APPLYING THE CYBERSECURITY RISK MANAGEMENT FRAMEWORK TO ENTERPRISE RISK MANAGEMENT DECISIONS:

REMEMBERING PEOPLE, PROCESSES, AND TECHNOLOGY

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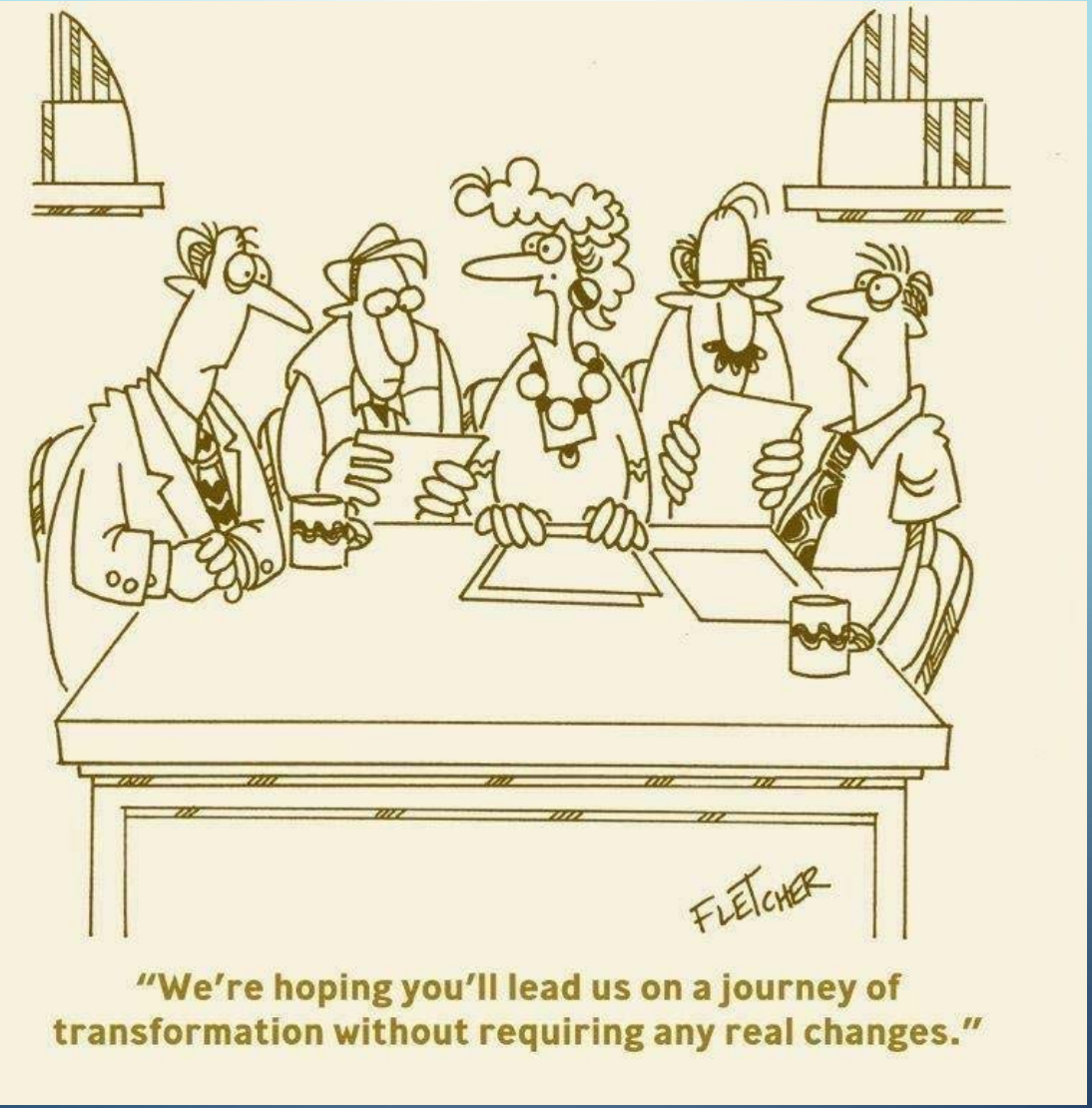
HOW CHANGE MANAGEMENT FEELS TO THE CHANGE ADVOCATE…



THE HEALTH CARE INDUSTRY CYBERSECURITY (HCIC) TASK FORCE FINAL REPORT JUNE 2, 2017

- Of the three aims of cybersecurity (confidentiality, integrity, availability), ***availability*** is the most important. You cannot take care of patients without having availability of information. Having high availability of patient information is especially important with hospitals that operate 24x7 and 365 days a year.
- ***Integrity*** of data is important for protecting patient safety. Patient safety is also directly implicated when it comes to connected medical devices and patients whose health can be directly impacted by the operation of the medical device.

