The attached DRAFT document (provided here for historical purposes) has been superseded by the following publication:

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Title: *Automation Support for Security Control Assessments. Volume 1: Hardware Asset Management*

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- Information on other NIST cybersecurity publications and programs can be found at: https://csrc.nist.gov/publications

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The following information was posted with the attached DRAFT document:

Feb. 2, 2016

NIST IR 8011

DRAFT Automation Support for Security Control Assessments
Volume 1: Overview
Volume 2: Hardware Asset Management

The National Institute of Standards and Technology (NIST) is pleased to announce the initial public draft release of NIST Internal Report (NISTIR) 8011, *Automation Support for Security Control Assessments*, Volumes 1 and 2. This NISTIR represents a joint effort between NIST and the Department of Homeland Security to provide an operational approach for automating security control assessments in order to facilitate information security continuous monitoring (ISCM), ongoing assessment, and ongoing security authorizations in a way that is consistent with the NIST Risk Management Framework overall and the guidance in NIST SPs 800-53 and 800-53A in particular.

NISTIR 8011 will ultimately consist of 13 volumes. Volume 1 introduces the general approach to automating security control assessments, 12 ISCM security capabilities, and terms and concepts common to all 12 capabilities. Volume 2 provides details specific to the hardware asset management security capability. The remaining 11 ISCM security capability volumes will provide details specific to each capability but will be organized in a very similar way to Volume 2.

Public comment period is open through ***March 18, 2016***. Please submit public comments to sec-cert@nist.gov. Comments are accepted in any desired format.

DRAFT NISTIR 8011
Volume 2

Automation Support for Security Control Assessments

Volume 2: Hardware Asset Management

Kelley Dempsey
Paul Eavy
George Moore

This publication is available free of charge from:
http://dx.doi.org/10.6028/NIST.IR.XXXX

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

DRAFT NISTIR 8011
Volume 2

Automation Support for Security Control Assessments

Volume 2: Hardware Asset Management

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February 2016

U.S. Department of Commerce
Penny Pritzker, Secretary

National Institute of Standards and Technology
Willie May, Acting Under Secretary of Commerce for Standards and Technology and Acting Director

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Public comment period: February 1, 2016 through March 18, 2016

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Reports on Computer Systems Technology

The Information Technology Laboratory (ITL) at the National Institute of Standards and Technology (NIST) promotes the U.S. economy and public welfare by providing technical leadership for the Nation's measurement and standards infrastructure. ITL develops tests, test methods, reference data, proof-of-concept implementations, and technical analyses to advance the development and productive use of information technology. ITL's responsibilities include the development of management, administrative, technical, and physical standards and guidelines for the cost-effective security and privacy of other than national security-related information in federal information systems.

Abstract

The NISTIR 8011 volumes focus on each individual information security capability, adding tangible detail to the more general overview given in NISTIR 8011 Volume 1, and providing a template for transition to a detailed, NIST standards-compliant automated assessment. This document, Volume 2 of NISTIR 8011, addresses the Hardware Asset Management (HWAM) information security capability. The focus of the HWAM capability is to manage risk created by unmanaged devices on a network. Unmanaged devices are targets that attackers can use to gain and more easily maintain a persistent platform from which to attack the rest of the network.

Keywords

actual state; assessment; assessment boundary; assessment method; authorization boundary; automated assessment; automation; capability; continuous diagnostics and mitigation;; dashboard; defect; defect check; desired state specification; information security continuous monitoring; mitigation; ongoing assessment; root cause analysis; security automation; security capability; security control; security control assessment; security control item.

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Executive Summary

The National Institute of Standards and Technology (NIST) and the Department of Homeland Security (DHS) have collaborated on the development of a process that automates the test assessment method described in NIST Special Publication (SP) 800-53A for the security controls catalogued in SP 800-53. The process is consistent with the Risk Management Framework as described in SP 800-37 and the Information Security Continuous Monitoring (ISCM) guidance in SP 800-137. The multivolume NIST Interagency Report 8011 (NISTIR 8011), which has been developed to provide information on automation support for ongoing assessments, describes how ISCM facilitates automated ongoing assessment to provide near-real-time security- and privacy-related information to organizational officials on the state of their systems and organizations.

The NISTIR 8011 volumes focus on each individual information security capability to (a) add tangible detail to the more general overview given in NISTIR 8011 Volume 1; and (b) provide a template for transition to detailed, standards-compliant automated assessment.

This document, which is Volume 2 of NISTIR 8011, addresses the information security capability known as Hardware Asset Management (HWAM). The focus of the HWAM capability is to manage risk created by unmanaged devices that are on a network. When devices are unmanaged, they are vulnerable because they tend to be forgotten or unseen. Moreover, when vulnerabilities are discovered on devices that are unmanaged, there is no one assigned to reduce the risk. As a result, unmanaged devices are targets that attackers can use to gain and more easily maintain a persistent platform from which to attack the rest of the network.

A well-designed HWAM program helps to prevent (a) entry of exploits or natural events into a network; (b) exploits or events from gaining a foothold; and (c) the exfiltration of information. The assessment helps verify that hardware asset management is working.

In Section 3, detailed step-by-step processes are outlined to adapt or customize the template presented here to meet the needs of a specific assessment target network and apply the results to the assessment of all authorization boundaries on that network. Section 3 also provides a process to implement the assessment (diagnosis) and mitigation. Automated testing related to these controls for HWAM, as outlined here, is compliant with other NIST guidance.

It has not been obvious to security professionals how to automate testing of other than technical controls. This volume documents a detailed assessment plan to assess the effectiveness of controls related to authorizing and assigning devices to be managed. Included are specific tests that form the basis for such a plan, how the tests apply to specific controls, and the kinds of resources needed to operate and use the assessment to mitigate defects found. For HWAM, it can be shown that the assessment of 88 percent of controls in the Low-Medium-High baseline *can* be automated.

Properly used, the methods outlined here are designed to provide objective, timely, and complete identification of security defects related to HWAM at a lower cost than manual assessment methods. If that information is used properly, it can drive the most efficient and effective remediation of the worst security defects found.

This volume assumes the reader is familiar with the concepts and ideas presented in the Overview (NISTIR 8011, Volume 1). Terms used herein are also defined in the Volume 1 glossary

1. Introduction

1.1 Purpose and Scope

The purpose of the National Institute of Standards (NIST) Interagency Report (NISTIR) 8011 series is to provide an operational approach for automating the assessment of security controls to facilitate information security continuous monitoring (ISCM) and near-real-time risk management decision making. The overall purpose and scope of the complete NISTIR 8011 can be found in Volume 1 of this NISTIR (Overview). Volume 2 addresses automation support for the assessment of SP 800-53 security controls related to the ISCM-defined security capability named *Hardware Asset Management* (HWAM).

Note

> The automated assessment information provided in this volume addresses only security controls/control items that are implemented for **hardware**.

1.2 Target Audience

The target audience for this volume is generally the same as that described in Volume 1 of this NISTIR. Because it is focused on HWAM, it may be of special relevance to those who manage hardware. However, it is still of value to others to help understand the risks hardware may be imposing on non-hardware assets.

1.3 Organization of this Volume

Section 2 provides an overview of the HWAM capability to clarify both scope and purpose and provides links to additional information specific to the HWAM capability. Section 3 provides detailed information on the HWAM defect checks and how they automate assessment of the effectiveness of SP 800-53 security controls that support the HWAM capability. Section 3 also provides artifacts that can be used by an organization to produce an automated security control assessment plan for most of the control items supporting Hardware Asset Management.

1.4 Interaction with Other Volumes in this NISTIR

Volume 1 of this NISTIR (Overview) provides a conceptual synopsis of using automation to support security control assessment and provides definitions and background information that facilitates understanding of the information in this and subsequent volumes. This volume assumes that the reader is familiar with that information.

The HWAM capability identifies all devices that are present on the network. This supports other capabilities by providing the full census of devices to check for defects related to software, device privileges, and device behavior.

2. Hardware Asset Management (HWAM) Capability Definition, Overview, and Scope

Hardware asset management recognizes that devices on networks that are unauthorized[1] and/or unassigned for management are likely to be vulnerable. External and inside attackers search for such devices and exploit them, either for what the device itself can offer, or as a platform from which to persist on the network to attack other assets. By removing unauthorized devices and/or authorizing them and ensuring they are assigned to a person or team for system administration, HWAM helps reduce the probability that attackers will find and easily exploit devices.

2.1 HWAM Capability Description

The Hardware Asset Management Capability provides an organization visibility into the devices operating on its network(s), so it can manage and defend itself in an appropriate manner. It also provides a view of device management responsibility in a way that prioritized defects can be presented to the responsible party for mitigation actions and risk acceptance decisions.

HWAM identifies devices, including virtual machines, actually present on the network and compares them with the *desired state* inventory to determine if they are authorized. Some devices are network-addressable, and others are removable (and presumably connected to addressable devices). The means for identifying the actual devices will vary, depending on the automated capabilities available and which type of device it is.

The ISCM process (as adapted for each agency) will provide insight into what percentage of the actual hardware assets are included in the desired state, and of those, how many identify an assigned manager.

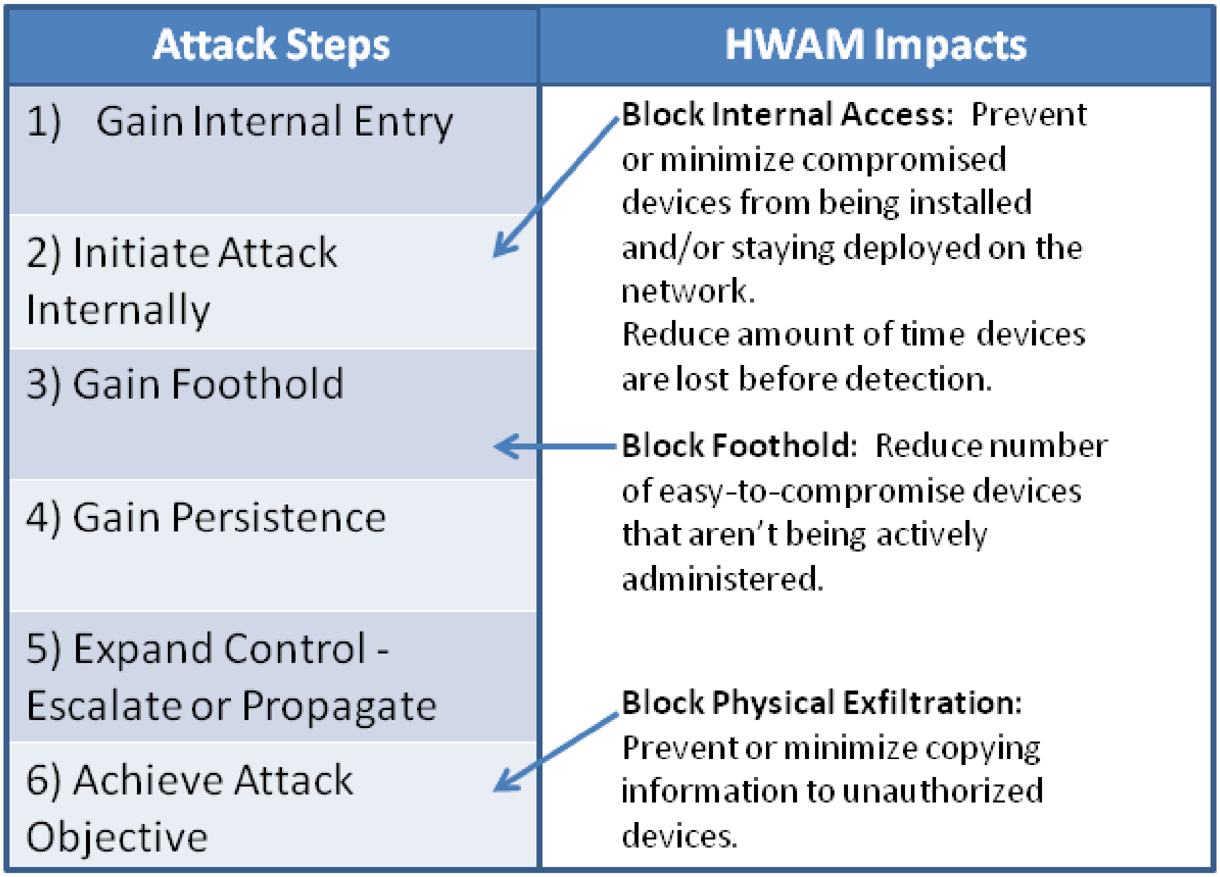
2.2 HWAM Attack Scenarios and Desired Result

This document (NISTIR 8011) uses an attack step model to summarize the seven primary steps in most cyber attacks (see Figure 1: HWAM Impact on an Attack Step Model). HWAM is designed to block or delay attacks at the attack steps listed in Table 1: HWAM Impact on an Attack Step Model.

[1] Unauthorized devices are those devices that have not been assessed and authorized to operate as part of an overall information system authorization process or individually if the device was added to an information system after the initial information system authorization.

Table 1: HWAM Impact on an Attack Step Model

Attack Step Name	Attack Step Purpose	Examples of HWAM Impact
2) Initiate Attack Internally	The attacker is inside the boundary and initiates attack on some object internally. Examples include: User opens spear phishing email or clicks on attachment; user installs unauthorized software or hardware; unauthorized personnel gains physical access to restricted facility.	Block Internal Access: Prevent or minimize unauthorized/compromised devices from being installed and/or staying deployed on the network. Reduce amount of time unauthorized devices are present before detection.
3) Gain Foothold	The attacker has gained entry to the object and achieves enough actual compromise to gain a foothold, but without persistence. Examples include: Unauthorized user successfully logs in with authorized credentials; browser exploit code successfully executed in memory and initiates call back; person gains unauthorized access to server room.	Block Foothold: Reduce number of unauthorized and/or easy-to-compromise devices that aren’t being actively administered.
6) Achieve Attack Objective	The attacker achieves an objective. Loss of confidentiality, integrity, or availability of data or system capability. Examples include: Exfiltration of files; modification of database entries; deletion of file or application; denial of service; disclosure of PII.	Block Physical Exfiltration: Prevent or minimize copying information to unauthorized devices.



Attack Steps

1) Gain Internal Entry

2) Initiate Attack Internally

3) Gain Foothold

4) Gain Persistence

5) Expand Control - Escalate or Propagate

6) Achieve Attack Objective

HWAM Impacts

Block Internal Access: Prevent or minimize compromised devices from being installed and/or staying deployed on the network.
Reduce amount of time devices are lost before detection.

Block Foothold: Reduce number of easy-to-compromise devices that aren't being actively administered.

Block Physical Exfiltration: Prevent or minimize copying information to unauthorized devices.

Figure 1: HWAM Impact on an Attack Step Model

Note

> The attack steps shown in Figure 1: HWAM Impact on an Attack Step Model, apply only to adversarial attacks. (See NISTIR 8011, Volume 1, Section 3.2.)

Other examples of traceability among requirement levels. While Table 1 shows HWAM impacts on example attack steps, it is frequently useful to observe traceability among other sets of requirements. To examine such traceability, see Table 2: Traceability among Requirement Levels. To reveal traceability from one requirement type to another, look up the cell in the matching row and column of interest and click on the link.

Table 2: Traceability among Requirement Levels

	Example Attack Steps	Capability	Sub-Capability/ Defect Check	Control Items
Example Attack Steps		Figure 1 Table 1	Table 6	Appendix A
Capability	Figure 1 Table 1		Table 6	Section 3.3[a]
Sub-Capability/ Defect Check	Table 6	Table 6		Section 3.2[b]
Control Items	Appendix A	Section 3.3[a]	Section 3.2[b]	

[a] Each level-four section (e.g., 3.3.1.1) is a control item that supports this capability.

[b] Refer to the table under the heading *Supporting Control Items* within each defect check.

2.3 Objects Protected and Assessed by HWAM

As noted in Section 1.1, the objects directly managed and assessed by the HWAM capability are hardware devices. However, the following clarification is relevant:

Hardware that cannot be attacked independently is not included in the definition of a device (Figure 2: Definition of *Devices* for HWAM). For example, remote attacks affect a device through its Internet Protocol (IP) connection and cannot attack a mouse independently. Thus, subcomponents of the device (Figure 3: Definition of *Device Subcomponents* for HWAM) are important primarily if they can be moved or accessed as independent devices (e.g., a thumb drive) or they impose risk to the overall device or the network (e.g., a wireless capability). These considerations drive the selected definitions. Otherwise, for HWAM purposes, devices like a mouse, monitor, or internal memory are simply parts of the device.

> **Devices (hardware assets)**, which are defined in the HWAM architecture and Concept of Operations [Figure 4 and HWAM Capability Description], consist of the following:
>
> - IP addressable hardware (or equivalent);
> - Removable hardware of security interest such as USB devices (USB thumb drives or USB hard drives); and
> - Virtual Devices included in hardware assets as devices.

Figure 2: Definition of *Devices* for HWAM

Subcomponents are the parts or functionalities from which devices are composed. Organizations may ***optionally*** choose to track such subcomponents and their attributes if they have security implications. For example, in cases of the following:

- presence of a modem connection; and/or
- presence of a wireless capability,

individual organizations have a great deal of flexibility in defining subcomponents as needed to meet organization specific needs. Thus, no precise definition of subcomponents is provided.

Figure 3: Definition of *Device Subcomponents* for HWAM

2.4 HWAM Data Requirements

Data requirements for the HWAM actual state are in Table 3. Data requirements for the HWAM desired state are in Table 4.

Table 3: HWAM Actual State Data Requirements

Data Item	Justification
Data necessary to accurately identify the device. Site-specific, examples include: • IP Address • MAC Address • Host-based certificate or Agent ID • Device domain name	To be able to assert which operational device is unauthorized, or has some other defect.
Data necessary to describe the attributes of a device such that other capabilities can determine the appropriate defect checks to run on that device. • Expected CPE for operating system of device or equivalent ▪ Vendor ▪ Product ▪ Version ▪ Release level	To ensure all appropriate defects for these devices are defined, run, and reported.
Data necessary to compare devices connected to the network to the authorized hardware inventory. • IP Address and associated logs • MAC Address • Host-based certificate or Agent ID • Device domain name	To be able to identify unauthorized devices.
Data necessary to locate physical assets based on information collected in the operational environment. Site specific, examples include: • Edge switch that detected device • Host that USB drive was connected to	To ensure that managers can find the device to fix, validate, or remove it.
Data necessary to determine how long devices have been present in the environment. At a minimum: • Date/time it was first discovered • Date/time it was last seen	To determine how long the device has been in existence and the last time it was detected in the enterprise

Table 4: HWAM Desired State Data Requirements

Data Item	Justification
Data necessary to accurately identify the device. At a minimum: - Serial Number - Expected CPE for hardware or equivalent ▪ Vendor ▪ Product ▪ Model Number - Static IP Address (where applicable) - Media Access Control (MAC) Address - Property Number Local enhancements[a] might include data necessary to accurately identify subcomponents.	To be able to uniquely identify the device. To be able to validate that the device on the network is the device authorized, and not an imposter.
Data necessary to describe a device such that other capabilities can determine the appropriate defect checks to run on that device. - Expected CPE for operating system of device or equivalent ▪ Vendor ▪ Product ▪ Version ▪ Release level	To ensure all appropriate defects for a device are defined, run, and reported. To help identify non-reporting associated with other capabilities that look for defects on the device.
A person or organization that is responsible for managing the device (note: this should be a reasonable assignment, do not count management assignments where a person or organization is assigned too many devices to effectively manage them). Local enhancements might include: - Approvers being assigned - Managers being approved - Managers acknowledging receipt	To know who to instruct to fix specific risk conditions found. To assess each such persons performance in risk management.
Data necessary to compare devices discovered on the network to the authorized hardware inventory. Site dependent, examples include - IP address - MAC address - Host-based certificate or Agent ID - Device domain name	To be able to identify unauthorized devices. To know which devices have defects.

Data Item	Justification
Data necessary to locate a physical device.	To ensure that managers can find the device to revalidate it for supply chain risk management. • Remove it if unauthorized
The period of time the device is authorized Local enhancements might include: • When the device must be physically inspected/verified for supply chain risk management	To allow previously authorized devices to remain in the authorized hardware inventory, but know they are no longer authorized.
Expected status of the device (e.g., authorized, expired, pending approval, missing) to include: • Date first authorized • Date of most recent authorization • Date authorization revoked Local enhancements might include: • Returned from high-risk location • Removed pending reauthorization • Date of last status change	To determine which devices in the authorized hardware inventory are not likely to be found in actual state inventory.

[a] Organizations can define data requirements and associated defects for their local environment. This is done in coordination with the CMaaS contractor.

2.5 HWAM Concept of Operational Implementation

Figure 4: HWAM Concept of Operations (CONOPS) illustrates how HWAM might be implemented. The CONOPS is central to the automated assessment process.

