

Tennessee Consolidated Retirement System (TCRS)

PAS Non-Functional Requirements

February 6, 2024

Version 0.1

Contract Attachment 2 Non-Functional Requirements		
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Introduction

Purpose

This document consolidates non-functional requirements for the procurement of a Pension Administration System for TCRS. There are seven subsections for the non-functional requirements:

1. System Architecture
2. Platform & Service Management
3. Integration
4. Data Management
5. Delivery
6. User Experience
7. Enterprise Content Management (ECM)

Glossary Information

There is a consolidated [glossary of terms](#) at the end of this document.

Applicability & Usage

Software Procurement and Implementation

For the software procurement and implementation, the overarching requirement is stated as:

Respondents must confirm that the solution will comply with all mandatory requirements defined in this document. This confirmation is to be provided in the Respondents' response to Item A.13 of RFP Attachment 6.2 – Section A—Mandatory Requirement Items. If the proposed PAS solution does not meet a particular non-functional requirement defined as Desired, the Respondent must provide details explaining what aspects of the functionality are not supported, along with any alternate solutions that can be employed to achieve the required results. These details are to be provided in the Respondent's response to the question posed in Section C.6 of RFP Attachment 6.2 – Section C (Technical Qualifications, Experience & Approach Items).

Requirements

Requirement statement priority options:

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- **Mandatory Requirements** . All commercial -off-the-shelf (COTS) software, custom software, and software maintenance processes must meet these mandatory requirements. The mandatory requirements shall be treated as **TCRS standards** .
- **Desired Requirements** . All commercial -off-the-shelf (COTS) software, custom software, and software maintenance processes should meet these desired requirements. The desired requirements shall be treated as **TCRS guidelines** .

System Architecture Requirements

Overview

The Tennessee Consolidated Retirement System (TCRS) requires the pension administration system (PAS) to meet rigorous system architecture standards spanning security, reliability, scalability, and flexibility.

A secure system development lifecycle is mandatory, including static and dynamic application testing, frequent vulnerability scanning, and prompt remediation timeframes based on severity. Change control processes must minimize risk.

The PAS must deliver 99.99% uptime, recovering within 24 hours and losing no more than 15 minutes of data. Response times for 98% of transactions should fall below 2 seconds. Parallelization and load balancing capabilities are expected to maximize throughput with minimal online impact.

The vendor should provide a comprehensive environment management strategy encompassing development, testing, training, disaster recovery, and production with security isolation. Automated promotion of changes across environments is key.

Configurability is paramount to accommodate evolving policies, processes, templates, rules, workflows, integrations, and other solution assets. A "configuration as code" approach should maximize business user control coupled with structured testing and controlled promotion functionality.

Instrumentation should furnish detailed insights into operations, configurations, and performance to inform constant optimization.

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SystemWide Requirements

Label	Responsible	Requirement Statement	Priority
SYS.01.01	System	Follow a documented development process with the Software Development Plan (SDP) that addresses the security and privacy requirements, identifies the standards and tools used for the development process, and change management process.	Mandatory
SYS.01.02	System	Follow OWASP Error Handling guidance	Mandatory
SYS.01.03	System	Follow OWASP Error Handling guidance	Mandatory
SYS.01.04	System	Verify all errors are centrally logged and the error log(s) are monitored. The Monthly M&O Report shall include a summary of the log review	Mandatory
SYS.01.05	System	Replace system components when support for the components is no longer available from the developer, vendor, or manufacturer.	Mandatory
SYS.01.06	System	Identify and track any software asset that is at end -of-support / end -of-life and ensure that maintenance agreements and processes are in place, where appropriate, to ensure software can remain operational to meet business requirements.	Mandatory
SYS.01.07	System	Platform or software error messages shall provide as little system information as possible, to the end user interfaces therefore limiting the ability to gain information on the system.	Mandatory
SYS.01.08	System	Log unhandled errors to an event log and include time and date, user id, and error code.	Mandatory
SYS.01.09	System	Verify all errors are centrally logged and the error log(s) are monitored.	Mandatory
SYS.01.10	System	All logs shall be designed and implemented in a manner that can be consumed by the TCRS Security Information and Event Management (SIEM) solution.	Mandatory

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Label	Responsible	Requirement Statement	Priority
SYS.0111	System	The system should be platform -agnostic (e.g.,capable of being hosted on various platforms such as Unix, Windows , etc.).	Desired
SYS.0121	System	<p>The system will at a minimum:</p> <ul style="list-style-type: none"> • Integrate with existing software applications and tools (e.g., have the ability to consume/provide APIs in real-time and through batch jobs). • Re-use existing software applications and tools where applicable. • Provide the capability to deploy new modules and/or additional enhanced functionality. 	Mandatory

Configuration Management

Label	Responsible	Requirement Statement	Priority
SYS.02.01	System	A current baseline configuration shall be developed, documented, and maintained under configuration control for the system.	Mandatory
SYS.02.02	System	The baseline configuration shall include up -to-date specifications and contain information about the components of the information system (e.g. , standard operating system, software load, patch level information, network topology, technology platform, etc.) .	Mandatory
SYS.02.03	System	Proposed configuration -controlled changes to the system shall be reviewed and approved or disapproved with explicit consideration for security impact analysis.	Mandatory
SYS.02.04	System	Configuration change decisions associated with the system shall be documented and retained for the life of the system.	Mandatory
SYS.02.05	System	Changes to the information system shall be tested, validated, and documented before being implemented on the operational system.	Mandatory

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Label	Responsible	Requirement Statement	Priority
SYS.02.06	System	Changes to the TCRS information systems shall be analyzed to determine potential security impacts prior to implementation.	Mandatory
SYS.02.07	System	Physical and logical access restrictions associated with changes to TCRS information systems shall be defined, documented, approved, and enforced.	Mandatory
SYS.02.08	System	Configuration settings are the configurable security - related parameters of information technology products that are part of an information system. A standard set of mandatory configuration settings shall be established and documented for information technology products employed within the system.	Mandatory
SYS.02.09	System	The system shall be configured to provide only essential capabilities –unnecessary functions, ports, protocols, and/or services must be blocked.	Mandatory
SYS.02.10	System	Remediate configuration management gaps found during periodic independent CM audit.	Mandatory

Secure System Development Lifecycle

Label	Responsible	Requirement Statement	Priority
SYS.03.01	System	Analyze identified vulnerabilities, providing detailed vulnerability analysis including applicability, risk, and estimated time to remediate .	Mandatory
SYS.03.02	System	Track all verified vulnerabilities as a technical debt item in defect management system or Agile backlog and report these in the Plan of Action and Milestones (POAM).	Mandatory
SYS.03.03	System	Remediate legitimate CRITICAL vulnerabilities within 3 business days or less.	Mandatory
SYS.03.04	System	Remediate legitimate HIGH vulnerabilities within 21 days.	Mandatory
SYS.03.05	System	Remediate legitimate MEDIUM vulnerabilities within 60 days.	Mandatory

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Label	Responsible	Requirement Statement	Priority
SYS.03.06	System	Remediate legitimate LOW vulnerabilities within 90 days.	Mandatory
SYS.03.07	System	Annually assess the system security controls to determine if the controls are effective in their application	Mandatory
SYS.03.08	System	Develop and implement plans of action designed to correct deficiencies and reduce or eliminate vulnerabilities in organizational systems .	Mandatory
SYS.03.09	System	Monitor security controls on an ongoing basis to ensure the continued effectiveness of the controls .	Mandatory
SYS.03.10	System	Address security at all system development and maintenance stages .	Mandatory
SYS.03.11	System	Align the secure SDLC with NIST Mitigating the Risk Software Vulnerabilities by Adopting a Secure Software Development Framework (SSDF).	Mandatory
SYS.03.12	System	Development and implementation of new software or systems shall include adequate documentation of the information system and its key security components. Information system documentation shall be readily available, adequately protected, and only distributed to authorized individuals.	Mandatory
SYS.03.12	System	Apply information system security engineering principles in the specification, design, development, implementation, and modification of the system.	Mandatory
SYS.03.13	System	Develop, document, and implement a configuration management plan for the system. Configuration Management Plans shall address roles, responsibilities, and configuration management processes and procedures.	Mandatory
SYS.03.14	System	Perform static application security testing (SAST) tool to identify common flaws and document the results of the analysis. Generate SAST reports (including CVE exposure)	Mandatory

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Label	Responsible	Requirement Statement	Priority
		as part of each build and publish the information for TCRS's review.	
SYS.03.15	System	Perform dynamic application security testing (DAST) tool to identify common flaws and document the results of the analysis. Generate DAST reports (including CVE exposure) during each sprint and publish the information for TCRS's review.	Mandatory
SYS.03.16	System	Regular security scans shall scan the system for the OWASP top 10 security vulnerabilities.	Mandatory
SYS.03.17	System	Regular security scans shall scan the system for the Common Weakness Enumeration (CWE)/SANS Top 25 Most Dangerous Software Errors.	Mandatory
SYS.03.18	System	Internal monitoring shall include intrusion detection, intrusion prevention, malicious code protection, audit recording, and network monitoring capabilities.	Mandatory
SYS.03.19	System	The Proposed Vendor shall use leverage the CVSS vulnerability rating and the exploitability rating in determining the severity of a vulnerability.	Mandatory
SYS.03.20	System	The Proposed Vendor shall justify the lowering of risks based on the CVSS and/or exploitability of a vulnerability by demonstrating compensating controls that mitigate the threat in the TCRS environment. In absence of this justification, the standardized scoring should be leveraged in determining the risk rating.	Mandatory

Development and Operations (DevOps)

Label	Responsible	Requirement Statement	Priority
SYS.04.44	System	The pipeline shall automate the system build & deployment	Mandatory
SYS.04.45	System	The pipeline shall automatically perform data migration tasks using an industry proven method and tools.	Mandatory

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Label	Responsible	Requirement Statement	Priority
SYS.04.46	System	Provide a repeatable process for rolling back of changes after an unsuccessful deployment	Mandatory
SYS.04.47	System	Release notes must include a list of resolved issues with resolution and completed change requests.	Mandatory
SYS.04.48	System	Passwords, integrations with databases and third -party systems, seeds and internal secrets, and API keys are managed securely and not included in the source code or stored within source code repositories.	Mandatory

Environment Management

Label	Responsible	Requirement Statement	Priority
SYS05.01	System	The system will ensure that all data, including data stored in all databases, environments, and data backups, is stored within the United States.	Mandatory
SYS05.02	System	The system will provide multi -tiered, redundant environments that are physically or logically isolated and distinct from each other.	Mandatory
SYS.05.03	System	The system will run a minimum the following separate application and database instances: <ul style="list-style-type: none"> • Production • Production DR (warm site) • User Acceptance Testing (UAT) • Training 	Mandatory
SYS.05.04	System	The system will have the capability to deploy, maintain and deprecate additional environments on an ad hoc basis as needed. These environments would be of a similar nature to other long-standing environments used in the system (e.g., test environments for use in parallel testing).	Mandatory

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Label	Responsible	Requirement Statement	Priority
SYS.05.05	System	The system will have the capability to generate environments using red (live, un-scrambled) or green (scrambled) data.	Mandatory
SYS.05.06	System	Facilitate discrete configuration promotion between environments, also called targeted functionality promotion. Example: The promotion of 3 enhancements out of the currently developing 50 item backlogs.	Mandatory

System Configuration

Label	Responsible	Requirement Statement	Priority
SYS.06.01	System	The system will provide the capability for business users to maintain pre-defined, effective-date-driven values to be used in rules with configurable parameters. The system should be table-driven to the maximum extent possible. The tables are to be maintained by a single common application.	Mandatory
SYS.06.02	System	The system will provide for each change to key parameters to be driven by effective dates and specific ranges of time. Functionality will include the ability to input multiple effective dates, end dates, and values for each parameter. These time sensitive variances will be used within automated processes. For example, the date-driven variances will allow a calculation or value to be correct for the date range in which it applies.	Mandatory
SYS.06.03	System	The system will provide a logical user interface for key rules and variable factors to be modified. For example, scripts, menus, screens, and tools will be provided to set the configuration and parameterization of the system's key values and rules.	Mandatory

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Label	Responsible	Requirement Statement	Priority
SYS.06.04	System	The system will handle hierarchical variance at the various levels, including plan, sub -plan, member (by status, e.g., active, inactive, retired, etc.).	Mandatory
SYS.06.05	System	The system will track changes to the parameters and provide key reporting functionality on -demand and as needed.	Mandatory
SYS.06.06	System	The system will maintain historical data that will allow administrators insight into previous configuration changes and parameters.	Mandatory
SYS.06.07	System	The system will support validations at the following levels: <ul style="list-style-type: none"> • Field level (within the UI, prior to posting) • Business logic-layer level (after submission through UI and prior to posting) • Database level (after posting) 	Mandatory
SYS.06.08	System	The system will store dates with a consistent format but be capable of displaying dates based on end user preferences. The system will allow for unambiguous selection of date values through calendar lists.	Mandatory
SYS.06.09	System	The system will include the ability to maintain drop-down selection lists with logical ordering that can be configured by list (e.g., chronological by date, alphabetical by name, etc.). The lists must be capable of being maintained by business users with the appropriate role(s).	Mandatory
SYS.06.10	System	The system will provide the capability to add a new plan to the system and to modify an existing plan from the system.	Mandatory
SYS.06.11	System	The system will allow administrators to clone existing plans to set up new plans rather than to manually set up all parameters. Rules for the new plan can then be added, deleted, or modified as required.	Mandatory

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Performance

Label	Responsible	Requirement Statement	Priority
SYS.07.01	System	The system will provide full functionality without concurrent processing impeding any aspect of the enterprise's day-to-day business operations.	Mandatory
SYS.07.03	System	The system will provide a maximum response time for query and update functions for 98% of covered transactions within 2 seconds. The intervals measured shall be every 60 minutes during guaranteed periods.	Mandatory
SYS.07.04	System	The system will provide the ability to monitor, log and report on performance trends and metrics (e.g. , real-time server CPU and memory loads, system response time, batch job completion time, etc.)	Mandatory
SYS.07.05	System	The system will have the capability to utilize multithreading when necessary.	Mandatory
SYS.07.06	System	The system will have the capability to utilize hardware load balancing during everyday activities (e.g, balancing server usage) and maintenance (e.g. , making use of secondary datacenters to reduce downtime during a deployment).	Mandatory
SYS.07.07	System	The system will provide tools that will allow application subject matter experts (SMEs) to troubleshoot the system and determine the processes that may be affecting performance.	Mandatory

Platform & Service Management Requirements

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Overview

The Tennessee Consolidated Retirement System (TCRS) requires stringent platform and service management standards to ensure the reliability, availability, and security of the pension administration system (PAS).

