Defense Acquisition University

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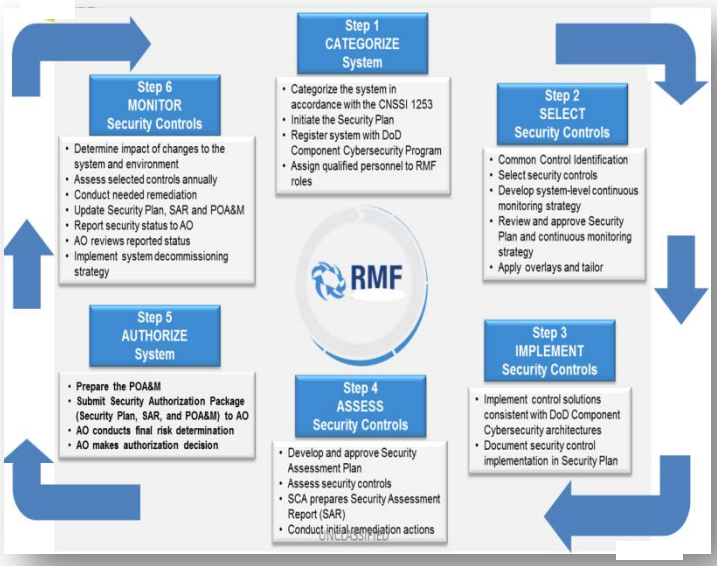
Risk Management Framework for DoD Information Technology

June 12, 2014 Lunch and Learn

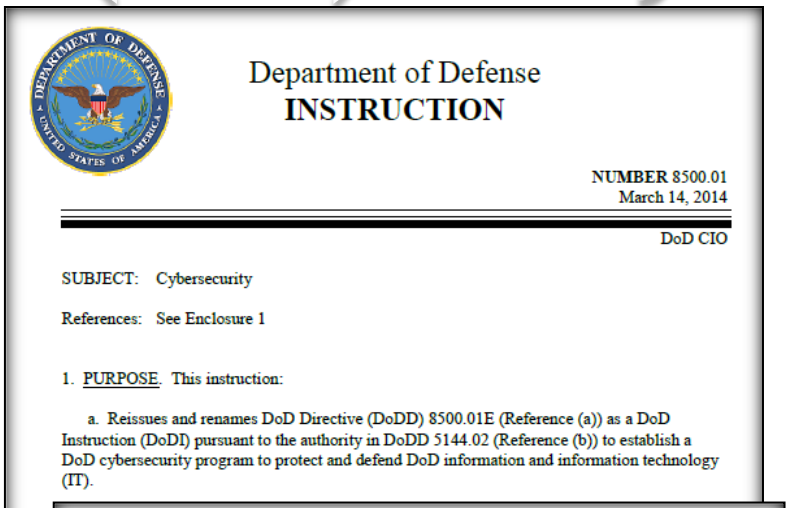
OUTLINE

- RMF Introduction and Applicability
- Major RMF Concepts
  - Risk Management
  - Cybersecurity Throughout the Program Lifecycle
  - Operational Resilience, Integration and Interoperability
  - Reciprocity
  - Continuous Monitoring
- RMF Security Controls
- RMF Responsibilities
- The RMF Cybersecurity Process
- RMF Transition



DoD Risk Management Framework (RMF) Policy

- DoD Instruction 8500.01
  - Cybersecurity
  - Signed March 14, 2014
- DoD Instruction 8510.01
  - Risk Management Framework (RMF) for DoD Information Technology (IT)
  - Signed March 12, 2014



Department of Defense
INSTRUCTION

NUMBER 8500.01
March 14, 2014

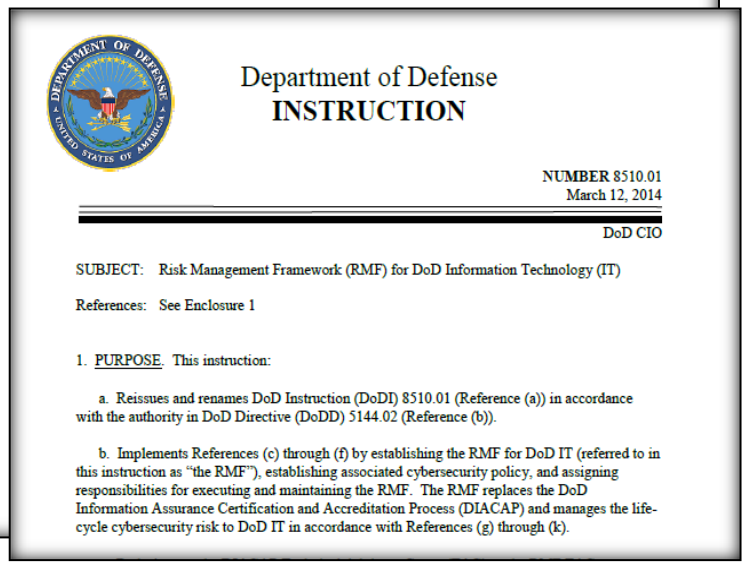
DoD CIO

SUBJECT: Cybersecurity

References: See Enclosure 1

1. PURPOSE. This instruction:

a. Reissues and renames DoD Directive (DoDD) 8500.01E (Reference (a)) as a DoD Instruction (DoDI) pursuant to the authority in DoDD 5144.02 (Reference (b)) to establish a DoD cybersecurity program to protect and defend DoD information and information technology (IT).



