Set Theory Relationship Mapping (STRM)

Reference Document : **Secure Controls Framework (SCF) version 2024.3**
Focal Document: **Department of Homeland Security (DHS) Zero Trust Capability Framework (ZTCF)**
Focal Document URL: **TBD - No yet published**
STRM URL: **https://content.securecontrolsframework.com/strm/scf-2024-3-dhs-ztcf.pdf**

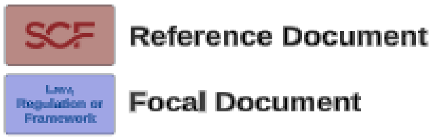
Set Theory Relationship Mapping (STRM) is well-suited for mapping between sets of elements that exist in two distinct concepts that are mostly the same as each other (e.g., cybersecurity & data privacy requirements). STRM also allows the strength of the mapping to be captured.

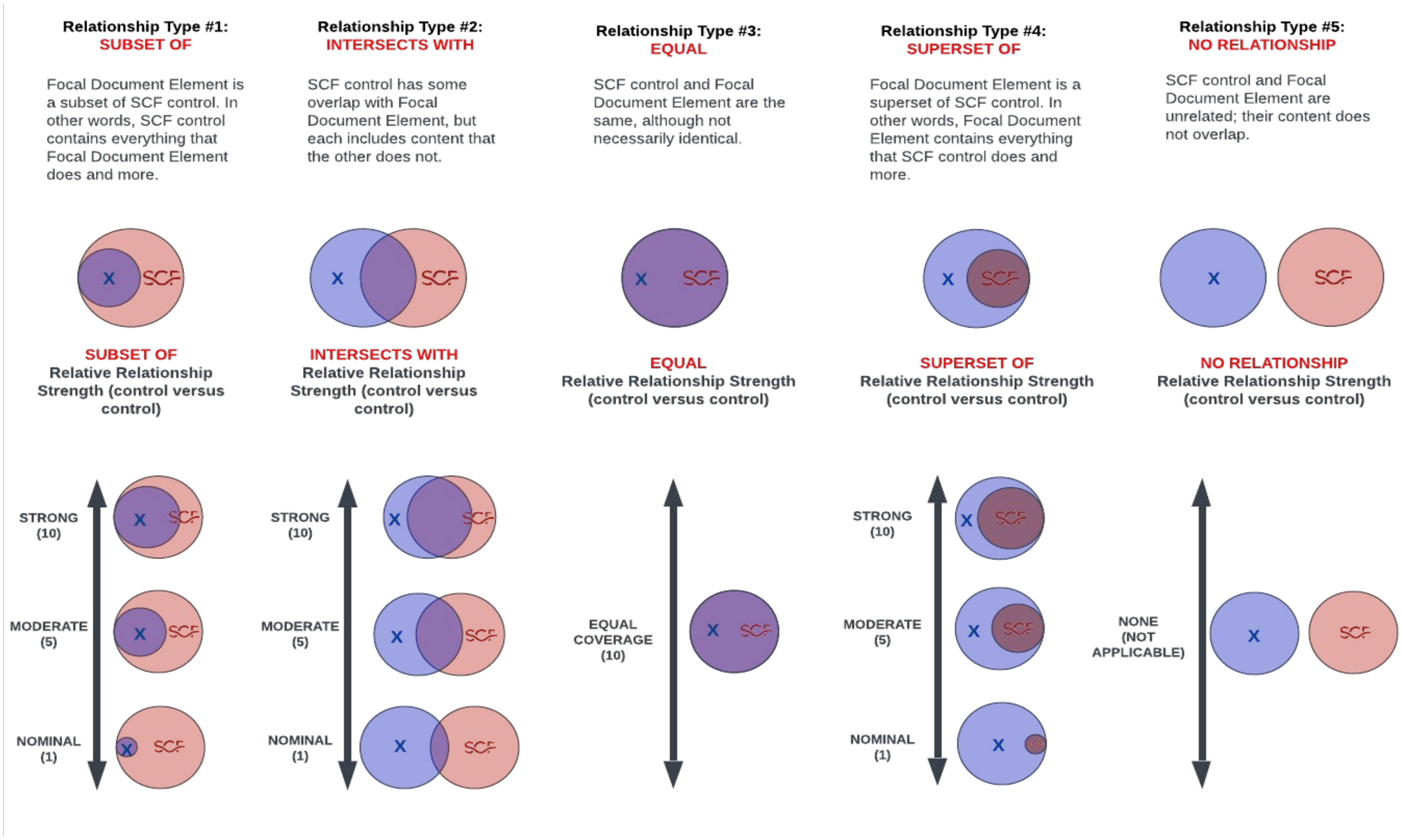
STRM relies on a justification for the relationship claim. There are three (3) options for the rationale, which is a high-level context within which the two concepts are related:

1. **Syntactic**: How similar is the wording that expresses the two concepts? This is a word-for-word analysis of the relationship, not an interpretation of the language.
2. **Semantic**: How similar are the meanings of the two concepts? This involves some interpretation of each concept's language.
3. **Functional**: How similar are the results of executing the two concepts? This involves understanding what will happen if the two concepts are implemented, performed, or otherwise executed.

Based on NIST IR 8477, STRM supports five (5) five relationship types to describe the logical similarity between two distinct concepts:

1. **Subset Of**
2. **Intersects With**
3. **Equal**
4. **Superset Of**
5. **No Relationship**





Relationship Type #1: SUBSET OF

Focal Document Element is a subset of SCF control. In other words, SCF control contains everything that Focal Document Element does and more.

Relationship Type #2: INTERSECTS WITH

SCF control has some overlap with Focal Document Element, but each includes content that the other does not.

Relationship Type #3: EQUAL

SCF control and Focal Document Element are the same, although not necessarily identical.

Relationship Type #4: SUPERSET OF

Focal Document Element is a superset of SCF control. In other words, Focal Document Element contains everything that SCF control does and more.

Relationship Type #5: NO RELATIONSHIP

SCF control and Focal Document Element are unrelated; their content does not overlap.

X
SCF
SUBSET OF
Relative Relationship Strength (control versus control)
INTERSECTS WITH
Relative Relationship Strength (control versus control)
EQUAL
Relative Relationship Strength (control versus control)
SUPERSET OF
Relative Relationship Strength (control versus control)
NO RELATIONSHIP
Relative Relationship Strength (control versus control)
STRONG (10)
MODERATE (5)
NOMINAL (1)
EQUAL COVERAGE (10)
NONE (NOT APPLICABLE)