Key metrics like 99.999% uptime, 24 -hour recovery time, and 15-minute recovery point are mandatory to minimize disruption. The vendor must meet prescribed response times based on incident severity, providing immediate notifications and detailed assessments. Responsiveness standards also apply post -implementation through technical support channels.

The vendor shall demonstrate a robust methodology for detecting and promptly mitigating security vulnerabilities at all stages per TCRS policies. Independent assessments may supplement vendor reporting.

Performance testing must validate sub-second response times for transactions during acceptance testing and at scale identical to production environments. The PAS platform should maximize throughput efficiency via parallelization with minimal online impact.

Change control processes that minimize risk are imperative for system stability. The vendor must furnish reports to demonstrate operational compliance, with deficiencies swiftly addressed. Continuous monitoring and optimization of service quality are central expectations.

Verification

Compliance with these requirements will be verified via Configuration Audits to validate the platform meets the requirements and via continuous monitoring by authorized TCRS staff to verify service levels are met.

Related Principles

Continuous Monitoring : Continuous monitoring involves the ongoing and systematic observation of an organization's IT systems, networks, and data to detect and respond to security threats, vulnerabilities, and compliance issues. This principle recognizes that cybersecurity threats and the technology landscape are constantly evolving, and traditional periodic security assessments are not sufficient to ensure adequate protection.

Health Checks and Monitoring: Implement health checks to monitor the operational status of different components and services, enabling proactive issue detection.

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Trust but Verify : TCRS fosters a trust relationship with all vendors. TCRS also performs due diligence and due care to ensure TCRS policies and practices are followed based on a risk management model.

Reliability

Label	Responsible	Requirement Statement	Priority
SRV.01.01	System	The system Recovery Time Objective (RTO) is a maximum system recovery time of 4 hours.	Mandatory
SRV.01.02	System	The system Recovery Point Objective (RPO) is a maximum period of lost transactions, data changes, or work -in - process of 15 minutes.	Mandatory
SRV.01.03	System	The System, in whole and in part, including but not limited to Hosting Services, must have Availability for User in accordance with Requirements 99.9% of the time 24 hours/day, seven days per week, except for planned maintenance that is communicated at least 48 hours in advance of system downtime. The intervals measured shall be every 5 minutes during guaranteed periods.	Mandatory

Support

Label	Responsible	Requirement Statement	Priority
SRV.02.01	Bidder	TCRS will determine the severity level assigned to a Technical Support Ticket. Severity Level– Critical Maximum Time Length for Initial Callback Performance Standard is 15 minutes. Expected Time to Resolution Performance Standard is 1 clock hours.	Mandatory

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Label	Responsible	Requirement Statement	Priority
SRV.02.02	Bidder	TCRS will determine the severity level assigned to a Technical Support Ticket. Severity Level- High Maximum Time Length for Initial Callback Performance Standard is 30 minutes. Expected Time to Resolution Performance Standard is 4 clock hours.	Mandatory
SRV.02.03	Bidder	TCRS will determine the severity level assigned to a Technical Support Ticket Severity Level- Medium Maximum Time Length for Initial Callback Performance Standard is 60 minutes. Expected Time to Resolution Performance Standard is 2 business days	Mandatory
SRV.02.04	Bidder	TCRS will determine the severity level assigned to a Technical Support Ticket. Severity Level–Low or Very Low Maximum Time Length for Initial Callback Performance Standard is 1 business day. Expected Time to Resolution Performance Standard is 1 week for Severity Level– Low and availability within the next Version Release or as otherwise agreed to by TCRS for Severity Level–Very Low.	Mandatory

Security for Implementation and Support

Label	Responsible	Requirement Statement	Priority
SRV.03.01	Bidder	Bidder shall notify the TCRS Project Director within one hour following the identification of any potential or actual major or minor incident , including any breach, any attack, or the introduction of any disabling device, related to the System.	Mandatory

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Label	Responsible	Requirement Statement	Priority
		<p>Bidder shall take corrective action to mitigate the potential or actual major or minor security incident within two hours following the identification of each potential or actual Security Incident.</p> <p>All potential or actual Security Incidents identification times shall be documented within the Security Report. Bidder shall provide Equipment, Facilities, Services or Software metrics to support the potential or actual Security Incidents identification time. Bidder shall also report the notification time of notifying the TCRS Project Director.</p> <p>Within the Security Report, Bidder shall document the correct action taken to mitigate the potential or actual Security Incidents. Bidder shall also provide Equipment or Software metrics to support the potential or actual Security Incidents correct action mitigation.</p> <p>Once an event has been confirmed to have an impact on security, the event is classified as a Security Incident. TCRS reserves the right to have an independent assessment of the security incident. The Bidder will provide reasonable support to the independent assessor in such instances.</p>	
SRV.03.02	Bidder	<p>Bidder shall provide a written report and assessment regarding all actions taken concerning each identified security incident, including any breach, any attack, or the introduction of any disabling device, the status, and any potential impact(s) to the TCRS Project Director of the security incident. Each security incident shall be categorized according to criticality as either minor or major.</p> <p>For a minor security incident, which causes limited loss of Confidential Information, integrity, protection, and/or availability of the System to organizational operations, organizational assets, or individuals, this</p>	Mandatory

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Label	Responsible	Requirement Statement	Priority
		<p>report and assessment shall be provided within <u>twelve (12) hours</u> following the identification of the minor security incident.</p> <p>For a <u>major security incident</u>, which causes serious or catastrophic loss of Confidential Information, integrity, protection, and/or availability of the Systems to organizational operations, organizational assets, or individuals, this report and assessment shall be provided within <u>eight (8) hours</u> following the identification of the major security incident. An initial high level and summary analysis shall be provided in <u>two (2) hours</u> following the identification of the major security incident.</p> <p>The TCRS Project Director, in his sole discretion, may require Bidder to update this report and assessment on an hourly or daily basis depending on criticality, status, and potential or real impact to TCRS</p>	

Performance

Label	Responsible	Requirement Statement	Priority
SRV.04.01	Bidder	<p>Bidder must meet the following response time Performance Standards for the System during Acceptance Tests and after the System, in whole or in part, is in Production:</p> <p>Maximum response time for query and update functions of 98% of covered transactions within 2 seconds.</p> <p>All Batch jobs must have a finite run -time of no more than 4 hours, except as otherwise approved by TCRS's Steering Committee</p>	Mandatory

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Integration Requirements

Overview

TCRS seeks a PAS with robust integration capabilities to efficiently connect with internal and external systems. The primary goal is to embed PAS capabilities within related business workflows, enabling authorized users to seamlessly access functionality without toggling between applications.

Tight integration between PAS and supporting components like imaging, case management, and correspondence management is mandatory through shared metadata models, single sign-on, and transparent user experiences. Workflows spanning multiple systems must provide end-to-end automation with configurable rules and analytics.

Flexible, standards-based integration approaches are required to interoperate with existing and future systems. This includes published APIs, managed file transfer protocols, batch scheduling, and message queuing across on-premises and cloud environments. Instrumentation for monitoring, logging, and alerting at the integration layer is crucial.

Vendors must demonstrate proven methodologies, tools, and artifacts to design, test, deploy, and maintain reliable interfaces aligned to industry best practices. A comprehensive plan detailing the strategy for defining, developing, and managing integration requirements across TCRS systems is needed. Responses must also address business continuity, data protection, and compliance considerations.

General Integration Requirements

Label	Responsible	Requirement Statement	Priority
INT.01.01	System	System interfaces will not require manual intervention for normal processing.	Mandatory
INT.01.02	System	The system will support dependencies when replacing existing interfaces with new interfaces.	Mandatory
INT.01.03	System	The system will provide an option to exchange files via Hypertext Transfer Protocol Secure (HTTPS).	Desired

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Label	Responsible	Requirement Statement	Priority
INT.01.04	System	The system will develop interfaces to support both hybrid on-premise and cloud architectures.	Mandatory
INT.01.05	System	All internal and external interfaces will be instrumented for performance metrics.	Mandatory
INT.01.06	System	Integration between internal TCRS systems must not require redundant work.	Mandatory
INT.01.07	System	The system must be able to meet the projected growth in processing volume of 10 percent per year for a period of 15-20 years following the end of the warranty period with no additional cost to TCRS.	Mandatory
INT.01.08	System	The system must support file exchange via Extensible Markup Language (XML), Comma Separated Value (CSV) files, fixed format, and JavaScript Object Notation (JSON) file formats.	Desired
INT.01.09	System	The system will accommodate synchronous and asynchronous updates to and from external data sources.	Mandatory
INT.01.10	System	The system will not rely on integration secrets that are unchanging passwords, such as API keys or shared privileged accounts.	Mandatory
INT.01.11	System	All data changes must be logged in the data change history log whether process is online, or batch executed.	Mandatory
INT.01.12	System	The system will have the ability to aggregate and correlate interface events with other system events to identify potential threats and vulnerabilities.	Mandatory
INT.01.13	Bidder	The bidder will ensure an Information Sharing Agreement is established with an external entity prior to proceeding with an Interface Control Document (ICD) or interface development.	Mandatory
INT.01.14	Bidder	The bidder will include all external interfaces as part of the Business Continuity Plan, defining	Mandatory

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Label	Responsible	Requirement Statement	Priority
		criticality and implement mechanisms for resumption consistent with the criticality.	
INT.01.15	Bidder	For interfaces already implemented, the bidder will leverage the existing Interface Control Document (ICD) and clearly indicate required modifications to meet current and future requirements.	Mandatory
INT.01.16	Bidder	The Bidder will ensure each system interface will have an approved Interface Control Document (ICD).	Mandatory
INT.01.17	Bidder	The Bidder will develop a comprehensive design and implementation plan or approach for defining, and developing interface requirements, including managing these activities for all known interfaces .	Mandatory
INT.01.18	System	The system will adhere to the Health Insurance Portability and Accountability Act (HIPAA).	Mandatory
INT.01.19	System	The system will comply with the National Automated Clearing House Association (NACHA) requirements for transactions that are performed electronically (EFTs, ACHs and others).	Mandatory
INT.01.20	System	The system will reuse interfaces and develop standardization processes to minimize interface design complexity.	Desired
INT.01.21	System	The system will leverage business logic to perform transformations as part of interface designs.	Mandatory
INT.01.22	Bidder	The bidder will maintain an interface catalog (both infrastructure and application external connectivity) that includes the related external information system, security controls, frequency, volume, and related technologies.	Mandatory
INT.01.23	System	The system will provide a mechanism to accept email from external partners with attachments.	Mandatory

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Label	Responsible	Requirement Statement	Priority
INT.01.24	System	The system will monitor for failed processes and send alerts based on non-receipt of files or messages.	Mandatory
INT.01.25	System	The system will design and implement logs in a manner that can be consumed by the TCRS's Security Information and Event Management (SIEM) solution.	Mandatory
INT.01.26	System	This system will develop temporary interfaces to maintain existing operations as part of a phased deployment.	Mandatory
INT.01.27	System	TCRS desires a system that provides a single point of management for all the system interfaces within the solution environment.	Desired
INT.01.28	Bidder	The Bidder will ensure each interface defined by a specific Interface Control Document (ICD) will have an associated operations guide.	Mandatory
INT.01.29	System	The system will have the ability to easily turn off all or specific interfaces if a security incident occurs.	Desired
INT.01.30	System	The system will protect any data related to an interface that is temporarily stored until processed (e.g., file directory, message queue, database staging table).	Mandatory