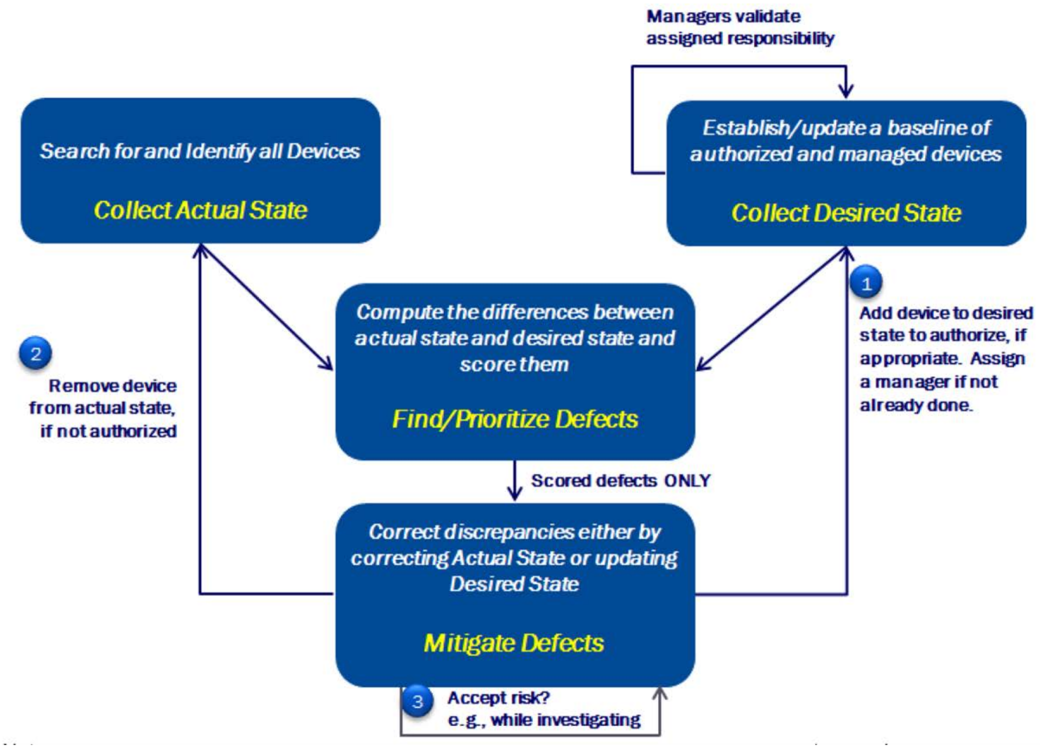

Managers validate assigned responsibility
Search for and Identify all Devices
Collect Actual State
Establish/update a baseline of authorized and managed devices
Collect Desired State
1
Add device to desired state to authorize, if appropriate. Assign a manager if not already done.
2
Remove device from actual state, if not authorized
Compute the differences between actual state and desired state and score them
Find/Prioritize Defects
Scored defects ONLY
Correct discrepancies either by correcting Actual State or updating Desired State
Mitigate Defects
3
Accept risk? e.g., while investigating

Figure 4: HWAM Concept of Operations (CONOPS)

The following is a brief description of the HWAM capability functionality:

> HWAM identifies devices (including virtual machines) actually present on the network (the actual state) and compares them with the desired state inventory to determine if they are authorized for operation and connection to the network. Some devices are IP-addressable (or equivalent), and others are removable subcomponents connected through addressable devices). The means for identifying the actual devices will vary, depending on the automated capabilities available and which type of device it is.

2.5.1 Collect Actual State

Use tools to collect information about what IP-addressable devices, virtual machines and removable media are actually present on the network. The network and connected devices are continuously observed to detect and learn about IP-addressable devices and removable media. Methods to detect devices (when it was first seen, and when/where it was last seen) include (but are not limited to):

- Passive listening to identify devices talking;
- Active IP range scanning, to detect devices (e.g., respond to a “ping”);
- Active mining of DHCP logs and/or switch tables; and
- Network Access Control (if present).

Methods to learn about discovered devices include (but are not limited to):

- Passive listening to types of traffic to/from devices;

- Active methods (e.g., trace route) to collect data about the device's location; and
- Active agents on the device to detect subcomponents and other details.

The ISCM data collection process will identify the assets actually on the network that are addressable and can provide the information required to compare them with the authorized inventory. Also, it is necessary to identify how much of the network is being monitored to discover the actual hardware operating on it.

2.5.2 Collect Desired State

Create an Authorized Hardware Inventory (white list) using policies, procedures, and processes suggested by the information security program or as otherwise defined by the organization. Output is a hardware inventory that contains identifying information for a device (to include physical location), when it was authorized, when the authorization expires, and who manages the device. Only authorized removable media are allowed to connect to IP-addressable devices on a network (e.g., plugged into a USB port), and the removable media authorized for each device are listed in the inventory.

2.5.3 Find/Prioritize Defects

Comparing the list of devices discovered on the network (actual state) with the authorized hardware inventory list (desired state), some devices might exist on one list and not on the other. This will identify unauthorized devices that need to be dealt with, as well as missing authorized devices that may indicate an additional security risk. Additional defects related to hardware management may be defined by the organization. After devices are detected, they will be automatically scored and prioritized (using federal- and organization-defined criteria) so that the response actions can be prioritized (i.e., worst problems can be addressed first).

2.6 SP 800-53 Control Items that Support HWAM

This section documents how control items that support HWAM were identified as well as the nomenclature used to clarify each control item's focus on hardware.

2.6.1 Process for Identifying Needed Controls

A section on Tracing Security Control Items to Capabilities explains the process used to determine the controls needed to support a capability—this process is described in detail in Volume 1 of this NISTIR. In short, the two steps are:

1. Use a keyword search of the control text to identify control items that might support the capability.
2. Manually identify those that *do* support the capability (true positives) and ignore those that do not (false positives).

This produces three sets of controls:

1. The control items in the low, moderate, and high baselines that support the HWAM capability (listed in the section on HWAM Control (Item) Security Assessment Plan Narrative Tables and Templates and the section on Control Allocation Tables).
2. Control items in the low-high baseline that were selected by the keyword search, but were manually determined to be false positives are listed in Appendix B.
3. Control items not in a baseline were not analyzed further after the keyword search. These include:
    a. The Program Management Family of controls, because they do not apply to individual systems;
    b. The *not selected* controls—controls that are in SP 800-53 but are not assigned to (selected in) a baseline; and
    c. The Privacy Controls.

    These controls are listed in Appendix C, in case the organization wants to develop automated tests.

2.6.2 Control Item Nomenclature

Many control items that support the HWAM capability also support several other capabilities. For example, hardware, software products, software settings, and software patches may all benefit from configuration management controls.

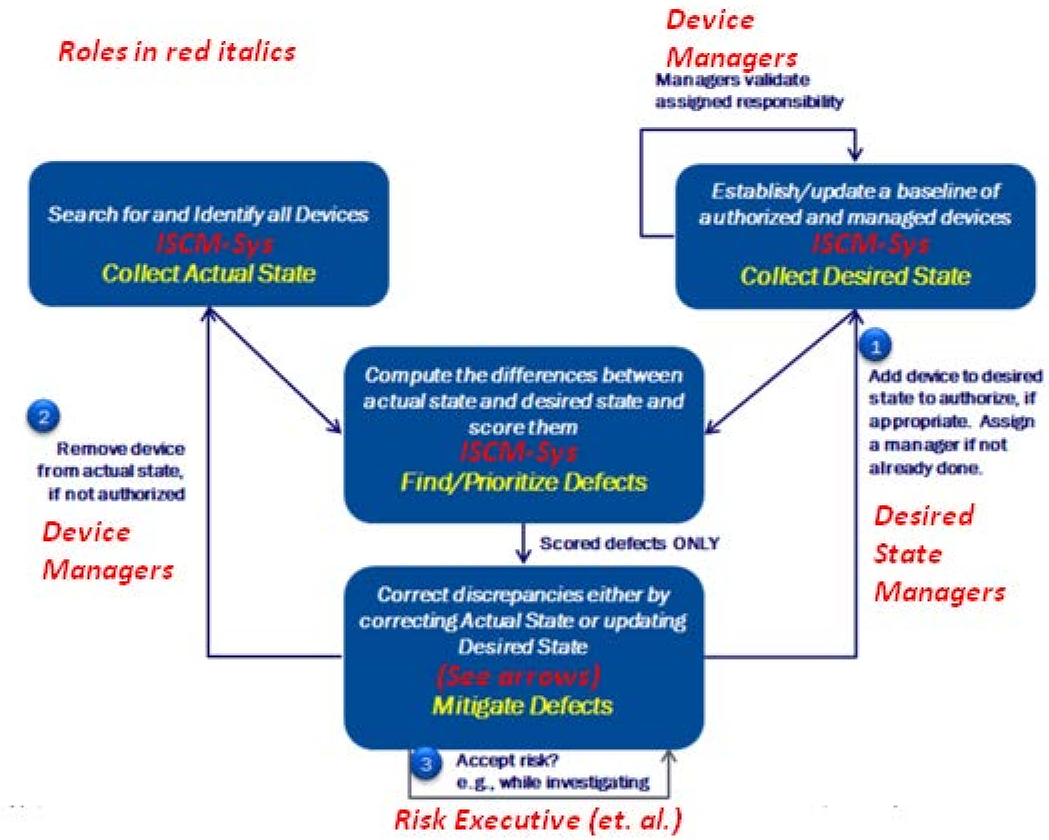
To add clarity to the scope of such control items related to HWAM, the parenthetic expression {hardware} is included in this volume to denote that a particular control item, as it supports the HWAM capability, focuses on—and only on—hardware.

2.7 HWAM Specific Roles and Responsibilities

Table 5: Operational and Managerial Roles for HWAM, describes HWAM-specific roles and their corresponding responsibilities. Figure 5: Primary Roles in Automated Assessment of HWAM, shows how these roles integrate with the concept of operations. An organization implementing automated assessment can customize its approach by assigning (allocating) these responsibilities to persons in existing roles.

409 **Table 5: Operational and Managerial Roles for HWAM**

Role Code	Primary Responsibility	Role Description	Role Type
DM	Device Manager (DM)	Assigned to a specific device or group of devices, device managers are (for HWAM) responsible for adding/removing devices from the network, and for configuring the hardware of each device (adding and removing hardware components). The device managers are specified in the desired state inventory specification. The device manager may be a person or a group. If a group, there is a group manager in charge.	Operational
DSM	Desired State Managers and Authorizers (DSM)	Desired State Managers are needed for both the ISCM Target Network and each object. The desired state managers ensure that data specifying the desired state of the relevant capability is entered into the ISCM system's desired state data and is available to guide the actual state collection subsystem and to identify defects. The DSM for the ISCM Target Network also resolves any ambiguity about which information system authorization boundary has defects (if any). Authorizers share some of these responsibilities by authorizing specific items (e.g., devices, software products, or settings), and thus defining the desired state. The desired state manager oversees and organizes this activity.	Operational
ISCM-Ops	ISCM Operators (ISCM-OPS)	ISCM operators are responsible for operating the ISCM system (see ISCM-Sys).	Operational
ISCM-Sys	The system that collects, analyzes and displays ISCM security-related information	The ISCM system: a) collects the desired state specification; b) collects security-related information from sensors (e.g., scanners, agents, training applications, etc.); and c) processes that information into a useful form. To support task c) the system conducts specified defect check(s) and sends defect information to an ISCM dashboard covering the relevant information system(s). The ISCM System is responsible for the assessment of most SP 800-53 security controls.	Operational
MAN	Manual Assessors	Assessments not automated by the ISCM system are conducted by human assessors using manual/procedural methods. Manual/procedural assessments might also be conducted to verify the automated security-related information collected by the ISCM system—when there is a concern about data quality.	Operational
RskEx	Risk Executive, System Owner, and/or Authorizing Official (RskEx)	Defined in SPs 800-37 and 800-39.	Managerial
TBD	To be determined by the organization	Depends on specific use. TBD by the organization.	Unknown



Roles in red italics
Device Managers
Managers validate assigned responsibility
Search for and Identify all Devices
ISCM-Sys
Collect Actual State
Establish/update a baseline of authorized and managed devices
ISCM-Sys
Collect Desired State
1
Add device to desired state to authorize, if appropriate. Assign a manager if not already done.
Desired State Managers
2
Remove device from actual state, if not authorized
Device Managers
Compute the differences between actual state and desired state and score them
ISCM-Sys
Find/Prioritize Defects
Scored defects ONLY
Correct discrepancies either by correcting Actual State or updating Desired State
(See arrows)
Mitigate Defects
3
Accept risk? e.g., while investigating
Risk Executive (et. al.)

Figure 5: Primary Roles in Automated Assessment of HWAM

2.8 HWAM Assessment Boundary

The assessment boundary is ideally an entire *network* of computers from the innermost enclave out to where the network either ends in an air-gap or interconnects to other network(s)—typically the Internet or the network(s) of a partner or partners. For HWAM, the boundary includes all devices inside this boundary and associated components, including removable devices. For more detail and definitions of some the terms applicable to the assessment boundary, see Section 4.3.2 in Volume 1 of this NISTIR.

2.9 HWAM Actual State and Desired State Specification

For information on the actual state and the desired state specification for HWAM, see the assessment criteria notes section of the defect check tables in Section 3.2.

Note that many controls in HWAM refer to developing and updating an inventory of devices (or other inventories). Note also, that per the SP 800-53A definition of *test*, testing of the HWAM controls implies the need for specification of both an actual state inventory and a desired state inventory, so that the test can compare the two inventories. The details of this are described in the defect check tables in Section 3.2.

2.10 HWAM Authorization Boundary and Inheritance

See Section 4.3.1 of Volume 1 of this NISTIR for information on how authorization boundaries are handled in automated assessment. In short, for HWAM, each device is assigned to one and only one authorization (system) boundary, per SP 800-53 CM-08(5). The ISCM dashboard can include a mechanism for recording the assignment of devices to authorization boundaries, making sure all devices are assigned to at least one such boundary, and that no device is assigned to more than one boundary.

For information on how inheritance is managed, see Section 4.3.3 of Volume 1 of this NISTIR. For HWAM, many network devices [e.g., firewalls, Lightweight Directory Access Protocols (LDAPs)] provide inheritable controls for other systems. The ISCM dashboard can include a mechanism to record such inheritance and use it in assessing the system's overall risk.

2.11 HWAM Assessment Criteria Recommended Scores and Risk-Acceptance Thresholds

General guidance on options for risk scores to be used to set thresholds is outside the scope of this NISTIR and is being developed elsewhere. In any case, for HWAM, organizations are encouraged to use metrics that look at both average risk and maximum risk per device.

2.12 HWAM Assessment Criteria Device Groupings to Consider

To support automated assessment and ongoing authorization, devices need to be clearly grouped by authorization boundary [see Control Items CM-8a and CM-8(5) in SP 800-53] and by the device managers responsible for specific devices [see Control Item CM-8(4) in SP 800-53]. In addition to these two important groupings, the organization may want to use other groupings for risk analysis, as discussed in Section 5.6 of Volume 1 of this NISTIR.

3. HWAM Security Assessment Plan Documentation Template

3.1 Introduction and Steps for Adapting This Plan

This section provides templates for the security assessment plan in accordance with SP 800-37 and SP 800-53A. The documentation elements are described in Section 6 of Volume 1 of this NISTIR. Section 9 of the same volume specifically describes how these products relate to the assessment tasks and work products defined in SP 800-37 and SP 800-53A. The following are suggested steps to adapt this plan to the organization's needs and implement automated monitoring.

Figure 6 shows the main steps in the adoption process. These are expanded to more detail in the following three sections.

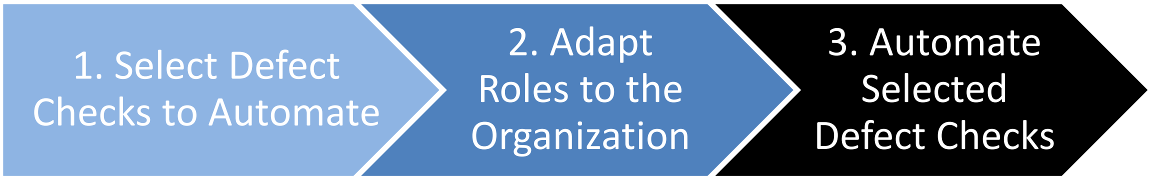

1. Select Defect Checks to Automate
2. Adapt Roles to the Organization
3. Automate Selected Defect Checks

Figure 6: Main Steps in Adapting the Plan Template

3.1.1 Select Defect Checks to Automate

The main steps in selecting defect checks to automate are described in this section.

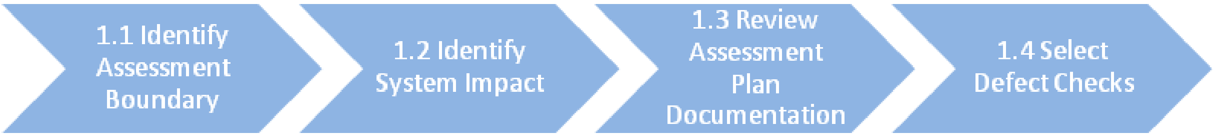

1.1 Identify Assessment Boundary
1.2 Identify System Impact
1.3 Review Assessment Plan Documentation
1.4 Select Defect Checks

Figure 7: Sub-Steps to Select Defect Checks to Automate

Take the following steps to select which local defect checks to automate:

(1) **Identify Assessment Boundary:** Identify the assessment boundary to be covered. (See Section 4.3 of Volume 1 of this NISTIR.)

(2) **Identify System Impact:** Identify the FIPS 199-defined impact level (high water mark) for that assessment boundary.
(See SP 800-60 and/or organizational categorization records.)

(3) **Review Security Assessment Plan Documentation:**

a. Review the defect checks documented in Section 3.2 to get an initial sense of the proposed items to be tested.

b. Review the security assessment plan narratives in Section 3.2 to understand how the defect checks apply to the controls that support hardware asset management.

(4) **Select Defect Checks:**

a. Based on Steps (2) to (4) in this list and an understanding of the organization’s risk tolerance, use Table 6: Mapping of Attack Steps to Security Sub-Capability, in Section 3.2.3 to identify the defect checks that would be necessary to test controls required by the impact level and risk tolerance.

b. Mark the local defect checks necessary as selected in Section 3.2.2. The organization is not required to use automation to test all of these, but automation of testing adds value to the extent that it:

(i) Produces assessment results timely enough to better defend against attacks; and/or

(ii) Reduces the cost of assessment over the long term.

3.1.2 Adapt Roles to the Organization

The main steps to adapt the roles to the organization are described in this section.

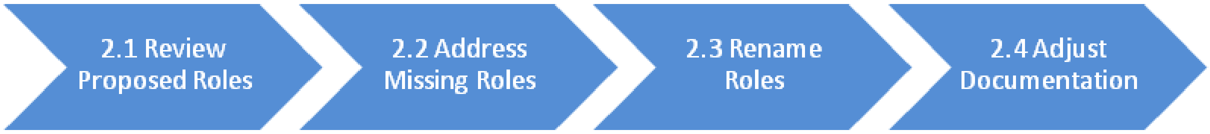


Figure 8: Sub-Steps to Adapt Roles to the Organization

(1) **Review Proposed Roles**: Proposed roles are described in Section 2.7, HWAM Specific Roles and Responsibilities (Illustrative).

(2) **Address Missing Roles:** Identify any required roles not currently assigned in the organization. Determine how these will be assigned, typically as other duties are assigned.

(3) **Rename Roles:** Identify the organization-specific names that will match each role. (Note that more than one proposed role might be performed by the same organizational role.)

(4) **Adjust Documentation:** Map the organization-specific roles to the roles proposed herein, in one of two ways (either may be acceptable):

a. Add a column to the table in Section 2.7 for the organization-specific role and list it there; or

b. Use global replace to change the role names throughout the documentation from the names proposed here to the organization-specific names.

3.1.3 Automate Selected Defect Checks

The main steps to implement automation are described in this section.

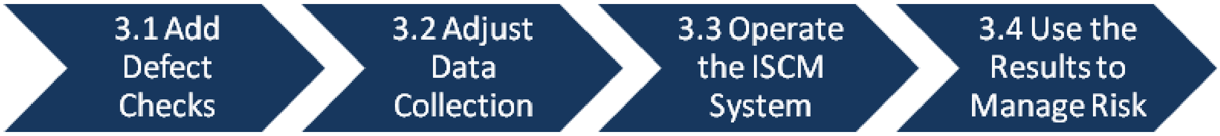

3.1 Add Defect Checks
3.2 Adjust Data Collection
3.3 Operate the ISCM System
3.4 Use the Results to Manage Risk

Figure 9: Sub-Steps to Automate Selected Defect Checks

(1) **Add Defect Checks:** Review the defect check definition and add checks as needed based on organizational risk tolerance and expected attack types. [Role: DSM (See Section 2.7.)]

(2) **Adjust Data Collection:**

a. Review the actual state information needed and configure automated sensor to collect the required information. [Role: ISCM-Sys (See Section 2.7)]

b. Review the matching desired state specification that was specified or add additional specifications to match the added actual state to be checked. Configure the collection system to receive and store this desired state specification in a form that can be automatically compared to the actual state data. [Role: ISCM-Sys (See Section 2.7.)]

(3) **Operate the ISCM-System:**

a. Operate the collection system to identify both security and data quality defects.

b. Configure the collection system to send these data to the defect management dashboard.

(4) **Use the Results to Manage Risk:** Use the results to respond to the worst problems first and to measure potential residual risk to inform aggregate risk acceptance decisions. If risk is determined to be too great for acceptance, the results may also be used to help prioritize further mitigation actions.

3.2 HWAM Sub-Capabilities and Defect Check Tables and Templates

This section documents the specific test templates that are proposed and considered adequate to assess the control items that support hardware asset management. See Section 5 of Volume 1 of this NISTIR for an overview of defect checks, and see Section 4.1 of Volume 1 for an overview of the actual state and desired state specifications discussed in the Assessment Criteria Notes for each defect check. Sections 3.2.1 and 3.2.2 of this document describe the foundational and local defect checks, respectively. The *Supporting Control Item(s)* data in these sections document which controls might cause any of these checks to fail, i.e., documenting why the check (test) might be needed. Refer to Section 3.1 on how to adapt these defect checks (and roles specified therein) to the organization.

Data found in Section 3.2 can be used in both defect check selection and root cause analysis, as described there. Section 3.2.3 documents how each sub-capability (tested by a defect check) serves to support the overall capability by addressing certain example attack steps and/or data quality issues.

The Defect Check Templates are organized as follows:

- In the column headed “The purpose of this sub-capability…,” the sub-capability being tested by the defect check is documented. (How these sub-capabilities block or delay certain example attack steps is described in Section 3.2.3.)