FDE #	FDE Name	Focal Document Element (FDE) Description	STRM Rationale	STRM Relationship	SCF Control	SCF #	Secure Controls Framework (SCF) Control Description	Strength of Relationship (optional)	Notes (optional)
ACC-01	Access Management	The ability of an organization to securely track and manage access to resources, granted to subject entities of any type, including internal, external, human, and non-person entities (NPEs), across any network, using any device, to ensure least privilege access.	Functional	Subset Of	Identity & Access Management (IAM)	IAC-01	Mechanisms exist to facilitate the implementation of identification and access management controls.	10	
			Functional	Intersects With	Authenticate, Authorize and Audit (AAA)	IAC-01.2	Mechanisms exist to strictly govern the use of Authenticate, Authorize and Audit (AAA) solutions, both on-premises and those hosted by an External Service Provider (ESP).	8	
			Functional	Intersects With	Identification & Authentication for Organizational Users	IAC-02	Mechanisms exist to uniquely identify and centrally Authenticate, Authorize and Audit (AAA) organizational users and processes acting on behalf of organizational users.	8	
			Functional	Intersects With	Identification & Authentication for Non-Organizational Users	IAC-03	Mechanisms exist to uniquely identify and centrally Authenticate, Authorize and Audit (AAA) third-party users and processes that provide services to the organization.	8	
			Functional	Intersects With	Identification & Authentication for Devices	IAC-04	Mechanisms exist to uniquely identify and centrally Authenticate, Authorize and Audit (AAA) devices before establishing a connection using bidirectional authentication that is cryptographically- based and replay resistant.	8	
			Functional	Intersects With	Identification & Authentication for Third Party Systems & Services	IAC-05	Mechanisms exist to identify and authenticate third-party systems and services.	8	
			Functional	Intersects With	Role-Based Access Control (RBAC)	IAC-08	Mechanisms exist to enforce a Role-Based Access Control (RBAC) policy over users and resources that applies need-to-know and fine-grained access control for sensitive/regulated data access.	8	
			Functional	Intersects With	Automated System Account Management (Directory Services)	IAC-15.1	Automated mechanisms exist to support the management of system accounts (e.g., directory services).	8	
			Functional	Intersects With	Privileged Account Management (PAM)	IAC-16	Mechanisms exist to restrict and control privileged access rights for users and services.	8	
			Functional	Intersects With	Least Privilege	IAC-21	Mechanisms exist to utilize the concept of least privilege, allowing only authorized access to processes necessary to accomplish assigned tasks in accordance with organizational business functions.	8	
ACC-02	Phishing-Resistant Multifactor Authentication (MFA)	The ability of an organization to authenticate a user with more than one factor that is resistant to phishing attacks.	Functional	Equal	Multi-Factor Authentication (MFA)	IAC-06	Mechanisms exist to enforce Multi-Factor Authentication (MFA) for: ▪ Remote network access; ▪ Third-party systems, applications and/or services; and/ or	10	
ACC-03	Policy Decision Point	The ability of an organization to insert a security policy into the access layer between any two workloads within the same extended data center.	Functional	Intersects With	Attribute-Based Access Control (ABAC)	IAC-29	Mechanisms exist to enforce Attribute-Based Access Control (ABAC) for policy-driven, dynamic authorizations that supports the secure sharing of information.	5	
			Functional	Equal	Policy Decision Point (PDP)	NET-04.7	Automated mechanisms exist to evaluate access requests against established criteria to dynamically and uniformly enforce access rights and permissions.	10	
ACC-04	Remote Access	The ability of an organization to allow users to access its non-public computing resources from non-organization-controlled locations based on an audit of the device against a baseline set of requirements.	Functional	Intersects With	Remote Maintenance	MNT-05	Mechanisms exist to authorize, monitor and control remote, non-local maintenance and diagnostic activities.	3	
			Functional	Subset Of	Remote Access	NET-14	Mechanisms exist to define, control and review organization-approved, secure remote access methods.	10	
			Functional	Intersects With	Managed Access Control Points	NET-14.3	Mechanisms exist to route all remote accesses through managed network access control points (e.g., VPN concentrator).	3	
			Functional	Intersects With	Work From Anywhere (WFA) - Telecommuting Security	NET-14.5	Mechanisms exist to define secure telecommuting practices and govern remote access to systems and data for remote workers.	5	
			Functional	Intersects With	Third-Party Remote Access Governance	NET-14.6	Mechanisms exist to proactively control and monitor third-party accounts used to access, support, or maintain system components via remote access.	3	
			Functional	Intersects With	Endpoint Security Validation	NET-14.7	Automated mechanisms exist to validate the security posture of the endpont devices (e.g., software versions, patch levels, etc.) prior to allowing devices to connect to organizational technology assets.	8	
APP-01	Application Inventory	The ability of an organization to ensure all applications are inventoried and authorized by the appropriate authorizing official.	Functional	Subset Of	Asset Governance	AST-01	Mechanisms exist to facilitate an IT Asset Management (ITAM) program to implement and manage asset management controls.	10	
			Functional	Intersects With	Asset-Service Dependencies	AST-01.1	Mechanisms exist to identify and assess the security of technology assets that support more than one critical business function.	8	
			Functional	Subset Of	Asset Inventories	AST-02	Mechanisms exist to perform inventories of technology assets that: ▪ Accurately reflects the current systems, applications and services in use; ▪ Identifies authorized software products, including business justification details;	10	
			Functional	Intersects With	System Hardening Through Baseline Configurations	CFG-02	Mechanisms exist to develop, document and maintain secure baseline configurations for technology platforms that are consistent with industry-accepted system hardening standards.	3	
			Functional	Intersects With	Data Action Mapping	AST-02.8	Mechanisms exist to create and maintain a map of technology assets where sensitive/regulated data is stored, transmitted or processed.	3	
			Functional	Intersects With	Configuration Management Database (CMDB)	AST-02.9	Mechanisms exist to implement and manage a Configuration Management Database (CMDB), or similar technology, to monitor and govern technology asset-specific information.	5	
			Functional	Intersects With	Least Functionality	CFG-03	Mechanisms exist to configure systems to provide only essential capabilities by specifically prohibiting or restricting the use of ports, protocols, and/or services.	3	
			Functional	Intersects With	Prevent Unauthorized Software Execution	CFG-03.2	Mechanisms exist to configure systems to prevent the execution of unauthorized software programs.	3	
			Functional	Intersects With	Unauthorized or Authorized Software (Blacklisting or Whitelisting)	CFG-03.3	Mechanisms exist to whitelist or blacklist applications in an order to limit what is authorized to execute on systems.	3	
			Functional	Intersects With	Geographic Location of Data	DCH-19	Mechanisms exist to inventory, document and maintain data flows for data that is resident (permanently or temporarily) within a service's geographically distributed applications (physical and virtual), infrastructure, systems components and/or shared	3	
			Functional	Intersects With	Third-Party Inventories	TPM-01.1	Mechanisms exist to maintain a current, accurate and complete list of External Service Providers (ESPs) that can potentially impact the Confidentiality, Integrity, Availability and/or Safety (CIAS) of the organization's systems, applications, services and data.	8	
APP-02	Continuous Monitoring and Ongoing Authorization	The ability of an organization to continuously monitor applications and assess their authorization to operate.	Functional	Intersects With	Integrity Assurance & Enforcement (IAE)	CFG-06.1	Automated mechanisms exist to identify unauthorized deviations from an approved baseline and implement automated resiliency actions to remediate the unauthorized change.	8	
			Functional	Subset Of	Continuous Monitoring	MON-01	Mechanisms exist to facilitate the implementation of enterprise-wide monitoring controls.	10	
			Functional	Intersects With	Intrusion Detection & Prevention Systems (IDS & IPS)	MON-01.1	Mechanisms exist to implement Intrusion Detection / Prevention Systems (IDS / IPS) technologies on critical systems, key network segments and network choke points.	5	
			Functional	Intersects With	Automated Tools for Real-Time Analysis	MON-01.2	Mechanisms exist to utilize a Security Incident Event Manager (SIEM), or similar automated tool, to support near real-time analysis and incident escalation.	5	
			Functional	Intersects With	Inbound & Outbound Communications Traffic	MON-01.3	Mechanisms exist to continuously monitor inbound and outbound communications traffic for unusual or unauthorized activities or conditions.	5	
			Functional	Intersects With	System Generated Alerts	MON-01.4	Mechanisms exist to generate, monitor, correlate and respond to alerts from physical, cybersecurity, data privacy and supply chain activities to achieve integrated situational awareness.	8	
			Functional	Intersects With	File Integrity Monitoring (FIM)	MON-01.7	Mechanisms exist to utilize a File Integrity Monitor (FIM), or similar change-detection technology, on critical assets to generate alerts for unauthorized modifications.	5	
			Functional	Intersects With	Reviews & Updates	MON-01.8	Mechanisms exist to review event logs on an ongoing basis and escalate incidents in accordance with established timelines and procedures.	8	
			Functional	Intersects With	Automated Alerts	MON-01.12	Mechanisms exist to automatically alert incident response personnel to inappropriate or anomalous activities that have potential security incident implications.	8	
			Functional	Intersects With	Analyze and Prioritize Monitoring Requirements	MON-01.16	Mechanisms exist to assess the organization's needs for monitoring and prioritize the monitoring of assets, based on asset criticality and the sensitivity of the data it stores, transmits and processes.	5	
			Functional	Intersects With	Centralized Collection of Security Event Logs	MON-02	Mechanisms exist to utilize a Security Incident Event Manager (SIEM), or similar automated tool, to support the centralized collection of security-related event logs.	8	
			Functional	Intersects With	Correlate Monitoring Information	MON-02.1	Automated mechanisms exist to correlate both technical and non-technical information from across the enterprise by a Security Incident Event Manager (SIEM) or similar automated tool, to enhance organization-wide situational awareness.	8	