Application Programming Interface (API)

Label	Responsible	Requirement Statement	Priority
INT.02.01	System	The system will use published APIs to ensure support for interoperability between components.	Mandatory
INT.02.02	Bidder	The Bidder will provide API documentation using an Open API specification (e.g., Swagger).	Mandatory

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Label	Responsible	Requirement Statement	Priority
INT.02.03	Bidder	The Bidder will perform API testing using a common API test tool (e.g., Postman) for APIs exposed for integration or TCRS use for extending the solution capabilities.	Mandatory
INT.02.04	System	The system will provide a mechanism for versioning of the services.	Mandatory
INT.02.05	System	The system will provide a mechanism for error handling and logging that may occur during API access and use.	Mandatory
INT.02.06	System	The system will provide reporting and monitoring of the service endpoints.	Mandatory
INT.02.07	System	The system will provide a mechanism of throttling access to the service endpoints.	Mandatory
INT.02.08	System	The system will provide a mechanism for controlling the access to the service endpoints.	Mandatory
INT.0209	System	The system will not limit the number APIs for API consumption, enabling the infrastructure to scale using elasticity.	Mandatory
INT.02.0	Bidder	The Bidder's technical documentation will include API design and development guidance that includes API design standards, API documentation standards, API testing guidance, API versioning, API deployment, and API monitoring, troubleshooting and support. This must be provided to TCRS upon request.	Mandatory
INT.02.1	System	The system will use of TCRS approved API technologies, include RESTful APIs, gRPC and GraphQL to implement real-time interfaces.	Mandatory
INT.02.2	System	The system will provide integration and interface frameworks that facilitate and support connections to internal and external applications using standard application interfaces (APIs) such as Azure Application Programming Interface Management (APIM).	Desired

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Label	Responsible	Requirement Statement	Priority
INT.02.3	System	The system will provide a robust 'abstraction' layer consisting of services and relevant and secure APIs to facilitate real time bi-directional transmission of data between public facing systems and internal systems of record.	Mandatory
INT.02.4	System	The system will handle and manage transactions across systems to ensure transactional integrity (Atomicity, Consistency, Isolation, Durability (ACID) properties.	Mandatory

Managed File Transfer (MFT)

Label	Responsible	Requirement Statement	Priority
INT.03.01	System	The system will enforce access controls for file transfers, so that only authorized users can access sensitive information.	Mandatory
INT.03.02	System	The system will encrypt file transfers, so that sensitive information is protected during transmission.	Mandatory
INT.03.03	System	The system will monitor and log file transfers, so that an authorized user can detect and respond to security incidents.	Mandatory
INT.03.04	System	The system will support configuration of multi-factor authentication for file transfers, so that only authorized users can access sensitive information.	Mandatory
INT.03.05	System	The system will be configurable to enforce least privilege principles for file transfers, so that users have only the necessary access to sensitive information.	Mandatory
INT.03.06	System	The system will provide the ability to review and update security policies for file transfers, so that they align with industry best practices and NIST standards.	Mandatory

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Label	Responsible	Requirement Statement	Priority
INT.03.07	Bidder	The bidder will establish contingency plans for file transfers, so that information is protected in the event of a disaster or outage.	Mandatory
INT.03.08	Bidder	The bidder will enable TCRS, or designee, the ability to perform regular security assessments of the Managed File Transfer software, so that any potential security risks can identify and mitigate.	Mandatory
INT.03.09	System	The system will be configurable to enforce strict data retention policies for file transfers that contain PII, so that information is not kept longer than necessary.	Mandatory
INT.03.10	System	The system will be able to use APIs and web services to automate file transfers and integrate with other systems, so that the flow of information is streamlined.	Mandatory
INT.03.11	System	The Managed File Transfer component will be configurable at a system-wide basis and at the file/transaction type to enable TCRS to meet the unique requirements of TCRS and data contained in the files (e.g., PII, financial).	Mandatory
INT.03.12	System	The system will provide access to detailed log and audit information for file transfers, so that an authorized user can troubleshoot issues and improve the system.	Mandatory
INT.03.13	System	The Managed File Transfer component will be scalable to meet the growing needs of TCRS, so that it can handle increasing volumes of data and information.	Mandatory
INT.03.14	System	The system will implement a mechanism that prevents files with vulnerabilities to be introduced into the TCRS computing environment.	Mandatory
INT.03.15	System	A secure portal will be available for vendors to collaborate and upload files securely.	Desired

Data Integration

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Label	Responsible	Requirement Statement	Priority
INT.04.01	System	The system will replicate all system data to the target business intelligence platform at near real -time, but not longer than 60 minutes.	Mandatory
INT.04.02	System	This system will include an Extract Transform and Load (ETL) capability to process data attained from legacy systems and external data providers that have different data schemas.	Mandatory
INT.04.03	System	The system's data architecture will not prohibit the replication of data between the operational database to a data warehouse or secondary location while users are actively working.	Mandatory
INT.04.04	System	The system will enforce data integrity.	Mandatory
INT.04.05	System	The system will provide data extract capabilities.	Mandatory
INT.04.06	System	The system will provide a mechanism to view the raw data provided by external entities and compare it to the transformed data for verification and troubleshooting.	Desired
INT.04.07	System	The system will configure interfaces through a graphical user interface to review source -to-target mappings and overall interface architecture.	Mandatory
INT.04.08	System	The system must accept and create interface files/messages as full files and as changes only files.	Mandatory

Batch Processing

Label	Responsible	Requirement Statement	Priority
INT.05.01	System	The system will maintain a batch schedule, a timetable that defines when each batch should run.	Mandatory
INT.05.02	System	The system includes a batch scheduler responsible for executing the batch processes on an ad -hoc or scheduled basis.	Mandatory

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Label	Responsible	Requirement Statement	Priority
INT.05.03	System	The system provides an authorized user the ability to manually start a batch job.	Mandatory
INT.05.04	System	The system will provide an authorized user the ability to view the batch schedule.	Mandatory
INT.05.05	System	The system will provide an authorized user the ability to view the batch event log and filter by date and job type.	Mandatory
INT.05.06	System	The system will allow an authorized user to view the status of batch jobs.	Mandatory
INT.05.07	System	The system will allow an authorized user the ability to generate a report of the batch jobs executed.	Mandatory
INT.05.08	System	The system will be architected so the batch schedule can run concurrently with user on -line access.	Desired
INT.05.09	System	The batch component will be architected to enable large batch jobs to be multi-threaded (e.g., each transaction that is not dependent on other transactions can run in parallel; not sequentially executed) to reduce the time to complete (e.g., member annual statements, pension payroll).	Mandatory
INT.05.10	System	The system will be configurable to identify batches that can be run concurrently and spin up processes that can run in parallel.	Mandatory
INT.05.11	System	The batch platform will be designed to not impact or minimally impact on -line performance (e.g., separate processing to other computing devices or other methods to separate on -line and batch processing).	Mandatory
INT.05.12	System	The system will monitor batches and provide failure reports as applicable.	Mandatory
INT.05.13	System	The system will allow simultaneous batch and online processing and be able to throttle resources to minimize impacts to end user operations.	Mandatory
INT.05.14	System	The system will roll back or restart partially completed or aborted batch jobs.	Mandatory

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Label	Responsible	Requirement Statement	Priority
INT.05.15	System	The system will be configurable to limit the running of batches during specified timeframes .	Mandatory

ARIS Interfaces

Label	Responsible	Requirement Statement	Priority
INT.06.01	Bidder	The Bidder will implement known interfaces .	Mandatory
INT.06.02	System	The system shall support integration using Lightweight Directory Access Protocol (LDAP) or Single Sign-On (SSO) authentication.	Mandatory
INT.06.03	System	The system shall support the system management architecture through the support of Simple Network Management Protocol (SNMP) manageable platforms.	Mandatory
INT.06.04	System	The system shall integrate with TCRS's existing email platform.	Mandatory
INT.06.05	System	The system shall have the ability to integrate with an Interactive Voice Response (IVR) system to reuse PAS transactions via phone self-service.	Mandatory
INT.06.06	System	The system shall provide a mechanism (e.g., CTI) to integrate PAS data or capabilities within another application.	Mandatory
INT.06.07	System	The system shall provide a mechanism (e.g., message queuing) that enables the PAS solution to be operational if the Enterprise Content Management (ECM) solution or other integrated 3rd party packages are unavailable.	Mandatory

Data Management Requirements

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Overview

TCRS aims to maximize the value of its data to drive better pension decisions. This entails creating an integrated information ecosystem that spans essential capabilities - from ingestion to analytics. The vision is centered around empowering business users through easy access to accurate, timely insights.

Rather than a patchwork of siloed applications, the goal is seamless interoperability. Data flows securely between transactional and analytical platforms, unlocking self-service visualization and predictive modeling. Master data discipline and governance toolkits are crucial enablers.

Automation based on common standards streamlines processes end-to-end. Dedicated test environments accelerate development iterations without risk. Best practices ensure quality, while instrumentation tracks data lineage across systems. State-of-the-art techniques like encryption and masking reinforce security.

TCRS is seeking a strategic partnership to launch this data-driven transformation. Leveraging robust technologies and specialist skills will enrich information so that we can enhance fact-based decision making, quantify process improvements, and explore fresh quantitative breakthroughs - all centered on better pension outcomes.

The results will be continuous innovation enabled by maximizing ROI from high-quality data. We welcome creative ideas to advance our progress toward this vision. The following requirements provide details in support of this overall vision.

