Security Configuration Management

Security Automation Conference

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The Threat Situation

Continuing serious cyber attacks on public and private sector information systems, large and small; targeting key operations and assets…

- Attacks are organized, disciplined, aggressive, and well resourced; many are extremely sophisticated.
- Adversaries are nation states, terrorist groups, criminals, hackers, and individuals or groups with intentions of compromising federal information systems.
- Effective deployment of malicious software causing significant exfiltration of sensitive information (including intellectual property) and potential for disruption of critical information systems/services.

The Flash Drive Incident

Targeting U.S. Department of Defense—

- Malware on flash drive infected military laptop computer at base in Middle East.
- Foreign intelligence agency is the suspected source.
- Malware uploaded itself to Central Command network.
- Code spread undetected to classified and unclassified systems establishing digital beachhead.
- Rogue program poised to silently steal military secrets.

McAfee Threats Report (2Q 2010)*

- McAfee saw 550,000 and 280,000 AutoRun attacks (malware that uses USB or portable storage devices to spread) in April and May respectively
- The top detection continues to be the Generic!atr Trojan, which was reported on nearly 9 percent of machines scanned worldwide by McAfee.
- In general, malware being produced is on the increase: 10 million new pieces of malware in the first half of this year! (as opposed to 9 million in the same period last year)
- This makes the first six months of 2010 the most active half-year ever for total malware production.

*http://www.mcafee.com/us/threat_center/default.asp

Potentially Unwanted Programs (PUPS)*

- Created by an entity for a purpose that benefits the entity but usually not the user
- Often alters the security state of the computer on which they are installed or the privacy posture of the computer user
- May intentionally shut down, disable, or weaken security tools such as browser security settings, firewall settings, or AV products.
- Peer-to-Peer file-sharing programs often act as a carrier for PUPs and other malware.
- **A robust and automated security configuration management program would greatly reduce the effectiveness of PUPs and other malware by detecting and preventing installation of unauthorized software** (whitelists, etc.) **and/or notifying administrators of changes to baseline configurations.**

*http://www.mcafee.com/us/threat_center/default.asp – info taken from a McAfee White Paper on PUPs

SCM – What is It?

- Security configuration management is the management and control of configurations for an information system with the goal of enabling security and managing risk.
- SCM does require an ongoing investment in time and resources
- SCM is a continuous, ongoing activity that touches all stages of the system development life cycle
- SCM should be incorporated into any existing organizational configuration management program

Guide for Security Configuration Management of Information Systems

NIST Special Publication (SP) 800-128:

- Provides guidance for implementation of Configuration Management (CM) family controls from 800-53 Rev 3
- Initial Public Draft released 18 March 2010
- Public comments were accepted through 14 June 2010
- Implementation and continued operation of ***many*** **non**-CM controls are dependent on secure configurations and configuration change control

SP 800-128 Phases

- Planning Phase
- Configuring to a Secure State Phase (implementing)
- Maintaining the Secure State Phase
- Monitoring

Planning Phase

- Establish/Develop Organizational and System level policies and procedures (CM-1)
- Develop Configuration Management Plan (CM-1/CM-9)
- Establish Change Control Board (CM-3)
- Develop IS Component Inventory (CM-8)
- Indentify Configuration Items (CM-3)

Configure to Secure State Phase

- Establish Secure Configurations (CM-6/CM-7)
- Implement & test Secure Configurations (CM-6/CM-7) and modify if necessary
- Document the finalized Secure Baseline Configuration (CM-2)

Maintaining Secure State Phase

- Implement Access Restrictions for Change (CM-5)
- Implement Configuration Change Control process to manage changes to the Baseline Configuration (CM-3)
- Conduct Security Impact Analyses for changes (CM-4)
- Document changes (new baseline) and archive previous baseline(s) (CM-2)

Monitor Phase

- Assess configurations on an ongoing basis using automated tools
  - Changes to Baselines (actual configuration settings, unauthorized software, etc.)
  - Changes in IS Component Inventory
- Analyze causes of unauthorized changes
- Report configuration status to senior management [Authorizing Official, RE(F), etc.]
- Monitor Phase activities support the generation of metrics
- Monitor Phase activities support all CM Family controls

800-128 Appendices

- The usual suspects
  - General references
  - Glossary
  - Acronyms
- Sample Templates
  - SCM Plan
  - Change Request
- Best Practices w/references to NIST SPs
- SCM Process Flowcharts