- The column headed “The defect check to assess…” describes the defect check name and the assessment criteria to be used to assess whether or not the sub-capability is effective in achieving its purpose.

- In the column headed *Example Mitigation/Responses*, the document describes examples of potential responses when the check finds a defect, and also what role is likely responsible.

- Finally, the column headed *Supporting Control Items* lists the control items that work together to support the sub-capability. This identification is based on the mapping of defect checks to control items in Section 3.3.

As noted in Section 3.1, this material is designed to be customized and adapted to become part of an organization’s security assessment plan.

3.2.1 Foundational Sub-Capabilities and Corresponding Defect Checks

This document (NISTIR 8011) proposes two foundational security-oriented defect checks for the HWAM capability. The foundational checks are designated HWAM-F01 and HWAM-F02 and focus on security.

The document also proposes four *data quality* defect checks, designated HWAM-Q01 through HWAM-Q04. The data quality defect checks are important because they provide the information necessary to document how reliable the overall automation is, information which can be used to decide whether to trust the other data (i.e., provide greater assurance about security control effectiveness). Defect checks may be computed for individual checks (e.g., federal and/or local), or summarized for various groupings of devices (e.g., device manager, device owner, system, etc.) out to the full assessment boundary.

Each of the foundational and data quality defect checks is defined in terms of assessment criteria, mitigation methods, and responsibility described in the *Example Mitigation/Responses* section under each defect check.

All of these defect checks were selected for their value for summary reporting. The *Selected* column indicates which of these checks to implement.

3.2.1.1 Prevent Unauthorized Devices *Sub-Capability and Defect Check HWAM-F01*

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Prevent unauthorized devices	Prevent or reduce the presence of unauthorized devices, thus reducing the number of potentially malicious or high-risk devices.

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-F01	Unauthorized devices	Device is In Actual State but not in Desired State [See supplemental criteria in L02]	Assessment Criteria Notes: 1) The actual state is the list (inventory) of all devices (within an organizationally defined tolerance) in the assessment boundary as determined by the ISCM system. 2) The desired state specification is a list of all devices authorized to be in the assessment boundary. 3) A defect is a device in the actual state but not in the desired state, and is thus unauthorized. This is computed by simple set differencing.	Yes

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST guidance. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-F01	Remove Device	DM
HWAM-F01	Authorize Device	DSM
HWAM-F01	Accept Risk	RskEx
HWAM-F01	Ensure Correct Response	DSM

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-F01	Low	AC-19-b	AC-19(b)
HWAM-F01	Low	CM-08-a	CM-8(a)
HWAM-F01	Low	CM-08-b	CM-8(b)
HWAM-F01	Low	PS-04-d	PS-4(d)
HWAM-F01	Low	SC-15-a	SC-15(a)
HWAM-F01	Moderate	AC-20-z-02-z	AC-20(2)
HWAM-F01	Moderate	CM-03-b	CM-3(b)
HWAM-F01	Moderate	CM-03-c	CM-3(c)
HWAM-F01	Moderate	CM-03-d	CM-3(d)
HWAM-F01	Moderate	CM-03-g	CM-3(g)
HWAM-F01	Moderate	CM-08-z-01-z	CM-8(1)
HWAM-F01	Moderate	CM-08-z-03-b	CM-8(3)(b)
HWAM-F01	Moderate	MA-03-z-01-z	MA-3(1)
HWAM-F01	High	CM-03-z-01-a	CM-3(1)(a)
HWAM-F01	High	CM-03-z-01-b	CM-3(1)(b)
HWAM-F01	High	CM-03-z-01-d	CM-3(1)(d)

3.2.1.2 Reduce Number of Devices without Assigned Device Manager *Sub-Capability and Defect Check HWAM-F02*

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Reduce number of devices without assigned device manager	Prevent or reduce the number of authorized devices without an assigned device manager within the assessment boundary, thus reducing delay in mitigating device defects (when found).

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-F02	Authorized devices without a device manager	Device is in Actual State and in Desired State (both from HWAM-F01) but no approved device manager is assigned.	Assessment Criteria Notes: 1) The actual state is the list of device managers assigned to manage each device plus a list of approved device managers as determined by the ISCM system. 2) The desired state specification is that a device manager is specified for each device, and is in the list of approved device managers. 3) A defect is an authorized device in the HWAM-F01 actual state where the device manager is either not listed or listed but not on the approved list. Such devices are called devices without an assigned device manager". Note: The HWAM-F01 status must be known to assess HWAM-F02. Also note that an unmanaged device that has never been on the network (in the HWAM-F1 Actual State) is not counted as a defect because it cannot cause risk to the network until it is on the network. The organization still needs to consider risk to the information system(s) from the unconnected device(s), if any, but because it is outside the assessment boundary, the ISCM assessment cannot do this.	Yes

Example Mitigation/Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST guidance. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-F02	Remove Device	DM
HWAM-F02	Assign Device	DSM
HWAM-F02	Accept Risk	RskEx
HWAM-F02	Ensure Correct Response	DSM

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-F02	Low	AC-19-b	AC-19(b)
HWAM-F02	Low	CM-08-z-04-z	CM-8(4)
HWAM-F02	Moderate	CM-03-b	CM-3(b)
HWAM-F02	Moderate	CM-03-c	CM-3(c)
HWAM-F02	Moderate	CM-03-d	CM-3(d)
HWAM-F02	Moderate	CM-03-g	CM-3(g)
HWAM-F02	Moderate	MA-03-z-01-z	MA-3(1)
HWAM-F02	High	CM-03-z-01-a	CM-3(1)(a)
HWAM-F02	High	CM-03-z-01-b	CM-3(1)(b)

3.2.1.3 Ensure Reporting of Devices *Sub-Capability and Defect Check HWAM-Q01*

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Ensure reporting of devices	Ensure that individual devices are regularly reported in the actual state inventory to prevent defects associated with other capabilities from going undetected.

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-Q01	Non-reporting devices	In Desired State but not in Actual State	Assessment Criteria Notes: 1) The actual state is the same as HWAM-F01 2) The desired state is the same as HWAM-F01 3) A defect occurs when a device in the desired state has not been detected as recently as expected in the actual state. Criteria are developed to define the threshold for "as recently as expected," for each device or device type based on the following considerations: a. some devices (e. g., domain controllers, routers) must always be present. b. endpoints may not report in a particular collection because they are turned off, network connections are temporarily down, etc. But they should appear in the actual state at least every n collections, where "n" is defined by "as recently as expected." c. defining "as recently as expected" for devices such as laptops might require information on what percent of the time they are expected to be connected to the network and powered on. As that percent goes down, the length of "as recently as expected" would go up. Time and experience will be required to accurately define "as recently as expected" for each device/device type in order to eliminate false positives while still finding true positives.	Yes

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST guidance. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-Q01	Restore Device Reporting	ISCM-Ops
HWAM-Q01	Declare Device Missing	DM
HWAM-Q01	Accept Risk	RskEx
HWAM-Q01	Ensure Correct Response	ISCM-Ops

Supporting Control Items: This sub-capability is supported by each of the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-Q01	Low	CM-08-a	CM-8(a)
HWAM-Q01	Moderate	CM-03-f	CM-3(f)
HWAM-Q01	Moderate	CM-03-z-02-z	CM-3(2)
HWAM-Q01	Moderate	CM-08-z-01-z	CM-8(1)
HWAM-Q01	High	CM-08-z-02-z	CM-8(2)

3.2.1.4 Ensure Correct Reporting of Defect Checks *Sub-Capability and Defect Check HWAM-Q02*

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Ensure correct reporting of defect checks	Ensure that defect check information is correctly reported in the actual state inventory to prevent systematic inability to check any defect on any device.

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-Q02	Non-reporting defect checks	Defect Checks are selected, but the HWAM Actual State Collection Manager does not report testing for all defects on all devices. (Device level and defect check level defect.)	Assessment Criteria Notes: 1) The actual state is the set of HWAM data that was collected in each collection cycle to support all implemented HWAM defect checks. 2) The desired state is the set of HWAM data that must be collected in each collection cycle to support all implemented HWAM defect checks. 3) The defect is any set of data needed for a defect where not all the data was collected for a specified number of devices (too many devices) indicating that the collection system is not providing enough information to perform a complete assessment. Criteria are developed to define the threshold for “too many devices” in order to balance the need for completeness with the reality that some data may be missing from even the highest quality collections.	Yes

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST documents. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-Q02	Restore Defect Check Reporting	ISCM-Ops
HWAM-Q02	Accept Risk	RskEx
HWAM-Q02	Ensure Correct Response	ISCM-Ops

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-Q02	Low	CM-08-a	CM-8(a)
HWAM-Q02	Moderate	CM-03-f	CM-3(f)
HWAM-Q02	Moderate	CM-03-z-02-z	CM-3(2)

3.2.1.5 Ensure Defect Check Completeness *Sub-Capability and Defect Check HWAM-Q03*

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Ensure defect check completeness	Ensure that data for as many defect checks as possible are correctly reported in the actual state inventory to prevent defects from persisting undetected across the assessment boundary.

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-Q03	Low completeness metric	Completeness of the actual inventory collection is below an [organization-defined-threshold]. (Summary of Q03 and Q04 for assessment boundary and other device grouping (e.g., system, device manager, etc.))	Assessment Criteria Notes: The completeness metric is not a device-level defect, but is applied to any collection of devices – for example, those in an information system authorization boundary. It is used in computing the maturity of the collection system. 1) The actual state is the number of specified defect checks provided by the collection system in a reporting window. 2) The desired state is the number of specified defect checks that should have been provided in that same reporting window. 3) Completeness is the actual state number divided by the desired state number – that is, it is the percentage of specified defect checks collected during the reporting window. Completeness measures long term ability to collect all needed data. 4) The metric is completeness, defined as the actual state number divided by the desired state number. 5) A defect is when completeness is too low (based on the defined threshold). This indicates risk because, when completeness is too low, there is too much risk of defects being undetected. An acceptable level of completeness balances technical feasibility against the need for 100% completeness. Note on 1): A specific check-device combination may only be counted once in the required minimal reporting period. For example, if checks are to be done every 3 days, a check done twice in that timeframe would still count as 1 check. However, if there are 30 days in the reporting window, that check-device combination could be counted for each of the ten 3-day periods included.	Yes

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
			Note on 2): Different devices may have different sets of specified checks, based on their role. The desired state in this example includes ten instances of each specified defect-check combinations for each of the 3-day reporting cycles in a 30 day reporting window.	

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST guidance. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-Q03	Restore Completeness	ISCM-Ops
HWAM-Q03	Accept Risk	RskEx
HWAM-Q03	Ensure Correct Response	ISCM-Ops

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-Q03	Low	CM-08-a	CM-8(a)
HWAM-Q03	Moderate	CM-03-f	CM-3(f)
HWAM-Q03	Moderate	CM-03-z-02-z	CM-3(2)
HWAM-Q03	High	CM-08-z-02-z	CM-8(2)

3.2.1.6 Ensure Reporting Timeliness *Sub-Capability and Defect Check HWAM-Q04*

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Ensure reporting timeliness	Ensure that data for as many defect checks as possible are reported in a timely manner in the actual state inventory to prevent defects from persisting undetected. To be effective, defects need to be found and mitigated considerably faster than they can be exploited.

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-Q04	Poor timeliness metric	Frequency of update (timeliness) of the actual inventory collection is lower than an [organization-defined-threshold]. (Summary of Q03 and Q04 for assessment boundary and other device grouping (e.g., system, device manager, etc.)	Assessment Criteria Notes: The Timeliness metric is not a device-level defect, but can be applied to any collection of devices – for example, those within an information system (authorization boundary). It is used in computing the maturity of the collection system. 1) The actual state is the number of specified defect checks provided by the collection system in one collection cycle – the period in which each defect should be checked once. 2) The desired state is the number of specified defect checks that should have been provided in the collection cycle. 3) Timeliness is the actual state number divided by the desired state number – that is, it is the percentage of specified defect checks collected in the reporting cycle. Thus it measures the percentage of data that is currently timely (collected as recently as required). 4) The metric is timeliness, defined as the actual state number divided by the desired state number. 5) A defect is when “timeliness” is too poor (based on the defined threshold). This indicates risk because when timeliness is poor there is too much risk of defects not being detected quickly enough. Note on 1): A specific check-device combination may only be counted once in the collection cycle. Note on 2): Different devices may have different sets of specified checks, based on their role.	Yes

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST documents. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-Q04	Restore Frequency	ISCM-Ops
HWAM-Q04	Accept Risk	RskEx
HWAM-Q04	Ensure Correct Response	ISCM-Ops

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-Q04	Low	CM-08-a	CM-8(a)
HWAM-Q04	Low	CM-08-b	CM-8(b)
HWAM-Q04	Moderate	CM-03-f	CM-3(f)
HWAM-Q04	Moderate	CM-03-g	CM-3(g)
HWAM-Q04	Moderate	CM-03-z-02-z	CM-3(2)
HWAM-Q04	Moderate	CM-08-z-01-z	CM-8(1)
HWAM-Q04	Moderate	CM-08-z-03-a	CM-8(3)(a)
HWAM-Q04	High	CM-08-z-02-z	CM-8(2)

3.2.2 Local Sub-Capabilities and Corresponding Defect Checks

This section includes local defect checks, as examples of what organizations may add to the foundational checks to support more complete automated assessment of SP 800-53 controls that support HWAM.

Organizations exercise their authority to manage risk by choosing whether or not to select these defect checks for implementation. In general, selecting more defect checks may lower risk (if there is capacity to address defects found) and provide greater assurance but may also increase cost of detection and mitigation. The organization selects defect checks for implementation (or not) to balance these benefits and costs, and to focus on the worst problems first.

Note that each local defect check may also include options to make it more or less rigorous, as the risk tolerance of the organization deems appropriate.

The “Selected” column is present for organizations to indicate which of these checks they choose to implement as documented or as modified by the organization.

3.2.2.1 Reduce Exploitation of Devices before Removal, during Use Elsewhere, and after Return *Sub-Capability and Defect Check HWAM-L01*

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Reduce exploitation of devices before removal, during use elsewhere, and after return	Prevent exploitation of devices before removal, during use elsewhere, and after return (or other mobile use) by a) appropriately hardening the device prior to removal; b) checking for organizational data before removal; and c) sanitizing the device before introduction or reintroduction into the assessment boundary.

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-L01	Devices moving into/out of the assessment boundary	The desired State is that the device is approved for removal and connection. The defect check fails if the device type or subcomponents do not meet organization defined rules (for removal and/or connection).	Assessment Criteria Notes: 1) The actual state includes four parts: a. the actual hardware configuration of devices approved for removal. This will typically consist of the presence or absence of specific hardware subcomponents (e.g., DVD drives, USB ports); b. data identifying devices about to be used in travel (and to where); c. users authorized to take the devices on travel; and d. data identifying devices reentering the assessment boundary (and where else the device has been connected while removed -this might be validated from GPS and IP logging, if appropriate). 2) The desired state includes two parts: a. the list of devices authorized for removal; and b. the desired hardware configuration and/or sanitization for such devices, based on the location(s) to which connected while removed. (XREF to 1a and 1d) 3) A defect occurs when: a. any device unauthorized for removal is either expected to be (or has actually been) removed, regardless of hardware configuration. b. a device approved for travel does not have the desired hardware configuration for the proposed uses. c. a device approved for travel was connected to unapproved location(s) where its hardware configuration was not appropriate (matching the desired state) for those location(s).	TBD

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST guidance. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-L01	Remove Authorization for Travel	DM
HWAM-L01	Correct the hardware configuration	DM
HWAM-L01	Accept Risk	RskEx
HWAM-L01	Ensure Correct Response	DM

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-L01	Low	AC-19-a	AC-19(a)
HWAM-L01	Low	PS-04-d	PS-4(d)
HWAM-L01	Low	SC-15-a	SC-15(a)
HWAM-L01	Moderate	AC-20-z-02-z	AC-20(2)
HWAM-L01	Moderate	CM-02-z-07-a	CM-2(7)(a)
HWAM-L01	Moderate	CM-02-z-07-b	CM-2(7)(b)
HWAM-L01	Moderate	CM-03-b	CM-3(b)
HWAM-L01	Moderate	CM-03-c	CM-3(c)
HWAM-L01	Moderate	CM-03-d	CM-3(d)
HWAM-L01	Moderate	CM-03-g	CM-3(g)
HWAM-L01	Moderate	MA-03-z-01-z	MA-3(1)
HWAM-L01	High	CM-03-z-01-a	CM-3(1)(a)
HWAM-L01	High	CM-03-z-01-b	CM-3(1)(b)
HWAM-L01	High	MA-03-z-03-a	MA-3(3)(a)
HWAM-L01	High	MA-03-z-03-b	MA-3(3)(b)

3.2.2.2 Reduce Insider Threat of Unauthorized Device *Sub-Capability and Defect Check HWAM-L02*

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Reduce insider threat of unauthorized device	Use separation of duties (i.e., requiring multiple persons to authorize adding a device to the authorization boundary) to limit the ability of a single careless or malicious insider to authorize high-risk devices. Note 1: The organization might choose to use access restrictions to enforce the separation of duties. If so, that would be assessed under the PRIV capability. What is assessed here is that the separation of duties occurs. Note 2: See HWAM-L11 for authorization boundary.

Local Defect Checks

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-L02	Required authorization missing	Device must be in the desired state inventory and approved by at least two authorized persons before connection.	Assessment Criteria Notes: 1) The actual state is the list of persons who authorized the change to the information system, thus allowing the device to be connected inside the assessment boundary. This would typically be recorded in the desired state inventory as part of the configuration change control process. 2) The desired state is the list of persons who are authorized to approve information system changes and allow devices to be connected inside the assessment boundary. This may include rules to support separation of duties specifying first, second, etc., approver roles. 3) A defect occurs when: a. addition of the device is authorized by less than the required number of distinct and authorized approvers; or b. addition of the device is authorized by persons not authorized to approve changes to the information system (at each step in the approval process).	TBD

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST guidance. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-L02	Remove Device	DM
HWAM-L02	Authorize Device	DSM
HWAM-L02	Accept Risk	RskEx
HWAM-L02	Ensure Correct Response	DSM

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-L02	Moderate	CM-03-b	CM-3(b)
HWAM-L02	Moderate	CM-03-c	CM-3(c)
HWAM-L02	Moderate	CM-03-d	CM-3(d)
HWAM-L02	Moderate	CM-03-g	CM-3(g)
HWAM-L02	High	CM-03-z-01-a	CM-3(1)(a)
HWAM-L02	High	CM-03-z-01-b	CM-3(1)(b)
HWAM-L02	High	CM-03-z-01-d	CM-3(1)(d)

3.2.2.3 Reduce Denial of Service Attacks from Missing Required Devices *Sub-Capability and Defect Check HWAM-L03*

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Reduce denial of service attacks from missing required devices	Prevent or reduce denial of service attacks and/or attacks on resilience by ensuring that all required devices are present in the assessment boundary.

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-L03	Required device not installed	Device is in the desired state and is authorized, but has not appeared in the actual state after [an organization-defined] number of collections.	Assessment Criteria Notes: 1) The actual state is the same as for HWAM-F01, the inventory of devices actually found to be connected inside the assessment boundary. 2) The desired state includes: a. a supplement to the desired state for HWAM-F01 that specifies that some devices are not only authorized, but required to be present on the network.; and b. a time frame and frequency of search for determining that the absence of the device is not a false positive. For example, this might specify that if the device is absent after an active search conducted every x minutes, the device is considered absent. 3) A defect occurs when a device is listed as required in the desired state, but has not been identified in the actual state within the number of checks (n) within the specified frequency (x).	TBD

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST guidance. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-L03	Install Device	DM
HWAM-L03	Remove Requirement	DSM
HWAM-L03	Accept Risk	RskEx
HWAM-L03	Ensure Correct Response	DM

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-L03	Low	CM-08-a	CM-8(a)
HWAM-L03	Moderate	AC-20-z-02-z	AC-20(2)
HWAM-L03	Moderate	CM-03-b	CM-3(b)
HWAM-L03	Moderate	CM-03-c	CM-3(c)
HWAM-L03	Moderate	CM-03-d	CM-3(d)
HWAM-L03	Moderate	CM-03-g	CM-3(g)
HWAM-L03	High	CM-03-z-01-a	CM-3(1)(a)
HWAM-L03	High	CM-03-z-01-b	CM-3(1)(b)
HWAM-L03	High	CM-03-z-01-f	CM-3(1)(f)
HWAM-L03	High	MA-03-z-03-a	MA-3(3)(a)
HWAM-L03	High	MA-03-z-03-b	MA-3(3)(b)

3.2.2.4 Restrict Device Ownership *Sub-Capability and Defect Check HWAM-L04*

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Restrict Device Ownership	Ensure that devices not owned by the organization are not connected in the assessment boundary, or that they are authorized for connection only in accordance with organizationally defined restrictions.

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-L04	Restrictions on device ownership	The device is not owned by the organization or is not in compliance with defined restrictions for non-organizationally owned device connection.	Assessment Criteria Notes: This check is relevant where connection of non-organizationally owned devices in the assessment boundary is allowed. The assessment criteria provided here include examples, and could be expanded to include other criteria of interest to the organization. 1) The actual state includes: a. the same inventory as for HWAM-F01, the inventory of devices actually found to be connected inside the assessment boundary; b. identifiers associated with defined restrictions for non-organizationally owned devices (e.g., connection type/limits, specific persons or roles permitted to connect such devices); c. the length of time (or period) each device has been connected; and d. IP or MAC address of the connected non-organizationally owned device. 2) The desired state includes: a. a list of approved device owners or roles; b. a list of authorized devices approved for connection by each owner; and c. rules to determine limits to connection time or periods. d. other organization-defined identifiers associated with defined restrictions for non-organizationally owned devices. 3) A defect occurs when: a. a device with no owner or an owner not on the approved owner list for that device is connected; b. a device is connected which violates restrictions on length or time of connection;	TBD

Local Defect Checks

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
			c. a device without the required identifiers; and/or d. a device fails other organizationally defined restrictions related to connection of non-organizationally owned devices.	