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			Functional	Intersects With	Central Review & Analysis	MON-02.2	Automated mechanisms exist to centrally collect, review and analyze audit records from multiple sources.	8	
			Functional	Intersects With	Integration of Scanning & Other Monitoring Information	MON-02.3	Automated mechanisms exist to integrate the analysis of audit records with analysis of vulnerability scanners, network performance, system monitoring and other sources to further enhance the ability to identify inappropriate or unusual activity.	8	
			Functional	Intersects With	Adaptive Identification & Authentication	IAC-13	Mechanisms exist to allow individuals to utilize alternative methods of authentication under specific circumstances or situations.	8	
			Functional	Intersects With	Single Sign-On (SSO) Transparent Authentication	IAC-13.1	Mechanisms exist to provide a transparent authentication (e.g., Single Sign-On (SSO)) capability to the organization's systems and services.	3	
			Functional	Intersects With	Federated Credential Management	IAC-13.2	Mechanisms exist to federate credentials to allow cross-organization authentication of individuals and devices.	3	
			Functional	Intersects With	Continuous Authentication	IAC-13.3	Automated mechanisms exist to enable continuous re-authentication through the lifecycle of entity interactions.	8	
			Functional	Intersects With	Re-Authentication	IAC-14	Mechanisms exist to force users and devices to re-authenticate according to organization-defined circumstances that necessitate re-authentication.	8	
BAS-01	Baselining	The ability of an organization to characterize normal operational behaviors across the environment for the identification of anomalous activity.	Functional	Intersects With	Rules of Behavior	HRS-05.1	Mechanisms exist to define acceptable and unacceptable rules of behavior for the use of technologies, including consequences for unacceptable behavior.	3	
			Functional	Intersects With	Social Media & Social Networking Restrictions	HRS-05.2	Mechanisms exist to define rules of behavior that contain explicit restrictions on the use of social media and networking sites, posting information on commercial websites and sharing account information.	3	
			Functional	Intersects With	Use of Communications Technology	HRS-05.3	Mechanisms exist to establish usage restrictions and implementation guidance for communications technologies based on the potential to cause damage to systems, if used maliciously.	3	
			Functional	Intersects With	Use of Critical Technologies	HRS-05.4	Mechanisms exist to govern usage policies for critical technologies.	3	
			Functional	Intersects With	Use of Mobile Devices	HRS-05.5	Mechanisms exist to manage business risks associated with permitting mobile device access to organizational resources.	3	
			Functional	Intersects With	Anomalous Behavior	MON-16	Mechanisms exist to detect and respond to anomalous behavior that could indicate account compromise or other malicious activities.	8	
			Functional	Equal	Behavioral Baselining	THR-11	Automated mechanisms exist to establish behavioral baselines that capture information about user and entity behavior to enable dynamic threat discovery.	10	
BAS-02	Behavioral Analytics	The ability of an organization to conduct a deep analysis of user and system activities within an organization to help pinpoint patterns, thereby surfacing usage anomalies.	Functional	Intersects With	Privileged User Oversight	MON-01.15	Mechanisms exist to implement enhanced activity monitoring for privileged users.	3	
			Functional	Intersects With	Real-Time Session Monitoring	MON-01.17	Mechanisms exist to enable authorized personnel the ability to remotely view and hear content related to an established user session in real time, in accordance with organizational standards, as well as statutory, regulatory and contractual obligations.	5	
			Functional	Intersects With	Correlate Monitoring Information	MON-02.1	Automated mechanisms exist to correlate both technical and non-technical information from across the enterprise by a Security Incident Event Manager (SIEM) or similar automated tool, to enhance organization-wide situational awareness.	8	
			Functional	Intersects With	Integration of Scanning & Other Monitoring Information	MON-02.3	Automated mechanisms exist to integrate the analysis of audit records with analysis of vulnerability scanners, network performance, system monitoring and other sources to further enhance the ability to identify inappropriate or unusual activity.	8	
BAS-03	Data Flow Mapping	The ability of an organization to visualize data flows to baseline informational access for the identification of anomalies.	Functional	Subset Of	Data Action Mapping	AST-02.8	Mechanisms exist to create and maintain a map of technology assets where sensitive/regulated data is stored, transmitted or processed.	10	
			Functional	Intersects With	Network Diagrams & Data Flow Diagrams (DFDs)	AST-04	Mechanisms exist to maintain network architecture diagrams that: ▪ Contain sufficient detail to assess the security of the network's architecture; ▪ Reflect the current architecture of the network environment; and	8	
			Functional	Intersects With	Asset Scope Classification	AST-04.1	Mechanisms exist to determine cybersecurity & data privacy control applicability by identifying, assigning and documenting the appropriate asset scope categorization for all systems, applications, services and personnel (internal and third-parties).	8	
			Functional	Intersects With	Control Applicability Boundary Graphical Representation	AST-04.2	Mechanisms exist to ensure control applicability is appropriately-determined for systems, applications, services and third parties by graphically representing applicable boundaries.	5	
			Functional	Intersects With	Compliance-Specific Asset Identification	AST-04.3	Mechanisms exist to create and maintain a current inventory of systems, applications and services that are in scope for statutory, regulatory and/or contractual compliance obligations that provides sufficient detail to determine control applicability, based on	8	
CLO-01	Cloud Access Security Broker	The ability of an organization to inject security policies between users and cloud service providers as the cloud-based resources are accessed.	Functional	Equal	Cloud Access Security Broker (CASB)	CLD-11	Mechanisms exist to utilize Cloud Access Points (CAPs) to provide boundary protection and monitoring functions that both provide access to the cloud and protect the organization from the cloud.	10	
CLO-02	Cloud Security Posture Management	The ability of an organization to perform continuous cloud security improvement and adaptation to reduce the likelihood of a successful attack.	Functional	Subset Of	Cloud Services	CLD-01	Mechanisms exist to facilitate the implementation of cloud management controls to ensure cloud instances are secure and in-line with industry practices.	10	
			Functional	Intersects With	Cloud Security Architecture	CLD-02	Mechanisms exist to ensure the cloud security architecture supports the organization's technology strategy to securely design, configure and maintain cloud employments.	8	
			Functional	Intersects With	Vulnerability & Patch Management Program (VPMP)	VPM-01	Mechanisms exist to facilitate the implementation and monitoring of vulnerability management controls.	3	
			Functional	Intersects With	Attack Surface Scope	VPM-01.1	Mechanisms exist to define and manage the scope for its attack surface management activities.	3	
			Functional	Intersects With	Vulnerability Remediation Process	VPM-02	Mechanisms exist to ensure that vulnerabilities are properly identified, tracked and remediated.	3	
CLO-03	Immutable Workloads	The ability of an organization to ensure workloads cannot be altered once they are operational.	Functional	Equal	Application Container	SEA-21	Mechanisms exist to utilize an application container (virtualization approach) to isolate to a known set of dependencies, access methods and interfaces.	10	
DIN-01	Data Catalog Risk Alignment	The ability of an organization to identify any changes to the data landscape automatically to identify potential anomalies.	Functional	Subset Of	Automated Central Management & Verification	CFG-02.2	Automated mechanisms exist to govern and report on baseline configurations of systems through Continuous Diagnostics and Mitigation (CDM), or similar technologies.	10	
			Functional	Intersects With	Configuration Enforcement	CFG-06	Automated mechanisms exist to monitor, enforce and report on configurations for endpoint devices.	8	
			Functional	Intersects With	Integrity Assurance & Enforcement (IAE)	CFG-06.1	Automated mechanisms exist to identify unauthorized deviations from an approved baseline and implement automated resiliency actions to remediate the unauthorized change.	8	
DIN-02	Data Classification	The ability of an organization to characterize its data assets using persistent labels so those assets can be managed properly.	Functional	Subset Of	Data Protection	DCH-01	Mechanisms exist to facilitate the implementation of data protection controls.	10	
			Functional	Intersects With	Sensitive / Regulated Data Protection	DCH-01.2	Mechanisms exist to protect sensitive/regulated data wherever it is stored.	8	
			Functional	Intersects With	Defining Access Authorizations for Sensitive/Regulated Data	DCH-01.4	Mechanisms exist to explicitly define authorizations for specific individuals and/or roles for logical and /or physical access to sensitive/regulated data.	3	
			Functional	Subset Of	Data & Asset Classification	DCH-02	Mechanisms exist to ensure data and assets are categorized in accordance with applicable statutory, regulatory and contractual requirements.	10	
			Functional	Intersects With	Highest Classification Level	DCH-02.1	Mechanisms exist to ensure that systems, applications and services are classified according to the highest level of data sensitivity that is stored, transmitted and/or processed.	3	
DIN-03	Enterprise Data Governance	The ability of an organization to establish a set of processes that ensures that data assets are formally managed throughout the enterprise.	Functional	Intersects With	Data Quality Operations	DCH-22	Mechanisms exist to check for Redundant, Obsolete/Outdated, Toxic or Trivial (ROTT) data to ensure the accuracy, relevance, timeliness, impact, completeness and de-identification of information throughout the information lifecycle.	8	
			Functional	Subset Of	Data Quality Management	PRI-10	Mechanisms exist to issue guidelines ensuring and maximizing the quality, utility, objectivity, integrity, impact determination and de-identification of sensitive/regulated data across the information lifecycle.	10	
			Functional	Subset Of	Use of Cryptographic Controls	CRY-01	Mechanisms exist to facilitate the implementation of cryptographic protections controls using known public standards and trusted cryptographic technologies.	10	
			Functional	Intersects With	Transmission Confidentiality	CRY-03	Cryptographic mechanisms exist to protect the confidentiality of data being transmitted.	8	