General Data Management Requirements

Label	Responsible	Requirement Statement	Priority
DAT.01.01	System	The system will provide the capability to publish data to a data warehouse that is dedicated to data analytics and separate from the transactional database.	Mandatory
DAT.01.02	Bidder	<p>The Bidder will:</p> <ul style="list-style-type: none"> Produce a consolidated ARIS Data Dictionary with definitions for all data entities and attributes Product data models that include conceptual, logical, and physical data models Provide tools for visualizing and documenting data architectures, data flows, and data dependencies 	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.01.03	Bidder	<p>The Bidder will provide:</p> <ul style="list-style-type: none"> • A data catalog that services as a central repository for data assets • A data catalog that includes data asset classification, tagging, and metadata enrichment for effective data discovery • Tools that provide search and browse capabilities to facilitate the discovery and exploration of data assets 	Mandatory
DAT.01.04	Bidder	<p>The Bidder shall provide Data Collaboration and Sharing capabilities to:</p> <ul style="list-style-type: none"> • Allow for secure data sharing and collaboration among authorized users and teams. • Provide access controls and permissions to ensure controlled sharing of data assets. • Support data annotation, data commenting, and data collaboration features to enhance collaboration and knowledge sharing 	Mandatory
DAT.01.05	Bidder	<p>The Bidder shall:</p> <ul style="list-style-type: none"> • Provide data management regulatory reporting and compliance management. • Provide tools to enable generation of data lineage documentation and data governance documentation. • Support compliance audits • Provide evidence of regulatory compliance 	Mandatory
DAT.01.06	Bidder	<p>The Bidder will provide a Data Dictionary describing the system's data structure including the database, tables, fields, foreign keys, dependencies, views, stored procedures, report documentation, etc. The system will also include graphical representations of the system's data structure.</p>	Mandatory
DAT.01.07	Bidder	<p>The Bidder shall maintain a Data Dictionary that includes the details required for mapping the current system data structure to the new system data structure.</p>	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.01.08	Bidder	The Bidder shall establish clear data governance policies and procedures for changing the database structure, reference data, and other data objects that aligns with TCRS's data governance policies and practices.	Mandatory
DAT.01.09	System	The system will provide Data Integration and Interoperability capabilities: <ul style="list-style-type: none"> • The system will facilitate the integration of data from various sources, systems, and formats. • It will support data transformation, data mapping, and data exchange between different applications and platforms. • The system will provide mechanisms for data interoperability and data exchange standards compliance. 	Mandatory
DAT.01.10	System	The system will provide Data Lifecycle Management capabilities: <ul style="list-style-type: none"> • The system will enable the management of data throughout its lifecycle, from creation to archiving or disposal. • The system will support data retention policies, data archiving, and data purging processes. • The system will facilitate data versioning, data change management, and data lineage tracking. 	Mandatory
DAT.01.11	Bidder	The Bidder will provide Data Ownership and Portability capabilities: <ul style="list-style-type: none"> • The Bidder will ensure TCRS retains full ownership of data and access to the database regardless of where the data is stored. • The Bidder shall not lock-in TCRS data and will provide an easy migration to alternative platforms, if desired. • The Bidder shall provide tools to enable the ability to add, remove, modify, and extract data as needed. 	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.01.12	Bidder	<p>The Bidder will provide Data Quality Management capabilities:</p> <ul style="list-style-type: none"> • The Bidder shall perform data profiling, data cleansing, and data validation to ensure data accuracy, completeness, and consistency. • The Bidder shall provide tools for data quality assessment, monitoring, and reporting to track and improve data quality over time. • The Bidder shall establish and enforce data quality rules and metrics. 	Mandatory
DAT01.13	Bidder	<p>The Bidder will provide Data Security and Privacy capabilities:</p> <ul style="list-style-type: none"> • The Bidder will incorporate robust security measures to protect data from unauthorized access, breaches, or malicious activities. • The Bidder will implement data encryption, access controls, and authentication mechanisms to ensure data confidentiality and integrity. • The Bidder will comply with relevant data privacy regulations and standards, providing features for data masking, anonymization, or consent management. 	Mandatory
DAT01.14	Bidder	<p>The Bidder will provide Data Strategy and Planning capabilities:</p> <ul style="list-style-type: none"> • The Bidder will facilitate the development and implementation of data strategies and roadmaps. • The Bidder will support the alignment of data management initiatives with business goals and objectives. • The Bidder will provide capabilities for defining data standards, data policies, and data management plans in alignment with TCRS data management policies and practices. 	Desired
DAT01.15	System	The system effective date all configuration settings to enable configurations to have a begin and end date.	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.01.16	System	The system must track all data changes to provide a historical view of each data change, when it occurred, and who made the change.	Mandatory
DAT.01.17	Bidder	<p>The Bidder will perform Master Data Management (MDM) activities:</p> <ul style="list-style-type: none"> • The Bidder will identify and manage master data entities, such as customer, product, or employee data. • The Bidder will use mechanisms to perform data deduplication, data consolidation, and data synchronization across multiple systems. • The Bidder will use tools that enable the creation and management of master data hierarchies, relationships, and business rules. <p>The system's Master Data Management (MDM) component will include robust data quality management capabilities to ensure the accuracy and consistency of master data.</p>	Mandatory
DAT.01.18	Bidder	<p>The Bidder will provide Metadata Management practices and tools that enable:</p> <ul style="list-style-type: none"> • Metadata management, including maintenance of data dictionaries, data lineage, and data definitions. • Metadata extraction and automatic documentation of data structures and relationships. • Metadata search and discovery to enhance data understanding and data asset reuse. 	Mandatory
DAT.01.19	System	<p>The system will provide Protected Health Information (PHI) capabilities:</p> <ul style="list-style-type: none"> • The system will ensure the secure storage, transmission, and handling of PHI. • The system will provide encryption mechanisms to protect PHI both at rest and in transit. • The system will enforce access controls and user authentication to restrict unauthorized access to PHI. 	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.01.20	System	<p>The system will provide Audit Controls capabilities:</p> <ul style="list-style-type: none"> • The system will provide robust audit trail capabilities to track and monitor access to PHI. • The system will record and retain audit logs of system activities and user actions related to PHI. • The system will support real-time alerts and notifications for suspicious or unauthorized access attempts. 	Mandatory
DAT.01.21	System	<p>The system will provide Data Privacy and Confidentiality capabilities:</p> <ul style="list-style-type: none"> • The system will include features for maintaining the privacy and confidentiality of PHI. • The system will enforce policies and controls to prevent unauthorized disclosure or access to PHI. • The system will support data masking or de-identification techniques to protect individual identities within PHI. 	Mandatory
DAT.01.22	Bidder	<p>The Bidder will perform Data Retention and Disposal services:</p> <ul style="list-style-type: none"> • The bidder will implement data retention and disposal policies in line with HIPAA guidelines. • The bidder will ensure secure data disposal, including the permanent deletion or destruction of PHI. • The bidder will implement data retention schedules to ensure compliance with HIPAA's data retention requirements. 	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.01.23	Bidder	<p>The Bidder will provide Risk Assessment and Management capabilities:</p> <ul style="list-style-type: none"> • The bidder will support risk assessment and management processes to identify and mitigate potential risks to PHI. • The bidder will perform vulnerability scanning, threat monitoring, and risk analysis activities. • The bidder will provide mechanisms for risk mitigation, incident response, and breach notification in accordance with HIPAA requirements. 	Mandatory
DAT0124	Bidder	<p>The bidder will perform Data Breach Notification services:</p> <ul style="list-style-type: none"> • The bidder will have mechanisms in place to detect and respond to data breaches promptly. • The bidder facilitates the notification of affected individuals and relevant authorities as required by applicable data breach notification laws. • The bidder will perform incident response services to mitigate the impact of data breaches and prevent further unauthorized access. 	Mandatory
DAT0125	System	<p>The system will provide Data Privacy and Confidentiality capabilities:</p> <ul style="list-style-type: none"> • The system will include features for maintaining data privacy and confidentiality. • The system will enforce policies and controls to prevent unauthorized disclosure or access to personal data. • The system will support data masking or anonymization techniques to protect individual identities within personal data. 	Mandatory
DAT0126	System	The system will use a database based on a Relational Database Management System (RDBMS).	Mandatory
DAT0127	System	The system will provide audit trails and logging capabilities to ensure accountability and traceability of reference data changes.	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.01.28	System	The system will provide a system -wide mechanism for configuring reference data entities and reference data values (e.g., modules must not use different ways of managing reference data).	Mandatory
DAT.01.29	Bidder	The bidder will establish practices for managing and documenting changes to reference data elements, including approvals and notifications.	Mandatory
DAT.01.30	System	The system will support versioning of reference data to track changes and maintain a historical record.	Mandatory
DAT.01.31	System	<p>The system will provide Scalability and Performance capabilities:</p> <ul style="list-style-type: none"> • The system will be scalable to handle growing data volumes and increasing user loads. • The system will provide efficient data processing and query performance to ensure timely access to data. • The system will support workload management and resource optimization for optimal performance. 	Mandatory

Business Intelligence & Data Analytics

Label	Responsible	Requirement Statement	Priority
DAT.02.01	System	The system will include a user -friendly data analytics platform integrated across all components. The data analytics platform will be capable of integrating data from sources in addition to the PAS database (e.g., financial data, funding strategy and risk, etc.).	Mandatory
DAT.02.02	System	The system will provide the capability to run data projections on various populations. For example, using the data retrieved for a scheduled report or ad hoc report, the system must determine trends in the data and project those trends into the future given an expiration or end date as defined by the user.	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.02.03	System	<p>The system will provide Data Visualization and Reporting capabilities:</p> <ul style="list-style-type: none"> a. The system will provide data visualization tools to create informative and interactive dashboards and reports. b. Its system will support data analytics and data exploration to derive insights from the data. c. The solution should facilitate the scheduling and distribution of automated data reports to stakeholders. 	Mandatory
DAT.02.04	Bidder	The system will include dashboards that are business - user configurable and provide metrics to allow supervisors to monitor work and work -in-progress along with statistics from the data analytics platform.	Mandatory
DAT.02.05	System	The data analytics platform will be capable of producing interactive data visualizations. The system will provide a range of visualization options, including charts, graphs, and tables, to present data insights effectively.	Mandatory
DAT.02.06	System	The system will only allow a user to distribute reports to recipients with data access rights.	Mandatory
DAT.02.07	System	The system will provide two basic types of reports: pre - developed reports and an ad hoc querying/reporting tool for business users.	Mandatory
DAT.02.08	System	<p>The system will provide Data Access and Querying capabilities:</p> <ul style="list-style-type: none"> a. The system will enable easy data access through intuitive interfaces and query tools. b. It will support ad -hoc querying, data exploration, and data retrieval from the data repository. c. The system will offer data federation and data virtualization capabilities to integrate data from disparate sources. 	Mandatory
DAT.02.09	System	The system will provide the ability to create, save, and re-use queries and reports. This includes the ability for users to save reports as personal or public.	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.02.10	System	The system will be able to export reports in varying formats (e.g., CSV, fixed width, PDF, XLS, DOC, XML and JSON).	Mandatory
DAT.02.11	System	The system will provide the capability to set validations or limits on queries and reports such that system performance is not affected (e.g., limit number of results shown per page).	Mandatory
DAT.02.12	System	The system will produce reports of professional appearance, including the following components: <ul style="list-style-type: none"> • Page Numbers • Header • Footer • Title • Description / Overview • Summary Statistics • User ID that generated the report • Date of report generation • Time of report generation • Metadata (e.g., data classification) 	Mandatory
DAT.02.13	System	The system will support data classification metadata in reports, forms, letters, and e-communications.	Mandatory
DAT.02.14	System	The system will be capable of querying data classification metadata.	Mandatory
DAT.02.15	System	The reporting tool must provide for the ability to limit the visibility of Personally Identifiable Information (PII) on reports (e.g., masking fields, displaying only the last 4 digits of the SSN).	Mandatory
DAT.02.16	System	The system will support the integration of master data from various sources and systems. It should have the capability to consolidate, and cleanse duplicate or conflicting master data records. It should provide mechanisms for data mapping, transformation and harmonization during integration.	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.02.7	System	<p>The system will support Data Analytics and Business Intelligence capabilities:</p> <ul style="list-style-type: none"> a. The solution should support data analytics and business intelligence capabilities, such as data visualization, reporting, and data mining. b. It should provide integration with analytical tools or platforms to enable advanced analytics and data - driven decision -making. c. The solution should facilitate the integration of data analytics models, algorithms, or machine learning capabilities. 	Mandatory
DAT.02.8	System	<p>The Business Intelligence platform will integrate with Ecosystem:</p> <ul style="list-style-type: none"> a. The platform will support integration with other tools and systems within the data ecosystem, such as data integration tools, data governance tools, and analytics platforms. b. The platform will have APIs or connectors to facilitate seamless data exchange and interoperability. c. The platform will support standard data interchange formats, such as CSV, JSON, or XML, to enable interoperability with other systems. 	Mandatory
DAT.0219	System	<p>The Business Intelligence platform will have Disaster Recovery and High Availability capabilities:</p> <ul style="list-style-type: none"> a. The platform will have robust disaster recovery mechanisms to ensure data availability and minimize downtime in case of system failures or disasters. b. It will support data replication, failover, and backup strategies to provide high availability and data resilience. c. The platform will have documented disaster recovery plans and procedures for timely recovery and restoration of data. 	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.02.0	System	<p>The Business Intelligence platform will provide Data Lineage and Impact Analysis capabilities:</p> <ol style="list-style-type: none"> The platform will provide data lineage tracking capabilities to trace the origin and transformation of data. It will support impact analysis to assess the impact of changes to data sources, transformations, or schema design. The platform will offer visual representations or documentation of data lineage and impact analysis for data auditing and compliance purposes. 	Mandatory
DAT.02.1	System	<p>The Business Intelligence platform will provide Performance Monitoring and Optimization capabilities:</p> <ol style="list-style-type: none"> The platform will provide monitoring and performance optimization features to ensure efficient data processing and query performance. It will offer performance monitoring dashboards, query optimization tools, and resource utilization tracking. The platform will support workload management and query tuning techniques to optimize performance. 	Mandatory
DAT.02.2	System	<p>The Business Intelligence Platform will provide Data Security and Access Control capabilities:</p> <ol style="list-style-type: none"> The platform will have robust data security measures to protect sensitive data and ensure compliance with privacy regulations. It will provide role-based access control mechanisms to manage user permissions and restrict data access based on user roles and responsibilities. The platform will support data masking, encryption, and auditing features to ensure data confidentiality, integrity, and traceability. 	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.02.2	System	<p>The BI Platform will provide Data Storage and Management capabilities:</p> <ul style="list-style-type: none"> a. The platform will provide scalable and efficient data storage capabilities to handle large volumes of data. b. It will support compression, partitioning, and indexing techniques to optimize storage and query performance. c. The platform will offer data management features, such as data partitioning, archiving, and data lifecycle management. 	Mandatory
DAT.02.4	System	<p>The BI Platform will provide Data Modeling and Schema Design capabilities:</p> <ul style="list-style-type: none"> a. The platform will enable the creation of logical and physical data models to represent the structure and relationships of the data. b. It will support dimensional modeling techniques, such as star schemas or snowflake schemas, to optimize query performance for analytical queries. c. The platform will provide tools or capabilities for schema design, data modeling, and metadata management. 	Mandatory

Development & Operations (DevOps)

