IT Security Controls

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What are Security Controls?

- A safeguard or countermeasure for an information system or an organization designed to protect **confidentiality, integrity, and availability** of its information and to meet a set of defined security requirements

	CONTROL FUNCTIONS			
		Preventative	**Detective**	**Corrective**
CONTROL TYPES	**Physical**	Fences, gates, locks	surveillance camera	Repair physical computing equipment
	Technical	Firewall, IPS, MFA solution, antivirus software	Intrusion detection systems, honeypots	Patch a system, terminate a process, reboot a system, quarantine a virus
	Administrative	Hiring and termination policies, separation of duties, data classification	Review access rights, audit logs, and unauthorized changes	Implement a business continuity plan or incident response plan

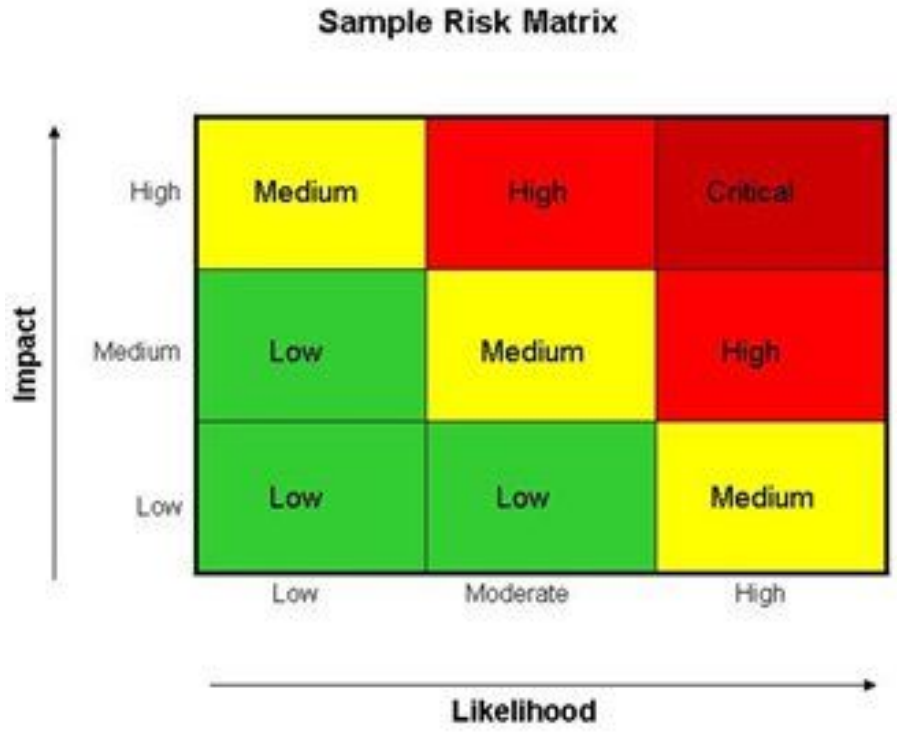
Why do we need IT Security Controls?

- Reduce risk and overall threat profile
  - Maintaining CIA
- Prevent security incidents and protect data (customer/corporate)
  - “Global Average Cost of a data breach is $3.86 million”
  - “Average cost for each stolen record is $148 per record” or “$429 per patient record)
- Laws and regulations (HIPAA, PCI, GDPR)
  - HIPAA (Healthcare)
  - FERPA (Education)
  - FISMA (Government)
  - State Laws – NY DFS (Financial)
  - International Laws – GDPR (EU)
  - Industry Standards – PCI DSS (Payment Processors)

https://securitytoday.com/articles/2018/07/17/the-average-cost-of-a-data-breach.aspx

What is risk?

- The potential of losing something of value
- Risk = Likelihood X Impact
  - Impact: How could the event it affect our business?
  - Likelihood: What is the probability of the event?