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DPR-01	Data Encryption	The ability of an organization to ensure data is encrypted to prevent unauthorized access, modification, and redistribution of data.	Functional	Intersects With	Transmission Integrity	CRY-04	Cryptographic mechanisms exist to protect the integrity of data being transmitted.	8	
			Functional	Intersects With	Encrypting Data At Rest	CRY-05	Cryptographic mechanisms exist to prevent unauthorized disclosure of data at rest.	8	
			Functional	Intersects With	Public Key Infrastructure (PKI)	CRY-08	Mechanisms exist to securely implement an internal Public Key Infrastructure (PKI) infrastructure or obtain PKI services from a reputable PKI service provider.	8	
			Functional	Intersects With	Cryptographic Key Management	CRY-09	Mechanisms exist to facilitate cryptographic key management controls to protect the confidentiality, integrity and availability of keys.	8	
DPR-02	Data Loss Prevention (DLP)	The ability of an organization to ensure data is encrypted to prevent unauthorized access, modification, and redistribution of data.	Functional	Subset Of	Data Protection	DCH-01	Mechanisms exist to facilitate the implementation of data protection controls.	10	
			Functional	Intersects With	Use of Cryptographic Controls	CRY-01	Mechanisms exist to facilitate the implementation of cryptographic protections controls using known public standards and trusted cryptographic technologies.	3	
			Functional	Equal	Data Loss Prevention (DLP)	NET-17	Automated mechanisms exist to implement Data Loss Prevention (DLP) to protect sensitive information as it is stored, transmitted and processed.	10	
DPR-03	Dynamic Data Masking	The ability of an organization to change the data stream so that the data requester does not get access to the sensitive data, while no physical changes to the original production data take place.	Functional	Intersects With	Masking Displayed Data	DCH-03.2	Mechanisms exist to apply data masking to sensitive/regulated information that is displayed or printed.	8	
			Functional	Intersects With	Data Masking	PRI-05.3	Mechanisms exist to mask sensitive/regulated data through data anonymization, pseudonymization, redaction or de-identification.	8	
DPR-04	Fully Encrypted Transmission	The ability of an organization to encrypt all types of data communications in transit.	Functional	Subset Of	Use of Cryptographic Controls	CRY-01	Mechanisms exist to facilitate the implementation of cryptographic protections controls using known public standards and trusted cryptographic technologies.	10	
			Functional	Equal	Transmission Confidentiality	CRY-03	Cryptographic mechanisms exist to protect the confidentiality of data being transmitted.	10	
DEV-01	API Standardization	The ability of an organization to establish and enforce enterprise-wide programmatic interface standards.	Functional	Intersects With	Publishing Cybersecurity & Data Protection Documentation	GOV-02	Mechanisms exist to establish, maintain and disseminate cybersecurity & data protection policies, standards and procedures.	3	
			Functional	Subset Of	Application & Program Interface (API) Security	CLD-04	Mechanisms exist to ensure support for secure interoperability between components with Application & Program Interfaces (APIs).	10	
			Functional	Intersects With	Secure Engineering Principles	SEA-01	Mechanisms exist to facilitate the implementation of industry-recognized cybersecurity & data privacy practices in the specification, design, development, implementation and modification of systems and services.	3	
DEV-02	Application Proxy	The ability of an organization to receive application requests intended for another server to ensure connectivity meets minimum security requirements	Functional	Equal	Application Proxy	NET-04.14	Mechanisms exist to terminate, inspect, control, and reinitiate application traffic, regardless of the user's location or the security posture of the surrounding network.	10	
DEV-03	DevSecOps	The ability of an organization to integrate security into emerging agile IT and DevOps development as seamlessly as possible.	Functional	Subset Of	Technology Development & Acquisition	TDA-01	Mechanisms exist to facilitate the implementation of tailored development and acquisition strategies, contract tools and procurement methods to meet unique business needs.	10	
			Functional	Intersects With	Product Management	TDA-01.1	Mechanisms exist to design and implement product management processes to update products, including systems, software and services, to improve functionality and correct security deficiencies.	8	
			Functional	Equal	DevSecOps	TDA-01.4	Mechanisms exist to integrate cybersecurity and data privacy into Development and Operations (DevOps) to prioritize secure practices throughout the Software Development Lifecycle (SDLC).	10	
			Functional	Intersects With	Minimum Viable Product (MVP) Security Requirements	TDA-02	Mechanisms exist to ensure risk-based technical and functional specifications are established to define a Minimum Viable Product (MVP).	8	
			Functional	Intersects With	Development Methods, Techniques & Processes	TDA-02.3	Mechanisms exist to require software developers to demonstrate that their software development processes employ industry-recognized secure practices for secure programming, engineering methods, quality control processes and validation	8	
			Functional	Intersects With	Cybersecurity & Data Privacy Representatives For Product Changes	TDA-02.7	Mechanisms exist to include appropriate cybersecurity & data privacy representatives in the product feature and/or functionality change control review process.	8	
			Functional	Intersects With	Secure Coding	TDA-06	Mechanisms exist to develop applications based on secure coding principles.	8	
			Functional	Intersects With	Software Assurance Maturity Model (SAMM)	TDA-06.3	Mechanisms exist to utilize a Software Assurance Maturity Model (SAMM) to govern a secure development lifecycle for the development of systems, applications and services.	8	
			Functional	Intersects With	Supporting Toolchain	TDA-06.4	Automated mechanisms exist to improve the accuracy, consistency and comprehensiveness of secure practices throughout the asset's lifecycle.	8	
			Functional	Intersects With	Software Design Review	TDA-06.5	Mechanisms exist to have an independent review of the software design to confirm that all cybersecurity & data privacy requirements are met and that any identified risks are satisfactorily addressed.	8	
			Functional	Intersects With	Secure Development Environments	TDA-07	Mechanisms exist to maintain a segmented development network to ensure a secure development environment.	5	
			Functional	Intersects With	Separation of Development, Testing and Operational Environments	TDA-08	Mechanisms exist to manage separate development, testing and operational environments to reduce the risks of unauthorized access or changes to the operational environment and to ensure no impact to production systems.	3	
			Functional	Intersects With	Secure Migration Practices	TDA-08.1	Mechanisms exist to ensure secure migration practices purge systems, applications and services of test/development/staging data and accounts before it is migrated into a production environment.	5	
			Functional	Intersects With	Cybersecurity & Data Privacy Testing Throughout Development	TDA-09	Mechanisms exist to require system developers/integrators consult with cybersecurity & data privacy personnel to: • Create and implement a Security Test and Evaluation (ST&E) plan;	8	
DEV-04	Software Supply Chain Protection	The ability of an organization to protect software in the CI/CD context ensuring that the software is not compromised through the various stages of build, test, package and deploy.	Functional	Intersects With	Software Bill of Materials (SBOM)	TDA-04.2	Mechanisms exist to generate a Software Bill of Materials (SBOM) for systems, applications and services that lists software packages in use, including versions and applicable licenses.	3	
			Functional	Intersects With	Separation of Development, Testing and Operational Environments	TDA-08	Mechanisms exist to manage separate development, testing and operational environments to reduce the risks of unauthorized access or changes to the operational environment and to ensure no impact to production systems.	3	
			Functional	Intersects With	Secure Migration Practices	TDA-08.1	Mechanisms exist to ensure secure migration practices purge systems, applications and services of test/development/staging data and accounts before it is migrated into a production environment.	3	
			Functional	Intersects With	Cybersecurity & Data Privacy Testing Throughout Development	TDA-09	Mechanisms exist to require system developers/integrators consult with cybersecurity & data privacy personnel to: • Create and implement a Security Test and Evaluation (ST&E) plan;	8	
			Functional	Intersects With	Developer Screening	TDA-13	Mechanisms exist to ensure that the developers of systems, applications and/or services have the requisite skillset and appropriate access authorizations.	3	
			Functional	Intersects With	Developer Configuration Management	TDA-14	Mechanisms exist to require system developers and integrators to perform configuration management during system design, development, implementation and operation.	8	
			Functional	Intersects With	Software / Firmware Integrity Verification	TDA-14.1	Mechanisms exist to require developer of systems, system components or services to enable integrity verification of software and firmware components.	5	
			Functional	Intersects With	Developer Threat Analysis & Flaw Remediation	TDA-15	Mechanisms exist to require system developers and integrators to create a Security Test and Evaluation (ST&E) plan and implement the plan under the witness of an independent party.	5	
			Functional	Subset Of	Risk Management Program	RSK-01	Mechanisms exist to facilitate the implementation of strategic, operational and tactical risk management controls.	10	
			Functional	Intersects With	Risk Framing	RSK-01.1	Mechanisms exist to identify: • Assumptions affecting risk assessments, risk response and risk monitoring; • Constraints affecting risk assessments, risk response and risk monitoring;	8	
			Functional	Intersects With	Risk Tolerance	RSK-01.3	Mechanisms exist to define organizational risk tolerance, the specified range of acceptable results.	8	
			Functional	Intersects With	Risk Threshold	RSK-01.4	Mechanisms exist to define organizational risk threshold, the level of risk exposure above which risks are addressed and below which risks may be accepted.	8	
			Functional	Intersects With	Risk Appetite	RSK-01.5	Mechanisms exist to define organizational risk appetite, the degree of uncertainty the organization is willing to accept in anticipation of a reward.	8	