THE HEALTH CARE INDUSTRY CYBERSECURITY (HCIC) TASK FORCE FINAL REPORT JUNE 2, 2017

- As the healthcare industry progresses towards more interoperability, healthcare data ***confidentiality*** must remain top of mind.
- The biggest barrier to cybersecurity program maturity in healthcare is the cultural barrier. The cybersecurity threat is not understood and/or there are not enough resources available by some organizations to deal with the threat—especially small and rural healthcare providers.

THE HEALTH CARE INDUSTRY CYBERSECURITY (HCIC) TASK FORCE FINAL REPORT JUNE 2, 2017

- **Taskforce Imperative No. 4:** Increase healthcare industry readiness through improved cybersecurity awareness and education
- "Cybersecurity can be an enabler for the healthcare industry, supporting both its business and clinical objectives, as well as facilitating the delivery of efficient, high-quality patient care. ***However, this requires a holistic cybersecurity strategy.*** Organizations that do not adopt a holistic strategy not only put their data, organizations, and reputation at risk, but also—most importantly—the welfare and safety of their patients."

NIST SP 800-39: MANAGING INFORMATION SECURITY RISK - ORGANIZATION, MISSION, AND INFORMATION SYSTEM VIEW

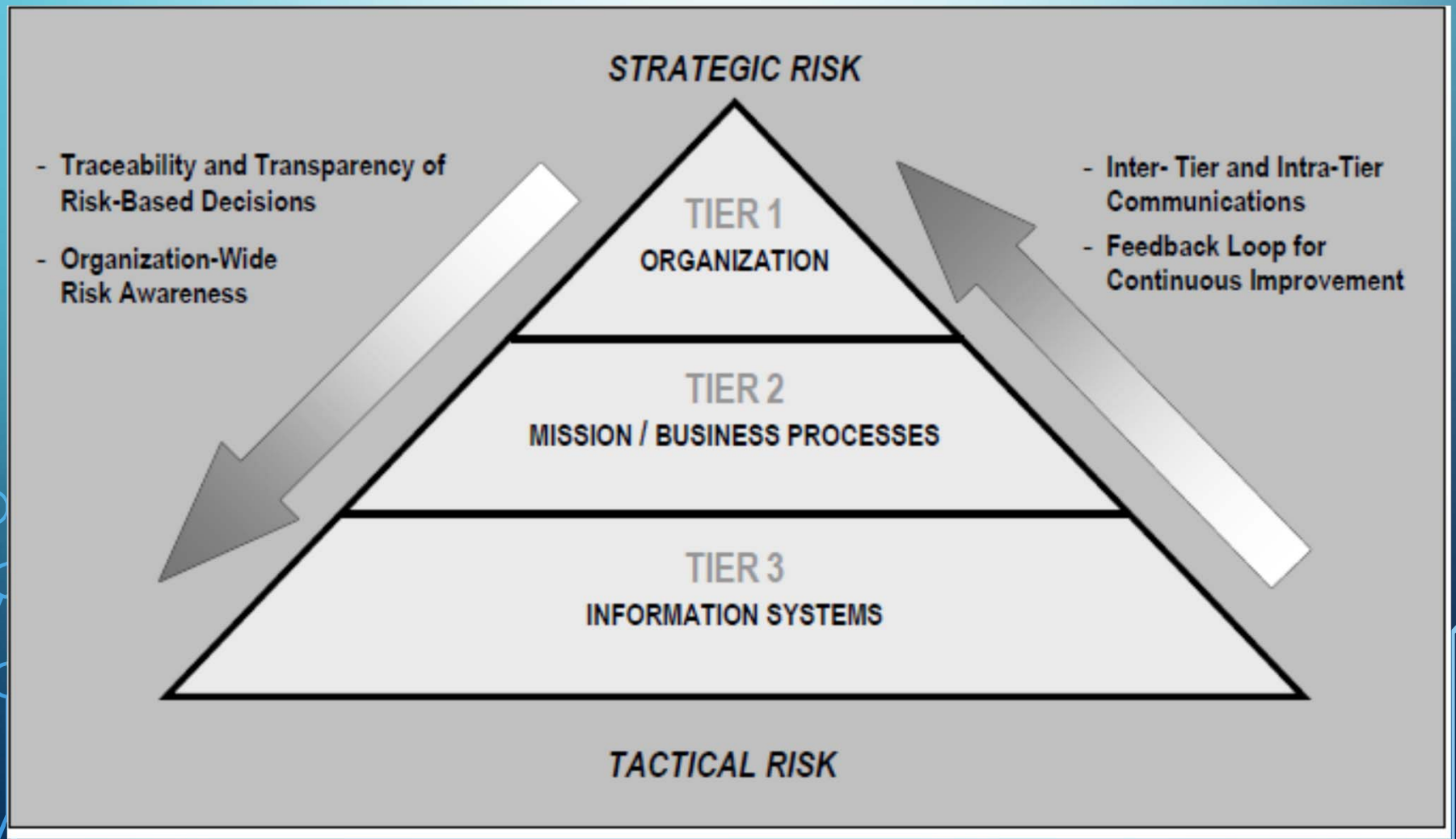
Organizational risk can include many types of risk (e.g., program management risk, investment risk, budgetary risk, legal liability risk, safety risk, inventory risk, supply chain risk, and security risk). ***Security risk related to the operation and use of information systems is just one of many components of organizational risk that senior leaders/executives address as part of their ongoing risk management responsibilities.*** Leaders must recognize that explicit, well-informed risk-based decisions are necessary in order to balance the benefits gained from the operation and use of these information systems with the risk of the same systems being vehicles through which purposeful attacks, environmental disruptions, or human errors cause mission or business failure. ***Managing information security risk, like risk management in general, is not an exact science. It brings together the best collective judgments of individuals and groups within organizations responsible for strategic planning, oversight, management, and day-to-day operations***—providing both the necessary and sufficient risk response measures to adequately protect the missions and business functions of those organizations.