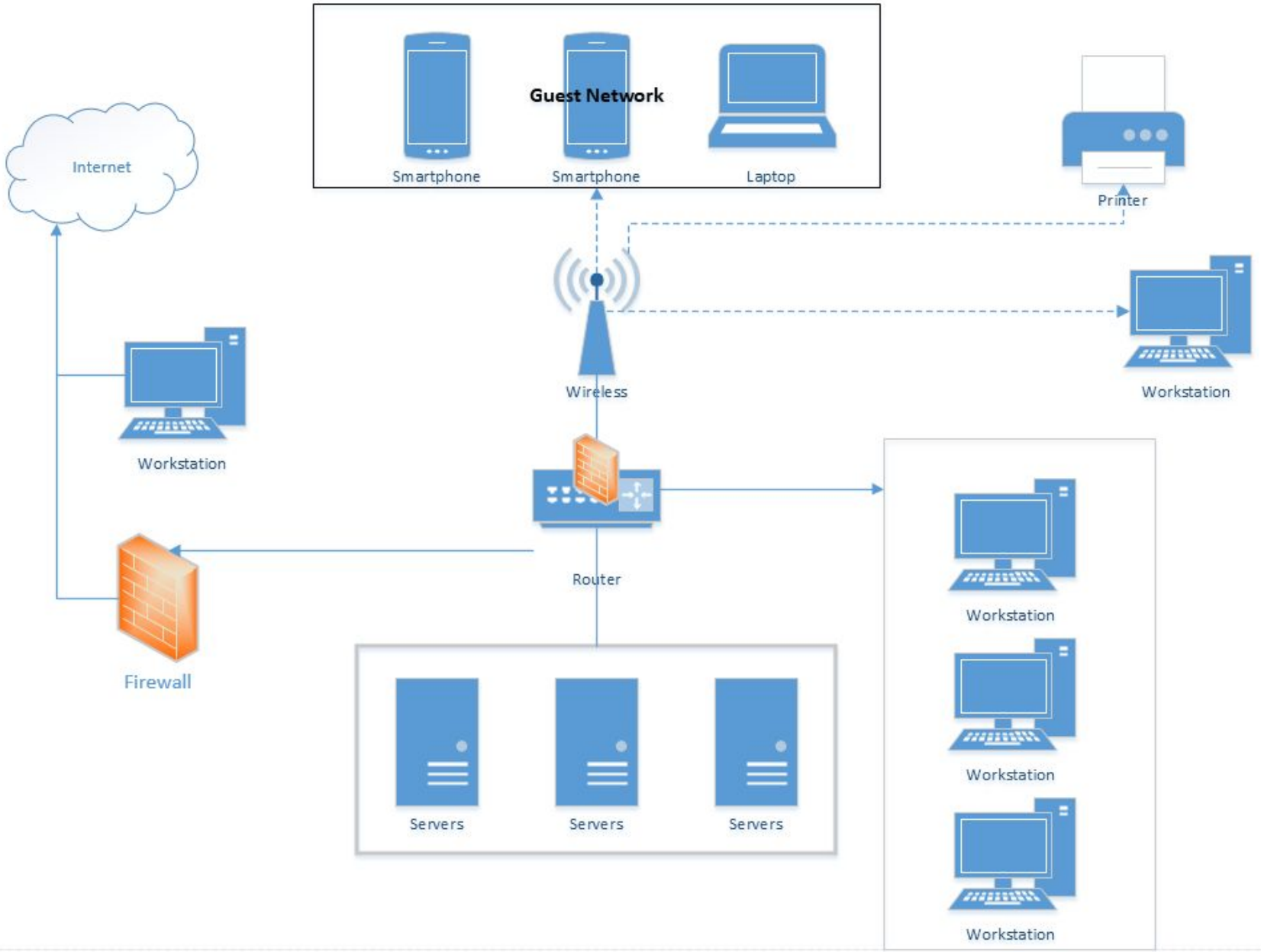


Risk and Controls

Controls are implemented to help manage and mitigate risk

Types of IT Risk

- Lack of IT oversight by management
- Lack of IT policies for security and operations
- Lack of IT infrastructure inventory for software and hardware
- Lack of incident response plan
- Lack of monitoring of third party service provider


Guest Network
Smartphone
Smartphone
Laptop
Internet
Printer
Wireless
Workstation
Workstation
Router
Firewall
Workstation
Workstation
Workstation
Servers
Servers
Servers

So how do we ensure we have the correct IT controls?

By using frameworks

What is a security framework?

- A framework consisting of policies, procedures, and processes that define how information is managed in a business, to lower risk and vulnerability
- A framework is not:
  - A regulation
  - A legislation
- However, a framework is a best practice

List of Security Frameworks

- **COBIT**
  - Created by ISACA
  - Risk Management Framework
- **ISO 27000 Series**
  - Created by International Organization for Standardization (ISO)
  - Information Security Standards
- **NIST SP 800 Series (**https://csrc.nist.gov/publications/sp800**)**
  - Created by National Institute of Standards and Technology
  - Technology/Computer Security Frameworks and Guidelines
  - 100+ SP Series Publications
  - Highlights
    - 800-53 (Security and Privacy Controls for Information Systems and Organizations) 494 Pages
    - 800-37 (Risk Management Framework)
    - 800-12 (An Introduction to Information Security)
    - 800-121 (Guide to Bluetooth Security)
    - 800-184 (Guide for Cybersecurity Event Recovery)
    - 800-115 (Technical Guide to Information Security Testing and Assesment)

List of Security Frameworks

- **PTES (Penetration Testing Execution Standard)**
  - Created by a group of information security practitioners
  - http://www.pentest-standard.org/index.php/Main_Page
- **NIST Cybersecurity Framework (NIST CSF)**
  - Created by National Institute of Standards and Technology
  - A shorten 800-53 for private sector businesses
- **HiTrust CSF (Health Information Trust Alliance Common Security Framework)**
  - Cybersecurity Framework for healthcare industry (HIPAA)
- **CIS Top 20**
  - Created by Center for Internet Security
  - Top 20 Security Controls

CIS Top 20

- Center for Internet Security Top 20 Controls
- CIS Top 20 Critical Security Controls is a prioritized set of best practices created to stop the most pervasive and dangerous threats.
- 3 Tier Implementation Level