Label	Responsible	Requirement Statement	Priority
DAT.03.01	System	<p>The system will provide Data Relationships and Hierarchies capabilities:</p> <ul style="list-style-type: none"> a. The system will support defining relationships and hierarchies between different data entities. b. It will allow configuring parent-child relationships, composite keys, or linking records based on predefined criteria. 	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.03.02	System	The system will provide Data Security and Access Controls capabilities: a. The system will provide granular data access controls to restrict user access to sensitive or confidential data. b. It will allow defining user roles and permissions at the field, record, or entity level to ensure data confidentiality and integrity.	Mandatory
DAT.03.03	System	The system should provide mechanisms for versioning and tracking changes to data assets, including databases, data models, and data transformations.	Mandatory
DAT.03.04	System	The system should allow for the visualization and tracing of data lineage, enabling users to understand the origin, transformations, and flow of data throughout the application lifecycle.	Mandatory
DAT.03.05	System	The deployment of data assets such as database schemas, ETL processes, and data pipelines will follow configuration management and DevOps practices to provide an audit of all data changes applied to the system.	Mandatory
DAT.03.06	System	The system should allow rollback or version control of deployed data assets in case of issues or errors.	Mandatory
DAT.03.07	System	The system should provide Data Backup and Recovery capabilities : a. The data operations solution should provide automated and regular backups of critical data to ensure data protection and disaster recovery. b. It should support backup scheduling, data retention policies, and offsite storage options for reliable data recovery. c. The solution should include mechanisms for efficient data restoration and recovery in case of data loss or system failures.	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.03.08	System	<p>The system should provide Data Storage and Archiving capabilities:</p> <ol style="list-style-type: none"> The system should offer scalable and secure data storage options that accommodate the organization's data volume and growth. It will support data archiving capabilities, allowing the transfer of infrequently accessed or historical data to lower-cost storage tiers. The solution will facilitate data retrieval and access controls for archived data, ensuring compliance with retention policies and regulatory requirements. 	Mandatory
DAT.03.09	System	<p>The system will provide Data Security and Privacy capabilities:</p> <ol style="list-style-type: none"> The data operations solution should incorporate robust security measures to protect data from unauthorized access, breaches, or malicious activities. It should support encryption of data at rest and in transit, as well as access controls and authentication mechanisms. 	Mandatory
DAT.03.10	System	<p>The system will provide Data Monitoring and Alerting capabilities:</p> <ol style="list-style-type: none"> The system will provide monitoring capabilities to track the health, performance, and usage of data systems and infrastructure. It will offer real-time alerts and notifications for data-related issues, anomalies, or breaches. The system will support customizable monitoring dashboards and reporting to facilitate proactive data management and troubleshooting. 	Mandatory
DAT.03.11	System	<p>The system will provide Data Quality Management capabilities:</p> <ol style="list-style-type: none"> The data operations system will enable continuous data quality monitoring and management. It will provide mechanisms for data profiling, data cleansing, and data validation to ensure data accuracy, consistency, and completeness. The system will support data quality rules, metrics, and reporting to assess and improve data quality over time. 	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.03.12	System	<p>The system will provide Performance Optimization capabilities:</p> <ul style="list-style-type: none"> a. The system will include tools and capabilities to optimize data performance, such as query optimization, indexing, and caching. b. It will support performance monitoring and analysis to identify bottlenecks, optimize data access, and improve overall system performance. c. The system will facilitate workload management and resource allocation to ensure optimal data processing and response times. 	Mandatory
DAT.03.13	Bidder	<p>The Bidder will provide Data Change Management capabilities:</p> <ul style="list-style-type: none"> a. The Bidder provide change management processes for tracking and managing data changes. b. The Bidder will perform change impact analysis to understand the consequences of data changes on systems and processes. c. The Bidder will implement change request workflows, approvals, and versioning for cont rolled data changes. 	Mandatory
DAT.03.14	Bidder	<p>The bidder will provide Data Operations and Management:</p> <ul style="list-style-type: none"> a. The bidder will support day -to-day data management operations, including data ingestion, data transformation, and data loading. b. The bidder will provide scheduling capabilities for data processes, data workflows, and data pipelines. c. The bidder will perform data monitoring, data auditing, and data performance optimization. 	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.03.15	System	The system will provide Data Monitoring and Auditing capabilities: a. The system will provide monitoring capabilities to track data usage, access patterns, and suspicious activities. b. The system will audit logs and reporting functionalities to facilitate compliance audits and regulatory requirements. a. c. The system will implement real -time alerts and notifications for security incidents or unusual data access patterns.	Mandatory
DAT.03.16	System	The system will retain all data until a deletion request is submitted. The system will securely delete data within 30 days of a deletion request.	Mandatory
DAT.03.17	System	The system will ensure a maximum data error rate of 0.5% for all data processing and reporting functionalities.	Mandatory
DAT.03.18	System	The system performs data requests within 2 seconds for standard operations and within 5 seconds for complex queries.	Mandatory
DAT.03.19	System	All sensitive data will be encrypted using AES -256 encryption both at rest and during transmission over public networks.	Mandatory
DAT.03.20	System	The system will perform daily backups of customer data and provide a recovery point objective (RPO) of 24 hours.	Mandatory
DAT.03.21	System	The system will be available for data access and retrieval 99.9% of the time.	Mandatory
DAT.03.22	System	The system will provide monthly compliance reports, including information on data access logs, security incidents, and data usage statistics.	Mandatory
DAT.03.23	System	The system will store and process TCRS data within data centers located in the United States, in compliance with applicable data residency requirements.	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.03.24	System	The system will support data transfer speeds of at least 100 Mbps for both uploading and downloading operations.	Mandatory
DAT.03.25	System	The system will have an RTO of 4 hours, meaning it will recover data and resume operations within 4 hours in the event of a major system failure.	Mandatory
DAT.03.26	System	The system will use industry -standard key management practices, including secure key storage, rotation , and access controls.	Mandatory

Data Migration

Label	Responsible	Requirement Statement	Priority
DAT.04.01	System	<p>The system will provide data mapping and transformation capabilities:</p> <ol style="list-style-type: none"> The data migration solution should support mapping of data fields between source and target systems, ensuring proper alignment. It should provide capabilities for data transformation, including data format conversions, data cleansing, and data validation. The solution should enable the definition and execution of data transformation rules and business logic during the migration process. 	Mandatory
DAT.04.02	System	<p>The system will provide data extraction and preprocessing:</p> <ol style="list-style-type: none"> The system should allow for the extraction of data from the source system(s) in a structured and consistent manner. It should support data preprocessing activities, such as data filtering, aggregation, or consolidation, before migrating to the target system. The system should handle data dependencies and relationships, ensuring data integrity and referential integrity during extraction and preprocessing. 	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.04.03	System	<p>The system will provide data quality assessment and cleansing:</p> <ol style="list-style-type: none"> The data migration solution should include mechanisms for assessing the quality of the data being migrated. It should provide data profiling and analysis capabilities to identify and address data quality issues before migration. The solution should enable data cleansing activities, such as deduplication, data standardization, and data validation, to ensure data accuracy and consistency. 	Mandatory
DAT.04.04	System	<p>The system will provide data validation and reconciliation:</p> <ol style="list-style-type: none"> The system should support data validation and reconciliation between the source and target systems after the migration process . It should facilitate the comparison of migrated data with the original source data to identify any discrepancies or data loss. The system should enable data validation against predefined business rules or data quality metrics to ensure the integrity of t he migrated data. 	Mandatory
DAT.04.05	System	<p>The system will provide error handling and rollback:</p> <ol style="list-style-type: none"> The data migration solution should have robust error handling mechanisms to capture and log migration errors or exceptions. It should provide functionality to rollback or revert the migration process in case of critical errors or data inconsistencies. The solution should support error resolution and data correction capabilities to address any issues encountered during the migration. 	Mandatory
DAT.04.06	System	<p>The system shall provide data security and privacy:</p> <ol style="list-style-type: none"> The system should prioritize data security during the migration process, ensuring the protection of sensitive and confidential data. It should comply with relevant data privacy regulations and standards, including encryption, data masking, or anonymization techniques. 	Mandatory

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Label	Responsible	Requirement Statement	Priority
		c. The system should include access controls and authentication mechanisms to restrict unauthorized access to data during migration.	
DAT.04.07	System	<p>The system shall provide data governance and auditability:</p> <ul style="list-style-type: none"> a. The data migration capabilities should provide audit trails and logging capabilities to track and document migration activities. b. It should support compliance with data governance policies and standards , including data lineage and metadata management. c. The system should facilitate the capture of migration metrics and reporting for audit purposes and performance analysis. 	Mandatory

Test Data Management

Label	Responsible	Requirement Statement	Priority
DAT.05.01	System	<p>The system will provide Data Generation Capabilities:</p> <ul style="list-style-type: none"> a. The test data management will should provide mechanisms for generating realistic and diverse test data sets. b. It should support the generation of data with varying characteristics, including different data types, formats, and volumes. c. The system will allow for the customization of data generation rules and scenarios to simulate real-world test scenarios. 	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.05.02	System	<p>The system will provide Data Privacy and Masking capabilities:</p> <ol style="list-style-type: none"> The solution will include features for data privacy and sensitive data protection during test data generation. It will support data masking techniques to anonymize or obfuscate sensitive information, ensuring compliance with data privacy regulations. The solution will provide configurable data masking rules and algorithms to generate masked data that retains the structure and integrity of the original data. 	Mandatory
DAT.05.03	System	<p>The system will provide Data Variation and Diversity capabilities:</p> <ol style="list-style-type: none"> The test data management system will enable the creation of diverse test data that covers a wide range of scenarios and edge cases. It will support data variation techniques, such as data permutations, randomization, or data mutation, to generate a comprehensive test data set. The system will allow for the incorporation of data dependencies and relationships to ensure realistic data scenarios. 	Mandatory
DAT.05.04	System	<p>The system will provide Data Volume and Scalability capabilities:</p> <ol style="list-style-type: none"> The system will be able to generate test data in large volumes to mimic real-world data sets and workload conditions. It will support scalability to generate test data sets of varying sizes, accommodating the needs of different testing scenarios. The system will provide efficient data generation algorithms and processing methods to generate large volumes of test data within reasonable time frames. 	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.05.05	System	<p>The system will provide Data Reusability and Versioning capabilities:</p> <ol style="list-style-type: none"> a. The test data management system will allow for the reuse of generated test data across multiple testing cycles and scenarios. b. It will support data versioning to track changes and iterations of test data, enabling effective test data management and tracking. c. The solution will provide mechanisms to manage and organize test data versions, ensuring traceability and reproducibility of test results. 	Mandatory
DAT.05.06	System	<p>The system will provide Data Subset Creation capabilities:</p> <ol style="list-style-type: none"> a. The system will offer capabilities to create subsets of test data for specific testing scenarios or subsets of data required for targeted testing. b. It will provide filtering and selection options to extract and manipulate specific subsets of data from the overall test data set. c. The system will support the creation of representative subsets that maintain the characteristics and distribution of the original data set. 	Mandatory
DAT.05.07	System	<p>The system will provide Data Integration and Synchronization capabilities:</p> <ol style="list-style-type: none"> a. The test data management system will facilitate the integration and synchronization of test data with test environments and systems under test. b. It will provide interfaces or integration capabilities to seamlessly load test data into the target systems or test environments. c. The system will support data synchronization mechanisms to keep test data aligned with the evolving systems and data changes. 	Mandatory

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Label	Responsible	Requirement Statement	Priority
DAT.05.08	System	<p>The system will provide Data Documenta tion and Metadata capabilities:</p> <ul style="list-style-type: none"> a. The system will enable the documentation and management of test data metadata, including data definitions, data sources, and data generation rules. b. It will provide a centralized repository or catalog to store and retrieve te st data documentation and metadata. c. The system will allow for the association of test data with specific test cases, requirements, or test scenarios for traceability and impact analysis. 	Mandatory
DAT.05.09	System	<p>The system will provide Data Governance and Compliance capabilities:</p> <ul style="list-style-type: none"> a. The test data management solution should comply with data governance policies, ensuring the appropriate use and management of test data. b. It should facilitate compliance with data privacy and data protection regulatio ns, ensuring the secure handling of test data. c. The solution should support access controls and permissions to restrict . 	Mandatory

Delivery Requirements

Overview

TCR expects stringent system delivery standards spanning planning, development, testing, security, operations, and documentation to instill confidence that the PAS implementation will meet requirements.

Comprehensive test coverage is mandatory, including end -to-end validation by role (e.g., business, compliance) across non -production and production -representative environments. Test rigor must

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prove functionality, interoperability, resiliency, recoverability, scalability, and accessibility pre-deployment while setting the framework for ongoing regression testing.

Strict secure SDLC protocols are required throughout the project lifecycle driven by NIST, incorporating threat modeling, static/dynamic analysis, penetration testing, and remediation. Operational plans for security, disaster recovery, DevOps procedures, maintenance, and skills transfer ensure continuity of operations.

Documentation deliverables should empower business user self-sufficiency through job aids, policy manuals, technical reference material, and configuration guides. Design artifacts will provide TCRS with architectural visibility ensuring flexibility for future integrations, extensions, and upgrades.

The vendor must demonstrate with tangible evidence how proposed methodologies, underlying platform capabilities, and project team skills will satisfy these system delivery expectations built on industry best practices.