NIST SP 800-39

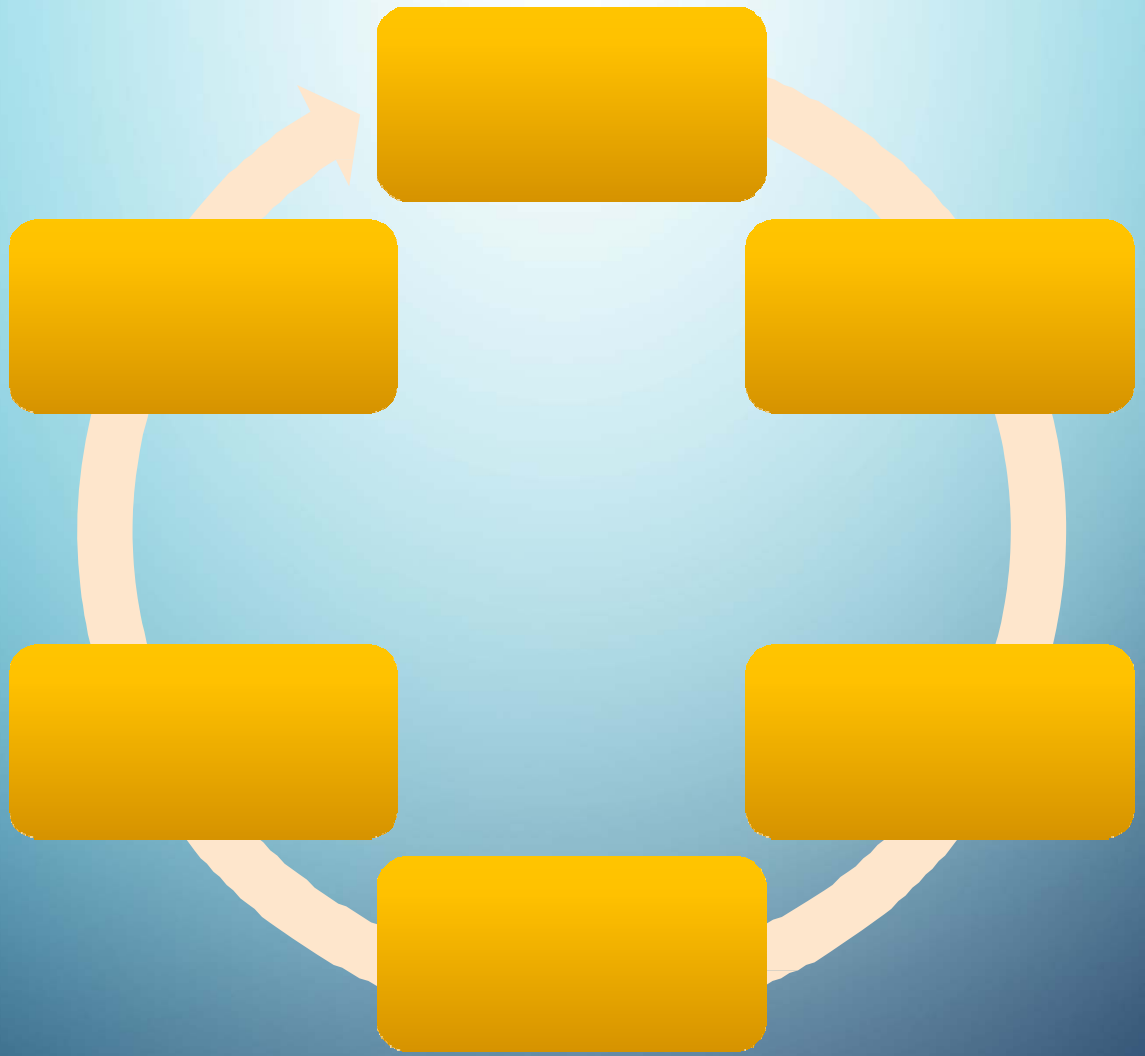
Objectives:

- Ensure that senior leaders/executives recognize the importance of managing information security risk and establish appropriate governance structures for managing such risk;
- Ensure that the organization's risk management process is being effectively conducted across the three tiers of organization, mission/business processes, and information systems;
- ***Foster an organizational climate where information security risk is considered within the context of the design of mission/business processes, the definition of an overarching enterprise architecture,*** and system development life cycle processes; and
- **Help individuals with responsibilities for information system implementation or operation better understand how information security risk associated with their systems translates into organization-wide risk that may ultimately affect the mission/business success.**

ENTERPRISE RISK MANAGEMENT TIERS
(FROM NIST SP 800-39)



CYBERSECURITY RISK MANAGEMENT FRAMEWORK



RISK MANAGEMENT FRAMEWORK (RMF)

- Categorize
- Select
- **Implement**
- Assess
- Authorize
- Monitor

- Categorize the system
- Initiate security plan
- Common control identification
- Select security controls
- **Implement the security controls**
- Describe how controls are employed

TASK 1-1 CATEGORIZE SYSTEM

- Categorize the system based on impact analysis
  - Confidentiality
  - Integrity
  - Availability

TASK 1-2: INITIATE SECURITY PLAN

- Describe the system (including system boundary) and document the description in the security plan.

POTENTIAL IMPACT OF A BREACH OF SECURITY

	Potential Impact		
Security Objective	**Low**	**Mod**	**High**
Confidentiality		X	
Integrity		X	
Availability	X		

Low

- **Limited adverse effect**
- Perform primary functions, but effectiveness is **noticeably** reduced
- **Minor** damage to assets
- **Minor** financial loss
- **Minor** harm to individuals

Moderate

- **Serious adverse effect**
- Perform primary functions, but effectiveness is **significantly** reduced
- **Significant** damage to assets
- **Significant** financial loss
- **Significant** harm to individuals that does not involve loss of life or serious life threatening injuries

SECURITY CONTROLS

- Security controls are the management, operational, and technical safeguards or countermeasures employed within an information system.
- People, Processes, AND Technology
  - Incident Response Plan
  - Vulnerability Assessments
  - Anti-virus Software
  - User Training
  - Firewall
  - Etc.

TYPES OF SECURITY CONTROLS

- **Common -** A security control that is inherited by one or more organizational information systems.
- **Hybrid -** A security control that is implemented in an information system in part as a common control and in part as a system-specific control.
- **System-Specific -** A security control for an information system that has not been designated as a common control or the portion of a hybrid security control that is to be implemented within an information system.