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST guidance. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-L04	Remove Device	DM
HWAM-L04	Authorize Owner	DSM
HWAM-L04	Accept Risk	RskEx
HWAM-L04	Ensure Correct Response	DM

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-L04	Moderate	AC-19-z-05-z	AC-19(5)
HWAM-L04	Moderate	CM-03-b	CM-3(b)
HWAM-L04	Moderate	CM-03-c	CM-3(c)
HWAM-L04	Moderate	CM-03-d	CM-3(d)
HWAM-L04	Moderate	CM-03-g	CM-3(g)
HWAM-L04	Moderate	MP-07-z-01-z	MP-7(1)
HWAM-L04	High	CM-03-z-01-a	CM-3(1)(a)
HWAM-L04	High	CM-03-z-01-b	CM-3(1)(b)

3.2.2.5 **Reduce Unapproved Suppliers and/or Manufacturers** ***Sub-Capability and Defect Check HWAM-L05***

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Reduce unapproved suppliers and/or manufacturers	Prevent or reduce supply chain threats in devices (e.g., by ensuring that all authorized devices are from trusted suppliers and/or manufacturers).

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-L05	Unapproved supplier and/or manufacturer	The device supplier and/or manufacturer is not in an approved list. Note: The organization could design other ways to establish supply chain trust.	Assessment Criteria Notes: 1) The actual state includes: a. the HWAM-F01 actual state inventory; b. the device manufacturer, based on inventory data about the device; and c. the device supplier, typically recorded during the devices' authorization in the desired state inventory. 2) The desired state includes: a. a list of trusted manufacturers; and b. a list of trusted suppliers 3) A defect occurs when: a. a device is in the actual state inventory without an authorized manufacturer; b. a device is in the actual state inventory without an authorized supplier; c. a device is in the desired state inventory without an authorized manufacturer; and/or d. a device is in the desired state inventory without an authorized supplier.	TBD

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST guidance. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-L05	Remove Device	DM
HWAM-L05	Correct the Supplier Data	DSM
HWAM-L05	Correct the Manufacturer Data	ISCM-OPS
HWAM-L05	Accept Risk	RskEx
HWAM-L05	Ensure Correct Response	DSM

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-L05	Moderate	CM-03-b	CM-3(b)
HWAM-L05	Moderate	CM-03-c	CM-3(c)
HWAM-L05	Moderate	CM-03-d	CM-3(d)
HWAM-L05	High	CM-03-z-01-a	CM-3(1)(a)
HWAM-L05	High	CM-03-z-01-b	CM-3(1)(b)
HWAM-L05	High	SA-12	SA-12

3.2.2.6 Reduce Unauthorized Subcomponents *Sub-Capability and Defect Check HWAM-L06*

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Reduce unauthorized components	Detect and remove unauthorized subcomponents and/or subcomponent types to implement least functionality in order to prevent or reduce the introduction of subcomponent and subcomponent types that could enable attacks.

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-L06	Subcomponents not authorized	The system verifies that [organization-defined subcomponent types] found in the actual state are reflected in the desired state as being authorized and required	Assessment Criteria Notes: 1) The actual state includes the list of actual hardware subcomponents discovered on a device. 2) The desired state includes the list of authorized and/or required subcomponents for devices: a. by device role/attributes; or b. by device identity. 3) A defect occurs when a device actually in the assessment boundary: a. has unauthorized hardware subcomponents; and/or b. does not have required hardware subcomponents.	TBD

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST guidance. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-L06	Remove Subcomponent	DM
HWAM-L06	Authorize Subcomponent	DSM
HWAM-L06	Accept Risk	RskEx
HWAM-L06	Ensure Correct Response	DM

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-L06	Low	AC-19-a	AC-19(a)
HWAM-L06	Low	CM-08-a	CM-8(a)
HWAM-L06	Moderate	AC-19-z-05-z	AC-19(5)
HWAM-L06	Moderate	CM-03-b	CM-3(b)
HWAM-L06	Moderate	CM-03-c	CM-3(c)
HWAM-L06	Moderate	CM-03-d	CM-3(d)
HWAM-L06	Moderate	CM-03-g	CM-3(g)
HWAM-L06	Moderate	CM-08-z-03-b	CM-8(3)(b)
HWAM-L06	High	CM-03-z-01-a	CM-3(1)(a)
HWAM-L06	High	CM-03-z-01-b	CM-3(1)(b)

3.2.2.7 Verify Ongoing Business Need for Device *Sub-Capability and Defect Check HWAM-L07*

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Verify ongoing business need for device	Require periodic and/or event driven consideration of whether a device is still needed for information system functionality to fulfill mission requirements in support of least functionality. Note: Good practice might be to require DMs to review what they manage and System Owners to review what is needed in their authorization boundaries.

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-L07	Business need and/or device manager not recently verified	Track a device business-need sunset date. Track triggers that can require reassessment of the business need.	Assessment Criteria Notes: 1) The actual state includes (for each device): a. the current date; and/or b. whether or not a specified trigger event has occurred. 2) The desired state includes: a. the maximum time before re-verification is required for each device b. a device sunset date; and/or c. specific events requiring consideration of device relevance, i. by device role/attributes ii. by device identity 3) A defect occurs when a device actually in the assessment boundary: a. has an expired sunset date; b. is nearing an expired sunset date (to provide warning to desired state managers); and/or c. a specified trigger event has occurred to this device without re-verification of business need.	TBD

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST guidance. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-L07	Remove Device	DM
HWAM-L07	Re-authorize Device	DSM
HWAM-L07	Accept Risk	RskEx
HWAM-L07	Ensure Correct Response	DM

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-L07	Moderate	CM-03-b	CM-3(b)
HWAM-L07	Moderate	CM-03-c	CM-3(c)
HWAM-L07	Moderate	CM-03-d	CM-3(d)
HWAM-L07	Moderate	CM-03-f	CM-3(f)
HWAM-L07	Moderate	CM-03-g	CM-3(g)
HWAM-L07	Moderate	CM-08-z-01-z	CM-8(1)
HWAM-L07	High	CM-03-z-01-a	CM-3(1)(a)
HWAM-L07	High	CM-03-z-01-b	CM-3(1)(b)

3.2.2.8 Ensure Required Device Data is Collected *Sub-Capability and Defect Check HWAM-L08*

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Ensure required device data is collected	Ensure that data required to assess risk are collected. These data may relate to other than a HWAM defect but may need to be collected by the HWAM sensor. For example, devices with inadequate memory to support basic OS and defensive security components may need to be detected as defects.

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-L08	Missing required device data	Track additional device data and score devices that don't have that data	Assessment Criteria Notes: 1) The actual state includes: a. the list of data attributes collected on each device by the actual state collection system; and b. the date each attribute was last collected. 2) The desired state includes: a. the list of attributes that are required to be collected for each device, specified i. by device role/attributes; and/or ii. by device identity; and/or b. the time frame within which each attribute should be recollected based on the same role/attribute/identity. 3) A defect occurs when the required data has not been collected from a device within the required time frame.	TBD

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST guidance. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-L08	Remove Non-reporting Devices	DM
HWAM-L08	Begin to Collect All Required Data	ISCM-OPS
HWAM-L08	Change Reporting Requirements	RskEx
HWAM-L08	Accept Risk	RskEx
HWAM-L08	Ensure Correct Response	ISCM-OPS

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-L08	Low	CM-08-a	CM-8(a)
HWAM-L08	Low	CM-08-b	CM-8(b)

3.2.2.9 Ensure Needed Changes Are Approved or Disapproved in a Timely Manner *Sub-Capability and Defect Check HWAM-L09*

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Ensure needed changes are approved or disapproved in a timely manner	Ensure that needed changes are approved or disapproved in a timely manner by flagging requested changes not considered (approved or disapproved) in a timely manner as risks.

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-L09	Proposed changes are too old	Proposed changes not approved or disapproved after [organization-defined time frame]. Assumes L02 is selected.	Assessment Criteria Notes: 1) The actual state includes: a. a list of proposed changes to the desired state; and b. a list of approved changes to the actual state, likely derived from the desired state specification; and c. the date the change was proposed/approved. 2) The desired state includes: a. the time frame within which proposed items should be approved or rejected; and b. the time frame within which approved changes should be implemented in the actual state. 3) A defect occurs when a device in the assessment boundary: a. includes a proposed change that has not been addressed within the time allowed in 2(a); and/or b. includes an approved change that has not been implemented within the time frame specified in 2(b).	TBD

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST guidance. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-L09	Reject Proposed Change	DSM
HWAM-L09	Approve Proposed Change	DSM
HWAM-L09	Accept Risk	RskEx
HWAM-L09	Ensure Correct Response	DSM

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-L09	Low	AC-19-a	AC-19(a)
HWAM-L09	Moderate	CM-03-b	CM-3(b)
HWAM-L09	Moderate	CM-03-c	CM-3(c)
HWAM-L09	Moderate	CM-03-d	CM-3(d)
HWAM-L09	Moderate	CM-03-f	CM-3(f)
HWAM-L09	Moderate	CM-03-g	CM-3(g)
HWAM-L09	High	CM-03-z-01-a	CM-3(1)(a)
HWAM-L09	High	CM-03-z-01-b	CM-3(1)(b)
HWAM-L09	High	CM-03-z-01-c	CM-3(1)(c)

3.2.2.10 **Ensure Adequate Record Retention** ***Sub-Capability and Defect Check HWAM-L10***

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Ensure adequate record retention	Ensure adequate historical records of HWAM ISCM data are kept in support of forensics and other risk management activities.

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-L10	Records retention too short	Records of actual state and/or desired state specification are not retained for the required period.	Assessment Criteria Notes: 1) The actual state includes data from actual state collection, by collection period. 2) The desired state includes: a. the required record retention period; and b. check summary data to verify the complete recording of each collection cycle, e.g., i. record counts by type; ii. hash of complete dataset; or iii. equivalent. 3) A defect occurs when data for a collection cycle: a. is missing in its entirety during the retention period; and/or b. application of the check summary indicated the collection has been altered.	TBD

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST guidance. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-L10	Restore from Backup	ISCM-OPS
HWAM-L10	Accept Risk	RskEx
HWAM-L10	Ensure Correct Response	ISCM-OPS

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-L10	Moderate	CM-03-e	CM-3(e)

3.2.2.11 Ensure One-to-One Device Assignment to Authorization Boundary *Sub-Capability and Defect Check HWAM-L11*

The purpose of this sub-capability is defined as follows:

Sub-Capability Name	Sub-Capability Purpose
Ensure one-to-one device assignment to authorization boundary	Ensure device-level accountability and reduce duplication of effort by verifying that each device is in one and only one assessment boundary.

The defect check to assess whether this sub-capability is operating effectively is defined as follows:

Defect Check ID	Defect Check Name	Assessment Criteria Summary	Assessment Criteria Notes	Selected
HWAM-L11	Device assignment to authorization boundary is not 1:1	Each device in the desired state specification is assigned to one and only one authorization boundary.	Assessment Criteria Notes: 1) The actual state includes the data from the desired state specifications for all authorization boundaries indicating which devices are assigned to which authorization boundaries. 2) The desired state includes details specified in the component inventory regarding the authorization boundary (information system) to which the device belongs. 3) A defect occurs when: a. a device is not listed in any authorization boundary; and/or b. a device is listed in more than one authorization boundary.	TBD

Example Responses: The following potential responses (with example assignments) are common actions and are appropriate when defects are discovered in this sub-capability. These example assignments do not change the overall management responsibilities defined in other NIST guidance. Moreover, they can be customized by each organization to best adapt to local circumstances.

Defect Check ID	Potential Response Action	Primary Responsibility
HWAM-L11	Add to boundary if in none	DSM
HWAM-L11	Remove from all boundaries except the correct one	DSM
HWAM-L11	Accept Risk	RskEx
HWAM-L11	Ensure Correct Response	DSM

Supporting Control Items: This sub-capability is supported by the following control items. Thus, if any of the following supporting controls fail, the defect check will fail and overall risk will increase.

Defect Check ID	Baseline	Sortable Control Item Code	NIST Control Item Code
HWAM-L11	Moderate	CM-08-z-05-z	CM-8(5)

3.2.3 Security Impact of Each Sub-Capability on an Attack Step Model

Table 6 shows the primary ways the defect checks derived from the SP 800-53 security controls contribute to blocking attacks/event as described in Figure 1: HWAM Impact on an Attack Step Model.

Table 6: Mapping of Attack Steps to Security Sub-Capability

Attack Step	Attack Step Description	Sub-Capability Name	Sub-Capability Purpose
2) Initiate Attack Internally	The attacker is inside the boundary and initiates attack on some object internally. Examples include: User opens spear phishing email or clicks on attachment; user installs unauthorized software or hardware; unauthorized personnel gains physical access to restricted facility.	Prevent unauthorized devices	Prevent or reduce the presence of unauthorized devices thus reducing the number of potentially malicious or high-risk devices.
2) Initiate Attack Internally	The attacker is inside the boundary and initiates attack on some object internally. Examples include: User opens spear phishing email or clicks on attachment; user installs unauthorized software or hardware; unauthorized personnel gains physical access to restricted facility.	Reduce exploitation of devices before removal, during use elsewhere, and after return	Prevent exploitation of devices before removal, during use elsewhere, and after return (or other mobile use) by a) appropriately hardening the device prior to removal; b) checking for organizational data before removal; and c) sanitizing the device before introduction or reintroduction into the assessment boundary.
2) Initiate Attack Internally	The attacker is inside the boundary and initiates attack on some object internally. Examples include: User opens spear phishing email or clicks on attachment; user installs unauthorized software or hardware; unauthorized personnel gains physical access to restricted facility.	Reduce insider threat of unauthorized device	Use separation of duties (i.e., requiring multiple persons to authorize adding a device to the authorization boundary) to limit the ability of a single careless or malicious insider to authorize high-risk devices. Note 1: The organization might choose to use access restrictions to enforce the separation of duties. If so, that would be assessed under the PRIV capability. What is assessed here is that the separation of duties occurs. Note 2: See HWAM-L11 for authorization boundary.

Attack Step	Attack Step Description	Sub-Capability Name	Sub-Capability Purpose
2) Initiate Attack Internally	The attacker is inside the boundary and initiates attack on some object internally. Examples include: User opens spear phishing email or clicks on attachment; user installs unauthorized software or hardware; unauthorized personnel gains physical access to restricted facility.	Reduce denial of service attacks from missing required devices	Prevent or reduce denial of service attacks and/or attacks on resilience by ensuring that all required devices are present in the assessment boundary.
2) Initiate Attack Internally	The attacker is inside the boundary and initiates attack on some object internally. Examples include: User opens spear phishing email or clicks on attachment; user installs unauthorized software or hardware; unauthorized personnel gains physical access to restricted facility.	Restrict Device Ownership	Ensure that devices not owned by the organization are not connected in the assessment boundary, or that they are authorized for connection only in accordance with organizationally-defined restrictions.
2) Initiate Attack Internally	The attacker is inside the boundary and initiates attack on some object internally. Examples include: User opens spear phishing email or clicks on attachment; user installs unauthorized software or hardware; unauthorized personnel gains physical access to restricted facility.	Reduce unauthorized components	Detect and remove unauthorized subcomponents and/or subcomponent types to implement least functionality in order to prevent or reduce the introduction of subcomponent and subcomponent types that could enable attacks.
2) Initiate Attack Internally	The attacker is inside the boundary and initiates attack on some object internally. Examples include: User opens spear phishing email or clicks on attachment; user installs unauthorized software or hardware; unauthorized personnel gains physical access to restricted facility.	Verify ongoing business need for device	Require periodic and/or event driven consideration of whether a device is still needed for information system functionality to fulfill mission requirements in support of least functionality). Note: Good practice might be to require DMs to review what they manage and System Owners to review what is needed in their authorization boundaries.
2) Initiate Attack Internally	The attacker is inside the boundary and initiates attack on some object internally. Examples include: User opens spear phishing email or clicks on attachment; user installs unauthorized software or hardware; unauthorized personnel gains physical access to restricted facility.	Ensure needed changes are approved or disapproved in a timely manner	Ensure that needed changes are approved or disapproved in a timely manner by flagging requested changes not considered (approved or disapproved) in a timely manner as risks.

Attack Step	Attack Step Description	Sub-Capability Name	Sub-Capability Purpose
3) Gain Foothold	The attacker has gained entry to the object and achieves enough actual compromise to gain a foothold, but without persistence. Examples include: Unauthorized user successfully logs in with authorized credentials; browser exploit code successfully executed in memory and initiates call back; person gains unauthorized access to server room.	Prevent unauthorized devices	Prevent or reduce the presence of unauthorized devices thus reducing the number of potentially malicious or high-risk devices.
3) Gain Foothold	The attacker has gained entry to the object and achieves enough actual compromise to gain a foothold, but without persistence. Examples include: Unauthorized user successfully logs in with authorized credentials; browser exploit code successfully executed in memory and initiates call back; person gains unauthorized access to server room.	Reduce number of devices without assigned device manager	Prevent or reduce the number of devices without an assigned device manager within the assessment boundary, thus reducing delay in mitigating device defects (when found).
3) Gain Foothold	The attacker has gained entry to the object and achieves enough actual compromise to gain a foothold, but without persistence. Examples include: Unauthorized user successfully logs in with authorized credentials; browser exploit code successfully executed in memory and initiates call back; person gains unauthorized access to server room.	Reduce exploitation of devices before removal, during use elsewhere, and after return	Prevent exploitation of devices before removal, during use elsewhere, and after return (or other mobile use) by a) appropriately hardening the device prior to removal; b) checking for organizational data before removal; and c) sanitizing the device before introduction or reintroduction into the assessment boundary.

Attack Step	Attack Step Description	Sub-Capability Name	Sub-Capability Purpose
3) Gain Foothold	The attacker has gained entry to the object and achieves enough actual compromise to gain a foothold, but without persistence. Examples include: Unauthorized user successfully logs in with authorized credentials; browser exploit code successfully executed in memory and initiates call back; person gains unauthorized access to server room.	Reduce insider threat of unauthorized device	Use separation of duties (i.e., requiring multiple persons to authorize adding a device to the authorization boundary) to limit the ability of a single careless or malicious insider to authorize high-risk devices. Note 1: The organization might choose to use access restrictions to enforce the separation of duties. If so, that would be assessed under the PRIV capability. What is assessed here is that the separation of duties occurs. Note 2: See HWAM-L11 for authorization boundary.
3) Gain Foothold	The attacker has gained entry to the object and achieves enough actual compromise to gain a foothold, but without persistence. Examples include: Unauthorized user successfully logs in with authorized credentials; browser exploit code successfully executed in memory and initiates call back; person gains unauthorized access to server room.	Reduce denial of service attacks from missing required devices	Prevent or reduce denial of service attacks and/or attacks on resilience by ensuring that all required devices are present in the assessment boundary.
3) Gain Foothold	The attacker has gained entry to the object and achieves enough actual compromise to gain a foothold, but without persistence. Examples include: Unauthorized user successfully logs in with authorized credentials; browser exploit code successfully executed in memory and initiates call back; person gains unauthorized access to server room.	Restrict Device Ownership	Ensure that devices not owned by the organization are not connected in the assessment boundary, or that they are authorized for connection only in accordance with organizationally-defined restrictions.

Attack Step	Attack Step Description	Sub-Capability Name	Sub-Capability Purpose
3) Gain Foothold	The attacker has gained entry to the object and achieves enough actual compromise to gain a foothold, but without persistence. Examples include: Unauthorized user successfully logs in with authorized credentials; browser exploit code successfully executed in memory and initiates call back; person gains unauthorized access to server room.	Reduce unauthorized components	Detect and remove unauthorized subcomponents and/or subcomponent types to implement least functionality in order to prevent or reduce the introduction of subcomponent and subcomponent types that could enable attacks.
3) Gain Foothold	The attacker has gained entry to the object and achieves enough actual compromise to gain a foothold, but without persistence. Examples include: Unauthorized user successfully logs in with authorized credentials; browser exploit code successfully executed in memory and initiates call back; person gains unauthorized access to server room.	Verify ongoing business need for device	Require periodic and/or event driven consideration of whether a device is still needed for information system functionality to fulfill mission requirements in support of least functionality). Note: Good practice might be to require DMs to review what they manage and System Owners to review what is needed in their authorization boundaries.
3) Gain Foothold	The attacker has gained entry to the object and achieves enough actual compromise to gain a foothold, but without persistence. Examples include: Unauthorized user successfully logs in with authorized credentials; browser exploit code successfully executed in memory and initiates call back; person gains unauthorized access to server room.	Ensure needed changes are approved or disapproved in a timely manner	Ensure that needed changes are approved or disapproved in a timely manner by flagging requested changes not considered (approved or disapproved) in a timely manner as risks.
6) Achieve Attack Objective	The attacker achieves an objective. Loss of confidentiality, integrity, or availability of data or system capability. Examples include: Exfiltration of files; modification of database entries; deletion of file or application; denial of service; disclosure of PII.	Prevent unauthorized devices	Prevent or reduce the presence of unauthorized devices thus reducing the number of potentially malicious or high-risk devices.