Architecture & Design

Label	Responsible	Requirement Statement	Priority
DEL.01.01	Bidder	The Bidder must develop a Concept of Operation (ConOps) document that outlines the high-level description of how a system, operation, or project will be conducted. It should include stakeholder alignment, requirements definition, scope definition, risk identification and mitigation, decision-making support, system design and development guidance, communications, and collaboration, and testing and validation approach.	Mandatory
DEL.01.02	Bidder	The Bidder will develop and maintain an up-to-date Architecture Design Document (ADD) for the ARIS integrated solution. The ADD is approved for each major ARIS release. The ADD shall include system diagrams, infrastructure setup, data flow, security measures, and APIs. This documentation will aid in understanding the solution's technical aspects and assist with future integrations, configurations, or extensions.	Mandatory

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Label	Responsible	Requirement Statement	Priority
DEL.01.03	Bidder	The Bidder must accept responsibility for: (a) understanding, documenting, and implementing the rules, regulations, procedures, and practices into its solution, as directed, and agreed by TCRS;(b) using a business rules modeling language, such as the Decision Model and Notation (DMN), to express and represent and document the software's business rules ; DMN provides a standardized notation for modeling decision logic and rules;(b) clearly documenting the dependencies between different rules and decision points.	Mandatory
DEL.01.04	Bidder	An interface catalog (both infrastructure and application external connectivity) shall be maintained that includes the related external information system, security controls, frequency, volume, and related technologies.	Mandatory
DEL.01.05	Bidder	The technology (software, hardware, and protocols) defined in the Bidder's proposal will establish the Technology Catalog Baseline. All changes to the technology catalog will be reviewed and approved by the TCRS Information Security Officer (ISO).	Mandatory
DEL.01.06	Bidder	The Bidder shall support TCRS in performing an independent Configuration Management Audit of the CM repositories and related version management, build, deployment, release management and environment management processes to verify compliance with NIST CM Controls.	Mandatory
DEL.01.07	Bidder	Each system interface shall have an approved Interface Control Document (ICD).	Mandatory

Testing

Label	Responsible	Requirement Statement	Priority
DEL.02.01	Bidder	The Bidder shall identify and prepare test plans, test variants, test scenarios, test cases, test scripts, test	Mandatory

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Label	Responsible	Requirement Statement	Priority
		data, and expected results for the entire system and for all testing levels for each functional rollout.	
DEL.02.02	Bidder	Bidder shall ensure that the IPA/A develops a test program and sampling plan to reconcile and confirm the assertion that its data conversion programs and processes result in an accurate conversion of data from the current system(s) to the new system without material error or change in the financial and actuarial basis.	Mandatory
DEL.02.03	Bidder	The Bidder shall validate and verify the business rules: Perform validation and verification activities to ensure the correctness and completeness of the bidder's modeled business rules. Conduct thorough testing to verify that the rules produce the desired outcomes and adhere to the expected behavior.	Mandatory
DEL.02.04	Bidder	The Bidder shall perform end -to-end business process testing.	Mandatory
DEL.02.05	Bidder	The Bidder shall provide imaging test plans.	Mandatory
DEL.02.06	Bidder	The Bidder shall provide unit test execution report(s) for each functional rollout phase.	Mandatory
DEL.02.07	Bidder	The Bidder shall provide system test execution reports for each functional rollout phase.	Mandatory
DEL.02.08	Bidder	The Bidder shall provide imaging test execution reports for each release that includes imaging updates.	Mandatory
DEL.02.09	Bidder	The Bidder shall plan and execute complete, end -to-end testing of the solution, not just the customizations done for TCRS.	Mandatory
DEL.02.10	Bidder	The Bidder shall provide a mechanism for reporting actual test results vs. expected results and for tracking all errors and problems identified during test execution, as well as their resolution (including trend analysis for tests completed, errors identified, rework	Mandatory

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Label	Responsible	Requirement Statement	Priority
		efforts, and retesting effort s, in both numeric and graphical presentations).	
DEL.02.11	Bidder	The Bidder shall deliver a Test Strategy and Test Management Plan to TCRS.	Mandatory
DEL.02.12	Bidder	The Bidder will prepare a separate test plan and set of materials for each f unctional cutover.	Mandatory
DEL.02.13	Bidder	The Bidder will provide all test data results for each functional rollout in the established repository.	Mandatory
DEL.02.14	Bidder	Perform and certify successful completion (at a minimum 95% level) of integration testing by the Bidder for each functional rollout prior to TCRS UAT.	Mandatory
DEL.02.15	Bidder	Perform and certify successful completion (at a minimum 95% level) of system testing (including end-to-end testing, performance - and backup and recovery-testing, and the full Bidder -developed suite of UAT tests) by the Bidder for each functional rollout prior to TCRS UAT.	Mandatory
DEL.02.16	Bidder	Demonstrate via a performance benchmark test to be conducted as mutually agreed to between the Bidder and TCRS at the time of each functional rollout, that the proposed solution will meet all performance criteria when all the following are running: <ul style="list-style-type: none"> • Standard LOB applications. • Ad hoc query is in use. • 100 concurrent sessions of TCRS staff users (whether internal or external [i.e., working from home or another remote location]). • 100 active Wage and Contribution transmissions occurring (i.e., 100 employer wage and contribution reports simultaneously submitted). • 500 concurrent external users accessing the system through the web. • Multiple instances of unattended processes such as interest calculation, 1099 generation, etc. 	Mandatory

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DEL.02.17	Bidder	Perform stress testing (designed to break the solution by overwhelming it or by depriving it of resources) for each functional rollout, demonstrating that the system is recoverable – i.e., that it fails and recovers gracefully.	Mandatory
DEL.02.18	Bidder	Perform volume testing (by introducing a constantly increasing load in an attempt to expose weaknesses that do not surface in routine testing) as part of the acceptance of each functional rollout.	Mandatory
DEL.02.19	Bidder	Prepare a regression test plan describing (1) the core test bed that ensures appropriate coverage of complete system functionality, and (2) how each specific programming change made to the solution will be classified, and how a test for its integrity will be incorporated into the regression test bed.	Mandatory
DEL.02.20	Bidder	Supply TCRS with the complete set of regression test instructions, scripts, expected outcomes, etc., upon final cut-over.	Mandatory
DEL.02.21	Bidder	Deliver an Acceptance Test Plan.	Mandatory
DEL.02.22	Bidder	Deliver a Web Accessibility Plan	Mandatory
DEL.02.23	Bidder	Accessibility testing shall be performed initially as part of the initial deployment will be within scope of on-going enhancements and operations.	Mandatory
DEL.02.24	Bidder	Accessibility testing shall be performed using the combination of operating systems, browsers and assistive technologies based on an TCRS approved Accessibility Test Plan.	Mandatory
DEL.02.25	Bidder	Accessibility testing shall include both automated testing and manual testing.	Mandatory

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Application Security



The table below contains the recommended security deliverables for the Bidder and TCRS based on the NIST Risk Management Framework (RMF). The diagram illustrates the RMF steps which are also referenced in the table.

Step	Input	Output
1. Categorize System	Concept of Operations	System Categorization * Data Categorization *
2. Select Security Controls	System Categorization Data Categorization	System Security Plan (SSP) * Security Architecture Description *
3. Implement Security Controls	System Security Plan (SSP) Security Architecture Description	Secure Development Environment(s) * Secure Test Environment(s) * Secure Operations Environment(s) * Disaster Recovery Plan (DRP) * Disaster Recovery Testing *
4. Assess Security Controls	Secure Development Environment(s) Secure Test Environment(s) Secure Operations Environment(s)	Security Assessment Plan (SAP)** Security Assessment Report (SAR)** Plan of Action and Milestones (POAM) *
5. Authorize Information System	Security Assessment Plan (SAP) Security Assessment Report (SAR)	Authorization to Operate (ATO)**
6. Monitor Security Controls	System Security Plan (SSP) Environments Security Alerts	Vulnerability Scan Reports * Plan of Action and Milestones (POAM) *

<< SSP based on NIST 800-53 security controls

* Solution/Service Provider Ownership

** Client Ownership

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Label	Responsible	Requirement Statement	Priority
DEL.03.01	Bidder	Produce a detailed System Security Plan , including an overview of all the security requirements associated with the proposed system (all components) throughout its life cycle, as well as a description of the processes and controls that are necessary to protect the application from loss, misuse, or unauthorized access to or modification of information –this plan must be produced within the first three months of the project's start.	Mandatory
DEL.03.02	Bidder	For all security vulnerabilities discovered, the Bidder will maintain a Plan of Action and Milestones (POAM) to document the planned remediation actions to correct weaknesses or deficiencies noted during the assessment of the controls and to reduce or eliminate known vulnerabilities in the system. This will be within the required scope during the implementation and through the warranty period. (Post-implementation will be addressed separately.)	Mandatory
DEL.03.03	Bidder	The Bidder will update and distribute to TCRS the POAM on a quarterly basis based on the findings from control assessments, independent audits or reviews, and continuous monitoring activities. This must be included all the way through the go-live and warranty period.	Mandatory
DEL.03.04	Bidder	The Bidder shall conduct penetration testing of the production system in accordance with the Open-Source Security Testing Methodology Manual prior to the projected "go live" date of any public-facing portions of the application. This includes, at a minimum, testing to determine the system's susceptibility to any of the following threats: <ul style="list-style-type: none"> • Operating system kernel flaws • Buffer overflow attacks • Improper server or network hardware configuration • Password cracking or missing passwords • Race conditions • Improper database, file, or directory permissions 	Mandatory

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Label	Responsible	Requirement Statement	Priority
		<ul style="list-style-type: none"> Denial of service attacks 	
DEL03.05	Bidder	Develop a Disaster Recovery Plan (DRP) prior to the initial release, to be updated as necessary during the warranty period.	Mandatory

DevOps

Label	Responsible	Requirement Statement	Priority
DEL.04.01	Bidder	Provide a written methodology for tracking changes and defect corrections to the system.	Mandatory
DEL.04.02	Bidder	The Bidder shall develop and maintain a Maintenance and Operations Plan (M&O Plan) that is a comprehensive document that outlines the strategies, procedures, and resources required to effectively maintain and operate the system. This must be submitted and approved at least three months prior to the go-live date.	Mandatory
DEL.04.03	Bidder	The Bidder shall provide system administration documentation, including material for both business analysts who need to reconfigure a function and IT staff who need to reconfigure/maintain/support the system.	Mandatory
DEL.04.04	Bidder	The Bidder shall provide written procedures for system maintenance tasks such as table/parameter updates, drop down value changes, new rates, factors, etc.	Mandatory
DEL.04.05	Bidder	The Bidder shall provide documentation of backup and recovery procedures (complete with recommended schedule).	Mandatory
DEL.04.06	Bidder	The Bidder shall provide documentation of error code descriptions accompanied by a discussion of how to work around or recover from the particular error condition.	Mandatory

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DEL.0407	Bidder	The Bidder shall provide system tuning documentation providing TCRS personnel with the information they need to adjust performance.	Mandatory
DEL.0408	Bidder	The Bidder shall provide documentation on all aspects of pension administration system configuration such as changing of tax codes, addition of new plans, etc.	Mandatory
DEL.0409	Bidder	The Bidder shall provide documentation on aspects of the system that are configurable but for functions other than pension administration system -specific (e.g., frequency of backups).	Mandatory
DEL.04.0	Bidder	The Bidder shall provide operational system documentation in support of the imaging and workflow.	Mandatory
DEL.04.1	Bidder	The Bidder shall provide system administrator operations manual in support of the imaging and workflow.	Mandatory
DEL.04.2	Bidder	The Bidder shall provide imaging software technical procedures manual(s).	Mandatory
DEL.04.3	Bidder	The Bidder shall provide documentation of workflow processes and procedures.	Mandatory
DEL.04.4	Bidder	The Bidder shall provide operations documentation relating to normal processing, exception processing, and abort conditions in support of the imaging and workflow; if a procedure or program aborts, the operational documentation should list the steps necessary to recover and restart/rerun.	Mandatory
DEL.04.5	Bidder	The Bidder shall provide hardware maintenance and support documentation for imaging and workflow capabilities.	Mandatory
DEL.04.6	Bidder	The Bidder shall deliver a Support/Help Desk Plan that includes anticipated end -user support needs (e.g., volume and timing), the approach and	Mandatory

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		responsibilities to address them, and the project tasks to install and test the support mechanism.	
DEL.0417	Bidder	Develop and maintain a Software Configuration Management Plan which addresses all NIST 800 -53 Configuration Management (CM) moderate controls.	Mandatory
DEL.0418	Bidder	Follow a documented development process with the Software Development Plan (SDP) that addresses the security and privacy requirements, identifies the standards and tools used for the development process, and change management process.	Mandatory

Business User Documentation

Label	Responsible	Requirement Statement	Priority
DEL.05.01	Bidder	The Bidder shall provide imaging training materials.	Mandatory
DEL.05.02	Bidder	The Bidder shall provide user documentation, including electronic help.	Mandatory
DEL.05.03	Bidder	The Bidder shall provide ECM-specific user documentation for the use of tools such as annotation, etc. within the imaging viewer	Mandatory
DEL.05.04	Bidder	The Bidder shall provide ECM-specific user documentation (manuals) for the imaging and indexing software procedures.	Mandatory

Requirements Management

Label	Responsible	Requirement Statement	Priority
DEL.06.01	Bidder	The Bidder shall provide detailed requirements definition documentation .	Mandatory

Data Management

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Label	Responsible	Requirement Statement	Priority
DEL.06.01	Bidder	The Bidder shall develop and maintain a Data Catalog/Data Dictionary that includes all data stores, data entities and data attributes with business and technical metadata to facilitate a shared data meaning.	Mandatory
DEL.06.02	Bidder	The Bidder shall provide a data conversion and migration plan(s).	Mandatory
DEL.06.03	Bidder	The Bidder shall provide data bridging plan(s) if data bridging is deemed necessary as part of the implementation project .	Mandatory
DEL.06.04	Bidder	Data shall be assigned a classification by the data owner based on data type, value, sensitivity, and criticality to the organization.	Mandatory

User Experience Requirements

Overview

TCRS requires exceptional user experience across all PAS interfaces to drive user adoption and productivity. Conformance with WCAG 2.1 AA standards and ADA regulations is mandatory to ensure accessibility for the disabled. Vendor testing processes must validate compliance both initially and after configuration changes.