Department of Defense
INSTRUCTION

NUMBER 8510.01
March 12, 2014

DoD CIO

SUBJECT: Risk Management Framework (RMF) for DoD Information Technology (IT)

References: See Enclosure 1

1. PURPOSE. This instruction:

a. Reissues and renames DoD Instruction (DoDI) 8510.01 (Reference (a)) in accordance with the authority in DoD Directive (DoDD) 5144.02 (Reference (b)).

b. Implements References (c) through (f) by establishing the RMF for DoD IT (referred to in this instruction as "the RMF"), establishing associated cybersecurity policy, and assigning responsibilities for executing and maintaining the RMF. The RMF replaces the DoD Information Assurance Certification and Accreditation Process (DIACAP) and manages the life-cycle cybersecurity risk to DoD IT in accordance with References (g) through (k).

Why Change Policy?

- The new policy is more consistent with established disciplines and best practices for effective systems engineering, systems security engineering, and program protection planning outlined in DoDI 5000.02 & DAG.
- The new policy leverages and builds upon numerous existing Federal policies and standards so we have less DoD policy to write and mainta

DoD participates in development of CNSS and NIST documents ensuring DoD equities are met

DoD leverages CNSS and NIST policies and filters requirements to meet DoD needs

DoD participates in CNSS and NIST policy development as a vested stakeholder with the goals of a more synchronized cybersecurity landscape and to protect the unique requirements of DoD Missions and warfighters

DOD INSTRUCTION 8500.01 CYBERSECURITY

- Cancels or supersedes 11 DoD Directives, Instructions, or Memorandums.
- References a total of 132 policy documents, including 12 National Institute of Standards (NIST) Special Publications and 9 Committee on National Security Systems (CNSS) Instructions or Policies
- Establishes the positions of DoD **principal authorizing official** (PAO) (formerly known as principal accrediting authority) and the DoD **Senior Information Security Officer (SISO)** (formerly known as the Senior Information Assurance Officer)
- Adopts the term "cybersecurity" to be used throughout the DoD instead of the term "information assurance (IA)."

KEY RMF DOCUMENTS

- **NIST Special Publications (SP)**
  - 800-37 – Guide for Applying the RMF
  - 800-39 – Managing Information Security Risks
  - 800-53 – Security and Privacy Controls
  - 800-53A - Guide for Assessing the Security Controls
  - 800-60 – Guide for Mapping Types of Information and Information Systems to Security Categories
  - 800-137 – Information Security Continuous Monitoring
- **Committee on National Security Systems (CNSS)**
  - Instruction 1253 - Security Categorization and Control Selection for National Security Systems
  - Instruction 4009 – Information Assurance Glossary
  - Policy 11 - National Policy Governing the Acquisition of IA and IA-Enabled IT Products

WHY THE CHANGE FROM IA TO CYBERSECURITY?

Cybersecurity - **Prevention of** damage to, protection of, and restoration of computers, electronic communications systems, electronic communications services, wire communication, and electronic communication, including information contained therein, to ensure its **availability, integrity, authentication, confidentiality,** and **nonrepudiation**.

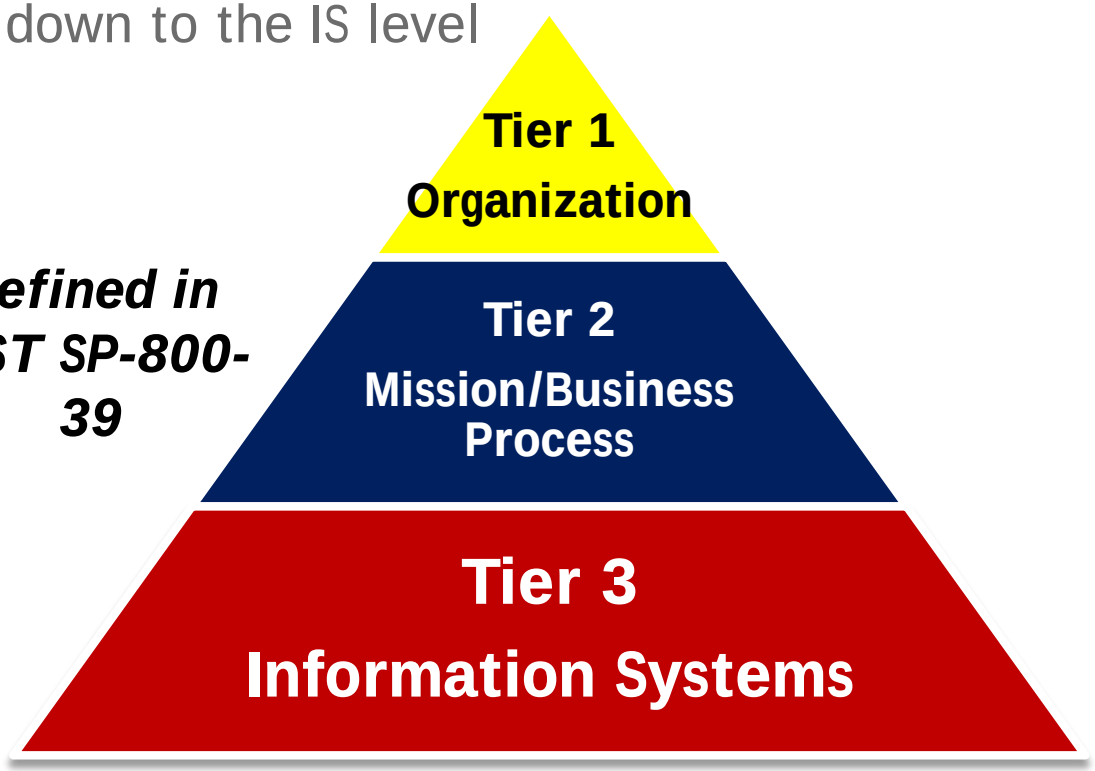
Department of Defense Instruction (DoDI) 8500.01E, March 14, 2014

This instruction applies to:
All DoD-owned IT or DoD-controlled IT that receive, process, store, display, or transmit DoD information. These technologies are broadly grouped as DoD IS, platform IT (PIT), IT services, and products. This includes IT supporting research, development, test and evaluation (T&E), and DoD-controlled IT operated by a contractor or other entity on behalf of the DoD .