Attack Step	Attack Step Description	Sub-Capability Name	Sub-Capability Purpose
6) Achieve Attack Objective	The attacker achieves an objective. Loss of confidentiality, integrity, or availability of data or system capability. Examples include: Exfiltration of files; modification of database entries; deletion of file or application; denial of service; disclosure of PII.	Reduce exploitation of devices before removal, during use elsewhere, and after return	Prevent or reduce exploitation of devices before removal, during use elsewhere, and after return (or other mobile use) by a) appropriately hardening the device prior to removal; b) checking for organizational data before removal; and c) sanitizing the device before introduction or reintroduction into the assessment boundary.
6) Achieve Attack Objective	The attacker achieves an objective. Loss of confidentiality, integrity, or availability of data or system capability. Examples include: Exfiltration of files; modification of database entries; deletion of file or application; denial of service; disclosure of PII.	Reduce insider threat of unauthorized device	Use separation of duties (i.e., requiring multiple persons to authorize adding a device to the authorization boundary) to limit the ability of a single careless or malicious insider to authorize high-risk devices. Note 1: The organization might choose to use access restrictions to enforce the separation of duties. If so, that would be assessed under the PRIV capability. What is assessed here is that the separation of duties occurs. Note 2: See HWAM-L11 for authorization boundary.
6) Achieve Attack Objective	The attacker achieves an objective. Loss of confidentiality, integrity, or availability of data or system capability. Examples include: Exfiltration of files; modification of database entries; deletion of file or application; denial of service; disclosure of PII.	Restrict Device Ownership	Ensure that devices not owned by the organization are not connected in the assessment boundary, or that they are authorized for connection only in accordance with organizationally-defined restrictions.
6) Achieve Attack Objective	The attacker achieves an objective. Loss of confidentiality, integrity, or availability of data or system capability. Examples include: Exfiltration of files; modification of database entries; deletion of file or application; denial of service; disclosure of PII.	Reduce unauthorized components	Detect and remove unauthorized subcomponents and/or subcomponent types to implement least functionality in order to prevent or reduce the introduction of subcomponent and subcomponent types that could enable attacks.

Attack Step	Attack Step Description	Sub-Capability Name	Sub-Capability Purpose
6) Achieve Attack Objective	The attacker achieves an objective. Loss of confidentiality, integrity, or availability of data or system capability. Examples include: Exfiltration of files; modification of database entries; deletion of file or application; denial of service; disclosure of PII.	Verify ongoing business need for device	Require periodic and/or event driven consideration of whether a device is still needed for information system functionality to fulfill mission requirements in support of least functionality. Note: Good practice might be to require DMs to review what they manage and System Owners to review what is needed in their authorization boundaries.

3.3 HWAM Control (Item) Security Assessment Plan Narrative Tables and Templates

The security assessment plan narratives in this section are designed to provide the core of an assessment plan for the automated assessment, as described in Section 6 of Volume 1 of this NISTIR. These narratives are supplemented by the other material in this section, including defect check tables (defining the tests to be used) and are summarized in the Control Allocation Tables in Section 3.4.

The roles referenced in these narratives match the roles defined by NIST in relevant special publications (SP 800-37, etc.) and/or the HWAM-specific roles defined in Section 2.7. These roles can be adapted and/or customized to the organization as described in the introduction to Section 3.

The determination statements listed here have been derived from the relevant control item language, specifically modified by the following adjustments:

(1) The phrase {for devices and device components} has been added where necessary for control items that apply to more areas than just HWAM. This language tailors the control item to remain within HWAM. In this case, the same control item will likely appear in other capabilities with the relevant scoping for that capability. For example, most Configuration Management (CM) family controls apply not only to hardware CM, but also to software CM. Only the hardware CM aspect is relevant to the HWAM capability, so that is what is covered in this volume.

(2) The phrases {actual state} or {desired state specification} have been added to determination statements where both actual and desired state are needed for automated testing but where this was implicit in the original statement of the control. For example, CM-8a has two determination statements that are identical except that determination statement CM-8a(1) applies to the actual state, and determination statement CM-8a(2) applies to the desired state specification.

(3) Where a control item includes inherently different actions that are best assessed by different defect checks (typically, because the assessment criteria are different), the control item may be divided into multiple HWAM-applicable determination statements.

(4) Part of a control item may not apply to HWAM, while another part does. For example, consider the control item CM-8(3b). To address this issue, the determination statements in this volume include only the portion of the control item applicable to the HWAM capability. The portion of the control item that does not apply is documented by a note under the control item and included with other capabilities, as appropriate.

3.3.1 Outline Followed for Each Control Item

The literal text of the control item follows the heading *Control Item Text*.

There may be one or more determination statements for each control item. Each determination statement is documented in a table, noting the:

- determination statement ID,
- determination statement text,
- implemented by (responsibility),
- assessment boundary,
- assessment responsibility,
- assessment method,
- selected column (TBD by the organization),
- rationale for risk acceptance (thresholds) (TBD by the organization),
- frequency of assessment[2], and
- impact of not implementing the defect check (TBD by the organization).

This is followed by a table showing the defect checks (and related sub-capability) that might be caused to fail if this control fails.

This text provides a template for the organization to edit, as described in Section 3.1.

3.3.2 Outline Organized by Baselines

This section includes control items selected in the SP 800-53 Low, Moderate, and High baselines and that support the HWAM capability. For convenience, these are presented in three sections as follows:

(1) **Low Baseline Control Items** (Section 3.3.3). Those in the low baseline, which are required for all systems.

(2) **Moderate Baseline Control Items** (Section 3.3.4). Those in the moderate baseline, which are also required for the high baseline.

(3) **High Baseline Control Items** (Section 3.3.5). Those that are only required for the high baseline.

Table 7 illustrates the relevance of each of these.

[2] While automated tools may be able to assess as frequently as every 3-4 days, organizations determine the appropriate assessment frequency in accordance with the ISCM strategy.

Table 7: Applicability of Control Items

FIPS-199[a] (SP 800-60)[b] System Impact Level	(1) Low Control Items (Section 3.3.3)	(2) Moderate Control Items (Section 3.3.4)	(3) High Control Items (Section 3.3.5)
Low	Applicable		
Moderate	Applicable	Applicable	
High	Applicable	Applicable	Applicable

[a] FIPS-199 defines Low, Moderate, and High overall potential impact designations.

[b] See SP 800-60, Section 3.2.

3.3.3 Low Baseline Security Control Item Narratives

3.3.3.1 Control Item AC-19: ACCESS CONTROL FOR MOBILE DEVICES

Control Item Text:

Control: The organization:

a. Establishes usage restrictions, configuration requirements, connection requirements, and implementation guidance for organization-controlled mobile devices.

Note: Parts of the control item are assigned to other capabilities, as follows: BEHAVE: usage restrictions; BOUND-N: connection requirements; SE implementation guidance.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
AC-19(a)(1)	Determine if the organization: Establishes configuration requirements for organization-controlled mobile devices (and subcomponents).

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency Of Assessment	Impact of not implementing
AC-19(a)(1)	DSM	ISCM-TN	ISCM-Sys	Test				

912 **A defect in control item effectiveness will create a defect in one or more of these defect checks:**

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in usage restrictions, configuration/connection requirements, and implementation guidance for organization-controlled mobile devices being established or implemented related to this control item*** might be the cause of ...
AC-19(a)(1)	HWAM-L01	Devices moving into/out of the assessment boundary	devices not being adequately prepared for movement into or out of the assessment boundary.
AC-19(a)(1)	HWAM-L06	Subcomponents not authorized	a device with unauthorized subcomponents or a device lacking required subcomponents being found in the assessment boundary.
AC-19(a)(1)	HWAM-L09	Proposed changes are too old	requested changes not being addressed in a timely manner.

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3.3.3.2 Control Item AC-19(b): ACCESS CONTROL FOR MOBILE DEVICES

Control Item Text:

Control: The organization:

b. Authorizes the connection of mobile devices to organizational information systems.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
AC-19(b)(1)	Determine if the organization: authorizes the connection of mobile devices to organizational information system {considering their subcomponents}

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
AC-19(b)(1)	DSM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in the authorization of the connection of mobile devices to organizational information systems related to this control item*** might be the cause of ...
AC-19(b)(1)	HWAM-F01	Unauthorized devices	the presence of unauthorized devices.
AC-19(b)(1)	HWAM-F02	Authorized devices without a device manager	a device manager not being assigned.

3.3.3.3 Control Item CM-8(a): INFORMATION SYSTEM COMPONENT INVENTORY

Control Item Text:

Control: The organization:

a. Develops and documents an inventory of information system components that:

1. Accurately reflects the current information system;
2. Includes all components within the authorization boundary of the information system;
3. Is at the level of granularity deemed necessary for tracking and reporting; and
4. Includes [Assignment: organization-defined information deemed necessary to achieve effective information system component accountability].

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-8(a)(1)	Determine if the organization: a. Develops and documents an inventory of information system components {for devices and device components} that: 1. Accurately reflects the current information system; 2. Includes all components within the authorization boundary of the information system;

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-8(a)(1)	DSM	ISCM-TN	ISCM-Sys	Test				

937 **A defect in control item effectiveness will create a defect in one or more of these defect checks:**

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in an inventory of the {devices and device subcomponents of the} information system that includes all components within the authorization boundary being developed/documented or being accurate related to this control item*** might be the cause of ...
CM-8(a)(1)	HWAM-F01	Unauthorized devices	the presence of unauthorized devices.
CM-8(a)(1)	HWAM-L03	Required device not installed	a required device not being found in the assessment boundary.
CM-8(a)(1)	HWAM-L06	Subcomponents not authorized	a device with unauthorized subcomponents or a device lacking required subcomponents being found in the assessment boundary.
CM-8(a)(1)	HWAM-L08	Missing required device data	a device missing required data being found in the assessment boundary.
CM-8(a)(1)	HWAM-Q01	Non-reporting devices	a device failing to report within the specified time frame.
CM-8(a)(1)	HWAM-Q03	Low completeness metric	completeness of overall ISCM reporting not meeting the threshold.
CM-8(a)(1)	HWAM-Q04	Poor timeliness metric	poor timeliness of overall ISCM reporting.

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Determination Statement 2:

Determination Statement ID	Determination Statement Text
CM-8(a)(2)	Determine if the organization: a. Develops and documents an inventory of information system components {for devices and device components} that: 3. Is at the level of granularity deemed necessary for tracking and reporting;

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-8(a)(2)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in "accurately" including "all {desired state} components within the authorization boundary of the information system" in this control item*** might be the cause of . . .
CM-8(a)(2)	HWAM-F01	Unauthorized Devices	the presence of unauthorized devices.
CM-8(a)(2)	HWAM-L03	Required Device not Installed	lack of a required device in the assessment boundary.
CM-8(a)(2)	HWAM-L06	Subcomponents not Authorized	a device with unauthorized subcomponents in the assessment boundary.
CM-8(a)(2)	HWAM-L08	Required Device Data	a device with missing required data.

Determination Statement 3:

Determination Statement ID	Determination Statement Text
CM-8(a)(3)	Determine if the organization: a. Develops and documents an inventory of information system components {for devices and device components} that: 4. Includes [Assignment: organization-defined information deemed necessary to achieve effective information system component accountability];

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-8(a)(3)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in the inventory of information system components {devices and device subcomponents} reflecting the organization-defined information deemed necessary to achieve effective information system component accountability related to this control item*** might be the cause of ...
CM-8(a)(3)	HWAM-L08	Missing required device data	a device missing required data being found in the assessment boundary.

3.3.3.4 Control Item CM-8(b): INFORMATION SYSTEM COMPONENT INVENTORY

Control Item Text:

Control: The organization:

b. Reviews and updates the information system component inventory [Assignment: organization-defined frequency].

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-8(b)(1)	Determine if the organization: b. Reviews and updates the information system component inventory {for devices and device components} [Assignment: organization-defined frequency].

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-8(b)(1)	DM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in conducting reviews and updates of the {actual state} information system component inventory {for devices and device components}" with the "organization-defined frequency" related to this control item*** might be the cause of ...
CM-8(b)(1)	HWAM-Q04	Low Timeliness Metric	low timeliness of overall ISCM reporting.

Determination Statement 2:

Determination Statement ID	Determination Statement Text
CM-8(b)(2)	Determine if the organization: b. Reviews and updates the information system component inventory {for devices and device components} [Assignment: organization-defined frequency].

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-8(b)(2)	DSM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in the information system component {devices and device subcomponents} inventory being reviewed and updated with the organization-defined frequency" related to this control item*** might be the cause of ...
CM-8(b)(2)	HWAM-F01	Unauthorized devices	the presence of unauthorized devices.
CM-8(b)(2)	HWAM-L08	Missing required device data	a device missing required data being found in the assessment boundary.

3.3.3.5 Control Item CM-8(4): INFORMATION SYSTEM COMPONENT INVENTORY | ACCOUNTABILITY INFORMATION

Control Item Text:

The organization includes in the information system component inventory information, a means for identifying by [Selection (one or more): name; position; role], individuals responsible/accountable for administering those components.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-8(4)(1)	Determine if the organization: Includes in the information system {hardware} component {desired state} inventory information, a means for identifying by [Selection (one or more): name; position; role], individuals responsible/accountable for administering those components

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-8(4)(1)	DSM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in the name, position, or role of the individuals responsible/accountable for administering those components {devices and device subcomponents} being included in the information system component inventory related to this control item*** might be the cause of ...
CM-8(4)(1)	HWAM-F02	Authorized devices without a device manager	a device manager not being assigned.

3.3.3.6 Control Item PS-4(d): PERSONNEL TERMINATION

Control Item Text:

Control: The organization, upon termination of individual employment:

d. Retrieves all security-related organizational information system-related property which is {a device or subcomponent}.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
PS-4(d)(1)	Determine if the organization: upon termination of individual employment: d. Retrieves all security-related organizational information system-related property {devices and subcomponents};

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
PS-4(d)(1)	DM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in assigned security-related devices and subcomponents being retrieved on employee termination related to this control item*** might be the cause of ...
PS-4(d)(1)	HWAM-F01	Unauthorized devices	the presence of unauthorized devices.
PS-4(d)(1)	HWAM-L01	Devices moving into/out of the assessment boundary	devices not being adequately prepared for movement into or out of the assessment boundary.

3.3.3.7 Control Item SC-15(a): COLLABORATIVE COMPUTING DEVICES

Control Item Text:

Control: The information system:

a. Prohibits remote activation of collaborative computing devices with the following exceptions: [Assignment: organization-defined exceptions where remote activation is to be allowed]; and

Determination Statement 1:

Determination Statement ID	Determination Statement Text
SC-15(a)(1)	Determine if the organization: prohibits remote activation of collaborative computing devices with the following exceptions: [Assignment: organization-defined exceptions where remote activation is to be allowed]

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
SC-15(a)(1)	DM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in the process to authorize collaborative computing devices in this control item*** might be the cause of ...
SC-15(a)(1)	HWAM-F01	Unauthorized Devices	the presence of unauthorized devices.
SC-15(a)(1)	HWAM-L01	Devices Moving into/out of the Assessment Boundary	devices not adequately prepared for movement into or out of the assessment boundary.

3.3.3.8 Control Item SC-15(b): COLLABORATIVE COMPUTING DEVICES

Control Item Text:

Control: The information system:

b. Provides an explicit indication of use to users physically present at the device.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
SC-15(b)(1)	Determine if the organization: provides an explicit indication of use {of collaborative computing} to users physically present at the devices

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
SC-15(b)(1)	MAN	ISCM-TN	ISCM-Sys	TBD				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

N/A because tested manually.

3.3.4 Moderate Baseline Security Control Item Narratives

3.3.4.1 Control Item AC-19(5): ACCESS CONTROL FOR MOBILE DEVICES | PERSONALLY OWNED DEVICES

Control Item Text:

The organization [Selection: restricts; prohibits] the connection of personally-owned, mobile devices to organizational information systems.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
AC-19(5)(1)	Determine if the organization: [Selection: restricts; prohibits] the connection of personally-owned, mobile devices to organizational information systems.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
AC-19(5)(1)	DM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in the connection of personally owned mobile devices to organizational information systems being restricted or prohibited related to this control item*** might be the cause of ...
AC-19(5)(1)	HWAM-L04	Restrictions on device ownership	a device not owned by the organization or by an approved owner being found in the assessment boundary (or violating other requirements for BYOD).
AC-19(5)(1)	HWAM-L06	Subcomponents not authorized	a device with unauthorized subcomponents or a device lacking required subcomponents being found in the assessment boundary.

3.3.4.2 Control Item AC-20(2): USE OF EXTERNAL INFORMATION SYSTEMS | *PORTABLE STORAGE DEVICES*

Control Item Text:

The organization [Selection: restricts; prohibits] the use of organization-controlled portable storage devices by authorized individuals on external information systems.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
AC-20(2)(1)	Determine if the organization: [Selection: restricts; prohibits] the use of organization-controlled portable storage devices by authorized individuals on external information systems

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
AC-20(2)(1)	DSM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in the use of removable storage devices being restricted or prohibited related to this control item*** might be the cause of ...
AC-20(2)(1)	HWAM-F01	Unauthorized devices	the presence of unauthorized devices.
AC-20(2)(1)	HWAM-L01	Devices moving into/out of the assessment boundary	devices not being adequately prepared for movement into or out of the assessment boundary.
AC-20(2)(1)	HWAM-L03	Required device not installed	a required device not being found in the assessment boundary.

3.3.4.3 Control Item CM-2(7)(a): BASELINE CONFIGURATION | CONFIGURE SYSTEMS, COMPONENTS, OR DEVICES FOR HIGH-RISK AREAS

Control Item Text:

The organization:

(a) Issues [Assignment: organization-defined information systems, system components, or devices] with [Assignment: organization-defined configurations] to individuals traveling to locations that the organization deems to be of significant risk.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-2(7)(a)(1)	Determine if the organization: issues [Assignment: organization-defined … devices {and subcomponents} with [Assignment: organization-defined configurations] to individuals traveling to locations that the organization deems to be of significant risk.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-2(7)(a)(1)	DM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in devices or device subcomponents of information systems that are securely configured in accordance with organization-defined configurations are issued to individuals traveling to locations that the organization deems to be of significant risk related to this control item*** might be the cause of ...
CM-2(7)(a)(1)	HWAM-L01	Devices moving into/out of the assessment boundary	devices not being adequately prepared for movement into or out of the assessment boundary.

3.3.4.4 Control Item CM-2(7)(b): BASELINE CONFIGURATION | CONFIGURE SYSTEMS, COMPONENTS, OR DEVICES FOR HIGH-RISK AREAS

Control Item Text:

The organization:

(b) Applies [Assignment: organization-defined security safeguards] to the devices when the individuals return.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-2(7)(b)(1)	Determine if the organization: Applies [Assignment: organization-defined security safeguards] to the devices {and device subcomponents} when the individuals return.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-2(7)(b)(1)	DM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in "organization-defined security safeguards" being applied to the {devices and device subcomponents of the} information systems when " individuals return" from "locations that the organization deems to be of significant risk" related to this control item*** might be the cause of ...
CM-2(7)(b)(1)	HWAM-L01	Devices moving into/out of the assessment boundary	devices not being adequately prepared for movement into or out of the assessment boundary.

3.3.4.5 Control Item CM-3(a): CONFIGURATION CHANGE CONTROL

Control Item Text:

Control: The organization:

a. Determines the types of changes to the information system that are configuration-controlled.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-3(a)(1)	Determine if the organization: a. Determines the types of changes to the {devices and device subcomponents of the} information system that are configuration-controlled.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(a)(1)	DSM	TBD	MAN	TBD				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

N/A because tested manually.

3.3.4.6 Control Item CM-3(b): CONFIGURATION CHANGE CONTROL

Control Item Text:

Control: The organization:

b. Reviews proposed configuration-controlled changes to the information system and approves or disapproves such changes with explicit consideration for security impact analyses;

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-3(b)(1)	Determine if the organization: b. Reviews proposed configuration-controlled changes to the {devices and device subcomponents of the} information system and approves or disapproves such changes.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(b)(1)	DSM	ISCM-TN	ISCM-Sys	Test				

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Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in "proposed configuration-controlled changes to the" devices or device subcomponents being reviewed and approved/disapproved related to this control item*** might be the cause of ...
CM-3(b)(1)	HWAM-F01	Unauthorized devices	the presence of unauthorized devices.
CM-3(b)(1)	HWAM-F02	Authorized devices without a device manager	a device manager not being assigned.
CM-3(b)(1)	HWAM-L01	Devices moving into/out of the assessment boundary	devices not being adequately prepared for movement into or out of the assessment boundary.
CM-3(b)(1)	HWAM-L02	Required authorization missing	changes to information system hardware not being authorized by multiple persons as required..
CM-3(b)(1)	HWAM-L03	Required device not installed	a required device not being found in the assessment boundary.
CM-3(b)(1)	HWAM-L04	Restrictions on device ownership	a device not owned by the organization or by an approved owner being found in the assessment boundary (or violating other requirements for BYOD).
CM-3(b)(1)	HWAM-L05	Unapproved supplier and/or manufacturer	a device with an unapproved supplier and/or manufacturer being found in the assessment boundary.
CM-3(b)(1)	HWAM-L06	Subcomponents not authorized	a device with unauthorized subcomponents or a device lacking required subcomponents being found in the assessment boundary.
CM-3(b)(1)	HWAM-L07	Business need and/or device manager not recently verified	a device with an expired sunset date (or other trigger to review need and management) being found in the assessment boundary.
CM-3(b)(1)	HWAM-L09	Proposed changes are too old	requested changes not being addressed in a timely manner.

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Determination Statement 2:

Determination Statement ID	Determination Statement Text
CM-3(b)(2)	Determine if the organization: b. explicitly considers security impact analysis when reviewing proposed configuration-controlled changes to the {devices and device subcomponents of the} information system.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(b)(2)	MAN	TBD	MAN	TBD				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

N/A because assessed manually.