The PAS should provide a modern, intuitive, and consistent user interface following web best practices and TCRS branding guidelines. It must fluently support both English and Spanish languages across channels. Ongoing browser and device testing is expected to guarantee cross-platform operability from desktops to mobile.

Personalization and customization features should adapt to individual working styles, information needs, and communication preferences. Robust instrumentation should measure usage patterns to identify usability issues and opportunities. Accessible feedback mechanisms will enable continuous UX improvements.

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Bidder responses must elaborate on specific platform capabilities, testing procedures, governance processes, and staff skills that will actualize TCRS’s user experience vision to empower and satisfy internal and external stakeholders. User interface prototypes and demos during the implementation should showcase the proposed solution’s next-generation design aesthetic and interactivity.

Web Accessibility Compliance

Label	Responsible	Requirement Statement	Priority
UX.01.01	System	The system including all interfaces shall comply with the latest version of the World Wide Web Consortium Web Content Accessibility Guidelines, State of Tennessee standards (https://www.tn.gov/web - policies/accessibility.html) and Federal ADA Compliance Standards.	Mandatory
UX.01.02	System	Vendor product user interface shall comply with the W3C WCAG 2.1 AA criteria.	Desired
UX.01.03	System	The system shall have an intuitive design defined where the system has a logical and intuitive layout, with consistent navigation patterns and clear labeling of functions. Users should be able to understand the purpose and functionality of different interface elements without extensive instructions or guidance.	Mandatory
UX.01.04	System	All functionality exposed to non-retired members/retirees through the TCRS web site shall have a consistent look and feel and shall conform to agreed-upon style standards and TCRS unique product branding.	Mandatory

User Personalization

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Label	Responsible	Requirement Statement	Priority
UX.01.13	System	The system shall support English and Spanish languages for all external web interfaces.	Mandatory
UX.01.14	System	The system shall support English and Spanish languages for all externally distributed web electronic documents.	Mandatory
UX.01.15	System	Externally facing system(s) shall allow a user to set their language preference (English or Spanish) as part of their user profile and default to using their preferred language. The default language of the system without preferences will be English.	Mandatory
UX.01.16	System	The system shall provide an easily accessible option to change the current language (Between English and Spanish) for external web interfaces .	Mandatory

Browser Support

Label	Responsible	Requirement Statement	Priority
UX.01.01	System	The system interface is to be a browser -based, thin client.	Mandatory
UX.01.02	System	Externally facing system(s) shall support the current release and at least one major previous version each of Chrome, Edge, Firefox, and Safari web browser applications.	Mandatory
UX.01.03	Verification	A UI regression test suite to verify Chrome compatibility will be configurable to run on specified Chrome versions.	Mandatory
UX.01.04	Verification	The DevOps pipeline shall automatically execute the Chrome UI regression test suite for the latest stable version of Chrome.	Desired

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Label	Responsible	Requirement Statement	Priority
UX.01.05	System	The system shall be compatible with the latest stable Edge version for both internal - and external - facing user interface elements.	Desired
UX.01.06	Verification	A UI regression test suite to verify Edge compatibility will be configurable to run on configured Edge versions.	Desired
UX.01.07	Verification	The DevOps pipeline shall automatically execute the Edge UI regression test suite for the latest stable version of Edge.	Desired
UX.01.08	System	The system shall be compatible with the latest stable version of Safari for external -facing user interface elements.	Mandatory
UX.01.09	Verification	A UI regression test suite to verify Safari compatibility will be configurable to run on user - specified Safari versions.	Mandatory
UX.01.10	Verification	The DevOps pipeline shall automatically execute the Safari UI regression test suite for the latest stable version of Edge.	Mandatory
UX.01.11	Bidder	Provide the ability for TCRS to analyze and report browser usage statistics across all supported and non-supported browsers on a quarterly basis.	Mandatory
UX.01.12	Bidder	Provide the ability for TCRS to generate a summary of browser-specific incidents and defects on a quarterly basis.	Desirable
UX.01.13	Bidder	Provide TCRS with a documented browser-specific test suite prior to implementation.	Desirable
UX.01.14	System	Google analytics (AppInsights) should be used as the basis for browser -based statistics.	Desirable
UX.01.15	System	Browser applications shall provide a feature that enables a user to submit accessibility issues for remediation that tracks the browser type and version.	Desirable

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Label	Responsible	Requirement Statement	Priority
UX.01.16	Bidder	Critical web accessibility non-compliance issues will be remediated in the next software release.	Mandatory

Mobile Support

Label	Responsible	Requirement Statement	Priority
UX.03.01	Solution	When the solution is used on mobile device, it shall meet the same performance requirements as established in the Performance Management Plan.	Mandatory
UX.03.02	Bidder	The Bidder shall test the solution on the supported mobile browsers for the top two (2) most used resolutions as defined in screen-resolution-stats. These resolutions will be mutually agreed on between TCRS and the Bidder prior to go-live.	Mandatory
UX.03.03	Solution	The solution shall be compatible with the latest stable mobile Chrome version	Mandatory
UX.03.04	Bidder	The Bidder shall develop and maintain a Chrome Mobile Regression Test Suite based on a parameterized Chrome version and parameterized screen resolution.	Mandatory
UX.03.05	Bidder	The Bidder shall automate execution of the Chrome Mobile Regression Test Suite for the latest Chrome version and all supported screen resolution within the DevOps pipeline.	Mandatory
UX.03.06	Solution	The system shall be compatible with the latest stable mobile Safari version	Mandatory
UX.03.07	Bidder	The Bidder shall develop and maintain a Safari Mobile Regression Test Suite based on a parameterized Safari version and parameterized screen resolution.	Mandatory

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Label	Responsible	Requirement Statement	Priority
UX.03.08	Bidder	The Bidder shall automate execution of the Safari Mobile Regression Test Suite for the latest Safari version and all supported screen resolution within the DevOps pipeline.	Mandatory
UX.03.09	Bidder	The Bidder shall perform quarterly analyze and report mobile browser usage statistics across all supported and non -supported browsers	Desirable
UX.03.10	Bidder	The Bidder shall provide a quarterly summary of mobile browser -specific incidents and defects for the quarter	Mandatory
UX.03.11	Bidder	The Bidder shall provide a quarterly update mobile browser -specific test suites based on incidents and updated market research	Mandatory
UX.03.12	Bidder	The Bidder should follow the W3C Mobile Web Application Best Practices	Desirable
UX.03.13	Bidder	The Bidder shall test for W3C WCAG 2.1 AA criteria, including mobile acceptance criteria (e.g., 2.5.1Pointer Gestures (A), 2.5.2Pointer Cancellation (A)) whenever a user interface is changed.	Mandatory
UX.03.14	Solution	The mobile solution shall provide a feature that enables a user to submit accessibility issues for remediation.	Mandatory
UX.03.15	Solution	The Bidder shall test mobile Apps on the supported mobile device, google and apple, for the top 2 most used resolutions as defined in screen-resolution -stats.	Mandatory
UX.03.16	Bidder	The Bidder shall perform quarterly analyze and report mobile App usage statistics across all supported mobile operating systems.	Desirable

Channels

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Label	Responsible	Requirement Statement	Priority
UX.04.01	System	The system shall support email as a channel for all user roles to send and receive communications with the proposed system.	Mandatory
UX.04.02	System	The system shall allow for user configurability of all standard outbound email communications, specifically email recipient, email sender, subject line, and email body. The email body must have the ability to configure text size, font, and add images.	Mandatory
UX.04.03	System	The system shall allow for user configurability (on/off) of all notification types, individually.	Mandatory
UX.04.04	System	The system shall allow for user configurability of all inbound email responses, by correspondence type, by mailbox.	Mandatory
UX.04.05	System	The system shall support Fax as a channel to receive communications from all external users.	Mandatory
UX.04.06	System	The system shall digitally persist documents received via fax by sender and recipient phone number.	Mandatory
UX.04.07	System	The system shall support receiving and scanning paper documents from users to be ingested and attributed by image contents. (See ECM requirements)	Mandatory
UX.04.08	System	The system shall provide the ability for external users to upload a document using the proposed system web interface.	Mandatory
UX.04.09	System	The system shall support attribution and channeling via work management by correspondence type.	Mandatory
UX.04.10	System	The system shall provide an error message under the conditions that security validation and acceptable file types are not adhered.	Mandatory
UX.04.11	System	The system shall allow roles to submit documents to a secure file share as authorized by security requirements.	Mandatory

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UX.04.12	System	The system shall distinguish by entry point, user, and filename the target file share path for persistence.	Mandatory
UX.04.13	System	Externally facing system(s) shall provide a chat feature that allows for customer service and IT support response.	Desired
UX.04.14	System	Internally facing system(s) shall provide the ability to receive, notify, and respond to customer service and IT support user requests.	Desired
UX.04.15	System	The system shall provide the ability to integrate with an Interactive Voice Response (IVR) system to provide self-service options.	Mandatory
UX.04.16	System	The system shall support user configurable messaging as an output channel option for user notifications, system-wide, by user group, or individual.	Desired
UX.04.17	System	The system shall not allow any single inbound document to exceed 50MB of memory.	Desired
UX.04.18	System	The system must be able to centrally log correspondence by employer and member so that information and case management is persisted for future reference.	Desired
UX.04.19	System	The system must be capable of rendering referential artifacts from the centrally logged interactions.	Desired

User Interface Requirements

Label	Responsible	Requirement Statement	Priority
UX.05.06	System	For any sub-system application utilities (e.g., image scanning) that are client/server based the application must be able to be minimized. When minimizing the application, all subordinate or “children” windows/panels of the LOB must also be minimized. If a user is performing specific work processes, the user should be able to minimize this work, and all related windows/panels for that	Mandatory

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Label	Responsible	Requirement Statement	Priority
		work should be minimized together – and maximized together at the appropriate time.	
UX.05.07	System	The integrated system shall provide a consistent and intuitive user interface across all integrated components (e.g., workflow, document management). Users shall be able to navigate seamlessly without disruptions, without re-keying information, and without the use of additional windows, to provide a unified user experience. If sign-on is required for multiple components of the system, single sign-on (SSO) must be implemented to provide this seamless experience.	Mandatory
UX.05.08	System	The system is to be fully integrated, and all subsystems are to be seamlessly interfaced (e.g., no rekeying of a member identifier required when retrieving an imaged member record).	Mandatory
UX.05.09	System	The system shall provide the ability to modify help text or field labels without major reprogramming.	Desired
UX.05.12	System	The system must provide the capability to perform validations and provide an on-screen context-sensitive error, warning, and help messages where applicable.	Mandatory

Enterprise Content Management Requirements

Overview

TCRS is seeking an enterprise content management (ECM) solution that seamlessly integrates with its PAS to efficiently manage content across its business processes. The desired ECM capabilities

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span document management, imaging, workflow automation, content authoring, records management, and analytics.

The overarching goal is to have the ECM fully embedded within the PAS user interface to enable authorized users to search, retrieve, and view documents without toggling between separate applications. Tight integration between the PAS and ECM is mandatory to provide end-to-end workflow execution with shared metadata and single sign-on. This will allow, for example, documents to be stored and retrieved in the context of a member or employer record.

Key requirements include support for a variety of document types and formats, automated workflows triggered by different events, robust search, user-friendly content authoring tools, multi-channel distribution, retention rules, and detailed activity logging and reporting. Scalability and security are also crucial.

The TCRS aims to maximize automation, minimize manual processes, and gain actionable insights through ECM analytics. An open, flexible platform based on industry standards is preferred to facilitate integration and future upgrades. Vendor responses should thoroughly demonstrate how their proposed ECM solution will seamlessly embed within and enhance the PAS environment.

