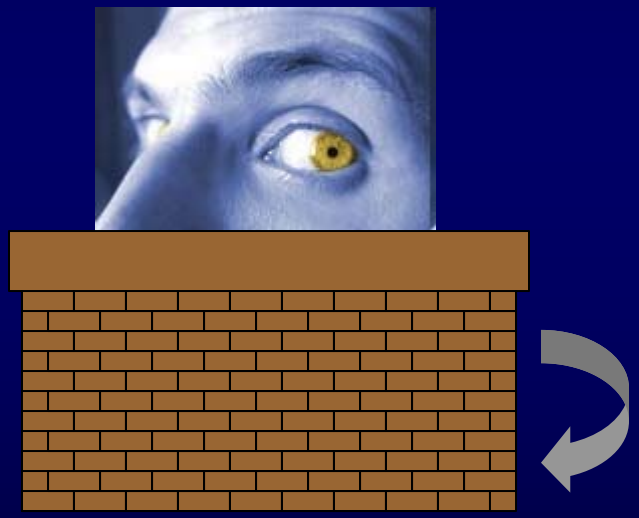
Risk Management Framework



Unconventional Wisdom

NEW RULE: *Boundary protection is no longer sufficient against high-end threats capable of launching sophisticated cyber attacks...*

- Complexity of IT products and information systems.
- Insufficient penetration resistance (trustworthiness) in commercial IT products.
- Insufficient application of information system and security engineering practices.
- Undisciplined behavior and use of information technology and systems by individuals.



The Central Question

From Two Perspectives

- **Security Capability Perspective**
  What security capability is needed to defend against a specific class of cyber threat, avoid adverse impacts, and achieve mission success? (REQUIREMENTS DEFINITION)
- **Threat Capability Perspective**
  Given a certain level of security capability, what class of cyber threat can be addressed and is that capability sufficient to avoid adverse impacts and achieve mission success? (GAP ANALYSIS)

Security Control Selection

- STEP 1: Select Baseline Security Controls
  (NECESSARY TO COUNTER THREATS)
- STEP 2: Tailor Baseline Security Controls
  (NECESSARY TO COUNTER THREATS)
- STEP 3: Supplement Tailored Baseline
  (SUFFICIENT TO COUNTER THREATS)

Cyber Preparedness

An increasingly sophisticated and motivated threat requires increasing preparedness…

Dual Protection Strategies

- **Boundary Protection**

  Primary Consideration: *Penetration Resistance*
  Adversary Location: *Outside the Defensive Perimeter*
  Objective: *Repelling the Attack*