3.3.4.7 Control Item CM-3(c): CONFIGURATION CHANGE CONTROL

Control Item Text:

Control: The organization:

c. Documents configuration change decisions associated with the information system;

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-3(c)(1)	Determine if the organization: c. Documents configuration change decisions associated with the {devices and device subcomponents of the} information system.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(c)(1)	DSM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in "configuration change decisions associated with the {devices and device subcomponents of the} information system" being documented and entered into the desired state specification related to this control item*** might be the cause of ...
CM-3(c)(1)	HWAM-F02	Authorized devices without a device manager	a device manager not being assigned.
CM-3(c)(1)	HWAM-L01	Devices moving into/out of the assessment boundary	devices not being adequately prepared for movement into or out of the assessment boundary.
CM-3(c)(1)	HWAM-L02	Required authorization missing	changes to information system hardware not being authorized by multiple persons as required..
CM-3(c)(1)	HWAM-L03	Required device not installed	a required device not being found in the assessment boundary.
CM-3(c)(1)	HWAM-L04	Restrictions on device ownership	a device not owned by the organization or by an approved owner being found in the assessment boundary (or violating other requirements for BYOD).
CM-3(c)(1)	HWAM-L05	Unapproved supplier and/or manufacturer	a device with an unapproved supplier and/or manufacturer being found in the assessment boundary.
CM-3(c)(1)	HWAM-L06	Subcomponents not authorized	a device with unauthorized subcomponents or a device lacking required subcomponents being found in the assessment boundary.
CM-3(c)(1)	HWAM-L07	Business need and/or device manager not recently verified	a device with an expired sunset date (or other trigger to review need and management) being found in the assessment boundary.
CM-3(c)(1)	HWAM-L09	Proposed changes are too old	requested changes not being addressed in a timely manner.

3.3.4.8 Control Item CM-3(d): CONFIGURATION CHANGE CONTROL

Control Item Text:

Control: The organization:

d. Implements approved configuration-controlled changes to the information system;

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-3(d)(1)	Determine if the organization: d. Implements approved configuration-controlled changes to the {devices and device subcomponents of the} information system.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(d)(1)	DM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in "approved configuration-controlled changes to the" devices or device subcomponents of the information system" being implemented related to this control item*** might be the cause of ...
CM-3(d)(1)	HWAM-F01	Unauthorized devices	the presence of unauthorized devices.
CM-3(d)(1)	HWAM-F02	Authorized devices without a device manager	a device manager not being assigned.
CM-3(d)(1)	HWAM-L01	Devices moving into/out of the assessment boundary	devices not being adequately prepared for movement into or out of the assessment boundary.
CM-3(d)(1)	HWAM-L02	Required authorization missing	changes to information system hardware not being authorized by multiple persons as required..
CM-3(d)(1)	HWAM-L03	Required device not installed	a required device not being found in the assessment boundary.
CM-3(d)(1)	HWAM-L04	Restrictions on device ownership	a device not owned by the organization or by an approved owner being found in the assessment boundary (or violating other requirements for BYOD).
CM-3(d)(1)	HWAM-L05	Unapproved supplier and/or manufacturer	a device with an unapproved supplier and/or manufacturer being found in the assessment boundary.
CM-3(d)(1)	HWAM-L06	Subcomponents not authorized	a device with unauthorized subcomponents or a device lacking required subcomponents being found in the assessment boundary.
CM-3(d)(1)	HWAM-L07	Business need and/or device manager not recently verified	a device with an expired sunset date (or other trigger to review need and management) being found in the assessment boundary.
CM-3(d)(1)	HWAM-L09	Proposed changes are too old	requested changes not being addressed in a timely manner.

3.3.4.9 Control Item CM-3(e): CONFIGURATION CHANGE CONTROL

Control Item Text:

Control: The organization:

e. Retains records of configuration-controlled changes to the information system for [Assignment: organization-defined time period];

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-3(e)(1)	Determine if the organization: e. Retains records of configuration-controlled changes to the {devices and device subcomponents of the} information system for [Assignment: organization-defined time period].

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(e)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in "records of configuration-controlled changes to the {devices and device subcomponents of the} information system" being retained for the required time period related to this control item*** might be the cause of ...
CM-3(e)(1)	HWAM-L10	Records retention too short	records of the actual/desired state not being retained for the required period.

3.3.4.10 Control Item CM-3(f): CONFIGURATION CHANGE CONTROL

Control Item Text:

Control: The organization:

f. Audits and reviews activities associated with configuration-controlled changes to the information system; and

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-3(f)(1)	Determine if the organization: f. Audits activities associated with configuration-controlled changes to the {devices and device subcomponents of the} information system.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(f)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in activities associated with configuration-controlled changes to the {devices and device subcomponents of the} information system being audited related to this control item*** might be the cause of ...
CM-3(f)(1)	HWAM-Q01	Non-reporting devices	a device failing to report within the specified time frame.
CM-3(f)(1)	HWAM-Q02	Non-reporting defect checks	specific defect checks failing to report.
CM-3(f)(1)	HWAM-Q03	Low completeness metric	completeness of overall ISCM reporting not meeting the threshold.
CM-3(f)(1)	HWAM-Q04	Poor timeliness metric	poor timeliness of overall ISCM reporting.

Determination Statement 2:

Determination Statement ID	Determination Statement Text
CM-3(f)(2)	Determine if the organization: f. Reviews activities associated with configuration-controlled changes to the {devices and device subcomponents of the} information system.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(f)(2)	DSM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in activities associated with configuration-controlled changes to the {devices and device subcomponents of the} information system being reviewed related to this control item*** might be the cause of ...
CM-3(f)(2)	HWAM-L07	Business need and/or device manager not recently verified	a device with an expired sunset date (or other trigger to review need and management) being found in the assessment boundary.
CM-3(f)(2)	HWAM-L09	Proposed changes are too old	requested changes not being addressed in a timely manner.
CM-3(f)(2)	HWAM-Q04	Poor timeliness metric	poor timeliness of overall ISCM reporting.

3.3.4.11 Control Item CM-3(g): CONFIGURATION CHANGE CONTROL

Control Item Text:

Control: The organization:

g. Coordinates and provides oversight for configuration change control activities through [Assignment: organization-defined configuration change control element (e.g., committee, board] that convenes [Selection (one or more): [Assignment: organization-defined frequency]; [Assignment: organization-defined configuration change conditions].

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-3(g)(1)	Determine if the organization: g. Coordinates configuration change control activities {of devices and device subcomponents} through [Assignment: organization-defined configuration change control element (e.g., committee, board] that convenes [Selection (one or more): [Assignment: organization-defined frequency]; [Assignment: organization-defined configuration change conditions].

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(g)(1)	DSM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in coordination of configuration change control activities related to {devices and device subcomponents of the} of the information system being provided via an established configuration change control element related to this control item*** might be the cause of ...
CM-3(g)(1)	HWAM-F01	Unauthorized devices	the presence of unauthorized devices.
CM-3(g)(1)	HWAM-F02	Authorized devices without a device manager	a device manager not being assigned.
CM-3(g)(1)	HWAM-L01	Devices moving into/out of the assessment boundary	devices not being adequately prepared for movement into or out of the assessment boundary.
CM-3(g)(1)	HWAM-L02	Required authorization missing	changes to information system hardware not being authorized by multiple persons as required..
CM-3(g)(1)	HWAM-L03	Required device not installed	a required device not being found in the assessment boundary.
CM-3(g)(1)	HWAM-L04	Restrictions on device ownership	a device not owned by the organization or by an approved owner being found in the assessment boundary (or violating other requirements for BYOD).
CM-3(g)(1)	HWAM-L06	Subcomponents not authorized	a device with unauthorized subcomponents or a device lacking required subcomponents being found in the assessment boundary.
CM-3(g)(1)	HWAM-L07	Business need and/or device manager not recently verified	a device with an expired sunset date (or other trigger to review need and management) being found in the assessment boundary.
CM-3(g)(1)	HWAM-L09	Proposed changes are too old	requested changes not being addressed in a timely manner.

Determination Statement 2:

Determination Statement ID	Determination Statement Text
CM-3(g)(2)	Determine if the organization: g. Provides oversight for configuration change control activities {of devices and device subcomponents} through [Assignment: organization-defined configuration change control element (e.g., committee, board] that convenes [Selection (one or more): [Assignment: organization-defined frequency]; [Assignment: organization-defined configuration change conditions].

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(g)(2)	DSM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in oversight of configuration change control activities related to {devices and device subcomponents of the} of the information system being provided via an established configuration change control element related to this control item*** might be the cause of ...
CM-3(g)(2)	HWAM-L07	Business need and/or device manager not recently verified	a device with an expired sunset date (or other trigger to review need and management) being found in the assessment boundary.
CM-3(g)(2)	HWAM-L09	Proposed changes are too old	requested changes not being addressed in a timely manner.
CM-3(g)(2)	HWAM-Q04	Poor timeliness metric	poor timeliness of overall ISCM reporting.

3.3.4.12 Control Item CM-3(2): CONFIGURATION CHANGE CONTROL | TEST / VALIDATE / DOCUMENT CHANGES

Control Item Text:

The organization tests, validates, and documents changes to the information system before implementing the changes on the operational system.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-3(2)(1)	Determine if the organization: tests, validates, and documents changes to the {devices and device subcomponents of the} information system before implementing the changes on the operational system. n/a in the operational environment. This should be assessed via manual reauthorization prior to placing policy in the desired state. Because it occurs as part of system engineering, it is outside the scope of this operational capability.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(2)(1)	TBD	TBD	MAN	TBD				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

N/A because assessed manually.

3.3.4.13 Control Item CM-8(1): INFORMATION SYSTEM COMPONENT INVENTORY | UPDATES DURING INSTALLATIONS / REMOVALS

Control Item Text:

The organization updates the inventory of information system components as an integral part of component installations, removals, and information system updates.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-8(1)(1)	Determine if the organization: (1) The organization updates the inventory of information system {devices and device subcomponents} as an integral part of component installations, removals, and information system updates.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-8(1)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in updating the inventory of information system {device and device subcomponents} as an integral part of component installations, removals, and information system updates related to this control item*** might be the cause of ...
CM-8(1)(1)	HWAM-Q01	Non-reporting devices	a device failing to report within the specified time frame.
CM-8(1)(1)	HWAM-Q04	Poor timeliness metric	poor timeliness of overall ISCM reporting.

Determination Statement 2:

Determination Statement ID	Determination Statement Text
CM-8(1)(2)	Determine if the organization: (1) The organization updates the {desired state} inventory of {devices and device subcomponents of the} information system components as an integral part of component installations, removals, and information system updates.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-8(1)(2)	DSM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in updates to the information system component {devices and device subcomponents} inventory being an integral part of component installations, removals, and information system updates related to this control item*** might be the cause of ...
CM-8(1)(2)	HWAM-F01	Unauthorized devices	the presence of unauthorized devices.
CM-8(1)(2)	HWAM-L07	Business need and/or device manager not recently verified	a device with an expired sunset date (or other trigger to review need and management) being found in the assessment boundary.

3.3.4.14 Control Item CM-8(3)(a): INFORMATION SYSTEM COMPONENT INVENTORY | AUTOMATED UNAUTHORIZED COMPONENT DETECTION

Control Item Text:

The organization:

(a) Employs automated mechanisms [Assignment: organization-defined frequency] to detect the presence of unauthorized hardware, software, and firmware components within the information system;

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-8(3)(a)(1)	Determine if the organization: (a) Employs automated mechanisms [Assignment: organization-defined frequency] to detect the presence of unauthorized {devices and device subcomponents} within the information system.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-8(3)(a)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in automated mechanisms to detect the presence of unauthorized information system components {devices and device subcomponents} at the organization-defined frequency being implemented related to this control item*** might be the cause of ...
CM-8(3)(a)(1)	HWAM-Q04	Poor timeliness metric	poor timeliness of overall ISCM reporting.

3.3.4.15 Control Item CM-8(3)(b): INFORMATION SYSTEM COMPONENT INVENTORY | AUTOMATED UNAUTHORIZED COMPONENT DETECTION

Control Item Text:

The organization:

(b) Takes the following actions when unauthorized components are detected: [Selection (one or more): disables network access by such components; isolates the components; notifies [Assignment: organization-defined personnel or roles].

Note: Parts of the control item are assigned to other capabilities, as follows: BEHAVE: notifies [Assignment: organization-defined personnel or roles].

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-8(3)(b)(1)	Determine if the organization: (b) Takes the following actions when unauthorized {devices and device subcomponents} are detected: [Selection (one or more): disables network access by such components; isolates the components].

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-8(3)(b)(1)	DM	ISCM-TN	ISCM-Sys	Test				

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Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in selected actions being taken by defined personnel or roles when unauthorized components {devices and device subcomponents} are detected (i.e., actual state components not found in the device inventory) related to this control item*** might be the cause of ...
CM-8(3)(b)(1)	HWAM-F01	Unauthorized devices	the presence of unauthorized devices.
CM-8(3)(b)(1)	HWAM-L06	Subcomponents not authorized	a device with unauthorized subcomponents or a device lacking required subcomponents being found in the assessment boundary.

3.3.4.16 Control Item CM-8(5): INFORMATION SYSTEM COMPONENT INVENTORY | NO DUPLICATE ACCOUNTING OF COMPONENTS

Control Item Text:

The organization verifies that all components within the authorization boundary of the information system are not duplicated in other information system inventories.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-8(5)(1)	Determine if the organization: verifies that all {devices} within the authorization boundary of the information system are not duplicated in other information system inventories.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-8(5)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in the verification that components {devices and device subcomponents} within the authorization boundary of the information system are duplicated in other information system inventories related to this control item*** might be the cause of ...
CM-8(5)(1)	HWAM-L11	Device assignment to authorization boundary is not 1:1.	device not being assigned correctly to one and only one authorization boundary.

3.3.4.17 Control Item MA-3(1): MAINTENANCE TOOLS | INSPECT TOOLS

Control Item Text:

The organization inspects the maintenance tools carried into a facility by maintenance personnel for improper or unauthorized modifications.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
MA-3(1)(1)	Determine if the organization: inspects the maintenance tools {devices and subcomponents} carried into a facility by maintenance personnel for improper or unauthorized modifications.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
MA-3(1)(1)	DM	ISCM-TN	ISCM-Sys	Test				

Note: Will find some instances, but not all, unless faster.

1214 **A defect in control item effectiveness will create a defect in one or more of these defect checks:**

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in maintenance tools {devices and device subcomponents} brought to a facility by maintenance personnel being inspected to check for improper or unauthorized modifications related to this control item*** might be the cause of ...
MA-3(1)(1)	HWAM-F01	Unauthorized devices	the presence of unauthorized devices.
MA-3(1)(1)	HWAM-F02	Authorized devices without a device manager	a device manager not being assigned.
MA-3(1)(1)	HWAM-L01	Devices moving into/out of the assessment boundary	devices not being adequately prepared for movement into or out of the assessment boundary.

3.3.4.18 Control Item MP-7(1): MEDIA USE | PROHIBIT USE WITHOUT OWNER

Control Item Text:

The organization prohibits the use of portable storage devices in organizational information systems when such devices have no identifiable owner.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
MP-7(1)(1)	Determine if the organization: prohibits the use of portable storage devices in organizational information systems when such devices have no identifiable owner.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
MP-7(1)(1)	DM	ISCM-TN	ISCM-Sys	Test				

Note: Will find some instances, but not all, unless faster.

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in the use of portable storage devices with no owner not being prohibited in {the actual state of} organizational information system (i.e., no policy or process exists, or the policies/processes are being followed). related to this control item*** might be the cause of ...
MP-7(1)(1)	HWAM-L04	Restrictions on device ownership	a device not owned by the organization or by an approved owner being found in the assessment boundary (or violating other requirements for BYOD).

3.3.5 High Baseline Security Control Item Narratives

3.3.5.1 Control Item CM-3(1)(a): CONFIGURATION CHANGE CONTROL | AUTOMATED DOCUMENT / NOTIFICATION / PROHIBITION OF CHANGES

Control Item Text:

The organization employs automated mechanisms to:

(a) Document proposed changes to the information system;

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-3(1)(a)(1)	Determine if the organization: employs automated mechanisms to: (a) Document proposed changes to the {devices and device subcomponents of the} information system.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(1)(a)(1)	DSM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in automated mechanisms to document proposed changes to the {devices and device subcomponents of the} information system being implemented related to this control item*** might be the cause of ...
CM-3(1)(a)(1)	HWAM-F01	Unauthorized devices	the presence of unauthorized devices.
CM-3(1)(a)(1)	HWAM-F02	Authorized devices without a device manager	a device manager not being assigned.
CM-3(1)(a)(1)	HWAM-L01	Devices moving into/out of the assessment boundary	devices not being adequately prepared for movement into or out of the assessment boundary.
CM-3(1)(a)(1)	HWAM-L02	Required authorization missing	changes to information system hardware not being authorized by multiple persons as required..
CM-3(1)(a)(1)	HWAM-L03	Required device not installed	a required device not being found in the assessment boundary.
CM-3(1)(a)(1)	HWAM-L04	Restrictions on device ownership	a device not owned by the organization or by an approved owner being found in the assessment boundary (or violating other requirements for BYOD).
CM-3(1)(a)(1)	HWAM-L05	Unapproved supplier and/or manufacturer	a device with an unapproved supplier and/or manufacturer being found in the assessment boundary.
CM-3(1)(a)(1)	HWAM-L06	Subcomponents not authorized	a device with unauthorized subcomponents or a device lacking required subcomponents being found in the assessment boundary.
CM-3(1)(a)(1)	HWAM-L07	Business need and/or device manager not recently verified	a device with an expired sunset date (or other trigger to review need and management) being found in the assessment boundary.
CM-3(1)(a)(1)	HWAM-L09	Proposed changes are too old	requested changes not being addressed in a timely manner.

3.3.5.2 Control Item CM-3(1)(b): CONFIGURATION CHANGE CONTROL | AUTOMATED DOCUMENT / NOTIFICATION / PROHIBITION OF CHANGES

Control Item Text:

The organization employs automated mechanisms to:

(b) Notify [Assignment: organized-defined approval authorities] of proposed changes to the information system and request change approval;

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-3(1)(b)(1)	Determine if the organization: employs automated mechanisms to: (b) Notify [Assignment: organized-defined approval authorities] of proposed changes to the {devices and device subcomponents of the} information system and request change approval.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(1)(b)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	**Defect Check ID**	**DC-Name**	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in automated mechanisms to notify appropriate personnel of proposed changes to the {devices and device subcomponents of the} information system and request change approval being implemented related to this control item*** might be the cause of ...
CM-3(1)(b)(1)	HWAM-F01	Unauthorized devices	the presence of unauthorized devices.
CM-3(1)(b)(1)	HWAM-F02	Authorized devices without a device manager	a device manager not being assigned.
CM-3(1)(b)(1)	HWAM-L01	Devices moving into/out of the assessment boundary	devices not being adequately prepared for movement into or out of the assessment boundary.
CM-3(1)(b)(1)	HWAM-L02	Required authorization missing	changes to information system hardware not being authorized by multiple persons as required..
CM-3(1)(b)(1)	HWAM-L03	Required device not installed	a required device not being found in the assessment boundary.
CM-3(1)(b)(1)	HWAM-L04	Restrictions on device ownership	a device not owned by the organization or by an approved owner being found in the assessment boundary (or violating other requirements for BYOD).
CM-3(1)(b)(1)	HWAM-L05	Unapproved supplier and/or manufacturer	a device with an unapproved supplier and/or manufacturer being found in the assessment boundary.
CM-3(1)(b)(1)	HWAM-L06	Subcomponents not authorized	a device with unauthorized subcomponents or a device lacking required subcomponents being found in the assessment boundary.
CM-3(1)(b)(1)	HWAM-L07	Business need and/or device manager not recently verified	a device with an expired sunset date (or other trigger to review need and management) being found in the assessment boundary.
CM-3(1)(b)(1)	HWAM-L09	Proposed changes are too old	requested changes not being addressed in a timely manner.

3.3.5.3 Control Item CM-3(1)(c): CONFIGURATION CHANGE CONTROL | AUTOMATED DOCUMENT / NOTIFICATION / PROHIBITION OF CHANGES

Control Item Text:

The organization employs automated mechanisms to:

(c) Highlight proposed changes to the information system that have not been approved or disapproved by [Assignment: organization-defined time period];

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-3(1)(c)(1)	Determine if the organization: employs automated mechanisms to: (c) Highlight proposed changes to the {devices and device subcomponents of the} information system that have not been approved or disapproved by [Assignment: organization-defined time period].

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(1)(c)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in automated mechanisms to highlight proposed changes to the {devices and device subcomponents of the} information system not being approved or disapproved within the established time period and thus being implemented related to this control item*** might be the cause of ...
CM-3(1)(c)(1)	HWAM-L09	Proposed changes are too old	requested changes not being addressed in a timely manner.

3.3.5.4 Control Item CM-3(1)(d): CONFIGURATION CHANGE CONTROL | AUTOMATED DOCUMENT / NOTIFICATION / PROHIBITION OF CHANGES

Control Item Text:

The organization employs automated mechanisms to:

(d) Prohibit changes to the information system until designated approvals are received;

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-3(1)(d)(1)	Determine if the organization: employs automated mechanisms to: (d) Prohibit changes to the {devices and device subcomponents of the} information system until designated approvals are received.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(1)(d)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in automated mechanisms to prohibit changes to the {devices and device subcomponents of the} information system until approval is received being implemented related to this control item*** might be the cause of ...
CM-3(1)(d)(1)	HWAM-F01	Unauthorized devices	the presence of unauthorized devices.
CM-3(1)(d)(1)	HWAM-L02	Required authorization missing	changes to information system hardware not being authorized by multiple persons as required..