- CIS Category
  - Basic CIS Controls
  - Foundational CIS Controls
  - Organizational CIS Controls

Basic CIS Controls (Technology)

Basic CIS Controls

1. Inventory and Control of Hardware Assets
2. Inventory and Control of Software Assets
3. Continuous Vulnerability Management
4. Controlled Use of Administrative Privileges
5. Secure Configuration for Hardware and Software on Mobile Devices, Laptops, Workstations and Servers
6. Maintenance, Monitoring and Analysis of Audit Logs

Foundational CIS Controls (Technology)

Foundational CIS Controls

7. Email and Web Browser Protections
8. Malware Defenses
9. Limitation and Control of Network Ports, Protocols and Services
10. Data Recovery Capabilities
11. Secure Configuration for Network Devices, such as Firewalls, Routers and Switches
12. Boundary Defense
13. Data Protection
14. Controlled Access Based on the Need to Know
15. Wireless Access Control
16. Account Monitoring and Control

Organizational CIS Controls (People & Process)

Organizational CIS Controls

17. Implement a Security Awareness and Training Program
18. Application Software Security
19. Incident Response and Management
20. Penetration Tests and Red Team Exercises

Analyzing CIS Controls

Inventory and Control of Hardware Assets

CIS Controls™ • CIS Control 1 *This is a basic Control*

Actively manage (inventory, track, and correct) all hardware devices on the network so that only authorized devices are given access, and unauthorized and unmanaged devices are found and prevented from gaining access.

Main Points:

- Utilize an active discovery tool to identify devices connected to the organization's network and update the hardware asset inventory.

- Maintain an accurate and up-to-date inventory of all technology assets with the potential to store or process information. This inventory shall include all hardware assets, whether connected to the organization's network or not.

CIS Control 1 Implementation Guide

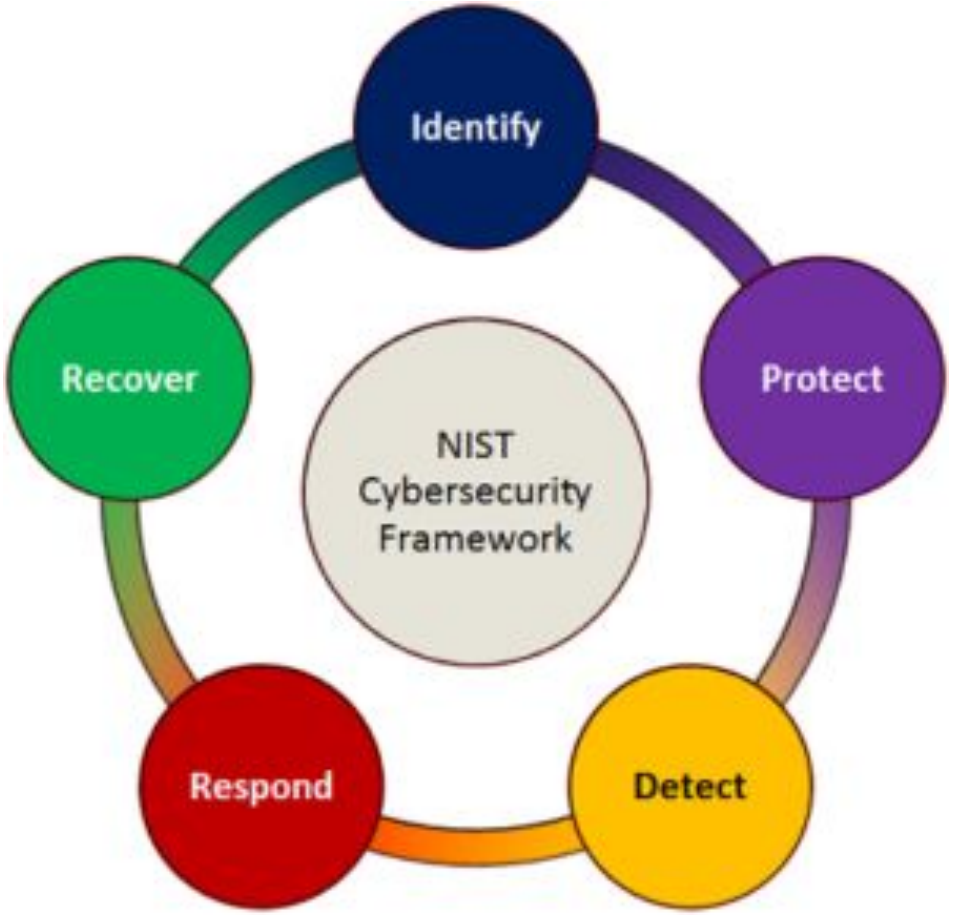
CIS Control 1: Inventory and Control of Hardware Assets

