NIST Risk Management Framework Overview

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- Supporting Publications
- The RMF Steps
  - Step 1: Categorize
  - Step 2: Select
  - Step 3: Implement
  - Step 4: Assess
  - Step 5: Authorize
  - Step 6: Monitor
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NIST Special Publication 800-37, Guide for Applying the Risk Management Framework

- A holistic and comprehensive risk management process
- Integrates the Risk Management Framework (RMF) into the system development lifecycle (SDLC)
- Provides processes (tasks) for each of the six steps in the RMF at the system level

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

Supporting Publications

Federal Information Processing Standards (FIPS)

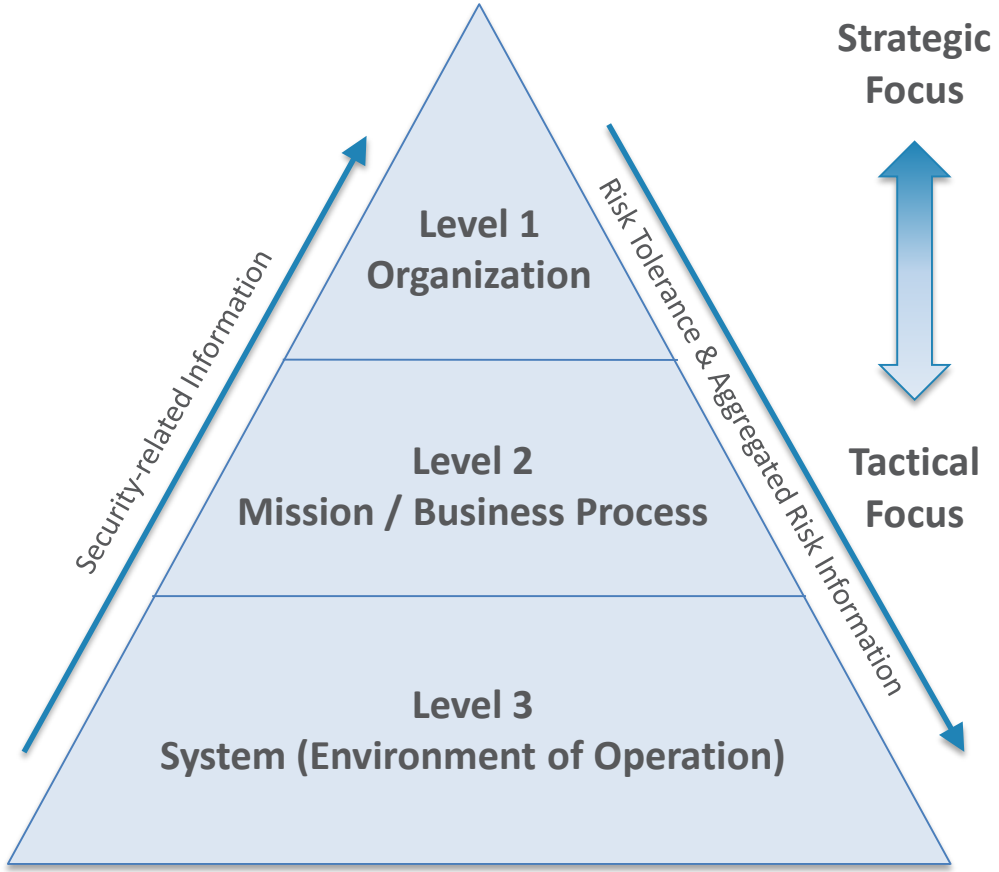
- FIPS 199 – Standards for Security Categorization
- FIPS 200 – Minimum Security Requirements

Special Publications (SPs)

- SP 800-18 – Guide for System Security Plan Development
- SP 800-30 – Guide for Conducting Risk Assessments
- SP 800-34 – Guide for Contingency Plan development
- SP 800-37 – Guide for Applying the Risk Management Framework
- SP 800-39 – Managing Information Security Risk
- SP 800-53/53A – Security Controls Catalog and Assessment Procedures
- SP 800-60 – Mapping Information Types to Security Categories
- SP 800-128 – Security-focused Configuration Management
- SP 800-137 – Information Security Continuous Monitoring
- Many others for operational and technical implementations