3.3.5.5 Control Item CM-3(1)(e): CONFIGURATION CHANGE CONTROL | AUTOMATED DOCUMENT / NOTIFICATION / PROHIBITION OF CHANGES

Control Item Text:

The organization employs automated mechanisms to:

(e) Document all changes to the information system;

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-3(1)(e)(1)	Determine if the organization: employs automated mechanisms to: (e) Document all changes to the {devices and device subcomponents of the} information system.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(1)(e)(1)	ISCM-Sys	TBD	MAN	TBD				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

N/A because assessed manually.

3.3.5.6 Control Item CM-3(1)(f): CONFIGURATION CHANGE CONTROL | AUTOMATED DOCUMENT / NOTIFICATION / PROHIBITION OF CHANGES

Control Item Text:

The organization employs automated mechanisms to:

(f) Notify [Assignment: organization-defined personnel] when approved changes to the information system are completed.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-3(1)(f)(1)	Determine if the organization: employs automated mechanisms to: (f) Notify [Assignment: organization-defined personnel] when approved changes to the {devices and device subcomponents of the} information system are completed.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-3(1)(f)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in automated mechanisms to notify designated personnel when approved changes to the {devices and device subcomponents of the} information system are being implemented related to this control item*** might be the cause of ...
CM-3(1)(f)(1)	HWAM-L03	Required device not installed	a required device not being found in the assessment boundary.

3.3.5.7 Control Item CM-8(2): INFORMATION SYSTEM COMPONENT INVENTORY | AUTOMATED MAINTENANCE

Control Item Text:

The organization employs automated mechanisms to help maintain an up-to-date, complete, accurate, and readily available inventory of information system components.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
CM-8(2)(1)	Determine if the organization: employs automated mechanisms to: help maintain an up-to-date, complete, accurate, and readily available {actual state} inventory of {devices and device subcomponents of the} information system.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
CM-8(2)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in automated mechanisms to help maintain and up-to-date, complete, accurate, and readily available information system component {devices and device subcomponents} inventory being implemented related to this control item*** might be the cause of ...
CM-8(2)(1)	HWAM-Q01	Non-reporting devices	a device failing to report within the specified time frame.
CM-8(2)(1)	HWAM-Q03	Low completeness metric	completeness of overall ISCM reporting not meeting the threshold.
CM-8(2)(1)	HWAM-Q04	Poor timeliness metric	poor timeliness of overall ISCM reporting.

3.3.5.8 Control Item MA-3(3)(a): MAINTENANCE TOOLS | PREVENT UNAUTHORIZED REMOVAL

Control Item Text:

The organization prevents the unauthorized removal of maintenance equipment containing organizational information by:

(a) Verifying that there is no organizational information contained on the equipment;

Determination Statement 1:

Determination Statement ID	Determination Statement Text
MA-3(3)(a)(1)	Determine if the organization: prevents the unauthorized removal of maintenance equipment containing organizational information by: (a) Verifying that there is no organizational information contained on the equipment [before removal].

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
MA-3(3)(a)(1)	DM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in verification that organizational information being contained on maintenance equipment {devices and device subcomponents} to be removed related to this control item*** might be the cause of ...
MA-3(3)(a)(1)	HWAM-L01	Devices moving into/out of the assessment boundary	devices not being adequately prepared for movement into or out of the assessment boundary.
MA-3(3)(a)(1)	HWAM-L03	Required device not installed	a required device not being found in the assessment boundary.

3.3.5.9 Control Item MA-3(3)(b): MAINTENANCE TOOLS | PREVENT UNAUTHORIZED REMOVAL

Control Item Text:

The organization prevents the unauthorized removal of maintenance equipment containing organizational information by:

(b) Sanitizing or destroying the equipment;

Determination Statement 1:

Determination Statement ID	Determination Statement Text
MA-3(3)(b)(1)	Determine if the organization: The organization prevents the unauthorized removal of maintenance equipment containing organizational information by: (b) Sanitizing or destroying the equipment.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
MA-3(3)(b)(1)	DM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in maintenance equipment {devices and device subcomponents} being sanitized or destroyed before removal related to this control item*** might be the cause of ...
MA-3(3)(b)(1)	HWAM-L01	Devices moving into/out of the assessment boundary	devices not being adequately prepared for movement into or out of the assessment boundary.
MA-3(3)(b)(1)	HWAM-L03	Required device not installed	a required device not being found in the assessment boundary.

Note: Will find some instances, but not all, unless faster.

3.3.5.10 Control Item SA-12: SUPPLY CHAIN PROTECTION

Control Item Text:

Control: The organization protects against supply chain threats to the information system, system component, or information system service by employing [Assignment: organization-defined security safeguards] as part of a comprehensive, defense-in-breadth information security strategy.

Determination Statement 1:

Determination Statement ID	Determination Statement Text
SA-12(1)	Determine if the organization: protects against supply chain threats to the information system {devices and device subcomponents } by employing [Assignment: organization-defined security safeguards] as part of a comprehensive, defense-in-breadth information security strategy.

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
SA-12(1)	DSM	ISCM-TN	ISCM-Sys	Test				

A defect in control item effectiveness will create a defect in one or more of these defect checks:

Determination Statement ID	Defect Check ID	DC-Name	**Rationale** If an [organization-defined measure] for this defect check is above [the organization-defined threshold], ***then defects in organization-defined security safeguards/mechanisms being employed to protect against supply-chain threats to the {devices and device subcomponents of the} information system related to this control item*** might be the cause of ...
SA-12(1)	HWAM-L05	Unapproved supplier and/or manufacturer	a device with an unapproved supplier and/or manufacturer being found in the assessment boundary.

3.4 Control Allocation Tables

Table 8: Low Baseline Control (Item) Allocation Table, Table 7: Moderate Baseline Control Allocation Table, and Table 10: High Baseline Control (Item) Allocation Table provide the low, moderate, and high baseline control allocation tables, respectively. This is a summary of the material in the security plan assessment narrative for each determination statement in Section 3.3. It provides a concise summary of the assessment plan.

3.4.1 Low Baseline Control Allocation Table

Table 8: Low Baseline Control (Item) Allocation Table

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
AC-19(a)(1)	DSM	ISCM-TN	ISCM-Sys	Test				
AC-19(b)(1)	DSM	ISCM-TN	ISCM-Sys	Test				
CM-8(a)(1)	DSM	ISCM-TN	ISCM-Sys	Test				
CM-8(a)(2)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				
CM-8(a)(3)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				
CM-8(b)(1)	DM	ISCM-TN	ISCM-Sys	Test				
CM-8(b)(2)	DSM	ISCM-TN	ISCM-Sys	Test				
CM-8(4)(1)	DSM	ISCM-TN	ISCM-Sys	Test				
PS-4(d)(1)	DM	ISCM-TN	ISCM-Sys	Test				
SC-15(a)(1)	DM	ISCM-TN	ISCM-Sys	Test				
SC-15(b)(1)	MAN	ISCM-TN	ISCM-Sys	TBD				

3.4.2 Moderate Baseline Control Allocation Table

Table 9: Moderate Baseline Control (Item) Allocation Table

Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
AC-19(5)(1)	DM	ISCM-TN	ISCM-Sys	Test				
AC-20(2)(1)	DSM	ISCM-TN	ISCM-Sys	Test				
CM-2(7)(a)(1)	DM	ISCM-TN	ISCM-Sys	Test				
CM-2(7)(b)(1)	DM	ISCM-TN	ISCM-Sys	Test				
CM-3(a)(1)	DSM	TBD	MAN	TBD				
CM-3(b)(1)	DSM	ISCM-TN	ISCM-Sys	Test				
CM-3(b)(2)	MAN	ISCM-TN	MAN	TBD				
CM-3(c)(1)	DSM	ISCM-TN	ISCM-Sys	Test				
CM-3(d)(1)	DM	ISCM-TN	ISCM-Sys	Test				
CM-3(e)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				
CM-3(f)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				
CM-3(f)(2)	DSM	ISCM-TN	ISCM-Sys	Test				
CM-3(g)(1)	DSM	ISCM-TN	ISCM-Sys	Test				
CM-3(g)(2)	DSM	ISCM-TN	ISCM-Sys	Test				
CM-3(2)(1)	TBD	TBD	MAN	TBD				
CM-8(1)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				
CM-8(1)(2)	DSM	ISCM-TN	ISCM-Sys	Test				
CM-8(3)(a)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				
CM-8(3)(b)(1)	DM	ISCM-TN	ISCM-Sys	Test				
CM-8(5)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				
MA-3(1)(1)	DM	ISCM-TN	ISCM-Sys	Test				
MP-7(1)(1)	DM	ISCM-TN	ISCM-Sys	Test				

3.4.3 High Baseline Control Allocation Table

Table 10: High Baseline Control (Item) Allocation Table

Impact Level	Determination Statement ID	Implemented By	Assessment Boundary	Assessment Responsibility	Assessment Methods	Selected	Rationale for Risk Acceptance	Frequency of Assessment	Impact of not implementing
3	CM-3(1)(a)(1)	DSM	ISCM-TN	ISCM-Sys	Test				
3	CM-3(1)(b)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				
3	CM-3(1)(c)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				
3	CM-3(1)(d)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				
3	CM-3(1)(e)(1)	ISCM-Sys	TBD	MAN	TBD				
3	CM-3(1)(f)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				
3	CM-8(2)(1)	ISCM-Sys	ISCM-TN	ISCM-Sys	Test				
3	MA-3(3)(a)(1)	DM	ISCM-TN	ISCM-Sys	Test				
3	MA-3(3)(b)(1)	DM	ISCM-TN	ISCM-Sys	Test				
3	SA-12(1)	DSM	ISCM-TN	ISCM-Sys	Test				

Appendix A. Traceability of HWAM Control Items to Example Attack Steps

Example Attack Step	Sortable Control Item Code	NIST Control Item Code
2) Initiate Attack Internally	AC-19-a	AC-19(a)
2) Initiate Attack Internally	AC-19-b	AC-19(b)
2) Initiate Attack Internally	AC-19-z-05-z	AC-19(5)
2) Initiate Attack Internally	AC-20-z-02-z	AC-20(2)
2) Initiate Attack Internally	CM-02-z-07-a	CM-2(7)(a)
2) Initiate Attack Internally	CM-02-z-07-b	CM-2(7)(b)
2) Initiate Attack Internally	CM-03-b	CM-3(b)
2) Initiate Attack Internally	CM-03-c	CM-3(c)
2) Initiate Attack Internally	CM-03-d	CM-3(d)
2) Initiate Attack Internally	CM-03-f	CM-3(f)
2) Initiate Attack Internally	CM-03-g	CM-3(g)
2) Initiate Attack Internally	CM-03-z-01-a	CM-3(1)(a)
2) Initiate Attack Internally	CM-03-z-01-b	CM-3(1)(b)
2) Initiate Attack Internally	CM-03-z-01-c	CM-3(1)(c)
2) Initiate Attack Internally	CM-03-z-01-d	CM-3(1)(d)
2) Initiate Attack Internally	CM-03-z-01-f	CM-3(1)(f)
2) Initiate Attack Internally	CM-08-a	CM-8(a)
2) Initiate Attack Internally	CM-08-b	CM-8(b)
2) Initiate Attack Internally	CM-08-z-01-z	CM-8(1)
2) Initiate Attack Internally	CM-08-z-03-b	CM-8(3)(b)
2) Initiate Attack Internally	MA-03-z-01-z	MA-3(1)
2) Initiate Attack Internally	MA-03-z-03-a	MA-3(3)(a)
2) Initiate Attack Internally	MA-03-z-03-b	MA-3(3)(b)
2) Initiate Attack Internally	MP-07-z-01-z	MP-7(1)
2) Initiate Attack Internally	PS-04-d	PS-4(d)
2) Initiate Attack Internally	SC-15-a	SC-15(a)
3) Gain Foothold	AC-19-a	AC-19(a)
3) Gain Foothold	AC-19-b	AC-19(b)
3) Gain Foothold	AC-19-z-05-z	AC-19(5)
3) Gain Foothold	AC-20-z-02-z	AC-20(2)
3) Gain Foothold	CM-02-z-07-a	CM-2(7)(a)
3) Gain Foothold	CM-02-z-07-b	CM-2(7)(b)
3) Gain Foothold	CM-03-b	CM-3(b)
3) Gain Foothold	CM-03-c	CM-3(c)
3) Gain Foothold	CM-03-d	CM-3(d)

Example Attack Step	Sortable Control Item Code	NIST Control Item Code
3) Gain Foothold	CM-03-f	CM-3(f)
3) Gain Foothold	CM-03-g	CM-3(g)
3) Gain Foothold	CM-03-z-01-a	CM-3(1)(a)
3) Gain Foothold	CM-03-z-01-b	CM-3(1)(b)
3) Gain Foothold	CM-03-z-01-c	CM-3(1)(c)
3) Gain Foothold	CM-03-z-01-d	CM-3(1)(d)
3) Gain Foothold	CM-03-z-01-f	CM-3(1)(f)
3) Gain Foothold	CM-08-a	CM-8(a)
3) Gain Foothold	CM-08-b	CM-8(b)
3) Gain Foothold	CM-08-z-01-z	CM-8(1)
3) Gain Foothold	CM-08-z-03-b	CM-8(3)(b)
3) Gain Foothold	CM-08-z-04-z	CM-8(4)
3) Gain Foothold	MA-03-z-01-z	MA-3(1)
3) Gain Foothold	MA-03-z-03-a	MA-3(3)(a)
3) Gain Foothold	MA-03-z-03-b	MA-3(3)(b)
3) Gain Foothold	MP-07-z-01-z	MP-7(1)
3) Gain Foothold	PS-04-d	PS-4(d)
3) Gain Foothold	SC-15-a	SC-15(a)
6) Achieve Attack Objective	AC-19-a	AC-19(a)
6) Achieve Attack Objective	AC-19-b	AC-19(b)
6) Achieve Attack Objective	AC-19-z-05-z	AC-19(5)
6) Achieve Attack Objective	AC-20-z-02-z	AC-20(2)
6) Achieve Attack Objective	CM-02-z-07-a	CM-2(7)(a)
6) Achieve Attack Objective	CM-02-z-07-b	CM-2(7)(b)
6) Achieve Attack Objective	CM-03-b	CM-3(b)
6) Achieve Attack Objective	CM-03-c	CM-3(c)
6) Achieve Attack Objective	CM-03-d	CM-3(d)
6) Achieve Attack Objective	CM-03-f	CM-3(f)
6) Achieve Attack Objective	CM-03-g	CM-3(g)
6) Achieve Attack Objective	CM-03-z-01-a	CM-3(1)(a)
6) Achieve Attack Objective	CM-03-z-01-b	CM-3(1)(b)
6) Achieve Attack Objective	CM-03-z-01-d	CM-3(1)(d)
6) Achieve Attack Objective	CM-08-a	CM-8(a)
6) Achieve Attack Objective	CM-08-b	CM-8(b)
6) Achieve Attack Objective	CM-08-z-01-z	CM-8(1)
6) Achieve Attack Objective	CM-08-z-03-b	CM-8(3)(b)
6) Achieve Attack Objective	MA-03-z-01-z	MA-3(1)
6) Achieve Attack Objective	MA-03-z-03-a	MA-3(3)(a)
6) Achieve Attack Objective	MA-03-z-03-b	MA-3(3)(b)

Example Attack Step	Sortable Control Item Code	NIST Control Item Code
6) Achieve Attack Objective	MP-07-z-01-z	MP-7(1)
6) Achieve Attack Objective	PS-04-d	PS-4(d)
6) Achieve Attack Objective	SC-15-a	SC-15(a)

Appendix B. Control Items in the Low-High Baseline that were Selected by the Keyword Search, but were Manually Determined to be False Positives

Control Item Code	NIST Code	Control Text	Level	Rationale for Calling a False Positive
AC-18-z-01-z	AC-18 (1)	(1) WIRELESS ACCESS | AUTHENTICATION AND ENCRYPTION The information system protects wireless access to the system using authentication of [Selection (one or more): users; devices] and encryption.	Moderate	Belongs in BOUND-O
IA-03	IA-3	DEVICE IDENTIFICATION AND AUTHENTICATION Control: The information system uniquely identifies and authenticates [Assignment: organization-defined specific and/or types of devices] before establishing a [Selection (one or more): local; remote; network] connection.	Moderate	Involves authentication and identification of devices which is in CRED
IA-05-I	IA-5	AUTHENTICATOR MANAGEMENT Control: The organization manages information system authenticators by: i. Requiring individuals to take, and having devices implement, specific security safeguards to protect authenticators; and	Low	These safeguards are usually configuration settings so this is fundamentally CSM work, but risk may be more tied to CRED.
MA-02-b	MA-2	CONTROLLED MAINTENANCE Control: The organization: b. Approves and monitors all maintenance activities, whether performed on site or remotely and whether the equipment is serviced on site or removed to another location;	Low	This is covered under BOUND-P, which is a major protector of hardware and media
MA-02-d	MA-2	CONTROLLED MAINTENANCE Control: The organization: d. Sanitizes equipment to remove all information from associated media prior to removal from organizational facilities for off-site maintenance or repairs;	Low	This is covered under BOUND-P, which is a major protector of hardware and media

Control Item Code	NIST Code	Control Text	Level	Rationale for Calling a False Positive
MA-03-z-03-c	MA-3 (3)	(3) MAINTENANCE TOOLS | PREVENT UNAUTHORIZED REMOVAL The organization prevents the unauthorized removal of maintenance equipment containing organizational information by: (c) Retaining the equipment within the facility; or	High	This is covered under BOUND-P, which is a major protector of hardware and media
MA-03-z-03-d	MA-3 (3)	(3) MAINTENANCE TOOLS | PREVENT UNAUTHORIZED REMOVAL The organization prevents the unauthorized removal of maintenance equipment containing organizational information by: (d) Obtaining an exemption from [Assignment: organization-defined personnel or roles] explicitly authorizing removal of the equipment from the facility.	High	This is covered under BOUND-P, which is a major protector of hardware and media
MP-06-z-03-z	MP-6 (3)	(3) MEDIA SANITIZATION | NONDESTRUCTIVE TECHNIQUES The organization applies nondestructive sanitization techniques to portable storage devices prior to connecting such devices to the information system under the following circumstances: [Assignment: organization-defined circumstances requiring sanitization of portable storage devices].	High	This is covered under BOUND-P, which is a major protector of hardware and media
PE-03-a	PE-3	PHYSICAL ACCESS CONTROL Control: The organization: a. Enforces physical access authorizations at [Assignment: organization-defined entry/exit points to the facility where the information system resides] by; 1. Verifying individual access authorizations before granting access to the facility; and 2. Controlling ingress/egress to the facility using [Selection (one or more): [Assignment: organization-defined physical access control systems/devices]; guards];	Low	This is covered under BOUND-P, which is a major protector of hardware and media

Control Item Code	NIST Code	Control Text	Level	Rationale for Calling a False Positive
PE-03-e	PE-3	PHYSICAL ACCESS CONTROL Control: The organization: e. Secures keys, combinations, and other physical access devices;	Low	These devices are credentials, and thus assigned to CRED
PE-03-f	PE-3	PHYSICAL ACCESS CONTROL Control: The organization: f. Inventories [Assignment: organization-defined physical access devices] every [Assignment: organization-defined frequency]; and	Low	These devices are credentials, and thus assigned to CRED
PE-05	PE-5	PE-5 ACCESS CONTROL FOR OUTPUT DEVICES Control: The organization controls physical access to information system output devices to prevent unauthorized individuals from obtaining the output.	Moderate	This is covered under BOUND-P, which is a major protector of hardware and media
PE-10-b	PE-10	PE-10 EMERGENCY SHUTOFF Control: The organization: b. Places emergency shutoff switches or devices in [Assignment: organization-defined location by information system or system component] to facilitate safe and easy access for personnel; and	Moderate	These devices are special purpose to detect and respond to contingencies. Putting them in place is assigned to PREP
PE-13	PE-13	PE-13 FIRE PROTECTION Control: The organization employs and maintains fire suppression and detection devices/systems for the information system that are supported by an independent energy source.	Low	These devices are special purpose to detect and respond to contingencies. Putting them in place is assigned to PREP
PE-13-z-01-z	PE-13 (1)	(1) FIRE PROTECTION | DETECTION DEVICES / SYSTEMS The organization employs fire detection devices/systems for the information system that activate automatically and notify [Assignment: organization-defined personnel or roles] and [Assignment: organization-defined emergency responders] in the event of a fire.	High	These devices are special purpose to detect and respond to contingencies. Putting them in place is assigned to PREP

Control Item Code	NIST Code	Control Text	Level	Rationale for Calling a False Positive
PE-13-z-02-z	PE-13 (2)	(2) FIRE PROTECTION | SUPPRESSION DEVICES / SYSTEMS The organization employs fire suppression devices/systems for the information system that provide automatic notification of any activation to Assignment: organization-defined personnel or roles] and [Assignment: organization-defined emergency responders].	High	These devices are special purpose to detect and respond to contingencies. Putting them in place is assigned to PREP
SC-03	SC-3	SC-3 SECURITY FUNCTION ISOLATION Control: The information system isolates security functions from nonsecurity functions.	High	Focus is on the isolation of security functions in the SWAM capability.
SC-07-c	SC-7	SC-7 BOUNDARY PROTECTION Control: The information system: c. Connects to external networks or information systems only through managed interfaces consisting of boundary protection devices arranged in accordance with an organizational security architecture.	Low	External connections are details of how that hardware/software protects the boundary are covered in BOUND N, O and P
SC-07-z-07-z	SC-7 (7)	(7) BOUNDARY PROTECTION | PREVENT SPLIT TUNNELING FOR REMOTE DEVICES The information system, in conjunction with a remote device, prevents the device from simultaneously establishing non-remote connections with the system and communicating via some other connection to resources in external networks.	Moderate	External connections are details of how that hardware/software protects the boundary are covered in BOUND N, O and P
SI-04-c	SI-4	SI-4 INFORMATION SYSTEM MONITORING Control: The organization: c. Deploys monitoring devices: (i) strategically within the information system to collect organization-determined essential information; and (ii) at ad hoc locations within the system to track specific types of transactions of interest to the organization;	Low	All ISCM devices and their requirements are covered within each capability, and are data quality is assessed via defect checks Q01 through Q04.