Sub-Control	Asset Type	Security Function	Control Title	Control Descriptions	Implementation Groups 1	2	3
1.1	Devices	Identify	Utilize an Active Discovery Tool	Utilize an active discovery tool to identify devices connected to the organization's network and update the hardware asset inventory.		●	●
1.2	Devices	Identify	Use a Passive Asset Discovery Tool	Utilize a passive discovery tool to identify devices connected to the organization's network and automatically update the organization's hardware asset inventory.			●
1.3	Devices	Identify	Use DHCP Logging to Update Asset Inventory	Use Dynamic Host Configuration Protocol (DHCP) logging on all DHCP servers or IP address management tools to update the organization's hardware asset inventory.		●	●
1.4	Devices	Identify	Maintain Detailed Asset Inventory	Maintain an accurate and up-to-date inventory of all technology assets with the potential to store or process information. This inventory shall include all assets, whether connected to the organization's network or not.	●	●	●
1.5	Devices	Identify	Maintain Asset Inventory Information	Ensure that the hardware asset inventory records the network address, hardware address, machine name, data asset owner, and department for each asset and whether the hardware asset has been approved to connect to the network.		●	●
1.6	Devices	Respond	Address Unauthorized Assets	Ensure that unauthorized assets are either removed from the network, quarantined or the inventory is updated in a timely manner.	●	●	●
1.7	Devices	Protect	Deploy Port Level Access Control	Utilize port level access control, following 802.1x standards, to control which devices can authenticate to the network. The authentication system shall be tied into the hardware asset inventory data to ensure only authorized devices can connect to the network.		●	●
1.8	Devices	Protect	Utilize Client Certificates to Authenticate Hardware Assets	Use client certificates to authenticate hardware assets connecting to the organization's trusted network.			●

What is NIST CSF?

- NIST Cybersecurity Framework
- Created by the National Institute of Standards and Technology (NIST)
- The NIST cybersecurity framework separate into five cores
  - Identify
  - Detect
  - Protect
  - Response
  - Recover
- These five cores represents industry standards, guidelines, and practices for cybersecurity activities across an organization.

NIST Cybersecurity Framework



Identify

- Develop an organizational understanding to manage cybersecurity risk to systems, people, assets, data, and capabilities.

ID	Identify	ID.AM	Asset Management
		ID.BE	Business Environment
		ID.GV	Governance
		ID.RA	Risk Assessment
		ID.RM	Risk Management Strategy
		ID.SC	Supply Chain Risk Management

Protect

- Develop and implement appropriate safeguards to ensure delivery of critical services.

PR	Protect	PR.AC	Identity Management and Access Control
		PR.AT	Awareness and Training
		PR.DS	Data Security
		PR.IP	Information Protection Processes and Procedures
		PR.MA	Maintenance
		PR.PT	Protective Technology

Detect

- Develop and implement appropriate activities to identify the occurrence of a cybersecurity event.

DE	Detect	DE.AE	Anomalies and Events
		DE.CM	Security Continuous Monitoring
		DE.DP	Detection Processes

Respond

- Develop and implement appropriate activities to take action regarding a detected cybersecurity incident.

RS	Respond	RS.RP	Response Planning
		RS.CO	Communications
		RS.AN	Analysis
		RS.MI	Mitigation
		RS.IM	Improvements

Recover

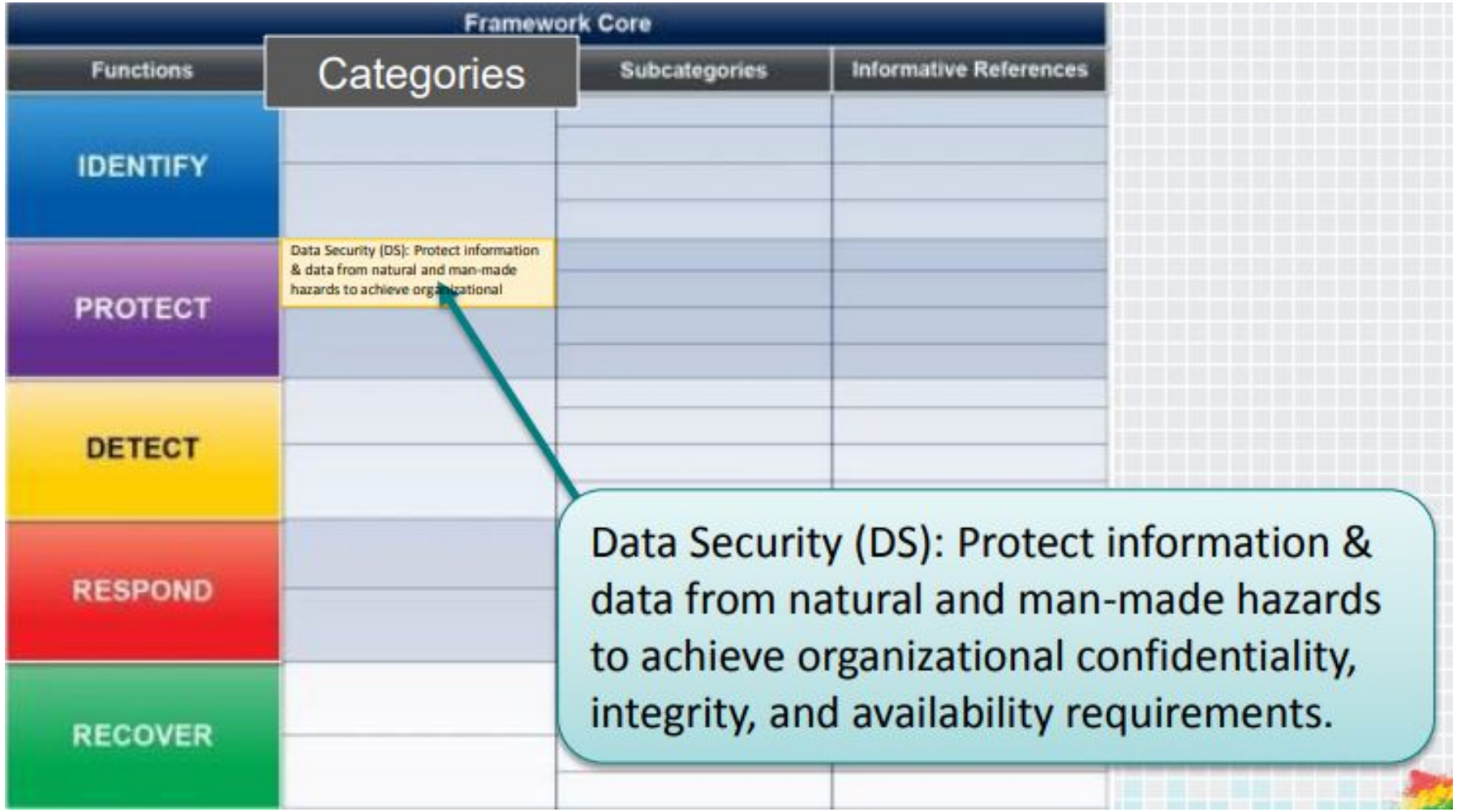
- Develop and implement appropriate activities to maintain plans for resilience and to restore any capabilities or services that were impaired due to a cybersecurity incident.