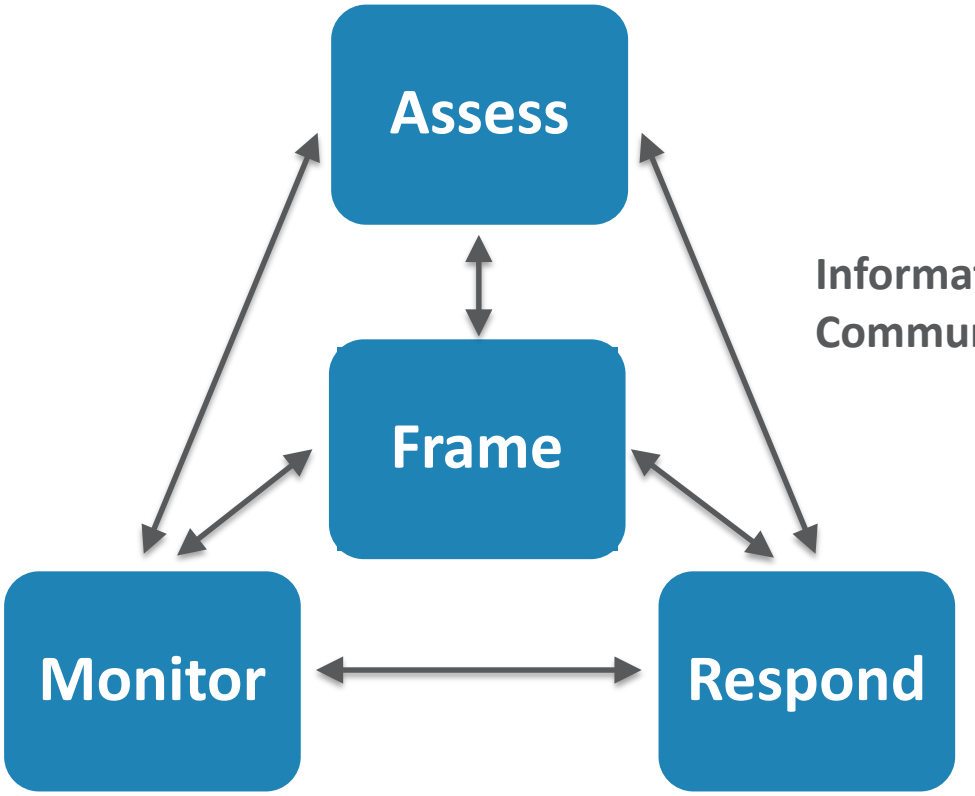
NIST SP 800-39: Managing Information Security Risk – Organization, Mission, and Information System View

- Multi-level risk management approach
- Implemented by the Risk Executive Function
- Enterprise Architecture and SDLC Focus
- Supports all steps in the RMF



Three Levels of Organization-Wide Risk Management

NIST SP 800-39: Managing Information Security Risk – Organization, Mission, and Information System View



Risk Management Process

NIST Special Publication 800-30, Guide to Conducting Risk Assessments

- Addresses the Assessing Risk component of Risk Management (from SP 800-39)
- Provides guidance on applying risk assessment concepts to:
  - All three tiers in the risk management hierarchy
  - Each step in the Risk Management Framework
- Supports all steps of the RMF
- A 3-step Process
  - Step 1: Prepare for assessment
  - Step 2: Conduct the assessment
  - Step 3: Maintain the assessment

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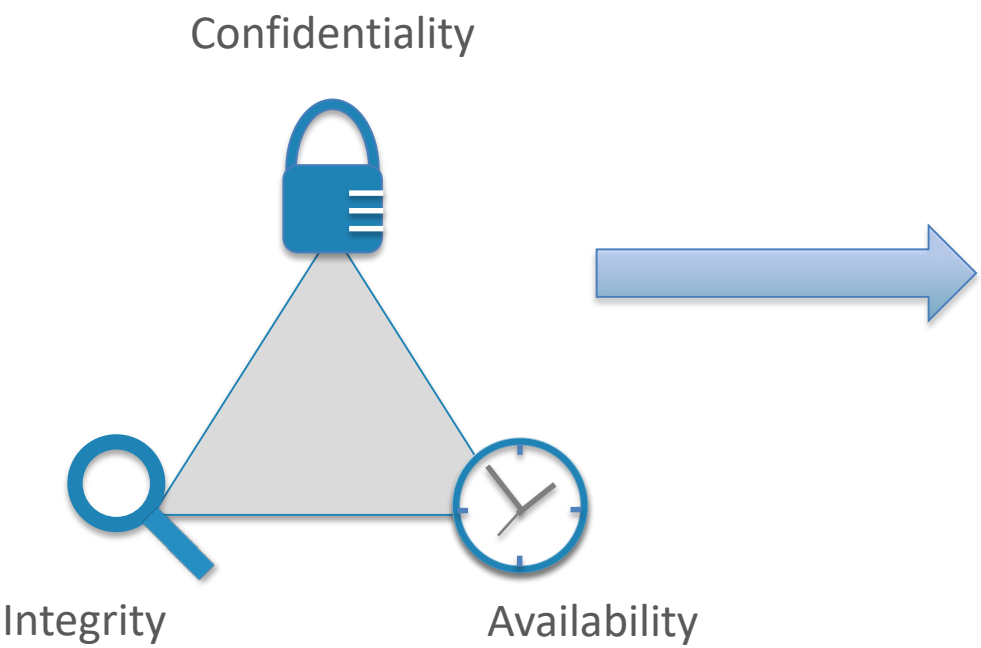
NIST RMF Step 1: Categorize

Purpose: Determine the **criticality** of the **information and system** according to potential worst-case, adverse **impact** to the organization, mission/business functions, and the system.