FDE #	FDE Name	Focal Document Element (FDE) Description	STRM Rationale	STRM Relationship	SCF Control	SCF #	Secure Controls Framework (SCF) Control Description	Strength of Relationship (optional)	Notes (optional)
DEV-05	Software Risk Management	The ability of an organization to enforce an application risk management program that focuses on the introduction of potential vulnerabilities through the various stages of the software development lifecycle.	Functional	Intersects With	Risk-Based Security Categorization	RSK-02	Mechanisms exist to categorize systems and data in accordance with applicable local, state and Federal laws that: ▪ Document the security categorization results (including supporting rationale) in the	8	
			Functional	Intersects With	Impact-Level Prioritization	RSK-02.1	Mechanisms exist to prioritize the impact level for systems, applications and/or services to prevent potential disruptions.	8	
			Functional	Intersects With	Risk Identification	RSK-03	Mechanisms exist to identify and document risks, both internal and external.	8	
			Functional	Intersects With	Risk Catalog	RSK-03.1	Mechanisms exist to develop and keep current a catalog of applicable risks associated with the organization's business operations and technologies in use.	5	
			Functional	Intersects With	Risk Assessment	RSK-04	Mechanisms exist to conduct recurring assessments of risk that includes the likelihood and magnitude of harm, from unauthorized access, use, disclosure, disruption, modification or destruction of the organization's systems and data.	8	
			Functional	Intersects With	Risk Register	RSK-04.1	Mechanisms exist to maintain a risk register that facilitates monitoring and reporting of risks.	5	
			Functional	Intersects With	Risk Ranking	RSK-05	Mechanisms exist to identify and assign a risk ranking to newly discovered security vulnerabilities that is based on industry-recognized practices.	5	
			Functional	Intersects With	Risk Remediation	RSK-06	Mechanisms exist to remediate risks to an acceptable level.	8	
			Functional	Intersects With	Risk Response	RSK-06.1	Mechanisms exist to respond to findings from cybersecurity & data privacy assessments, incidents and audits to ensure proper remediation has been performed.	8	
			Functional	Intersects With	Compensating Countermeasures	RSK-06.2	Mechanisms exist to identify and implement compensating countermeasures to reduce risk and exposure to threats.	5	
			Functional	Intersects With	Risk Assessment Update	RSK-07	Mechanisms exist to routinely update risk assessments and react accordingly upon identifying new security vulnerabilities, including using outside sources for security vulnerability information.	5	
EPM-01	Extended Detection and Response	The ability of an organization to provide end-to-end tracking with a unified view across multiple tools and attack vectors to improve SOC performance.	Functional	Intersects With	Endpoint File Integrity Monitoring (FIM)	END-06	Mechanisms exist to utilize File Integrity Monitor (FIM), or similar technologies, to detect and report unauthorized changes to system files and configurations.	5	
			Functional	Intersects With	Integrity Checks	END-06.1	Mechanisms exist to validate configurations through integrity checking of software and firmware.	8	
			Functional	Equal	Endpoint Detection & Response (EDR)	END-06.2	Mechanisms exist to detect and respond to unauthorized configuration changes as cybersecurity incidents.	10	
EPM-02	Patch Management	The ability of an organization to systematically identify, prioritize, acquire, install, and verify the installation of patches, updates, and upgrades throughout the environment.	Functional	Subset Of	Vulnerability & Patch Management Program (VPMP)	VPM-01	Mechanisms exist to facilitate the implementation and monitoring of vulnerability management controls.	10	
			Functional	Intersects With	Attack Surface Scope	VPM-01.1	Mechanisms exist to define and manage the scope for its attack surface management activities.	8	
			Functional	Intersects With	Vulnerability Remediation Process	VPM-02	Mechanisms exist to ensure that vulnerabilities are properly identified, tracked and remediated.	8	
			Functional	Intersects With	Vulnerability Ranking	VPM-03	Mechanisms exist to identify and assign a risk ranking to newly discovered security vulnerabilities using reputable outside sources for security vulnerability information.	5	
			Functional	Intersects With	Vulnerability Exploitation Analysis	VPM-03.1	Mechanisms exist to identify, assess, prioritize and document the potential impact(s) and likelihood(s) of applicable internal and external threats exploiting known vulnerabilities.	5	
			Functional	Intersects With	Continuous Vulnerability Remediation Activities	VPM-04	Mechanisms exist to address new threats and vulnerabilities on an ongoing basis and ensure assets are protected against known attacks.	8	
			Functional	Intersects With	Stable Versions	VPM-04.1	Mechanisms exist to install the latest stable version of any software and/or security-related updates on all applicable systems.	3	
			Functional	Equal	Software & Firmware Patching	VPM-05	Mechanisms exist to conduct software patching for all deployed operating systems, applications and firmware.	10	
			Functional	Intersects With	Centralized Management of Flaw Remediation Processes	VPM-05.1	Mechanisms exist to centrally-manage the flaw remediation process.	8	
			Functional	Intersects With	Automated Remediation Status	VPM-05.2	Automated mechanisms exist to determine the state of system components with regard to flaw remediation.	3	
			Functional	Intersects With	Automated Software & Firmware Updates	VPM-05.4	Automated mechanisms exist to install the latest stable versions of security-relevant software and firmware updates.	8	
			Functional	Intersects With	Removal of Previous Versions	VPM-05.5	Mechanisms exist to remove old versions of software and firmware components after updated versions have been installed.	3	
			Functional	Intersects With	Vulnerability Scanning	VPM-06	Mechanisms exist to detect vulnerabilities and configuration errors by recurring vulnerability scanning of systems and web applications.	5	
			Functional	Intersects With	Update Tool Capability	VPM-06.1	Mechanisms exist to update vulnerability scanning tools.	5	
			Functional	Intersects With	Breadth / Depth of Coverage	VPM-06.2	Mechanisms exist to identify the breadth and depth of coverage for vulnerability scanning that define the system components scanned and types of vulnerabilities that are checked for.	5	
EPM-03	Unified Endpoint Management	The ability of an organization to manage computer and mobile devices via a single console that allows for the enforcement of security policies.	Functional	Subset Of	Endpoint Security	END-01	Mechanisms exist to facilitate the implementation of endpoint security controls.	10	
			Functional	Intersects With	Endpoint Protection Measures	END-02	Mechanisms exist to protect the confidentiality, integrity, availability and safety of endpoint devices.	8	
			Functional	Intersects With	Centralized Management Of Mobile Devices	MDM-01	Mechanisms exist to remotely manage and enforce Mobile Device Management (MDM) controls.	8	
NTW-01	Micro Segmentation	The ability of an organization to insert a security policy into the access layer between any two workloads within the same extended data center.	Functional	Equal	Microsegmentation	NET-06.6	Automated mechanisms exist to enable microsegmentation, either physically or virtually, to divide the network according to application and data workflows communications needs.	10	
NTW-02	Network Device Plane Segmentation	The ability of an organization to separate the control, data, and management planes to ensure compromise of one plane does not affect the other.	Functional	Intersects With	Network Segmentation (macrosegementation)	NET-06	Mechanisms exist to ensure network architecture utilizes network segmentation to isolate systems, applications and services that protections from other network resources.	5	
			Functional	Intersects With	Security Management Subnets	NET-06.1	Mechanisms exist to implement security management subnets to isolate security tools and support components from other internal system components by implementing separate subnetworks with managed interfaces to other components of the system.	5	
			Functional	Intersects With	Virtual Local Area Network (VLAN) Separation	NET-06.2	Mechanisms exist to enable Virtual Local Area Networks (VLANs) to limit the ability of devices on a network to directly communicate with other devices on the subnet and limit an attacker's ability to laterally move to compromise neighboring systems.	5	
			Functional	Intersects With	Sensitive / Regulated Data Enclave (Secure Zone)	NET-06.3	Mechanisms exist to implement segmentation controls to restrict inbound and outbound connectivity for sensitive / regulated data enclaves (secure zones).	5	
NTW-03	Network Segmentation	The ability of an organization to provide logical or physical network segmentation into smaller zones with their own access controls.	Functional	Equal	Network Segmentation (macrosegementation)	NET-06	Mechanisms exist to ensure network architecture utilizes network segmentation to isolate systems, applications and services that protections from other network resources.	10	
			Functional	Intersects With	Security Management Subnets	NET-06.1	Mechanisms exist to implement security management subnets to isolate security tools and support components from other internal system components by implementing separate subnetworks with managed interfaces to other components of the system.	5	
			Functional	Intersects With	Virtual Local Area Network (VLAN) Separation	NET-06.2	Mechanisms exist to enable Virtual Local Area Networks (VLANs) to limit the ability of devices on a network to directly communicate with other devices on the subnet and limit an attacker's ability to laterally move to compromise neighboring systems.	5	
			Functional	Intersects With	Sensitive / Regulated Data Enclave (Secure Zone)	NET-06.3	Mechanisms exist to implement segmentation controls to restrict inbound and outbound connectivity for sensitive / regulated data enclaves (secure zones).	5	
NTW-04	Software Defined Networking	The ability of an organization to separate the control plane from the data plane in networking equipment.	Functional	Equal	Software Defined Networking (SDN)	NET-06.7	Automated mechanisms exist to enable dynamic, policy-driven network segmentation, access controls and traffic management with a Software Defined Networking (SDN) architecture.	10	