RC	Recover	RC.RP	Recovery Planning
		RC.IM	Improvements
		RC.CO	Communications

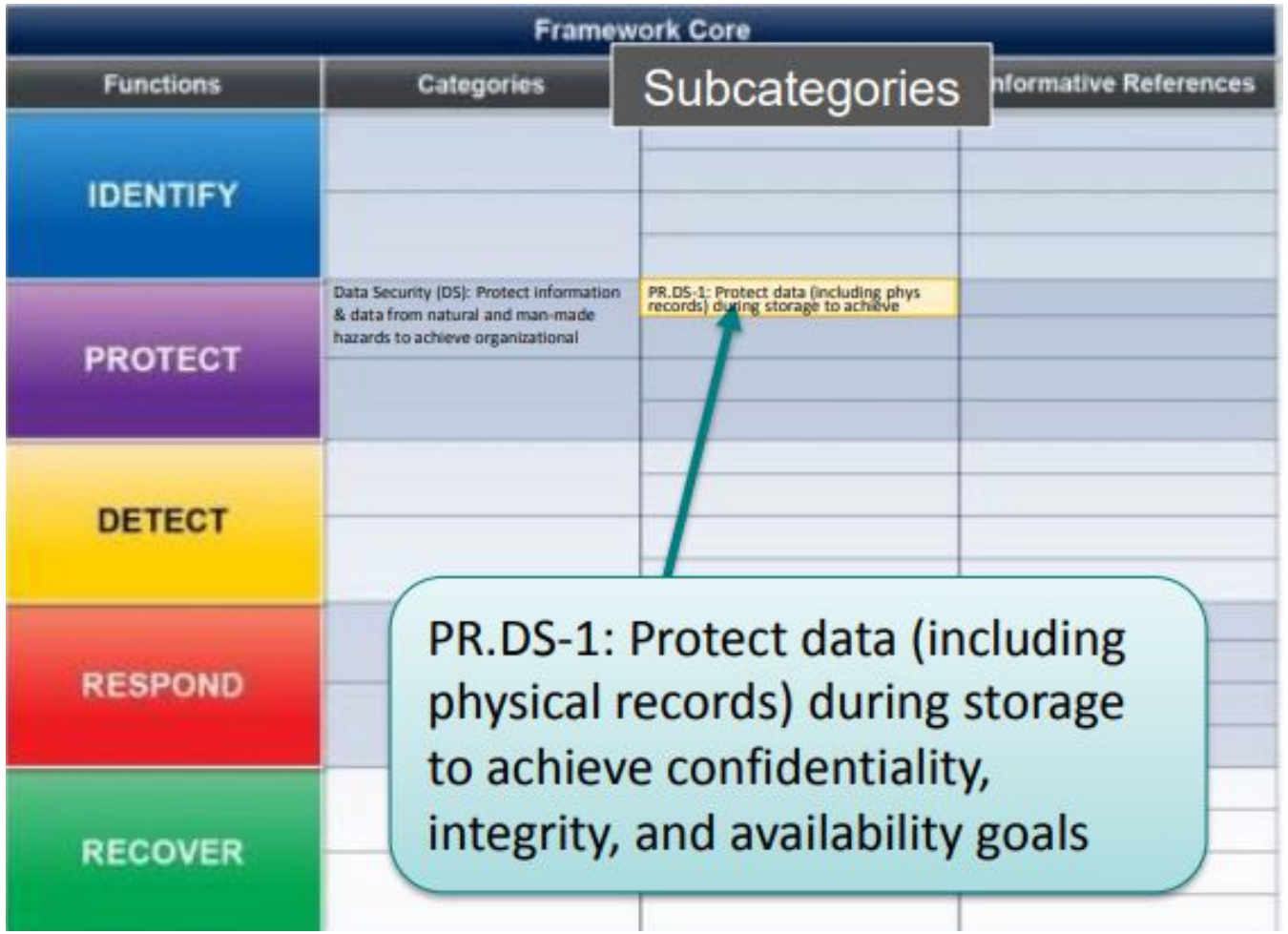
Control Breakdown

Functions	# of Subcategory (Controls)