RISK MANAGEMENT AND THE RMF

- Multi-tiered Risk Management
  - DoD will implement a multi-tiered cybersecurity risk management process to protect U.S. interests, DoD operational capabilities, and DoD individuals, organizations, and assets from the DoD Information Enterprise level, through the DoD Component level, down to the IS level

Defined in NIST SP-800-39



Tier 1 RMF Governance Structure

Tier 1 is the Office of Secretary of the Defense (OSD) and/or strategic level, and it addresses risk management at the DoD enterprise level. The key governance elements in Tier 1 are:

- DoD CIO Directs and oversees the cybersecurity risk management of DoD IT
- Risk Executive Function DoD Information Security Risk Management Committee (ISRMC) (formerly the Defense Information Systems Network (DISN)/Global Information Grid (GIG) Flag Panel) performs the DoD Risk Executive Function. Defense IA Security Accreditation Working Group (DSAWG) supports the DoD ISRMC and develops and provides guidance to the Authorizing Officials for IS connections to the DoD Information Enterprise
- DoD Senior Information Security Officer (SISO) The DoD SISO represents the DoD CIO, directs and coordinates the DoD Cybersecurity Program, and establishes and maintains the DoD RMF
- The RMF Technical Advisory Group (TAG) The TAG provides implementation guidance for the DoD RMF
- The RMF Knowledge Service (KS) The KS is the **authoritative source** for RMF procedures and guidance. The KS supports RMF by providing access to DoD security control baselines, security control descriptions, security control overlays, and DoD implementation guidance and assessment procedures

Tier 1 Organization

Tier 2 RMF Governance Structure

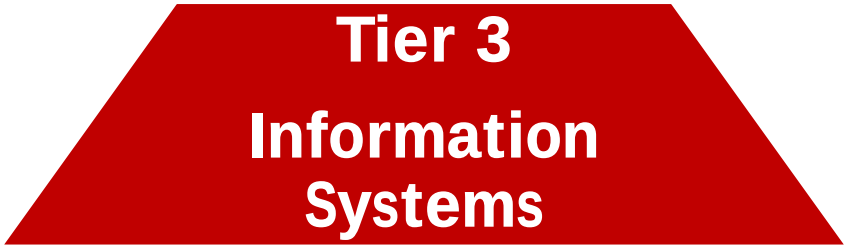
Tier 2 are the Mission Area and Component level, and addresses risk management at this level. The key governance elements in Tier 2 are:

- Principal Authorizing Official (PAO) A PAO is appointed for each of the 4 DoD Mission Areas (MAs), the Enterprise Information Environment MA (EIEMA), Business MA (BMA), Warfighting MA (WMA), and DoD portion of the Intelligence MA (DIMA)
- DoD Component CIO Component CIOs are responsible for administration of the RMF within the DoD Component Cybersecurity Program, including:
  - Enforcing training requirements for persons participating in the RMF
  - Verify that a Component Program Manager or System Manager is identified for each IS or Platform IT system
  - Appoint Component SISO
- Component SISO Component SISOs have authority and responsibility for security controls assessment, including:
  - Establishing and managing a coordinated security assessment process
  - Performing as the Security Controls Assessor (SCA) or formally delegate the security control assessment role

Tier 3 RMF Governance Structure

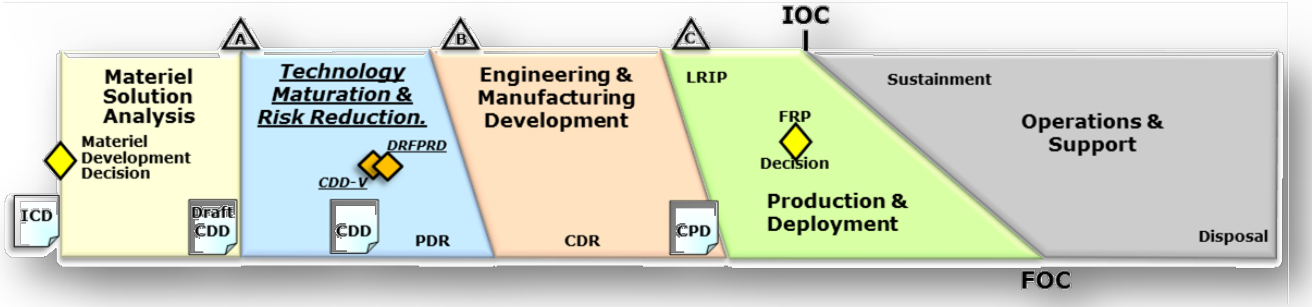
Tier 3 - is the System Level, and addresses risk management at this level. The key governance elements in Tier 3 are:

- Authorizing Official (AO) The DoD Component heads are responsible appointing trained and qualified AOs for all DoD ISs and PIT systems within their Component. AOs should be appointed from senior leadership positions within business owner and mission owner organizations
- System Cybersecurity Program The system cybersecurity program consists of the policies, procedures, and activities of the:
  - Information System Owner (ISO) Appoints a User Representative (UR) for assigned IS or PIT system
  - Program Manager/System Manager (PM/SM) Ensures an IS Systems Engineer is assigned for IS or PIT systems and implements the RMF for assigned IS or PIT systems
- User Representative (UR)
- IS Security Manager (ISSM)
- IS Security Officers (ISSO)



RMF AND THE ACQUISITION LIFE CYCLE

- Cybersecurity requirements must be identified and included throughout the lifecycle of systems to include acquisition, design, development, developmental testing, operational testing, integration, implementation, operation, upgrade, or replacement of all DoD IT supporting DoD tasks and missions.
- Integration. Cybersecurity must be fully integrated into system life cycles so that it will be a visible element of organizational, joint, and DoD Component architectures, capability identification and development processes, integrated testing, information technology portfolios, acquisition, operational readiness assessments, supply chain risk management, SSE, and operations and maintenance activities.