TASK 2-1: COMMON CONTROL IDENTIFICATION

TASK 2-2: SELECT SECURITY CONTROLS

- There are six steps in the security controls selection process:
  - Select the initial set of security controls
  - Select and apply security control overlays
  - Tailor the set of security controls
  - Supplement the tailored set of controls
  - Identify common controls
  - Document the security control baseline

TASK 3-1: IMPLEMENT SECURITY CONTROLS

- Design
- Purchase
- Install
- Configure
- Test

This is where most IT folks forget about the people and processes and instead focus SOLELY on the technology

TASK 3-2: DOCUMENT SECURITY CONTROLS

- Security control documentation describes how system-specific, hybrid, and common controls are implemented
- The documentation formalizes plans and expectations regarding the overall functionality of the information system
- Documentation of security control implementation allows for traceability of decisions taken prior to and after deployment of the information system
- The level of effort expended on documentation of the information system is commensurate with the purpose, scope, and impact of the system with respect to organizational missions, business functions, and operations

SOURCE DOCUMENTS FOR RMF

Categorize	FIPS 199
Select	CNSSI 1253
Implement	NIST SP 800-53
Assess	NIST SP 800-37
Authorize	
Monitor	NIST SP 800-137

NIST SP 800-53 REVISION 5 – WE'RE AHEAD OF OUR TIME

- Making the security and privacy controls more outcome-based by changing the structure of the controls
- Fully integrating the privacy controls into the security control catalog creating a consolidated and unified set of controls for systems and organizations (***currently 2 separate appendices***)
- Separating the control selection process from the actual controls, thus allowing the controls to be used by different communities of interest including systems engineers, software developers, enterprise architects; and mission/business owners
- Eliminating the term "information system" and replacing it with the term "system" so the controls can be applied to any type of system including, for example, general purpose systems, cyber-physical systems, industrial/process control systems, and IoT devices

NIST SP 800-53 REVISION 5 – MORE CHANGES

- De-emphasizing the federal focus of the publication to encourage greater use by nonfederal organizations
- ***Promoting integration with different risk management and cybersecurity approaches and lexicons, including the Cybersecurity Framework***
- Clarifying the relationship between security and privacy to improve the selection of controls necessary to address the full scope of security and privacy risks
- Incorporating new, state of the practice controls based on threat intelligence and empirical attack data, including controls to strengthen cybersecurity and privacy governance and accountability

NIST CYBERSECURITY FRAMEWORK

Identify

- Asset Mgmnt
- Business Env
- Governance
- Risk Assessment
- Risk Mgmnt Strategy

Protect

- Access Control
- Awareness & Training
- Data Security
- Information protection & procedures
- Maintenance
- Protective Technology

Detect

- Anomalies & Events
- Security Continuous Monitoring
- Detection Process

Respond

- Response Planning
- Communications
- Analysis
- Mitigation

Recover

- Recovery Planning
- Improvements
- Communications

NIST SP 800-53, SECURITY AND PRIVACY CONTROLS FOR ~~FEDERAL INFORMATION~~ SYSTEMS AND ORGANIZATIONS

CONTROL FAMILIES

- AC Access Control
- AT Awareness & Training
- AU Audit & Accountability
- CA Security Assessment & Authorization
- CM Configuration Management
- CP Contingency Planning
- IA Identification & Authentication
- IR Incident Response
- MA Maintenance
- MP Media Protection
- PS Personnel Security
- PE Physical & Environmental Protection
- PL Planning
- PM Program Management
- RA Risk Assessment
- SC System & Communications Protection
- SI Systems & Information Integrity
- SA Systems & Services Acquisition
- **Authority and Purpose (AP)**
- **Accountability, Audit, and Risk Management (AR)**
- **Data Quality and Integrity (DI)**
- **Data Minimization and Retention (DM)**
- **Individual Participation and Redress (IP)**
- **Security (SE)**
- **Transparency (TR)**
- **Use Limitation (UL)**

- *Bold family members are PRIVACY additions to rev. 4 of NIST SP 800-53*

ACCESS CONTROL

- Usually considered a "technical" control
- Focus on user access and account management
  - Assign risk categories based on job description
  - Rescreen users when changing job descriptions/level of responsibility
- Liken it to "key control" of a physical plant
  - Not everybody needs a master key
  - Policies can prevent universal access
  - Technology REINFORCES policies