Identify	29
Protect	39
Detect	18
Respond	16
Recover	6
Total	108

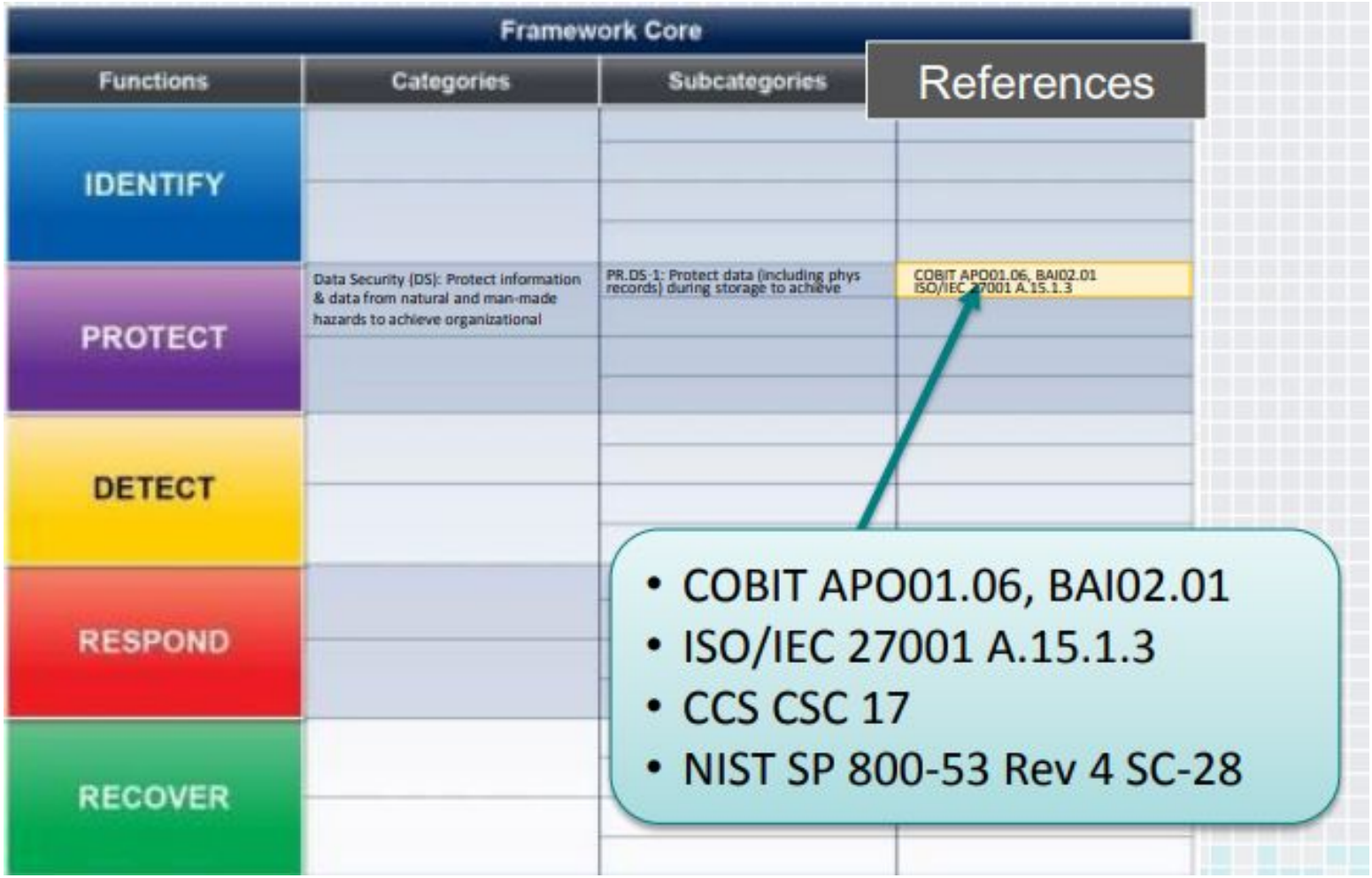
NIST CSF Structure (Categories)