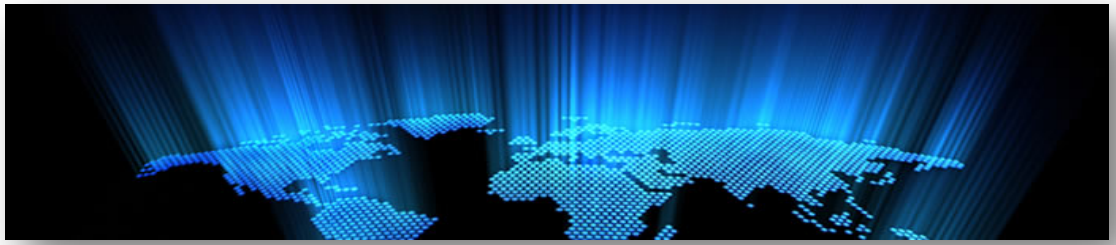
RMF - OPERATIONAL RESILIENCE, INTEGRATION, AND INTEROPERABILITY

Operational Resilience

1. Information and computing services are available to authorized users whenever and wherever needed
2. Security posture is sensed, correlated, and made visible to mission owners, network operators, and to the DoD Information Enterprise
3. Hardware and software have the ability to reconfigure, optimize, self-defend, and recover with little or no human intervention

Integration and Interoperability

1. Cybersecurity must be fully integrated into system life cycles and will be a visible element of IT portfolios.
2. Interoperability will be achieved through adherence to DoD architecture principles
3. All interconnections of DoD IT will be managed to minimize shared risk



RMF AND CYBERSECURITY RECIPROCITY

- Definition: Mutual agreement among participating enterprises to accept each other's security assessments in order to reuse information system resources and/or to accept each other's assessed security posture in order to share information.
- If applied appropriately, reciprocity will reduce:
  - Redundant testing
  - Redundant assessment and documentation
  - Overall costs in time and resources

RMF AND CONTINUOUS MONITORING

<u>Information System Continuous Monitoring</u> - maintaining ongoing awareness of information security, vulnerabilities, and threats to support organizational risk management decisions.

- Continuous monitoring capabilities will be implemented to the greatest extent possible.

NIST SP 800-53
SECURITY AND PRIVACY CONTROLS

- Security controls are the safeguards/countermeasures prescribed for information systems or organizations that are designed to:
  - Protect the confidentiality, integrity, and availability of information that is processed, stored, and transmitted by those systems/organizations; and
  - Satisfy a set of defined security requirements
- Key questions
  - What security controls are needed to satisfy the security requirements and to adequately mitigate risk incurred by using information and information systems in the execution of organizational missions and business functions?
  - Have the security controls been implemented, or is there an implementation plan in place?
  - What is the desired or required level of assurance that the selected security controls, as implemented, are effective in their application?

NIST SP 800-53
SECURITY AND PRIVACY CONTROLS

Security Control Structure

- Each family contains security controls related to the general security topic of the family
- Security controls may involve aspects of policy, oversight, supervision, manual processes, actions by individuals, or automated mechanisms implemented by information systems/devices
- There are 18 security control families and over 900 controls included in NIST SP 800-53

ID	Family	ID	Family
AC	Access Control	MP	Media Protection
AT	Awareness & Training	PE	Physical & Environmental Protection
AU	Audit & Accountability	PL	Planning
CA	Security Assessment & Authorization	PS	Personnel Security
CM	Configuration Management	RA	Risk Assessment
CP	Contingency Planning	SA	System & Services Acquisition
IA	Identification & Authentication	SC	System & Communications Protection
IR	Incident Response	SI	System & Information Integrity
MA	Maintenance	PM	Program Management

Security Control Identifiers and Family Names

NIST SP 800-53 SECURITY AND PRIVACY CONTROLS (AN EXAMPLE)

Access Control – AC-6 – Least Privilege

- Control: The organization employs the principle of least privilege, allowing only authorized accesses for users (or processes acting on behalf of users) which are necessary to accomplish assigned tasks in accordance with organizational missions and business functions.
- Supplemental Guidance: Organizations employ least privilege for specific duties and information systems… Related controls: AC-2, AC-3, AC-5, CM-6, CM-7, PL-2.
- Control Enhancements:
  - (1) LEAST PRIVILEGE | AUTHORIZE ACCESS TO SECURITY FUNCTIONS
    - The organization explicitly authorizes access to [Assignment: organization-defined security functions (deployed in hardware, software, and firmware) and security-relevant information].
    - Supplemental Guidance: Security functions include, …
  - *(Enhancements 2 -9 - not shown)*
  - (10) LEAST PRIVILEGE | PROHIBIT NON-PRIVILEGED USERS FROM EXECUTING PRIVILEGED FUNCTIONS
    - The information system prevents non-privileged users from executing privileged functions to include disabling, circumventing, or altering implemented security safeguards/countermeasures.
    - Supplemental Guidance: Privileged functions include, …
- References: None.
- Priority and Baseline Allocation:

P1	**LOW** Not Selected	**MOD** AC-6(1) (2) (5) (9) (10)	**HIGH** AC-6(1) (2) (3) (5) (9) (10)