Federal Information Processing Standard (FIPS) 199

Standards for Security Categorization of Federal Information and Information Systems

Security Objectives



Impact Level

Low: loss has limited adverse impact

Moderate: loss has serious adverse impact

High: loss has catastrophic adverse impact

NIST RMF Step 2: Select

Purpose:

- **Select** security controls starting with the appropriate baseline **using categorization output** from Step 1
- Apply **tailoring guidance** as needed based on **risk assessment**

Federal Information Processing Standard (FIPS) 200

Minimum Security Requirements for Federal Information and Information Systems

- Defines **17 security-related areas** (families) that:
  - Represent a broad-based, balanced security program
  - Include management, operational, and technical security controls (all are needed for defense in depth)
- Specifies that a **minimum baseline of security controls**, as defined in NIST SP 800-53, will be implemented
- Specifies that the **baselines are to be appropriately tailored**

NIST Special Publication 800-53

Security and Privacy Controls for Information Systems and Organizations

- A **catalog** of security controls
- Defines **three security baselines** (L, M, H)
- Initial version published in 2005
- Currently using Rev. 4 (2013)

- ***Undergoing update*** to Rev. 5, draft released in Aug 2017 for public comment

Security and Privacy Controls

- A countermeasure prescribed for system or an organization designed to protect the confidentiality, integrity, and availability of its information and to meet a set of defined requirements.
- Security and privacy controls are intentionally not focused on any specific technologies

- Control implementations and assessment methods **may vary** based on the technology to which the control is being applied, e.g.:
  - Cloud-based systems
  - Mobile systems
  - Applications

SP 800-53 Control Families

AC – Access Control	MP – Media Protection
AT – Awareness and Training	PA* – Privacy Authorization
AU – Audit and Accountability	PE – Physical and Environmental Protection
CA – Security Assessment and Authorization	PL – Planning
CM – Configuration Management	PM – Program Management
CP – Contingency Planning	PS – Personnel Security
IA – Identification and Authentication	RA – Risk Assessment
IP* – Individual Participation	SA – System and Service Acquisition
IR – Incident Response	SC – System and Communication Protection
MA - Maintenance	SI – System and Information Integrity

SP 800-53 Control Baselines

- Baselines are defined in Appendix D
- Determined by:
  - Information and system categorization (L, M, H)
  - Organizational risk assessment and risk tolerance
  - System level risk assessment
- Baselines **can** and **should** be **tailored, based on RISK**, to fit the mission and system environment
- Some controls are not included in baselines

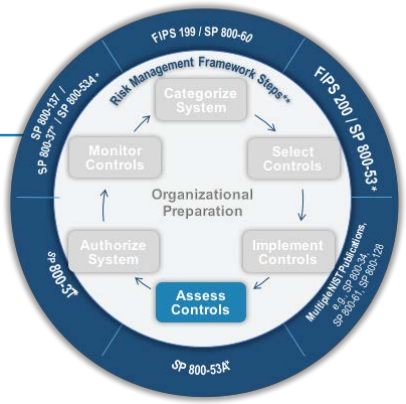
NIST RMF Step 3: Implement

Purpose: **Implement** security controls within enterprise architecture and systems using sound system security engineering practices (see SP 800-160); **apply security configuration settings**.

Implementation Tips

- Plan for control implementation during the development phase of the SDLC – **BAKE IT IN**
- Many NIST publications are available to provide implementation guidance on a wide range of controls and control types (https://csrc.nist.gov)
- Implementation may include:
  - Writing and following policies, plans, and operational procedures
  - Configuring settings in operating systems and applications
  - Installing tools/software to automate control implementation
- Training

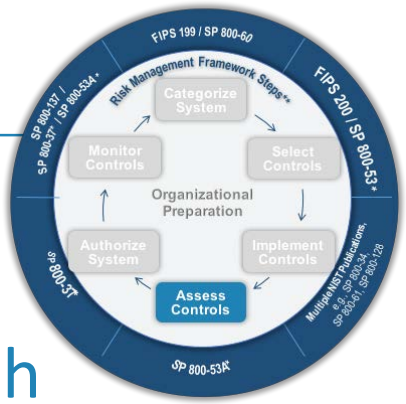
NIST RMF Step 4: Assess



Purpose: Determine **security control effectiveness** – are controls **implemented correctly, operating as intended, and meeting the security requirements** for the system and environment of operation?