ACCESS CONTROL - EXAMPLES

- *AC-2j – The organization reviews accounts for compliance with account management requirements (set frequency)*
- *AC-2k – The organization establishes a process for reissuing shared/group account credentials (if deployed) when individuals are removed from the group (can be automatic within the system)*
- *AC-6(1) – The organization explicitly authorizes access to defined systems (no default access)*
- *AC-6(3) – The organization documents the rationale for access across a network in the security plan for the ~~information system~~ enterprise*

AUDIT & ACCOUNTABILITY

- Also usually considered a "technical" control
- "You only get what you measure"
- Understanding the regulatory environment in which your systems operate is critical
- Healthcare systems must operate within HIPAA, HITECH, FDA, CMS "meaningful use", and other parameters – not all of which are technical

AUDIT & ACCOUNTABILITY - EXAMPLES

- *AU-2(b) – The organization coordinates the security audit function with other organizational entities requiring audit-related information to enhance mutual support and to help guide the selection of auditable events.*
- *AU-6a(3) – The organization analyzes and correlates audit records across different repositories to gain organization-wide situational awareness. (Also AU-16 – Cross-Organizational Auditing)*
- *AU-6a(6) – The organization correlates information from audit records with information obtained from monitoring physical access to further enhance the ability to identify suspicious, inappropriate, unusual, or malevolent activity*
- *AU-13 – The organization monitors open source information and open source information sites for evidence of unauthorized disclosure of organizational information (more than a sophisticated RSS feed; includes social media sites)*

AWARENESS & TRAINING

- Clearly an "operational" control
- Beginning with the hiring process, monitor and respond to suspicious or disruptive behavior
  - Easier to keep out than to kick out
  - Don't just shuffle the bad apple into a new barrel
- Train employees on expected behavior
- Train supervisors to respond to employee behavior outside of accepted norms
  - Investigate uniformly
  - Discipline uniformly
- Train employees on reporting inappropriate behavior

AWARENESS & TRAINING - EXAMPLES

- *AT-2 – The organization provides basic security awareness training to information system users (including managers, senior executives, and contractors) … when required by information system changes.* ***(Guidance: The content also addresses awareness of the need for operational security AND recognizing and reporting indicators of insider threat)***
- *AT-3 – The organization provides role-based security training to personnel with assigned security roles and responsibilities.* ***(Guidance: including the employment and operation of physical security controls)***

IDENTIFICATION & AUTHENTICATION

- Also viewed as a "technical" control
- Do you verify people's resumes, references, training, certifications?
- Do you do criminal and permissible credit background checks?
- Do you re-screen upon promotion or lateral movement?
- Are persons with access to financial access bonded?
  - Permits higher level financial security checks

IDENTIFICATION & AUTHENTICATION - EXAMPLES

- *IA-4a – The organization manages information system identifiers by receiving authorizations to assign an individual, group, role, or device identifier from specified individuals* ***(Guidance: authorization requires multiple forms of personal identification to prevent fraud and an initial in-person request)***

INCIDENT RESPONSE

- Now more important than ever due to changes in CMS policy effective November 2016 participating providers to plan for natural and man-made disasters, train for disaster preparedness, and test emergency plans.
- March 24, 2017 memo clarified that participating providers are expected to meet the requirements of the final rule by November 15, 2017, or face citations for non-compliance.
- Participating providers are to "seek out and participate in a full-scale, community-based exercise with their local and/or state emergency agencies and health care coalitions and to have completed a tabletop exercise by [November, 2017]."
- Clearly, then, the IR criteria cannot be focused simply on information system security

INCIDENT RESPONSE - EXAMPLES

- *IR-4b – The organization coordinates incident handling activities with contingency planning activities (**Guidance: "Organizations consider incident response as part of the definition, design, and development of mission/business processes and information systems.")***
- *IR-8a – The organization develops an incident response plan that provides a high-level approach for how the incident response capability fits into the overall organization*
- *IR-8a7 – The organization defines the resources and management support needed to effectively maintain and mature an incident response capability*

NEW PRIVACY FAMILY CONTROLS – APPENDIX J TO NIST SP 800-53 REV4

Organizations analyze and apply each privacy control with respect to their distinct mission/business and operational needs based on their legal authorities and obligations. Implementation of the privacy controls may vary based upon this analysis (e.g., organizations that are defined as covered entities pursuant to the Health Insurance Portability and Accountability Act [HIPAA] may have additional requirements that are not specifically enumerated in this publication). This enables organizations to determine the information practices that are compliant with law and policy and those that may need review. It also enables organizations to tailor the privacy controls to meet their defined and specific needs at the organization level, mission/business process level, and information system level.