ASSESSING SECURITY CONTROLS EXAMPLE PROCEDURES

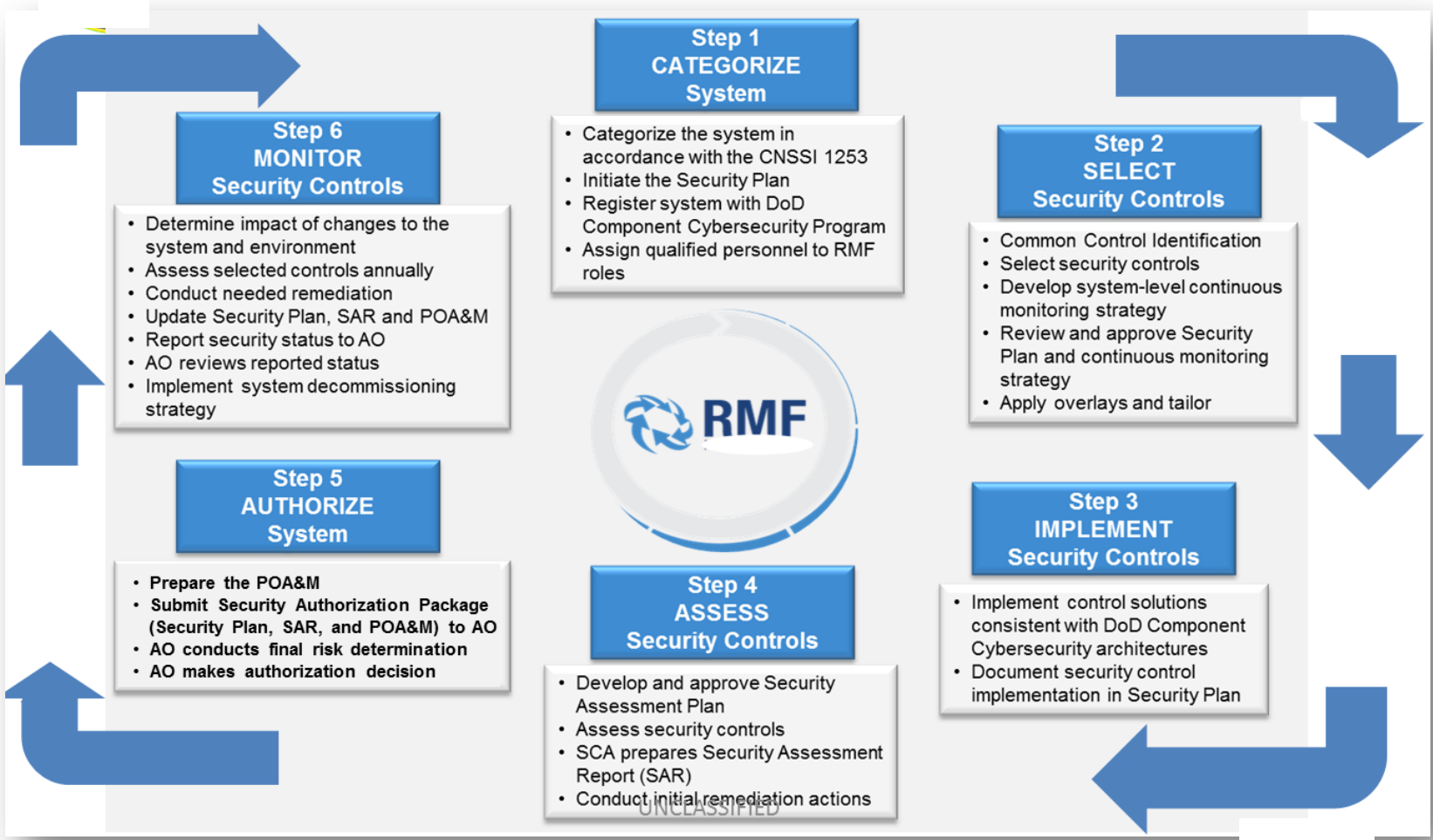
SI-4(15)	INFORMATION SYSTEM MONITORING
SI-4(15).1	**ASSESSMENT OBJECTIVE:** *Determine if the organization employs an intrusion detection system to monitor wireless communications traffic as the traffic passes from wireless to wireline networks.* **POTENTIAL ASSESSMENT METHODS AND OBJECTS:** **Examine:** [*SELECT FROM:* System and information integrity policy; procedures addressing information system monitoring tools and techniques; information system design documentation; information system monitoring tools and techniques documentation; information system configuration settings and associated documentation; information system protocols documentation; other relevant documents or records]. **Test:** [*SELECT FROM:* Automated mechanisms implementing wireless communications intrusion detection capability].

SI-4(16)	INFORMATION SYSTEM MONITORING
SI-4(16).1	**ASSESSMENT OBJECTIVE:** *Determine if the organization correlates information from monitoring tools employed throughout the information system to achieve organization-wide situational awareness.* **POTENTIAL ASSESSMENT METHODS AND OBJECTS:** **Examine:** [*SELECT FROM:* System and information integrity policy; procedures addressing information system monitoring tools and techniques; information system design documentation; information system monitoring tools and techniques documentation; information system configuration settings and associated documentation; event correlation logs or records; other relevant documents or records]. **Interview:** [*SELECT FROM:* Organizational personnel with information system monitoring responsibilities].