NIST CSF Structure (Subcategories)



NIST CSF Structure



NIST CSF Structure/ Risk Management

Function	Category	Subcategory	Satisified?	Risk (1-5)	Informative References
IDENTIFY (ID)	**Asset Management (ID.AM):** The data, personnel, devices, systems, and facilities that enable the organization to achieve business purposes are identified and managed consistent with their relative importance to organizational objectives and the organization's risk strategy.	**ID.AM-1:** Physical devices and systems within the organization are inventoried	Yes	3	· **CIS CSC** 1 · **COBIT 5** BAI09.01, BAI09.02 · **ISA 62443-2-1:2009** 4.2.3.4 · **ISA 62443-3-3:2013** SR 7.8 · **ISO/IEC 27001:2013** A.8.1.1, A.8.1.2 · **NIST SP 800-53 Rev. 4** CM-8, PM-5
		ID.AM-2: Software platforms and applications within the organization are inventoried	No	4	· **CIS CSC** 2 · **COBIT 5** BAI09.01, BAI09.02, BAI09.05 · **ISA 62443-2-1:2009** 4.2.3.4 · **ISA 62443-3-3:2013** SR 7.8 · **ISO/IEC 27001:2013** A.8.1.1, A.8.1.2, A.12.5.1 · **NIST SP 800-53 Rev. 4** CM-8, PM-5
		ID.AM-3: Organizational communication and data flows are mapped	Yes	5	· **CIS CSC** 12 · **COBIT 5** DSS05.02 · **ISA 62443-2-1:2009** 4.2.3.4 · **ISO/IEC 27001:2013** A.13.2.1, A.13.2.2 · **NIST SP 800-53 Rev. 4** AC-4, CA-3, CA-9, PL-8
		ID.AM-4: External information systems are catalogued	Yes	1	· **CIS CSC** 12 · **COBIT 5** APO02.02, APO10.04, DSS01.02 · **ISO/IEC 27001:2013** A.11.2.6 · **NIST SP 800-53 Rev. 4** AC-20, SA-9
		ID.AM-5: Resources (e.g., hardware, devices, data, time, personnel, and software) are prioritized based on their classification, criticality, and business value	No	2	· **CIS CSC** 13, 14 · **COBIT 5** APO03.03, APO03.04, APO12.01, BAI04.02, BAI09.02 · **ISA 62443-2-1:2009** 4.2.3.6 · **ISO/IEC 27001:2013** A.8.2.1 · **NIST SP 800-53 Rev. 4** CP-2, RA-2, SA-14, SC-6
		ID.AM-6: Cybersecurity roles and responsibilities for the entire workforce and third-party stakeholders (e.g., suppliers, customers, partners) are established	Yes	1	· **CIS CSC** 17, 19 · **COBIT 5** APO01.02, APO07.06, APO13.01, DSS06.03 · **ISA 62443-2-1:2009** 4.3.2.3.3 · **ISO/IEC 27001:2013** A.6.1.1 · **NIST SP 800-53 Rev. 4** CP-2, PS-7, PM-11

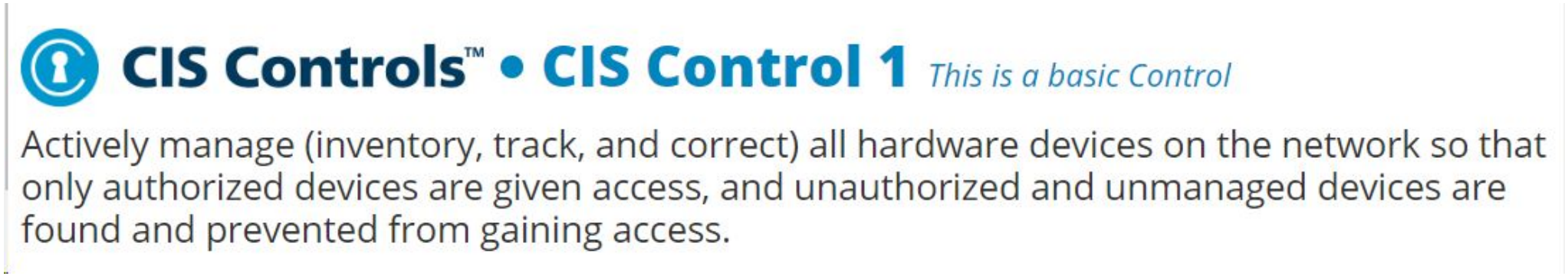
NIST CSF (First Two Controls)