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SEC-01	Security Information and Event Management	The ability of an organization to gather security data from information system Components and present that data as actionable information via a single interface.	Functional	Subset Of	Continuous Monitoring	MON-01	Mechanisms exist to facilitate the implementation of enterprise-wide monitoring controls.	10	
			Functional	Intersects With	Automated Tools for Real-Time Analysis	MON-01.2	Mechanisms exist to utilize a Security Incident Event Manager (SIEM), or similar automated tool, to support near real-time analysis and incident escalation.	8	
			Functional	Intersects With	Inbound & Outbound Communications Traffic	MON-01.3	Mechanisms exist to continuously monitor inbound and outbound communications traffic for unusual or unauthorized activities or conditions.	5	
			Functional	Intersects With	System Generated Alerts	MON-01.4	Mechanisms exist to generate, monitor, correlate and respond to alerts from physical, cybersecurity, data privacy and supply chain activities to achieve integrated situational awareness.	5	
			Functional	Intersects With	Reviews & Updates	MON-01.8	Mechanisms exist to review event logs on an ongoing basis and escalate incidents in accordance with established timelines and procedures.	5	
			Functional	Intersects With	Automated Alerts	MON-01.12	Mechanisms exist to automatically alert incident response personnel to inappropriate or anomalous activities that have potential security incident implications.	5	
			Functional	Intersects With	Alert Threshold Tuning	MON-01.13	Mechanisms exist to "tune" event monitoring technologies through analyzing communications traffic/event patterns and developing profiles representing common traffic patterns and/or events.	5	
			Functional	Intersects With	Individuals Posing Greater Risk	MON-01.14	Mechanisms exist to implement enhanced activity monitoring for individuals who have been identified as posing an increased level of risk.	5	
			Functional	Intersects With	Privileged User Oversight	MON-01.15	Mechanisms exist to implement enhanced activity monitoring for privileged users.	5	
			Functional	Intersects With	Analyze and Prioritize Monitoring Requirements	MON-01.16	Mechanisms exist to assess the organization's needs for monitoring and prioritize the monitoring of assets, based on asset criticality and the sensitivity of the data it stores, transmits and processes.	5	
			Functional	Subset Of	Centralized Collection of Security Event Logs	MON-02	Mechanisms exist to utilize a Security Incident Event Manager (SIEM), or similar automated tool, to support the centralized collection of security-related event logs.	10	
			Functional	Intersects With	Correlate Monitoring Information	MON-02.1	Automated mechanisms exist to correlate both technical and non-technical information from across the enterprise by a Security Incident Event Manager (SIEM) or similar automated tool, to enhance organization-wide situational awareness.	8	
			Functional	Intersects With	Central Review & Analysis	MON-02.2	Automated mechanisms exist to centrally collect, review and analyze audit records from multiple sources.	8	
			Functional	Intersects With	Integration of Scanning & Other Monitoring Information	MON-02.3	Automated mechanisms exist to integrate the analysis of audit records with analysis of vulnerability scanners, network performance, system monitoring and other sources to further enhance the ability to identify inappropriate or unusual activity.	5	
			Functional	Intersects With	Correlation with Physical Monitoring	MON-02.4	Automated mechanisms exist to correlate information from audit records with information obtained from monitoring physical access to further enhance the ability to identify suspicious, inappropriate, unusual or malevolent activity.	5	
SEC-02	Incident Response	The ability of an organization to focus on finding the root cause of an incident by searching for tools, techniques, and procedures along with behaviors and associated artifacts within the environment.	Functional	Subset Of	Incident Response Operations	IRO-01	Mechanisms exist to implement and govern processes and documentation to facilitate an organization-wide response capability for cybersecurity & data privacy-related incidents.	10	
			Functional	Intersects With	Incident Handling	IRO-02	Mechanisms exist to cover the preparation, automated detection or intake of incident reporting, analysis, containment, eradication and recovery.	8	
			Functional	Intersects With	Automated Incident Handling Processes	IRO-02.1	Automated mechanisms exist to support the incident handling process.	3	
			Functional	Intersects With	Dynamic Reconfiguration	IRO-02.3	Automated mechanisms exist to dynamically reconfigure information system components as part of the incident response capability.	3	
			Functional	Intersects With	Incident Classification & Prioritization	IRO-02.4	Mechanisms exist to identify classes of incidents and actions to take to ensure the continuation of organizational missions and business functions.	8	
			Functional	Intersects With	Automatic Disabling of System	IRO-02.6	Mechanisms exist to automatically disable systems, upon detection of a possible incident that meets organizational criteria, which allows for forensic analysis to be performed.	3	
			Functional	Intersects With	Indicators of Compromise (IOC)	IRO-03	Mechanisms exist to define specific Indicators of Compromise (IOC) to identify the signs of potential cybersecurity events.	8	
			Functional	Intersects With	Incident Response Plan (IRP)	IRO-04	Mechanisms exist to maintain and make available a current and viable Incident Response Plan (IRP) to all stakeholders.	8	
			Functional	Intersects With	Integrated Security Incident Response Team (ISIRT)	IRO-07	Mechanisms exist to establish an integrated team of cybersecurity, IT and business function representatives that are capable of addressing cybersecurity & data privacy incident response operations.	5	
			Functional	Intersects With	Chain of Custody & Forensics	IRO-08	Mechanisms exist to perform digital forensics and maintain the integrity of the chain of custody, in accordance with applicable laws, regulations and industry-recognized secure practices.	8	
			Functional	Intersects With	Root Cause Analysis (RCA) & Lessons Learned	IRO-13	Mechanisms exist to incorporate lessons learned from analyzing and resolving cybersecurity & data privacy incidents to reduce the likelihood or impact of future incidents.	8	
SEC-03	Security Operations Center (SOC)	The ability of an organization to defend and monitor an organization's systems and networks (i.e., cyber infrastructure) on an ongoing basis.	Functional	Intersects With	Position Categorization	HRS-02	Mechanisms exist to manage personnel security risk by assigning a risk designation to all positions and establishing screening criteria for individuals filling those positions.	3	
			Functional	Intersects With	Users With Elevated Privileges	HRS-02.1	Mechanisms exist to ensure that every user accessing a system that processes, stores, or transmits sensitive information is cleared and regularly trained to handle the information in question.	3	
			Functional	Intersects With	Defined Roles & Responsibilities	HRS-03	Mechanisms exist to define cybersecurity roles & responsibilities for all personnel.	3	
			Functional	Intersects With	Competency Requirements for Security-Related Positions	HRS-03.2	Mechanisms exist to ensure that all security-related positions are staffed by qualified individuals who have the necessary skill set.	5	
			Functional	Intersects With	Personnel Screening	HRS-04	Mechanisms exist to manage personnel security risk by screening individuals prior to authorizing access.	3	
			Functional	Intersects With	Roles With Special Protection Measures	HRS-04.1	Mechanisms exist to ensure that individuals accessing a system that stores, transmits or processes information requiring special protection satisfy organization-defined personnel screening criteria.	3	
			Functional	Subset Of	Operations Security	OPS-01	Mechanisms exist to facilitate the implementation of operational security controls.	10	
			Functional	Intersects With	Standardized Operating Procedures (SOP)	OPS-01.1	Mechanisms exist to identify and document Standardized Operating Procedures (SOP), or similar documentation, to enable the proper execution of day-to-day / assigned tasks.	8	
			Functional	Intersects With	Security Concept Of Operations (CONOPS)	OPS-02	Mechanisms exist to develop a security Concept of Operations (CONOPS), or a similarly-defined plan for achieving cybersecurity objectives, that documents management, operational and technical measures implemented to apply defense-in-depth techniques	8	
			Functional	Intersects With	Service Delivery (Business Process Support)	OPS-03	Mechanisms exist to define supporting business processes and implement appropriate governance and service management to ensure appropriate planning, delivery and support of the organization's technology capabilities supporting business functions,	8	
			Functional	Equal	Security Operations Center (SOC)	OPS-04	Mechanisms exist to establish and maintain a Security Operations Center (SOC) that facilitates a 24x7 response capability.	10	
SEC-04	Security Orchestration, Automation and Response (SOAR)	The ability of an organization to empower their security teams by integrating and coordinating separate security tools, automating repetitive tasks, and streamlining incident and threat	Functional	Equal	Security Orchestration, Automation, and Response (SOAR)	OPS-06	Mechanisms exist to utilize Security Orchestration, Automation and Response (SOAR) tools to define, prioritize and automate the response to security incidents.	10	
			Functional	Intersects With	Indicators of Compromise (IOC)	IRO-03	Mechanisms exist to define specific Indicators of Compromise (IOC) to identify the signs of potential cybersecurity events.	5	
			Functional	Intersects With	Centralized Collection of Security Event Logs	MON-02	Mechanisms exist to utilize a Security Incident Event Manager (SIEM), or similar automated tool, to support the centralized collection of security-related event logs.	3	
			Functional	Intersects With	Correlate Monitoring Information	MON-02.1	Automated mechanisms exist to correlate both technical and non-technical information from across the enterprise by a Security Incident Event Manager (SIEM) or similar automated tool, to enhance organization-wide situational awareness.	3	
			Functional	Intersects With	Central Review & Analysis	MON-02.2	Automated mechanisms exist to centrally collect, review and analyze audit records from multiple sources.	3	