Changes to Cybersecurity Roles & Responsibilities

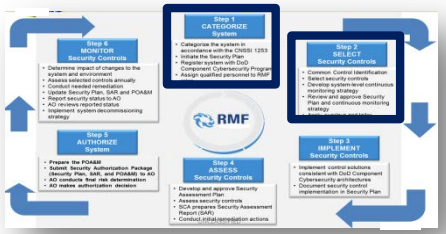
DIACAP role DODI 8510.01, 2007	RMF role DODI 8510.01 2014	Responsibilities (Reference DoDI 8510.01 for a complete definition of roles and responsibilities)
Designated Accrediting Authority (DAA)	Authorizing Official (AO)	The AO ensures all appropriate RMF tasks are initiated and completed, with appropriate documentation, for assigned ISs and PIT systems, monitor and track overall execution of system-level POA&Ms, Promote reciprocity.
Certifying Authority	Security Control Assessor (SCA)	The SCA is the senior official with authority and responsibility to conduct security control assessments.
No explicit role	Information System Owner (ISO)	In coordination with the information owner (IO), the ISO categorizes systems and documents the categorization in the appropriate JCIDS document (e.g., CDD).
Information Assurance Manager (IAM)	Information System Security Manager (ISSM)	The ISSM maintains and reports IS and PIT systems assessment and authorization status and issues, provides ISSO direction, and coordinates with the security manager to ensure issues affecting the organization's overall security are addressed appropriately.
Information Assurance Officer	Information System Security Officer (ISSO)	The ISSO is responsible for maintaining the appropriate operational security posture for an information system or program .

RMF – 6 STEP PROCESS



This process parallels the system life cycle, with the RMF activities being initiated at program or system inception

RMF – STEPS 1 AND 2



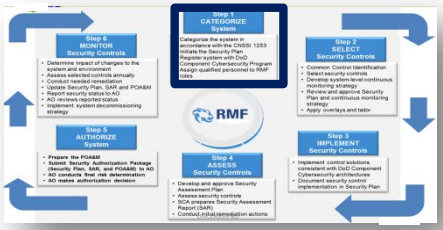
- **Step 1 - Categorize System**
  - Categorize the system in accordance with CNSSI 1253 and document the results in the security plan.
  - Describe the system (including system boundary) and document the description in the security plan.
  - Register the system with the DoD Component Cybersecurity Program
  - Assign qualified personnel to RMF roles.
- **Step 2 - Select Security Controls**
  - Common Control Identification - Common controls are selected as "common" and provided via the Knowledge Service based on risk assessments conducted by these entities at the Tier 1 and Tier 2 levels
  - Security Control Baseline and Overlay Selection - Identify the security control baseline for the system
  - Monitoring Strategy - Develop and document a system-level strategy for the continuous monitoring of the effectiveness of security controls

RMF - Step 1 - Categorize System

	POTENTIAL IMPACT		
Security Objective	**LOW**	**MODERATE**	**HIGH**
Confidentiality Preserving authorized restrictions on information access and disclosure, including means for protecting personal privacy and proprietary information. [44 U.S.C., SEC. 3542]	The unauthorized disclosure of information could be expected to have a **limited** adverse effect on organizational operations, organizational assets, or individuals.	The unauthorized disclosure of information could be expected to have a **serious** adverse effect on organizational operations, organizational assets, or individuals.	The unauthorized disclosure of information could be expected to have a **severe or catastrophic** adverse effect on organizational operations, organizational assets, or individuals.
Integrity Guarding against improper information modification or destruction, and includes ensuring information non-repudiation and authenticity. [44 U.S.C., SEC. 3542]	The unauthorized modification or destruction of information could be expected to have a **limited** adverse effect on organizational operations, organizational assets, or individuals.	The unauthorized modification or destruction of information could be expected to have a **serious** adverse effect on organizational operations, organizational assets, or individuals.	The unauthorized modification or destruction of information could be expected to have a **severe or catastrophic** adverse effect on organizational operations, organizational assets, or individuals.
Availability Ensuring timely and reliable access to and use of information. [44 U.S.C., SEC. 3542]	The disruption of access to or use of information or an information system could be expected to have a **limited** adverse effect on organizational operations, organizational assets, or individuals.	The disruption of access to or use of information or an information system could be expected to have a **serious** adverse effect on organizational operations, organizational assets, or individuals.	The disruption of access to or use of information or an information system could be expected to have a **severe or catastrophic** adverse effect on organizational operations, organizational assets, or individuals.

TABLE 1: POTENTIAL IMPACT DEFINITIONS FOR SECURITY OBJECTIVES

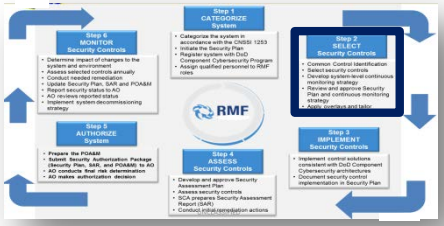
FIPS Publication 199 - Standards for Security Categorization of Federal Information and Information Systems



From CNSSI 1253

The security categorization method builds on the foundation established in FIPS 199, which defines three impact values (low, moderate, or high) reflecting the potential impact on organizations or individuals should a security breach occur (i.e., a loss of confidentiality, integrity, or availability). Organizations that employ NSS applying these definitions must do so within the context of their organization and the overall national interest.