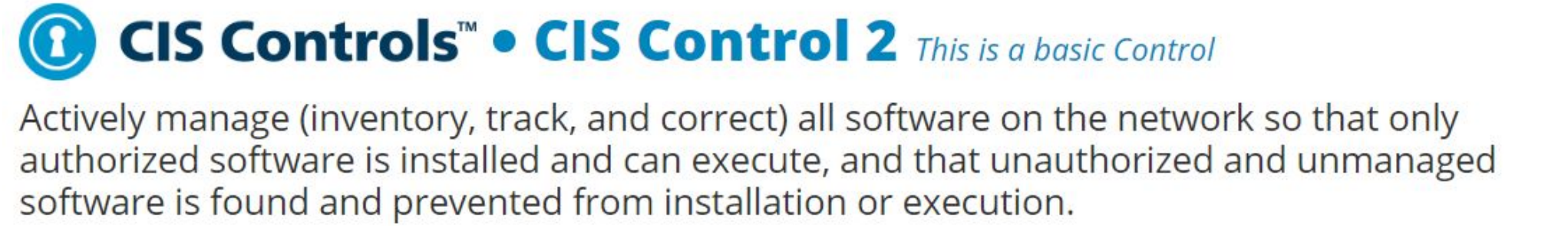
Function	Category	Subcategory
IDENTIFY (ID)	**Asset Management (ID.AM):** The data, personnel, devices, systems, and facilities that enable the organization to achieve business purposes are identified and managed consistent with their relative importance to organizational objectives and the organization's risk strategy.	**ID.AM-1:** Physical devices and systems within the organization are inventoried
		ID.AM-2: Software platforms and applications within the organization are inventoried

NIST CSF Mapping

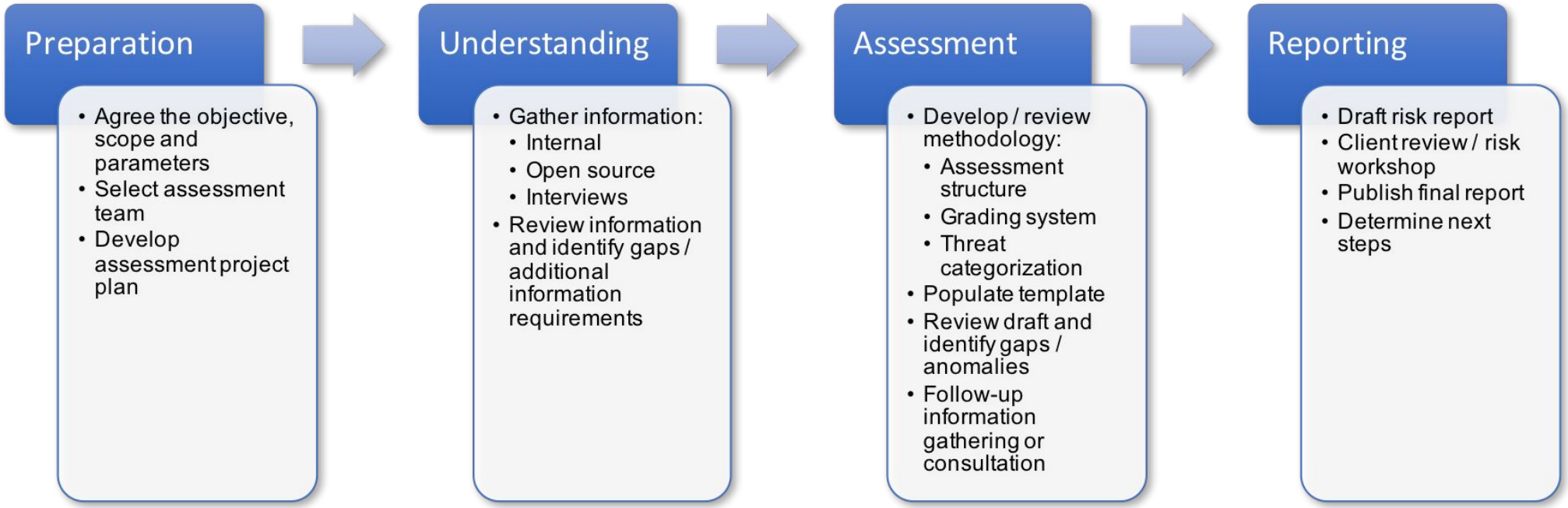
Function	Category	Subcategory	Informative References
IDENTIFY (ID)	**Asset Management (ID.AM):** The data, personnel, devices, systems, and facilities that enable the organization to achieve business purposes are identified and managed consistent with their relative importance to organizational objectives and the organization's risk strategy.	**ID.AM-1:** Physical devices and systems within the organization are inventoried	**CIS CSC** 1 **COBIT 5** BAI09.01, BAI09.02 **ISA 62443-2-1:2009** 4.2.3.4 **ISA 62443-3-3:2013** SR 7.8 **ISO/IEC 27001:2013** A.8.1.1, A.8.1.2 **NIST SP 800-53 Rev. 4** CM-8, PM-5
		ID.AM-2: Software platforms and applications within the organization are inventoried	**CIS CSC** 2 **COBIT 5** BAI09.01, BAI09.02, BAI09.05 **ISA 62443-2-1:2009** 4.2.3.4 **ISA 62443-3-3:2013** SR 7.8 **ISO/IEC 27001:2013** A.8.1.1, A.8.1.2, A.12.5.1 **NIST SP 800-53 Rev. 4** CM-8, PM-5

CIS Control Mapping





Risk Assessment Process



The End

- Questions?