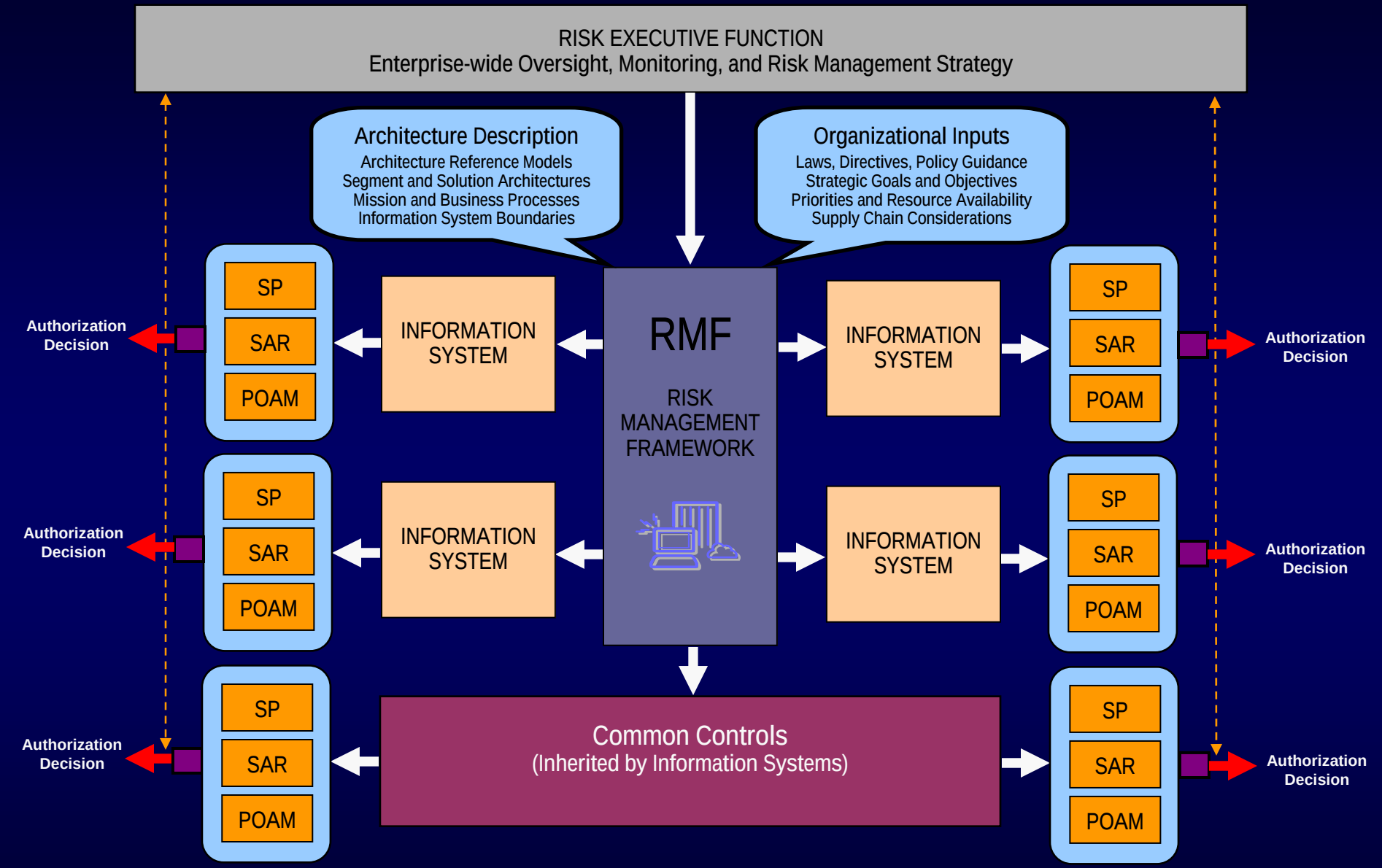
- **Agile Defense**

  Primary Consideration: *Information System Resilience*
  Adversary Location: *Inside the Defensive Perimeter*
  Objective: *Operating while under Attack*

Agile Defense

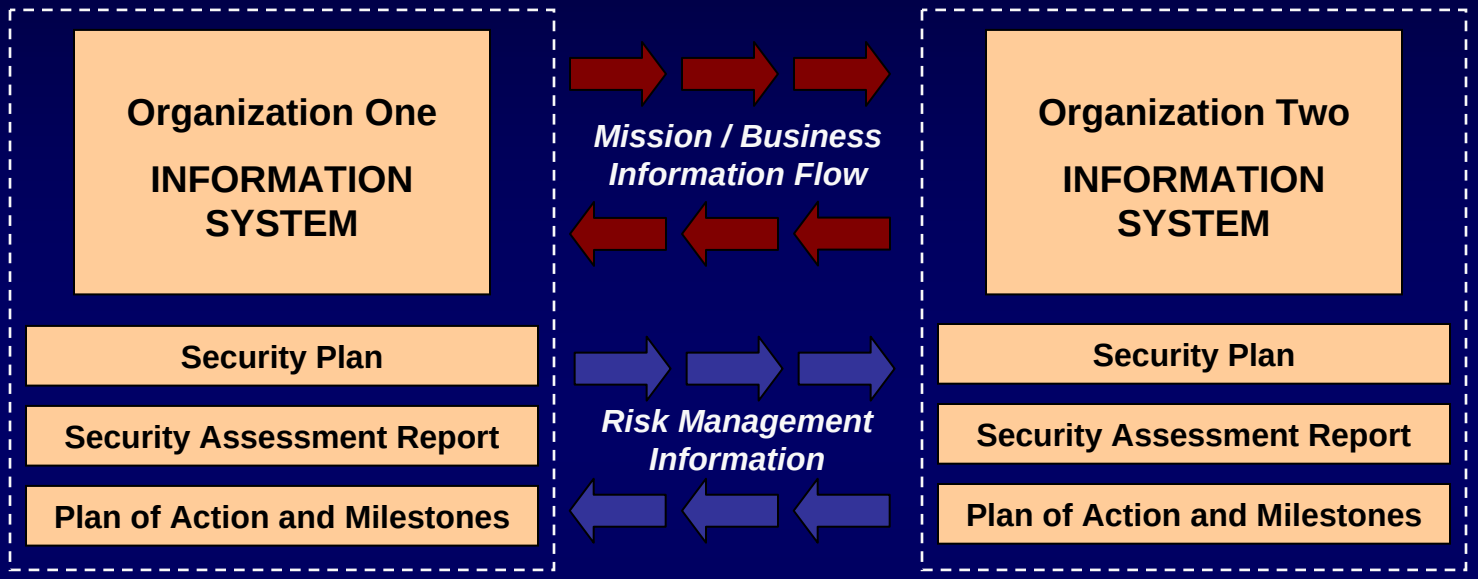
- Boundary protection is a necessary but not sufficient condition for *Agile Defense*
- Examples of *Agile Defense* measures:
  - Compartmentalization and segregation of critical assets
  - Targeted allocation of security controls
  - Virtualization and obfuscation techniques
  - Encryption of data at rest
  - Limiting of privileges
  - Routine reconstitution to known secure state