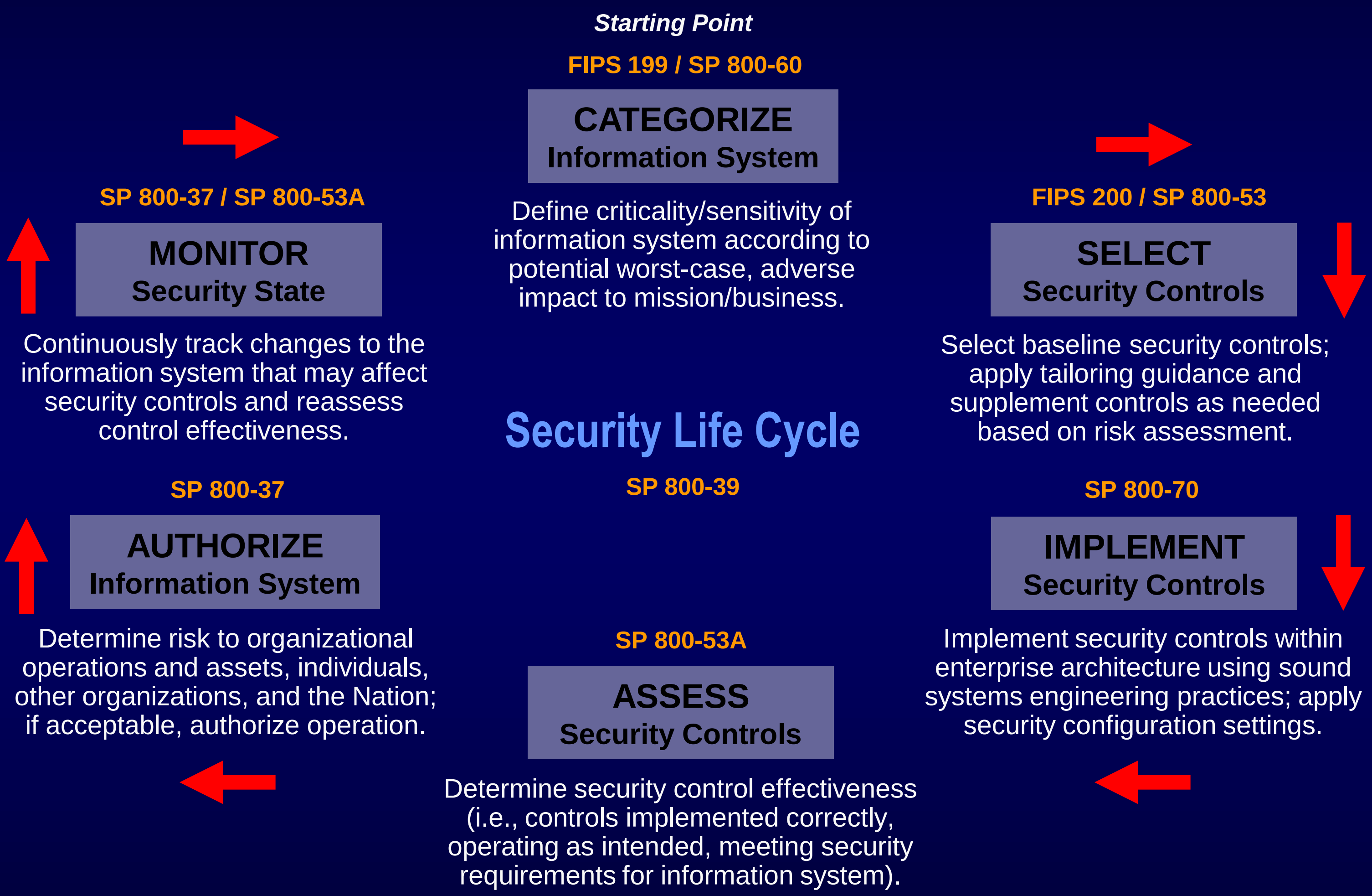
SCM - Why Is It Important?

- Change happens!
- Once a secure configuration is implemented, subsequent changes must be controlled
- In the absence of SCM, an asset that is securely configured today will most likely not be secure within a short period of time
- SCM ensures configuration changes are controlled (approved, analyzed, tested)

SCM - Why Is It Important? (#2)

- Without SCM, unauthorized, unanalyzed, and untested changes will render systems, networks, and organizations vulnerable to a wide range of threats
- In addition, SCM:
  - Facilitates asset management
  - Improves incident response, help desk, disaster recovery, and problem solving
  - Aids in software development and release management
  - Enables process automation
  - Supports compliance with policies and preparation for audits
- SCM is vital to the establishment and maintenance of security of information and information systems

Risk Management Framework



Starting Point

FIPS 199 / SP 800-60

CATEGORIZE
Information System

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

FIPS 200 / SP 800-53

SELECT
Security Controls

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

SP 800-70

IMPLEMENT
Security Controls

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

SP 800-53A

ASSESS
Security Controls

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

SP 800-37

AUTHORIZE
Information System

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

SP 800-37 / SP 800-53A

MONITOR
Security State

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

Security Life Cycle

SP 800-39

NIST SP 800-128 and the RMF (#1)

- RMF - Categorize Step
  - Planning Phase of SCM
  - System information types and overall system impact level, along with organization- and system-level assessment of risk, determine the 800-53 baseline to be applied and level of effort for SCM implementation
- RMF - Select Step
  - Planning Phase of SCM
  - Tailor and supplement CM family of controls
- RMF - Implement Step
  - Configure to Secure State Phase of SCM
  - Establish, implement, test for functionality, and document Secure Configurations/Baselines

NIST SP 800-128 and the RMF (#2)

- RMF - Assess Step
  - Configure to Secure State Phase of SCM
  - Test secure configuration implementations for effectiveness (i.e., is the secure configuration operating as intended with respect to protecting the system)
- RMF - Authorize Step
  - Configure to Secure State Phase of SCM
  - Authorizing Official may require changes to the secure configuration and/or implementation of additional controls
- RMF - Monitor Step
  - Maintain the Secure State Phase of SCM
  - Monitor Phase of SCM

NIST SP 800-128 and SCAP

- SCAP = Security Content Automation Protocol
- The primary purpose of SCAP is to improve the automated application, verification, and reporting of commercial information technology product-specific **security configuration settings**.
- SCAP-expressed checklists can **map to secure configuration settings**
- If SCAP-enabled tools are not available, plan ahead by **implementing SCAP-expressed checklists for secure configurations**
- Encourage security software vendors to incorporate support for SCAP specifications (CCE, CPE, CVE, XCCDF)

NIST SP 800-128 and Continuous Monitoring

An effective Continuous Monitoring program includes:

- **Configuration Management and Control Processes**
  - Configuration Management is an important precondition to the success of a Continuous Monitoring program
  - Without configuration control down to the component level, monitoring will result in inaccurate risk data
- **Security impact analyses** on changes to systems and environments of operation
  - SIA determines the extent to which a change may effect implemented security controls
  - SIA is an essential factor for SCM and thus also for Continuous Monitoring

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