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SEC-05	Threat Intelligence Integration	The ability of an organization to enforce an application risk management program that focuses on the introduction of potential vulnerabilities through the various stages of the software development lifecycle.	Functional	Intersects With	Integration of Scanning & Other Monitoring Information	MON-02.3	Automated mechanisms exist to integrate the analysis of audit records with analysis of vulnerability scanners, network performance, system monitoring and other sources to further enhance the ability to identify inappropriate or unusual activity.	3	
			Functional	Intersects With	Correlation with Physical Monitoring	MON-02.4	Automated mechanisms exist to correlate information from audit records with information obtained from monitoring physical access to further enhance the ability to identify suspicious, inappropriate, unusual or malevolent activity.	3	
			Functional	Intersects With	Anomalous Behavior	MON-16	Mechanisms exist to detect and respond to anomalous behavior that could indicate account compromise or other malicious activities.	5	
			Functional	Intersects With	Security Orchestration, Automation, and Response (SOAR)	OPS-06	Mechanisms exist to utilize Security Orchestration, Automation and Response (SOAR) tools to define, prioritize and automate the response to security incidents.	5	
			Functional	Subset Of	Threat Intelligence Program	THR-01	Mechanisms exist to implement a threat intelligence program that includes a cross-organization information-sharing capability that can influence the development of the system and security architectures, selection of security solutions, monitoring, threat	10	
			Functional	Intersects With	Indicators of Exposure (IOE)	THR-02	Mechanisms exist to develop Indicators of Exposure (IOE) to understand the potential attack vectors that attackers could use to attack the organization.	5	
			Functional	Intersects With	Threat Intelligence Feeds	THR-03	Mechanisms exist to maintain situational awareness of vulnerabilities and evolving threats by leveraging the knowledge of attacker tactics, techniques and procedures to facilitate the implementation of preventative and compensating controls.	8	
			Functional	Intersects With	Threat Analysis	THR-10	Mechanisms exist to identify, assess, prioritize and document the potential impact(s) and likelihood(s) of applicable internal and external threats.	8	
			Functional	Intersects With	Behavioral Baselining	THR-11	Automated mechanisms exist to establish behavioral baselines that capture information about user and entity behavior to enable dynamic threat discovery.	5	
SYS-01	Continuous Device Authorization	The ability of an organization to enforce least privilege access to resources from devices that are connected to the network through security policy enforcement.	Functional	Equal	Continuous Authentication	IAC-13.3	Automated mechanisms exist to enable continuous re-authentication through the lifecycle of entity interactions.	10	
SYS-02	Device Authentication	The ability of an organization to validate associated policies on all potential endpoints.	Functional	Equal	Identification & Authentication for Devices	IAC-04	Mechanisms exist to uniquely identify and centrally Authenticate, Authorize and Audit (AAA) devices before establishing a connection using bidirectional authentication that is cryptographically- based and replay resistant.	10	
			Functional	Intersects With	Endpoint Security Validation	NET-14.7	Automated mechanisms exist to validate the security posture of the endpont devices (e.g., software versions, patch levels, etc.) prior to allowing devices to connect to organizational technology assets.	8	
SYS-03	Device Inventory	The ability of an organization to maintain an inventory of approved devices with their technical attributes authorized to connect to the network.	Functional	Subset Of	Asset Governance	AST-01	Mechanisms exist to facilitate an IT Asset Management (ITAM) program to implement and manage asset management controls.	10	
			Functional	Intersects With	Asset-Service Dependencies	AST-01.1	Mechanisms exist to identify and assess the security of technology assets that support more than one critical business function.	3	
			Functional	Equal	Asset Inventories	AST-02	Mechanisms exist to perform inventories of technology assets that: ▪ Accurately reflects the current systems, applications and services in use; ▪ Identifies authorized software products, including business justification details;	10	
			Functional	Intersects With	Configuration Management Database (CMDB)	AST-02.9	Mechanisms exist to implement and manage a Configuration Management Database (CMDB), or similar technology, to monitor and govern technology asset-specific information.	8	
SYS-04	Device Signaling	The ability of an organization to continually monitor the security posture of employee devices through the collection of device data prior to granting the user access to resources.	Functional	Equal	Endpoint Security Validation	NET-14.7	Automated mechanisms exist to validate the security posture of the endpoint devices (e.g., software versions, patch levels, etc.) prior to allowing devices to connect to organizational technology assets.	10	
SYS-05	Internet of Things (IoT) Security	The ability of an organization to protect IoT devices that are connected to the network from cyber-attacks.	Functional	Subset Of	Embedded Technology Security Program	EMB-01	Mechanisms exist to facilitate the implementation of embedded technology controls.	10	
			Functional	Equal	Internet of Things (IOT)	EMB-02	Mechanisms exist to proactively manage the cybersecurity & data privacy risks associated with Internet of Things (IoT).	10	
			Functional	Intersects With	Operational Technology (OT)	EMB-03	Mechanisms exist to proactively manage the cybersecurity & data privacy risks associated with Operational Technology (OT).	8	
			Functional	Intersects With	Interface Security	EMB-04	Mechanisms exist to protect embedded devices against unauthorized use of the physical factory diagnostic and test interface(s).	5	
			Functional	Intersects With	Embedded Technology Configuration Monitoring	EMB-05	Mechanisms exist to generate log entries on embedded devices when configuration changes or attempts to access interfaces are detected.	5	
			Functional	Intersects With	Prevent Alterations	EMB-06	Mechanisms exist to protect embedded devices by preventing the unauthorized installation and execution of software.	5	
			Functional	Intersects With	Embedded Technology Maintenance	EMB-07	Mechanisms exist to securely update software and upgrade functionality on embedded devices.	5	
			Functional	Intersects With	Authorized Communications	EMB-13	Mechanisms exist to restrict embedded technologies to communicate only with authorized peers and service endpoints.	5	
			Functional	Intersects With	Certificate-Based Authentication	EMB-16	Mechanisms exist to enforce certificate-based authentication for embedded technologies (e.g., IoT, OT, etc.) and their supporting services.	5	
			Functional	Intersects With	Chip-To-Cloud Security	EMB-17	Mechanisms exist to implement embedded technologies that utilize pre-provisioned cloud trust anchors to support secure bootstrap and Zero Touch Provisioning (ZTP).	5	
			Functional	Intersects With	Real-Time Operating System (RTOS) Security	EMB-18	Mechanisms exist to ensure embedded technologies utilize a securely configured Real-Time Operating System (RTOS).	5	
			Functional	Intersects With	Safe Operations	EMB-19	Mechanisms exist to continuously validate autonomous systems that trigger an automatic state change when safe operation is no longer assured.	5	
TRF-01	Advanced Threat Protection	The ability of an organization to defend against complex threat actor attacks that target sensitive data.	Functional	Intersects With	Monitoring for Indicators of Compromise (IOC)	MON-11.3	Automated mechanisms exist to identify and alert on Indicators of Compromise (IoC).	8	
			Functional	Intersects With	Anomalous Behavior	MON-16	Mechanisms exist to detect and respond to anomalous behavior that could indicate account compromise or other malicious activities.	8	
			Functional	Intersects With	Indicators of Compromise (IOC)	IRO-03	Mechanisms exist to define specific Indicators of Compromise (IOC) to identify the signs of potential cybersecurity events.	8	
			Functional	Subset Of	Threat Intelligence Program	THR-01	Mechanisms exist to implement a threat intelligence program that includes a cross-organization information-sharing capability that can influence the development of the system and security architectures, selection of security solutions, monitoring, threat	10	
			Functional	Intersects With	Indicators of Exposure (IOE)	THR-02	Mechanisms exist to develop Indicators of Exposure (IOE) to understand the potential attack vectors that attackers could use to attack the organization.	8	
			Functional	Intersects With	Threat Intelligence Feeds	THR-03	Mechanisms exist to maintain situational awareness of vulnerabilities and evolving threats by leveraging the knowledge of attacker tactics, techniques and procedures to facilitate the implementation of preventative and compensating controls.	8	
			Functional	Intersects With	Threat Catalog	THR-09	Mechanisms exist to develop and keep current a catalog of applicable internal and external threats to the organization, both natural and manmade.	8	
			Functional	Intersects With	Threat Analysis	THR-10	Mechanisms exist to identify, assess, prioritize and document the potential impact(s) and likelihood(s) of applicable internal and external threats.	8	
			Functional	Intersects With	Behavioral Baselining	THR-11	Automated mechanisms exist to establish behavioral baselines that capture information about user and entity behavior to enable dynamic threat discovery.	8	
TRF-02	Automated Dynamic Policies	The ability of an organization to utilize artificial intelligence solutions to enhance security configurations through continuous security posture monitoring.	Functional	Intersects With	Attribute-Based Access Control (ABAC)	IAC-29	Mechanisms exist to enforce Attribute-Based Access Control (ABAC) for policy-driven, dynamic authorizations that supports the secure sharing of information.	8	
			Functional	Intersects With	Policy Decision Point (PDP)	NET-04.7	Automated mechanisms exist to evaluate access requests against established criteria to dynamically and uniformly enforce access rights and permissions.	8	
			Functional	Subset Of	Identity & Access Management (IAM)	IAC-01	Mechanisms exist to facilitate the implementation of identification and access management controls.	10	
			Functional	Subset Of	Authenticate, Authorize and Audit (AAA)	IAC-01.2	Mechanisms exist to strictly govern the use of Authenticate, Authorize and Audit (AAA) solutions, both on-premises and those hosted by an External Service Provider (ESP).	10	