Bottom Line: Limit damage of hostile attack while operating in a (potentially) degraded mode…



SP: Security Plan
SAR: Security Assessment Report
POAM: Plan of Action and Milestones

Trust and Reciprocity



Determining risk to the organization's operations and assets, individuals, other organizations, and the Nation; and the acceptability of such risk.

Determining risk to the organization's operations and assets, individuals, other organizations, and the Nation; and the acceptability of such risk.

The objective is to achieve transparency of prospective partner's information security programs and processes…establishing trust relationships based on common, shared risk management principles.

Key Risk Management Publication

- NIST Special Publication 800-53, Revision 3
  Recommended Security Controls for Federal Information Systems and Organizations

  August 2009

  - Updating all material from NIST Special Publication 800-53, Revision 2
  - Incorporating security controls from Draft CNSS Instruction 1253
  - Incorporating new security controls for advanced cyber threats
  - Incorporating information security program-level controls
  - Incorporating threat appendix for cyber preparedness
    (Separately vetted and added to SP 800-53, Revision 3 when completed)

Key Risk Management Publication

- NIST Special Publication 800-37, Revision 1
  Guide for Applying the Risk Management Framework to Federal Information Systems

  Projected: January 2010

  - Incorporating comments from Initial Public Draft
  - Implementing guideline for Risk Management Framework
  - Transforming previous certification and accreditation process
  - Integrating Risk Management Framework into the SDLC
  - Greater emphasis on ongoing monitoring of information system security state
  - Ongoing security authorizations informed by risk executive function
  - Greater accountability and assurances for common (inherited) controls
  - Increased use of automated support tools

Key Risk Management Publication

- NIST Special Publication 800-39
  Integrated Enterprise-wide Risk Management
  Organization, Mission, and Information Systems View

  Projected: February 2010

  - Incorporating public comments from NIST Special Publication 800-39, Second Public Draft
  - Incorporating three-tiered risk management approach: organization, mission/business process, and information system views
  - Incorporating cyber preparedness information
  - Providing ISO/IEC 27001 mapping to risk management publications

Key Risk Management Publication

- NIST Special Publication 800-53A, Revision 1
  Guide for Assessing the Security Controls in Federal Information Systems and Organizations

  Projected: January 2010

  - Updating all assessment procedures to ensure consistency with NIST Special Publication 800-53, Revision 3
  - Developing new assessment procedures for information security program management controls
  - Updating web-based assessment cases for inventory of assessment procedures

Key Risk Management Publication

- NIST Special Publication 800-30, Revision 1 (Initial Public Draft)
  Guide for Conducting Risk Assessments

  Projected: February 2010

  - Down scoping current publication from risk management focus to risk assessment focus
  - Providing guidance for conducting risk assessments at each step in the Risk Management Framework
  - Incorporating threat information for cyber preparedness

Transformation… Getting There

Current State

- Lack of reciprocity in authorization and assessment results
- Resource intensive
- Redundant and duplicative activities
- Inconsistent policy and process implementation
- Lack of automation (for both workflow and testing tools)
- Lack of standardized documentation and artifacts to facilitate informed decisions
- Three-year “Paperwork Drill”

The Future

- Enabled reciprocity and information sharing
- Improve security postures (architecture and information)
- Streamline processes and improve end-product quality
- Uniform set of policies and practices
- Consistent implementation and use of automated tools
- More effective resource allocation; reduce costs
- Continuous monitoring

Contact Information

100 Bureau Drive Mailstop 8930
Gaithersburg, MD USA 20899-8930

Project Leader

Dr. Ron Ross
(301) 975-5390
ron.ross@nist.gov

Administrative Support

Peggy Himes
(301) 975-2489
peggy.himes@nist.gov

Senior Information Security Researchers and Technical Support

Marianne Swanson
(301) 975-3293
marianne.swanson@nist.gov

Dr. Stu Katzke
(301) 975-4768
skatzke@nist.gov

Pat Toth
(301) 975-5140
patricia.toth@nist.gov

Arnold Johnson
(301) 975-3247
arnold.johnson@nist.gov

Kelley Dempsey
(301) 975-2827
kelley.dempsey@nist.gov

Information and Feedback
Web: csrc.nist.gov/sec-cert
Comments: sec-cert@nist.gov