NIST Special Publication 800-53A

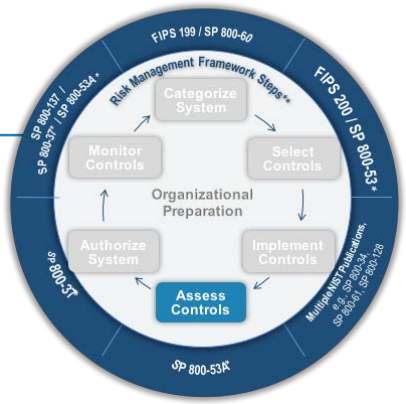
Assessing Security and Privacy Controls in Systems and Organizations: Building Effective Security Assessment Plans



- Supports RMF Step 4 (Assess)
- Is a companion document to 800-53
- Is updated shortly after 800-53 is updated

- Describes high level procedures for assessing security controls for effectiveness
- Defines assessment procedures using
  - Assessment Objectives
  - Assessment Methods
  - Assessment Objects

SP 800-53A Assessment Steps



1. Develop the Security Assessment Plan
   a. Determine which controls are to be assessed
   b. Select appropriate procedures to assess those controls
   c. Determine depth and coverage needed for assurance
   d. Tailor the assessment procedures
   e. Finalize the plan and obtain approval
2. Conduct the assessment
3. Analyze the results
4. Create the Security Assessment Report

SP 800-53A Assessment Procedures "Parts"

- Assessment **objectives** – determination statements
- Three assessment **methods** and associated assessment **objects**
  - **Interview** – objects are individuals/groups of individuals
  - **Examine** – objects include:
    - Specifications (e.g., documents - policies, procedures, designs)
    - Mechanisms (e.g., functionality in HW, SW, firmware)
    - Activities (e.g., system ops, administration, mgmt., exercises)
  - **Test** – objects include:
    - Mechanisms (e.g., HW, SW, firmware)
    - Activities (e.g., system ops, administration, mgmt., exercises)

NIST RMF Step 5: Authorize

Purpose:

- The Authorizing Official (AO) **examines the output** of the security controls assessment to **determine whether or not the risk is acceptable**
- The AO may consult with the Risk Executive (Function), the Chief Information Officer, the Chief Information Security Officer, as needed since aggregate risk should be considered for the authorization decision
- After the initial authorization, ongoing authorization is put in place using output from continuous monitoring (see Supplemental Guidance on Ongoing Authorization at: http://csrc.nist.gov/publications/nistpubs/800-37-rev1/nist_oa_guidance.pdf)

NIST RMF Step 6: Monitor

Purpose:

- **Continuously monitor** controls implemented for the system and its environment of operation for changes, signs of attack, etc. that may affect controls, and reassess control effectiveness
- **Incorporate all monitoring** (800-39 risk monitoring, 800-128 configuration management monitoring, 800-137 control effectiveness monitoring, etc.) into **an integrated organization-wide monitoring program**

Examples of Applications

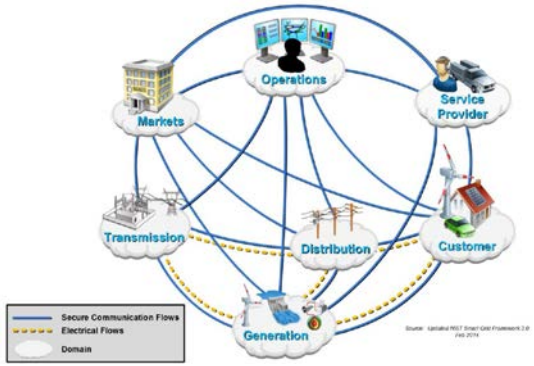
Committee on National Security Systems

Overlays for specific **national security systems/operational environments**, such as: space platform, privacy, classified information, etc.

FedRAMP

The Federal Risk and Authorization Management Program (FedRAMP) is a government-wide program that provides a standardized approach to **security assessment, authorization, and continuous monitoring** for **cloud** products and services.

NIST Interagency Report 7628, Rev. 1, Guidelines for Smart Grid Cybersecurity



Additional Resources and Contact Information

FISMA Publications: sec-cert@nist.gov

https://csrc.nist.gov/Projects/Risk-Management

@usaNISTgov
@NISTcyber

THANK YOU!