Overlays - Can be applied in Step 2



Overlays address additional factors beyond impact (baselines only address impact of loss of confidentiality, integrity, and availability)

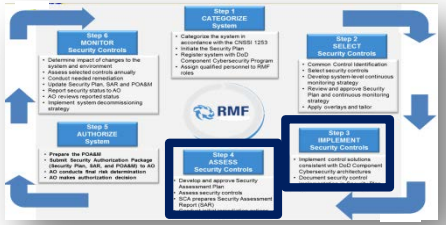
Enterprise Tailoring

- Consistent approach and set of security controls by subject area
- One time resource expenditure vs. continued expenditures of single system tailoring
- Promotes reciprocity

Current approved overlays include:

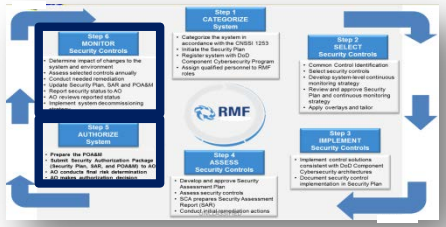
- *Intelligence (FOUO, October 2012)*
- *Space Platforms (June 2013)*
- *Cross Domain Solutions (September 2013)*

RMF - STEPS 3 AND 4



- **Step 3 - Implement Security Controls**
  - Implement the security controls specified in the security plan
  - Document the security control implementation
  - Security controls that are available for inheritance (e.g. common controls) by IS and PIT systems will be identified and have associated compliance status provided by hosting or connected systems
- **Step 4 - Assess Security Controls**
  - Develop, review, and approve a plan to assess the security controls.
  - Assess the security controls in accordance with the security assessment plan and DoD assessment procedures
  - Prepare the Security Assessment Report, documenting the issues, findings, and recommendations from the security control assessment
  - Conduct remediation actions on non-compliant security controls based on the findings and recommendations of the SAR and reassess remediated control(s)

RMF – STEPS 5 AND 6



- **Step 5 - Authorize System**
  - Prepare the Plan of Actions and Milestones (POA&M) based on the vulnerabilities identified during the security control assessment
  - Assemble the security authorization package and submit the package to the AO for adjudication.
  - Determine the risk to organizational operations (including mission, functions, image, or reputation), organizational assets, individuals, other organizations, or the Nation
  - Determine if the risk to organizational operations, organizational assets, individuals, other organizations, or the Nation is acceptable
- **Step 6 - Monitor Security Controls**
  - Determine the security impact of proposed or actual changes to the IS or PIT system and its environment of operation
  - Assess a subset of the security controls employed within and inherited by the IS or PIT system
  - Conduct remediation actions based on the results of ongoing monitoring activities, assessment of risk, and outstanding items in the POA&M
  - Implement a system decommissioning strategy, when needed, which executes required actions when an IS or PIT system is removed from service

RMF AUTHORIZATIONS

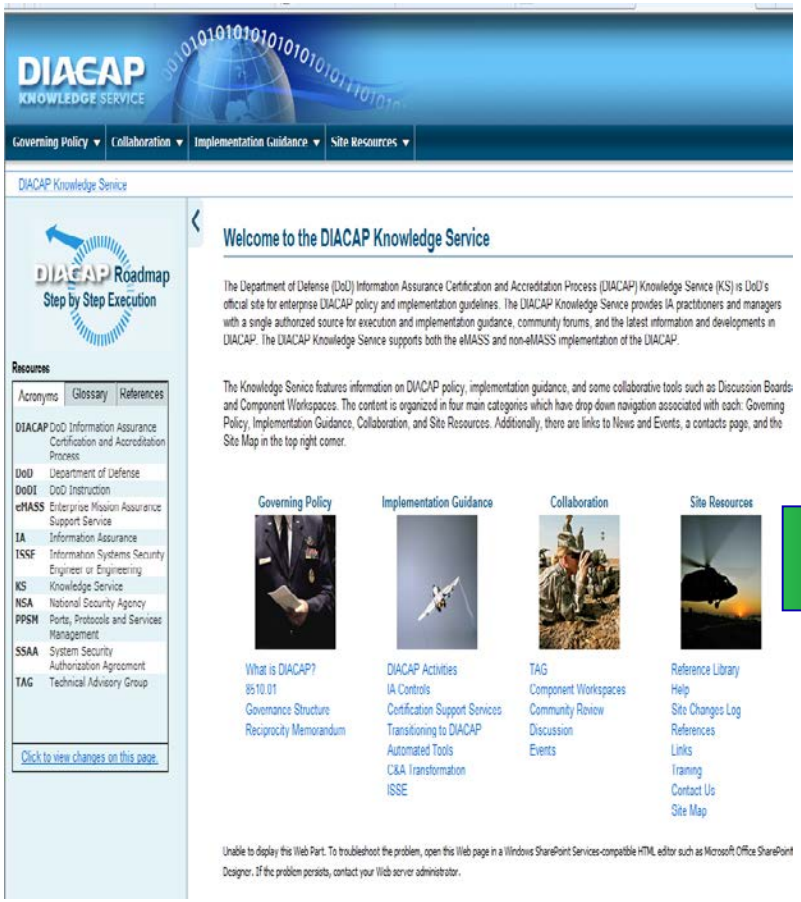
Authorization Type	Decision Criteria	Authorization Period
Authorization to Operate (ATO)	Overall risk is determined to be acceptable, and there are no NC controls with a level of risk of "Very High" or "High".	Must specify an Authorization Termination Date (ATD) that is within 3 years of the authorization date unless the IS or PIT system has a system-level, DoD policy compliant ,continuous monitoring program.
ATO with conditions (Only with permission of the DoD Component Chief Information Officer (CIO))	NC controls with "Very High" or "High" risk that can't be corrected or mitigated immediately, but overall system risk is determined to be acceptable due to mission criticality	Should specify an AO review period that is within 6 months of the authorization date. If the system still requires operation with a level of risk of "Very High" or "High" after 1 year, the DoD Component CIO must again grant permission for continued operation of the system.
Interim Authority To Test (IATT)	Risk determination is being made to permit testing of the system in an operational information environment or with live data, and the risk is acceptable,	Should expire at the completion of testing (normally for a period of less than 90 days)
Denial of Authorization to Operate (DATO)	Risk is determined to be unacceptable	Immediate or in concert with a system decommissioning strategy