Appendix C. Control Items Not in the Low-High Baseline

The controls not in a baseline were not analyzed further after the keyword search. These include:

- the Program Management Family, because they do not apply to individual systems;
- the *not selected* controls that are in the other NIST 800-53 families but were not assigned to a baseline; and
- the Privacy Controls.

These are listed in this appendix, in case an organization wants to develop automated tests.

Control Item Code	NIST Code	Control Text
AC-07-z-02-z	AC-7 (2)	(2) UNSUCCESSFUL LOGON ATTEMPTS | PURGE / WIPE MOBILE DEVICE The information system purges/wipes information from [Assignment: organization-defined mobile devices] based on [Assignment: organization-defined purging/wiping requirements/techniques] after [Assignment: organization-defined number] consecutive, unsuccessful device logon attempts.
AC-16-z-05-z	AC-16 (5)	(5) SECURITY ATTRIBUTES | ATTRIBUTE DISPLAYS FOR OUTPUT DEVICES The information system displays security attributes in human-readable form on each object that the system transmits to output devices to identify [Assignment: organization-identified special dissemination, handling, or distribution instructions] using [Assignment: organization-identified human-readable, standard naming conventions].
AC-19-z-04-a	AC-19 (4)	(4) ACCESS CONTROL FOR MOBILE DEVICES | RESTRICTIONS FOR CLASSIFIED INFORMATION The organization: (a) Prohibits the use of unclassified mobile devices in facilities containing information systems processing, storing, or transmitting classified information unless specifically permitted by the authorizing official; and

Control Item Code	NIST Code	Control Text
AC-19-z-04-b	AC-19 (4)	(4) ACCESS CONTROL FOR MOBILE DEVICES | RESTRICTIONS FOR CLASSIFIED INFORMATION The organization: (b) Enforces the following restrictions on individuals permitted by the authorizing official to use unclassified mobile devices in facilities containing information systems processing, storing, or transmitting classified information: - Connection of unclassified mobile devices to classified information systems is prohibited; - Connection of unclassified mobile devices to unclassified information systems requires approval from the authorizing official; - Use of internal or external modems or wireless interfaces within the unclassified mobile devices is prohibited; and - Unclassified mobile devices and the information stored on those devices are subject to random reviews and inspections by [Assignment: organization-defined security officials], and if classified information is found, the incident handling policy is followed.
AC-19-z-06-z	AC-19 (6)	(6) ACCESS CONTROL FOR MOBILE DEVICES | FULL DISK ENCRYPTION The organization uses full-disk encryption to protect the confidentiality of information on [Assignment: organization-defined mobile devices].
AC-19-z-07-z	AC-19 (7)	(7) ACCESS CONTROL FOR MOBILE DEVICES | CENTRAL MANAGEMENT OF MOBILE DEVICES The organization centrally manages [Assignment: organization-defined mobile devices]. Supplemental Guidance: This control enhancement applies to mobile devices that are organization-controlled and excludes portable storage media. [MAPCAT-HWAM]
AC-19-z-08-z	AC-19 (8)	(8) ACCESS CONTROL FOR MOBILE DEVICES | REMOTE PURGING OF INFORMATION The organization provides the capability to remotely purge information from [Assignment: organization-defined mobile devices].
AC-19-z-09-z	AC-19 (9)	(9) ACCESS CONTROL FOR MOBILE DEVICES | TAMPER DETECTION The organization inspects [Assignment: organization-defined mobile devices] [Selection (one or more): at random; at [Assignment: organization-defined frequency], upon [Assignment: organization-defined indications of need for inspection]] to detect tampering.

Control Item Code	NIST Code	Control Text
AC-20-z-03-z	AC-20 (3)	(3) USE OF EXTERNAL INFORMATION SYSTEMS | NON-ORGANIZATIONALLY OWNED SYSTEMS / COMPONENTS / DEVICES The organization [Selection: restricts; prohibits] the use of non-organizationally owned information systems, system components, or devices to process, store, or transmit organizational information.
AC-20-z-04-z	AC-20 (4)	(4) USE OF EXTERNAL INFORMATION SYSTEMS | NETWORK ACCESSIBLE STORAGE DEVICES The organization prohibits the use of [Assignment: organization-defined network accessible storage devices] in external information systems.
CM-03-z-03-z	CM-3 (3)	(3) CONFIGURATION CHANGE CONTROL | AUTOMATED CHANGE IMPLEMENTATION The organization employs automated mechanisms to implement changes to the current information system baseline and deploys the updated baseline across the installed base.
CM-03-z-04-z	CM-3 (4)	(4) CONFIGURATION CHANGE CONTROL | SECURITY REPRESENTATIVE The organization requires an information security representative to be a member of the [Assignment: organization-defined configuration change control element].
CM-03-z-05-z	CM-3 (5)	(5) CONFIGURATION CHANGE CONTROL | AUTOMATED SECURITY RESPONSE The information system implements [Assignment: organization-defined security responses] automatically if baseline configurations are changed in an unauthorized manner.
CM-03-z-06-z	CM-3 (6)	(6) CONFIGURATION CHANGE CONTROL | CRYPTOGRAPHY MANAGEMENT The organization ensures that cryptographic mechanisms used to provide [Assignment: organization-defined security safeguards] are under configuration management.
CM-08-z-06-z	CM-8 (6)	(6) INFORMATION SYSTEM COMPONENT INVENTORY | ASSESSED CONFIGURATIONS / APPROVED DEVIATIONS The organization includes assessed component configurations and any approved deviations to current deployed configurations in the information system component inventory.
CM-08-z-07-z	CM-8 (7)	(7) INFORMATION SYSTEM COMPONENT INVENTORY | CENTRALIZED REPOSITORY The organization provides a centralized repository for the inventory of information system components.

Control Item Code	NIST Code	Control Text
CM-08-z-08-z	CM-8 (8)	(8) INFORMATION SYSTEM COMPONENT INVENTORY | AUTOMATED LOCATION TRACKING The organization employs automated mechanisms to support tracking of information system components by geographic location.
CM-08-z-09-a	CM-8 (9)	(9) INFORMATION SYSTEM COMPONENT INVENTORY | ASSIGNMENT OF COMPONENTS TO SYSTEMS The organization: (a) Assigns [Assignment: organization-defined acquired information system components] to an information system; and
CM-08-z-09-b	CM-8 (9)	(9) INFORMATION SYSTEM COMPONENT INVENTORY | ASSIGNMENT OF COMPONENTS TO SYSTEMS The organization: (b) Receives an acknowledgement from the information system owner of this assignment.
IA-03-z-01-z	IA-3 (1)	(1) DEVICE IDENTIFICATION AND AUTHENTICATION | CRYPTOGRAPHIC BIDIRECTIONAL AUTHENTICATION The information system authenticates [Assignment: organization-defined specific devices and/or types of devices] before establishing [Selection (one or more): local; remote; network] connection using bidirectional authentication that is cryptographically based.
IA-03-z-03-a	IA-3 (3)	(3) DEVICE IDENTIFICATION AND AUTHENTICATION | DYNAMIC ADDRESS ALLOCATION The organization: (a) Standardizes dynamic address allocation lease information and the lease duration assigned to devices in accordance with [Assignment: organization-defined lease information and lease duration]; and
IA-11	IA-11	RE-AUTHENTICATION Control: The organization requires users and devices to re-authenticate when [Assignment: organization-defined circumstances or situations requiring re-authentication].
IR-04-z-10-z	IR-4 (10)	(10) INCIDENT HANDLING | SUPPLY CHAIN COORDINATION The organization coordinates incident handling activities involving supply chain events with other organizations involved in the supply chain.

Control Item Code	NIST Code	Control Text
IR-06-z-03-z	IR-6 (3)	(3) INCIDENT REPORTING | COORDINATION WITH SUPPLY CHAIN The organization provides security incident information to other organizations involved in the supply chain for information systems or information system components related to the incident.
MP-06-z-08-z	MP-6 (8)	(8) MEDIA SANITIZATION | REMOTE PURGING / WIPING OF INFORMATION The organization provides the capability to purge/wipe information from [Assignment: organization-defined information systems, system components, or devices] either remotely or under the following conditions: [Assignment: organization-defined conditions].
PE-05-z-01-a	PE-5 (1)	(1) ACCESS CONTROL FOR OUTPUT DEVICES | ACCESS TO OUTPUT BY AUTHORIZED INDIVIDUALS The organization: (a) Controls physical access to output from [Assignment: organization-defined output devices]; and
PE-05-z-01-b	PE-5 (1)	(1) ACCESS CONTROL FOR OUTPUT DEVICES | ACCESS TO OUTPUT BY AUTHORIZED INDIVIDUALS The organization: (b) Ensures that only authorized individuals receive output from the device.
PE-05-z-02-a	PE-5 (2)	(2) ACCESS CONTROL FOR OUTPUT DEVICES | ACCESS TO OUTPUT BY INDIVIDUAL IDENTITY The information system: (a) Controls physical access to output from [Assignment: organization-defined output devices]; and
PE-05-z-02-b	PE-5 (2)	(2) ACCESS CONTROL FOR OUTPUT DEVICES | ACCESS TO OUTPUT BY INDIVIDUAL IDENTITY The information system: (b) Links individual identity to receipt of the output from the device.
PE-05-z-03-z	PE-5 (3)	(3) ACCESS CONTROL FOR OUTPUT DEVICES | MARKING OUTPUT DEVICES The organization marks [Assignment: organization-defined information system output devices] indicating the appropriate security marking of the information permitted to be output from the device.
PM-05	PM-5	PM-5 INFORMATION SYSTEM INVENTORY Control: The organization develops and maintains an inventory of its information systems.

Control Item Code	NIST Code	Control Text
SA-12-z-01-z	SA-12 (1)	(1) SUPPLY CHAIN PROTECTION | ACQUISITION STRATEGIES / TOOLS / METHODS The organization employs [Assignment: organization-defined tailored acquisition strategies, contract tools, and procurement methods] for the purchase of the information system, system component, or information system service from suppliers.
SA-12-z-02-z	SA-12 (2)	(2) SUPPLY CHAIN PROTECTION | SUPPLIER REVIEWS The organization conducts a supplier review prior to entering into a contractual agreement to acquire the information system, system component, or information system service
SA-12-z-05-z	SA-12 (5)	(5) SUPPLY CHAIN PROTECTION | LIMITATION OF HARM The organization employs [Assignment: organization-defined security safeguards] to limit harm from potential adversaries identifying and targeting the organizational supply chain.
SA-12-z-07-z	SA-12 (7)	(7) SUPPLY CHAIN PROTECTION | ASSESSMENTS PRIOR TO SELECTION / ACCEPTANCE / UPDATE The organization conducts an assessment of the information system, system component, or information system service prior to selection, acceptance, or update.
SA-12-z-08-z	SA-12 (8)	(8) SUPPLY CHAIN PROTECTION | USE OF ALL-SOURCE INTELLIGENCE The organization uses all-source intelligence analysis of suppliers and potential suppliers of the information system, system component, or information system service.
SA-12-z-09-z	SA-12 (9)	(9) SUPPLY CHAIN PROTECTION | OPERATIONS SECURITY The organization employs [Assignment: organization-defined Operations Security (OPSEC) safeguards] in accordance with classification guides to protect supply chain-related information for the information system, system component, or information system service.
SA-12-z-10-z	SA-12 (10)	(10) SUPPLY CHAIN PROTECTION | VALIDATE AS GENUINE AND NOT ALTERED The organization employs [Assignment: organization-defined security safeguards] to validate that the information system or system component received is genuine and has not been altered.

Control Item Code	NIST Code	Control Text
SA-12-z-11-z	SA-12 (11)	(11) SUPPLY CHAIN PROTECTION | PENETRATION TESTING / ANALYSIS OF ELEMENTS, PROCESSES, AND ACTORS The organization employs [Selection (one or more): organizational analysis, independent third-party analysis, organizational penetration testing, independent third-party penetration testing] of [Assignment: organization-defined supply chain elements, processes, and actors] associated with the information system, system component, or information system service.
SA-12-z-12-z	SA-12 (12)	(12) SUPPLY CHAIN PROTECTION | INTER-ORGANIZATIONAL AGREEMENTS The organization establishes inter-organizational agreements and procedures with entities involved in the supply chain for the information system, system component, or information system service.
SA-12-z-13-z	SA-12 (13)	(13) SUPPLY CHAIN PROTECTION | CRITICAL INFORMATION SYSTEM COMPONENTS The organization employs [Assignment: organization-defined security safeguards] to ensure an adequate supply of [Assignment: organization-defined critical information system components].
SA-12-z-14-z	SA-12 (14)	(14) SUPPLY CHAIN PROTECTION | IDENTITY AND TRACEABILITY The organization establishes and retains unique identification of [Assignment: organization-defined supply chain elements, processes, and actors] for the information system, system component, or information system service.
SA-12-z-15-z	SA-12 (15)	(15) SUPPLY CHAIN PROTECTION | PROCESSES TO ADDRESS WEAKNESSES OR DEFICIENCIES The organization establishes a process to address weaknesses or deficiencies in supply chain elements identified during independent or organizational assessments of such elements.
SA-18	SA-18	SA-18 TAMPER RESISTANCE AND DETECTION Control: The organization implements a tamper protection program for the information system, system component, or information system service.
SA-18-z-01-z	SA-18 (1)	(1) TAMPER RESISTANCE AND DETECTION | MULTIPLE PHASES OF SDLC The organization employs anti-tamper technologies and techniques during multiple phases in the system development life cycle including design, development, integration, operations, and maintenance.

Control Item Code	NIST Code	Control Text
SA-18-z-02-z	SA-18 (2)	(2) TAMPER RESISTANCE AND DETECTION | INSPECTION OF INFORMATION SYSTEMS, COMPONENTS, OR DEVICES The organization inspects [Assignment: organization-defined information systems, system components, or devices] [Selection (one or more): at random; at [Assignment: organization-defined frequency], upon [Assignment: organization-defined indications of need for inspection]] to detect tampering.
SA-19-a	SA-19	SA-19 COMPONENT AUTHENTICITY Control: The organization: a. Develops and implements anti-counterfeit policy and procedures that include the means to detect and prevent counterfeit components from entering the information system; and
SA-19-z-01-z	SA-19 (1)	(1) COMPONENT AUTHENTICITY | ANTI-COUNTERFEIT TRAINING The organization trains [Assignment: organization-defined personnel or roles] to detect counterfeit information system components (including hardware, software, and firmware).
SA-19-z-04-z	SA-19 (4)	(4) COMPONENT AUTHENTICITY | ANTI-COUNTERFEIT TRAINING The organization scans for counterfeit information system components [Assignment: organization-defined frequency].
SA-22-a	SA-22	SA-22 UNSUPPORTED SYSTEM COMPONENTS Control: The organization: a. Replaces information system components when support for the components is no longer available from the developer, vendor, or manufacturer; and
SA-22-b	SA-22	SA-22 UNSUPPORTED SYSTEM COMPONENTS Control: The organization: b. Provides justification and documents approval for the continued use of unsupported system components required to satisfy mission/business needs.
SA-22-z-01-z	SA-22 (1)	(1) UNSUPPORTED SYSTEM COMPONENTS | ALTERNATIVE SOURCES FOR CONTINUED SUPPORT The organization provides [Selection (one or more): in-house support; [Assignment: organization-defined support from external providers]] for unsupported information system components.

Control Item Code	NIST Code	Control Text
SC-03-z-01-z	SC-3 (1)	(1) SECURITY FUNCTION ISOLATION | HARDWARE SEPARATION The information system utilizes underlying hardware separation mechanisms to implement security function isolation.
SC-03-z-02-z	SC-3 (2)	(2) SECURITY FUNCTION ISOLATION | ACCESS / FLOW CONTROL FUNCTIONS The information system isolates security functions enforcing access and information flow control from nonsecurity functions and from other security functions.
SC-03-z-03-z	SC-3 (3)	(3) SECURITY FUNCTION ISOLATION | MINIMIZE NONSECURITY FUNCTIONALITY The organization minimizes the number of nonsecurity functions included within the isolation boundary containing security functions.
SC-03-z-04-z	SC-3 (4)	(4) SECURITY FUNCTION ISOLATION | MODULE COUPLING AND COHESIVENESS The organization implements security functions as largely independent modules that maximize internal cohesiveness within modules and minimize coupling between modules.
SC-03-z-05-z	SC-3 (5)	(5) SECURITY FUNCTION ISOLATION | LAYERED STRUCTURES The organization implements security functions as a layered structure minimizing interactions between layers of the design and avoiding any dependence by lower layers on the functionality or correctness of higher layers.
SC-07-z-16-z	SC-7 (16)	(16) BOUNDARY PROTECTION | PREVENT DISCOVERY OF COMPONENTS / DEVICES The information system prevents discovery of specific system components composing a managed interface.
SC-15-z-01-z	SC-15 (1)	(1) COLLABORATIVE COMPUTING DEVICES | PHYSICAL DISCONNECT The information system provides physical disconnect of collaborative computing devices in a manner that supports ease of use.
SC-15-z-03-z	SC-15 (3)	(3) COLLABORATIVE COMPUTING DEVICES | DISABLING / REMOVAL IN SECURE WORK AREAS The organization disables or removes collaborative computing devices from [Assignment: organization-defined information systems or information system components] in [Assignment: organization-defined secure work areas].

Control Item Code	NIST Code	Control Text
SC-15-z-04-z	SC-15 (4)	(4) COLLABORATIVE COMPUTING DEVICES | EXPLICITLY INDICATE CURRENT PARTICIPANTS The information system provides an explicit indication of current participants in [Assignment: organization-defined online meetings and teleconferences].
SC-25	SC-25	SC-25 THIN NODES Control: The organization employs [Assignment: organization-defined information system components] with minimal functionality and information storage.
SC-29	SC-29	SC-29 HETEROGENEITY Control: The organization employs a diverse set of information technologies for [Assignment: organization-defined information system components] in the implementation of the information system.
SC-29-z-01-z	SC-29 (1)	(1) HETEROGENEITY | VIRTUALIZATION TECHNIQUES The organization employs virtualization techniques to support the deployment of a diversity of operating systems and applications that are changed [Assignment: organization-defined frequency].
SC-37	SC-37	SC-37 OUT-OF-BAND CHANNELS Control: The organization employs [Assignment: organization-defined out-of-band channels] for the physical delivery or electronic transmission of [Assignment: organization-defined information, information system components, or devices] to [Assignment: organization-defined individuals or information systems].
SC-37-z-01-z	SC-37 (1)	(1) OUT-OF-BAND CHANNELS | ENSURE DELIVERY / TRANSMISSION The organization employs [Assignment: organization-defined security safeguards] to ensure that only [Assignment: organization-defined individuals or information systems] receive the [Assignment: organization-defined information, information system components, or devices].
SC-41	SC-41	SC-41 PORT AND I/O DEVICE ACCESS Control: The organization physically disables or removes [Assignment: organization-defined connection ports or input/output devices] on [Assignment: organization-defined information systems or information system components].

Control Item Code	NIST Code	Control Text
SC-42-z-03-z	SC-42 (3)	(3) SENSOR CAPABILITY AND DATA | PROHIBIT USE OF DEVICES The organization prohibits the use of devices possessing [Assignment: organization-defined environmental sensing capabilities] in [Assignment: organization-defined facilities, areas, or systems].
SE-01-a	SE-1	SE-1 INVENTORY OF PERSONALLY IDENTIFIABLE INFORMATION Control: The organization: a. Establishes, maintains, and updates [Assignment: organization-defined frequency] an inventory that contains a listing of all programs and information systems identified as collecting, using, maintaining, or sharing personally identifiable information (PII); and
SE-01-b	SE-1	SE-1 INVENTORY OF PERSONALLY IDENTIFIABLE INFORMATION Control: The organization: b. Provides each update of the PII inventory to the CIO or information security official [Assignment: organization-defined frequency] to support the establishment of information security requirements for all new or modified information systems containing PII.
SI-04-z-13-c	SI-4 (13)	(13) INFORMATION SYSTEM MONITORING | ANALYZE TRAFFIC / EVENT PATTERNS The organization: (c) Uses the traffic/event profiles in tuning system-monitoring devices to reduce the number of false positives and the number of false negatives.
SI-04-z-14-z	SI-4 (14)	(14) INFORMATION SYSTEM MONITORING | WIRELESS INTRUSION DETECTION The organization employs a wireless intrusion detection system to identify rogue wireless devices and to detect attack attempts and potential compromises/breaches to the information system.
SI-04-z-23-z	SI-4 (23)	(23) INFORMATION SYSTEM MONITORING | HOST-BASED DEVICES The organization implements [Assignment: organization-defined host-based monitoring mechanisms] at [Assignment: organization-defined information system components].
SI-07-z-09-z	SI-7 (9)	(9) SOFTWARE, FIRMWARE, AND INFORMATION INTEGRITY | VERIFY BOOT PROCESS The information system verifies the integrity of the boot process of [Assignment: organization-defined devices].

Control Item Code	NIST Code	Control Text
SI-07-z-10-z	SI-7 (10)	(10) SOFTWARE, FIRMWARE, AND INFORMATION INTEGRITY | PROTECTION OF BOOT FIRMWARE The information system implements [Assignment: organization-defined security safeguards] to protect the integrity of boot firmware in [Assignment: organization-defined devices].

Appendix D. HWAM-Specific Acronyms

None