FDE #	FDE Name	Focal Document Element (FDE) Description	STRM Rationale	STRM Relationship	SCF Control	SCF #	Secure Controls Framework (SCF) Control Description	Strength of Relationship (optional)	Notes (optional)
USR-01	User Authentication	The ability of an organization to continuously verify the identity of a user as a prerequisite to allowing access to resources.	Functional	Subset Of	Identification & Authentication for Organizational Users	IAC-02	Mechanisms exist to uniquely identify and centrally Authenticate, Authorize and Audit (AAA) organizational users and processes acting on behalf of organizational users.	10	
			Functional	Intersects With	Group Authentication	IAC-02.1	Mechanisms exist to require individuals to be authenticated with an individual authenticator when a group authenticator is utilized.	5	
			Functional	Intersects With	Replay-Resistant Authentication	IAC-02.2	Automated mechanisms exist to employ replay-resistant authentication.	5	
			Functional	Subset Of	Identification & Authentication for Non-Organizational Users	IAC-03	Mechanisms exist to uniquely identify and centrally Authenticate, Authorize and Audit (AAA) third-party users and processes that provide services to the organization.	10	
			Functional	Intersects With	Identification & Authentication for Third Party Systems & Services	IAC-05	Mechanisms exist to identify and authenticate third-party systems and services.	8	
			Functional	Intersects With	Adaptive Identification & Authentication	IAC-13	Mechanisms exist to allow individuals to utilize alternative methods of authentication under specific circumstances or situations.	5	
			Functional	Intersects With	Account Management	IAC-15	Mechanisms exist to proactively govern account management of individual, group, system, service, application, guest and temporary accounts.	5	
			Functional	Intersects With	Automated System Account Management (Directory Services)	IAC-15.1	Automated mechanisms exist to support the management of system accounts (e.g., directory services).	8	
USR-02	Conditional User Access	The ability of an organization to provide a conditional level of access for users by leveraging dynamic access rules.	Functional	Intersects With	Cybersecurity & Data Privacy Attributes	DCH-05	Mechanisms exist to bind cybersecurity & data privacy attributes to information as it is stored, transmitted and processed.	5	
			Functional	Intersects With	Dynamic Attribute Association	DCH-05.1	Mechanisms exist to dynamically associate cybersecurity & data privacy attributes with individuals and objects as information is created, combined, or transformed, in accordance with organization-defined cybersecurity and data privacy policies.	5	
USR-03	User Inventory	The ability of an organization to inventory all entity data.	Functional	Equal	User & Service Account Inventories	IAC-01.3	Automated mechanisms exist to maintain a current list of authorized users and service accounts.	10	
			Functional	Intersects With	Authenticate, Authorize and Audit (AAA)	IAC-01.2	Mechanisms exist to strictly govern the use of Authenticate, Authorize and Audit (AAA) solutions, both on-premises and those hosted by an External Service Provider (ESP).	8	
			Functional	Intersects With	Identification & Authentication for Organizational Users	IAC-02	Mechanisms exist to uniquely identify and centrally Authenticate, Authorize and Audit (AAA) organizational users and processes acting on behalf of organizational users.	8	
			Functional	Intersects With	Automated System Account Management (Directory Services)	IAC-15.1	Automated mechanisms exist to support the management of system accounts (e.g., directory services).	8	