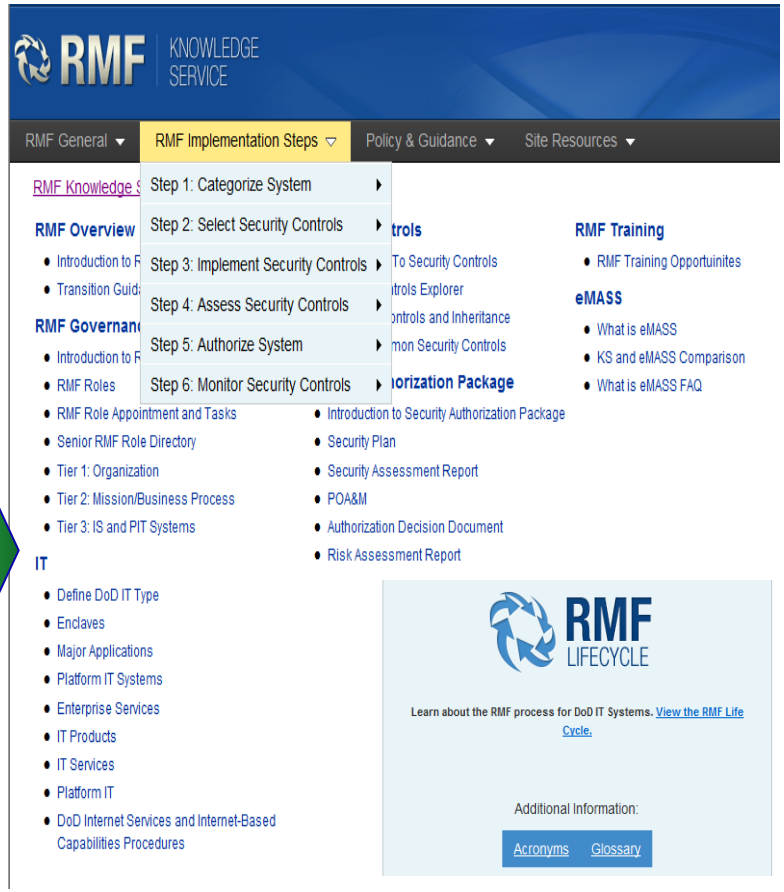
RMF TRANSITION TIMELINE
(PER DODI 8510.01, ENCLOSURE 8)

System Authorization Status		Transition Timeline And Instructions
1	New start or unaccredited	Transition to the RMF within six months
2	System has initiated DIACAP but has not yet started executing the DIACAP Implementation Plan	Transition to the RMF within six months
3	System has begun executing the DIACAP Implementation Plan	Either: a. Continue under DIACAP. Develop a strategy and schedule for transitioning to the RMF not to exceed the system re-authorization timeline or b. Transition to the RMF within six months
4	System has a current valid DIACAP accreditation decision	Develop a strategy and schedule for transitioning to the RMF not to exceed the system re-authorization timeline
5	System has a DIACAP accreditation that is more than 3 years old	Transition to the RMF within six months

RMF Knowledge Service

The Knowledge Service is the **authoritative source** for information, guidance, procedures, and templates on how to execute the DIACAP and Risk Management Framework

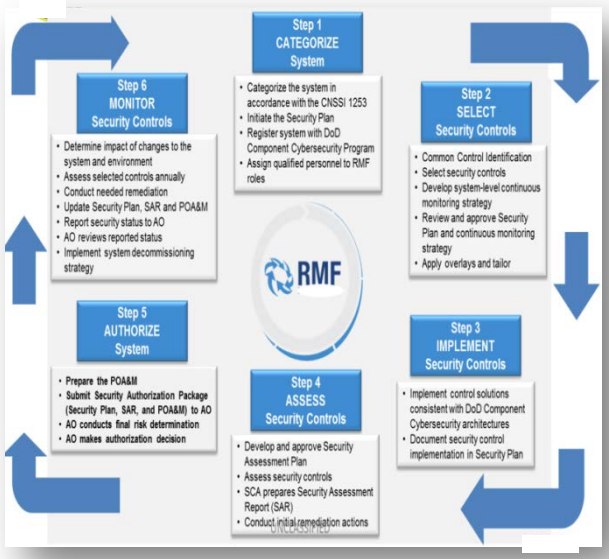




https://rmfks.osd.mil/

DAU AND CYBERSECURITY

- DAU is developing an online Cybersecurity Course – POC: Tim Denman DAU-S
  - Covers the RMF and Cybersecurity across acquisition career fields
  - Course available early CY15
- DAU is developing an online 100-level Program Protection Planning (PPP) Course – POC: Allen Harris DAU-W
  - Cybersecurity one element of PP
  - Course available late CY14
- DAU is developing an online 200-level PPP Classroom Course – POC: Ed Adkins DAU-S
  - Cybersecurity one element of Program Protection
  - Course available mid CY15
- DAU-South has formed a Cybersecurity Integrated Product Team (IPT) to help provide cybersecurity training and consulting Team Members are:
  - Tim Denman (Huntsville, AL) – Tim.Denman@dau.mil
  - Steve Mills (Huntsville, AL) - Steve.Mills@dau.mil
  - Ed Adkins (Eglin Air Force Base, FL) – Edward.Adkins@dau.mil

SUMMARY

- Introduction and Applicability
- Major RMF Concepts
  - Risk Management
  - Cybersecurity Throughout the Program Lifecycle
  - Operational Resilience, Integration and Interoperability
  - Reciprocity
  - Continuous Monitoring
- RMF Security Controls
- RMF Responsibilities
- The RMF Cybersecurity Process
- RMF Transition