At the discretion of the implementing organization, privacy controls may be documented in a distinct privacy plan or incorporated into other risk management documents (e.g., system security plans). Organizational assessments of privacy controls can be conducted either by the [privacy official] alone or jointly with the other organizational risk management offices including the information security office.

NEW PRIVACY FAMILY CONTROLS – APPENDIX J TO NIST SP 800-53 REV4

Specific overlays for privacy can also be considered to facilitate the tailoring of the security control baselines with the requisite privacy controls to ensure that both security and privacy requirements can be satisfied by organizations. Many of the security controls provide the fundamental information protection for confidentiality, integrity, and availability within organizational information systems and the environments in which those systems operate—protection that is essential for strong and effective privacy.

NEW PRIVACY FAMILY CONTROLS – APPENDIX J TO NIST SP 800-53 REV4

Accountability, Audit, and Risk Management

- AR-2 – The organization (a) documents and implements a privacy risk management process that assesses privacy risk to individuals resulting from the collection, sharing, storing, transmitting, use, and disposal of personally identifiable information (PII); and (b) conducts Privacy Impact Assessments (PIAs) for information systems, programs, or other activities that pose a privacy risk in accordance with applicable law, OMB policy, or any existing organizational policies and procedures.
  - Organizational privacy risk management processes operate across the life cycles of all mission/business processes that collect, use, maintain, share, or dispose of PII.
  - PIAs are also conducted to ensure that programs or information systems comply with legal, regulatory, and policy requirements. PIAs are performed before developing or procuring information systems, or initiating programs or projects, that collect, use, maintain, or share PII and are updated when changes create new privacy risks.

NEW PRIVACY FAMILY CONTROLS – APPENDIX J TO NIST SP 800-53 REV4

Accountability, Audit, and Risk Management

- AR-4 - The organization monitors and audits privacy controls and internal privacy policy [on an organization-defined frequency] to ensure effective implementation.
  - Regular internal risk assessments should address gaps in technical controls.
  - Reports should describe compliance gaps identified ni programs, projects, and information systems.
  - Organizations should assess whether they imbed privacy considerations into the life cycle of information systems, mission/business processes, and technology

NEW PRIVACY FAMILY CONTROLS – APPENDIX J TO NIST SP 800-53 REV4

Accountability, Audit, and Risk Management

- AR-7 - The organization designs information systems to support privacy by automating privacy controls.
  - To the extent feasible, when designing organizational information systems, organizations employ technologies and system capabilities that automate privacy controls on the collection, use, retention, and disclosure of personally identifiable information (PII). By building privacy controls into system design and development, organizations mitigate privacy risks to PII, thereby reducing the likelihood of information system breaches and other privacy-related incidents.

NEW PRIVACY FAMILY CONTROLS – APPENDIX J TO NIST SP 800-53 REV4

Data Quality and Integrity

- DI-1a. – The organization confirms to the greatest extent practicable upon collection or creation of PII the accuracy, relevance, timeliness, and completeness of that information
- DI-1c. – The organization checks for, and corrects as necessary, any inaccurate or outdated PII used by its programs or systems
  - ***Guidance – each time data is collected the individual is asked to revalidate the information***

NEW PRIVACY FAMILY CONTROLS – APPENDIX J TO NIST SP 800-53 REV4

Data Minimization and Retention

- DM-1a. and b. – The organization identifies the minimum PII elements that are relevant and necessary to accomplish the legally authorized purpose of collection and limits the collection and retention of PII to the minimum elements identified for the purposes described in the notice and for which the individual has provided consent

NEW PRIVACY FAMILY CONTROLS – APPENDIX J TO NIST SP 800-53 REV4

Individual Participation and Redress

- IP-1 – The organization:
- a. Provides means, where feasible and appropriate, for individuals to authorize the collection, use, maintaining, and sharing of personally identifiable information (PII) prior to its collection;
- b. Provides appropriate means for individuals to understand the consequences of decisions to approve or decline the authorization of the collection, use, dissemination, and retention of PII;
- c. Obtains consent, where feasible and appropriate, from individuals prior to any new uses or disclosure of previously collected PII; and
- d. Ensures that individuals are aware of and, where feasible, consent to all uses of PII not initially described in the public notice that was in effect at the time the organization collected the PII.

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