ECM Architecture

Label	Responsible	Requirement Statement	Priority
ECM.01.01	System	The ECM components (e.g., text capture, document management, workflow, document generation, document distribution, and records management) shall integrate with the Pension Administration System (PAS) transparent to the PAS user by (1) Supporting an industry single sign-on (SSO) mechanism that eliminates the need for a user to logon separately; (2) Configuring PAS and ECM to share metadata values store and retrieve documents in context of employer, member, and other user types.	Mandatory
ECM.01.02	System	Allow multiple users and processes to access documents at the same time.	Mandatory
ECM.01.03	System	Ability to support new document types, workflows, and metadata changes.	Mandatory

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Label	Responsible	Requirement Statement	Priority
ECM.01.04	System	Provide quality application programming interfaces (APIs) that allow the system to integrate with other applications and services	Mandatory
ECM.01.05	System	Provide proven integration with other systems (e.g., through marketplace or connectors) that allow the system to connect with other applications and services, such as Imaging software, Fax system, and Customer Communications Management (CCM).	Desired
ECM.01.06	System	Support open standards and interoperability with other systems, such as content authoring, workflow interoperability, and other ECM systems.	Desired
ECM.01.07	System	Continue to meet performance and throughput requirements as system usage increases.	Mandatory
ECM.01.08	System, Bidder, Managed Service	Ensure the ECM components' 3rd party products, product configurations, and operating procedures meet the Gramm -Leach-Bliley Act (GLBA) requirements for data security and privacy for protecting consumer financial information.	Mandatory
ECM.01.09	System, Bidder, Managed Service	Ensure the ECM components' 3rd party products, product configurations, and operating procedures meet the Health Insurance Portability and Accountability Act of 1996 (HIPAA) requirements for data security and privacy for protecting individual health information.	Mandatory
ECM.01.10	Bidder	Comply with Tennessee Data Breach Notification Law in notifying individuals if their personal information has been compromised. This applies to paper and electronic records.	Mandatory
ECM.01.11	System, Bidder, Managed Service	Ensure the ECM components' 3rd party products, product configurations, and operating procedures meet the Tennessee Information Protection Act (TIPA) requirements for data security and privacy for protecting personally identifiable information (PII).	Mandatory

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Label	Responsible	Requirement Statement	Priority
ECM.0112	System, Bidder, Managed Service	Ensure the ECM components' 3rd party products, product configurations, and operating procedures meet the Tennessee Public Records Act (TPRA) to retain and provide access to public records which includes electronic documents and records.	Mandatory
ECM.01.13	Bidder	Ensure the ECM components' 3rd party products, product configurations, and operating procedures meet the Tennessee Uniform Electronic Transactions Act (TUETA) for the legal validity of electronic records and signatures.	Mandatory
ECM.01.14	Bidder	Perform on-going capacity planning to make any configuration changes required to meet projected document volume and ECM usage. This must be explicitly noted in writing in the response as part of maintenance and support obligations.	Mandatory
ECM.01.15	System	Measure and report on performance during peak usage and under heavy workloads when scaled.	Mandatory
ECM.01.16	System	Initially support 4TB of documents of data and documents that the system can handle	Mandatory
ECM.01.17	System	Support an annual increase of 20% of documents for 10 years.	Mandatory
ECM.01.18	System	The system must be capable of supporting a cloud - based deployment.	Mandatory
ECM.01.19	System	The system must be capable of scaling up or down based on demand.	Mandatory
ECM.01.20	System	If the system contains multiple tenants on a single infrastructure, it shall ensure data is not shared across tenants.	Mandatory
ECM.01.21	System	The ECM components shall record all activity related the session's owner to track user activity.	Mandatory
ECM.01.22	System	The system must log and track user activity and access to content, and generate reports on this data	Mandatory

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Label	Responsible	Requirement Statement	Priority
ECM.01.23	System	Grant users' levels of access and permissions to features and content based on their role and/or user attribute.	Mandatory
ECM.01.24	System	Protect sensitive document folders and documents from unauthorized access.	Mandatory
ECM.01.25	System	Protect sensitive information from unauthorized access.	Mandatory
ECM.01.26	System	Prevent data loss or theft through access control, encryption, and other security measures	Mandatory
ECM.01.27	System	Recover and restore data in the event of a natural disaster or other catastrophic event.	Mandatory
ECM.01.28	Bidder	Address potential security vulnerabilities and threats, including malware, viruses, and hacking attempts.	Mandatory
ECM.01.29	System	Store or retrieve a document in 3 seconds.	Mandatory

Document Management

Label	Responsible	Requirement Statement	Priority
ECM.02.01	System	Restrict the viewing of document annotations by security role including authorized external users.	Mandatory
ECM.02.02	System	Allow a user to classify documents at the page level.	Mandatory
ECM.02.03	System	Restrict the viewing of redacted material by security role including authorized external users.	Mandatory
ECM.02.04	System	Allow for documents to be marked as "viewable" by the member or employer in the self-service applications.	Mandatory
ECM.02.05	System	Store, retrieve, and play audio and related transcriptions.	Mandatory
ECM.02.06	System	Store, retrieve, and view user-authored documents (e.g., PDF and Microsoft Word).	Mandatory
ECM.02.07	System	Store transcriptions of chat session and web meetings (e.g., Teams transcriptions).	Desired

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Label	Responsible	Requirement Statement	Priority
ECM.02.08	System	Store, retrieve, and view messaging (SMS), secure messaging content and attachments.	Mandatory
ECM.02.09	System	Store, retrieve, and view email messages and attachments.	Mandatory
ECM.02.10	System	Manage emails created and received as part of government business as business records and shall be retained in a useable and accessible manner until their approved disposal.	Mandatory
ECM.02.11	System	Store, retrieve, and view system-generated documents (e.g., XML, PDF) including forms and letters.	Mandatory
ECM.02.12	System	Store, retrieve, and view images (e.g., TIFF, JPEG, JPG).	Mandatory
ECM.02.13	System	Store and retrieve medical imaging (e.g., CT scans) content.	Desired
ECM.02.14	System	Store, retrieve, and view reports (e.g., Excel format, csv, PDF).	Mandatory
ECM.02.15	System	The system will allow users the ability to push reports to the ECM solution for archival.	Mandatory
ECM.02.16	System	Store, retrieve, and view social media content (e.g., blogs)	Desired
ECM.02.17	System	Support all the document types that exist across all TCRS document repositories.	Mandatory
ECM.02.18	System	Store, retrieve, and play video (e.g., AVI, MP3, MP4, WMV) content.	Mandatory
ECM.02.19	System	Store, retrieve, and play voice and related transcriptions.	Mandatory
ECM.02.20	System	Enable an authorized user the ability to store content associated with: a) An organization entity (Employer, Third -party organization, TCRS department) b) A person (Member, or anyone from public)	Mandatory
ECM.02.21	System	If a different document management solution is proposed other than FileNet, the system will provide the	Mandatory

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Label	Responsible	Requirement Statement	Priority
		ability to convert all current images within TCRS's ECM system into a new ECM solution. This includes: <ul style="list-style-type: none"> • Approximately 11 (eleven) million images • Annotations and overlays • Metadata (e.g., Document Class, versioning data, indexing data and folder structure representations) 	
ECM.02.22	System	Capable of transforming electronic records in native formats to open-standard technology-neutral file formats for long-term storage.	Mandatory
ECM.02.23	System	Log viewing of content track for sensitive information.	Mandatory
ECM.02.24	System	Allow users to classify content using a taxonomy and later change the classification in the case that content was wrongly indexed. The content classification shall be effective dated to track when the content was reclassified. The content shall not be duplicated, and full history shall be maintained.	Mandatory
ECM.02.25	System	Provide a controlled vocabulary, a defined list of explicitly allowed terms used to index, categorize, tag, sort, and retrieve content through browsing and searching. A controlled vocabulary provides metadata standardization.	Mandatory
ECM.02.26	System	Classify and categorize content assets using multiple taxonomic classifications without duplicating the content. Different business organizations can search and navigate the content using different taxonomies.	Mandatory
ECM.02.27	System	Indicate whether the content is publicly accessible to support NIST 800-53 security control compliance.	Mandatory
ECM.02.28	System	Support template versions for different channels (e.g., email, paper, SMS)	Mandatory
ECM.02.29	System	Track effective begin and end dates for templates	Mandatory
ECM.02.30	System	Maintains a history of template versions	Mandatory
ECM.02.31	System	Support template versions for different languages (i.e., English and Spanish)	Mandatory

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ECM.02.32	System	Provide an authorized user to create and manage templates.	Mandatory
ECM.02.33	System	Store templates in an industry -standard format (e.g., XML) that does not tie the template to particular product version.	Mandatory
ECM.02.34	System	Ensure all electronic templates conform to WCAG AA 2.2 criteria.	Mandatory
ECM.02.35	System	Provide a text transcript version for audio content to make content accessible to people who are deaf or hard of hearing, as well as to search engines and other technologies that can't hear.	Mandatory
ECM.02.36	System	Facilitate the author performing meta-tagging, alt -tagging, and completing descriptions for WCAG compliance.	Mandatory
ECM.02.37	System	Provide compliance checks for these content types: Web pages (HTML or XML file); email messages (HTML or text file); authored documents (Word or PDF file); generated Reports (XML or Excel file) and video (YouTube video).	Mandatory
ECM.02.38	System	Allow users to link electronic documents (images, spreadsheets, etc.) to a contact record.	Mandatory

Imaging & Text Capture

Label	Responsible	Requirement Statement	Priority
ECM.03.01	System	Provide the capability to read and interpret a barcode located anywhere on a document both forward and/or backward	Mandatory
ECM.03.02	System	Provide the capability to identify documents that have an encoded document identifier such as a barcode printed on the document.	Mandatory

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Label	Responsible	Requirement Statement	Priority
ECM.03.03	System	Provide the capability to read and interpret barcodes of varying sizes on documents.	Mandatory
ECM.03.04	System	Ensure that all scanned text-based documents are converted to an Optical Character Recognition (OCR) compatible format.	Mandatory
ECM.03.05	System	Provide scanning capabilities that allow for unambiguous interpretation of barcodes and/or text via OCR.	Mandatory
ECM.03.06	System	Provide the capability to interpret a barcode on documents and automatically index the document based on the values encoded in the barcode.	Mandatory
ECM.03.07	System	Execute business rules to validate extracted data to reuse business rules across the enterprise.	Mandatory
ECM.03.08	System	Automatically extract information from documents and associate the data extracted with the stored image of the document.	Mandatory
ECM.03.09	System	Text capture will accommodate "returned mail" as one of the imaging document types and trigger a returned mail workflow process for processing, investigation, flagging of mailing information as incorrect.	Mandatory
ECM.03.10	System	Allow a user to define specific regions within a correspondence (e.g., form) to be OCRcompatible.	Mandatory
ECM.03.11	System	Text capture will receive electronic documents directly without scanning or batching.	Mandatory
ECM.03.12	System	Provide ability to configure text capture to receive incoming email documents.	Mandatory
ECM.03.13	System	Provide ability to configure options to file e-mail and attachments as single record or individual records.	Mandatory
ECM.03.14	System	Provide ability to configure capture from a fax server.	Mandatory
ECM.03.15	System	Provide ability to configure capture to import files from a shared network location.	Mandatory

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Label	Responsible	Requirement Statement	Priority
ECM.03.16	System	Provide ability to configure the imaging user interface to use a form (E.g., that mirrors document if possible) for data validation and editing process.	Mandatory
ECM.03.17	System	Provide ability to configure text capture to recognize the language (English or Spanish) and process the document based on the document language.	Mandatory
ECM.03.18	System	Provide ability to configure text capture to translate Spanish to English for data stored.	Mandatory
ECM.03.19	System	Provide ability to configure the system to translate incoming Spanish documents into English and store both versions for document retrieval and viewing.	Mandatory
ECM.03.20	System	Provide ability to configure a verification step within an imaging workflow.	Mandatory
ECM.03.21	System	Manage annotations separately to provide separate access control and the ability to hide and view annotations.	Mandatory
ECM.03.22	System	Store documents with related metadata	Mandatory
ECM.03.23	System	Scan converts to standard image formats (e.g., PDF, TIFF)	Mandatory
ECM.03.24	System	Provide the capability for the user to view documents in the incoming folders prior to indexing and filing, although the documents may not yet be accessible from the PAS environment.	Mandatory
ECM.03.25	System	Provide an authorized user the ability to annotate a document.	Mandatory
ECM.03.26	System	Provide tools to clean up the quality of an image.	Mandatory
ECM.03.27	System	Provide view and zoom of all supported document types.	Mandatory
ECM.03.28	System	Receive documents from other applications using an API or vendor-provided connector	Mandatory
ECM.03.29	System	Direct capture of content from external systems, line of business applications so that transactional records and	Mandatory

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Label	Responsible	Requirement Statement	Priority
		content created by those applications can be captured within the system.	
ECM.03.30	System	Allow an authorized TCRS user to scan and index documents.	Mandatory
ECM03.31	System	Process batches of scanned documents.	Mandatory
ECM.03.32	System	Ensure that all scanners are TWAIN and/or ISIS compliant.	Mandatory
ECM.03.33	System	Support documents of varying size and quality in the same batch	Mandatory

Workflow

Label	Responsible	Requirement Statement	Priority
ECM.04.01	System	Enable an authorized user to configure (add or change) workflows and their associated sub -tasks based on the business processes defined by TCRS.	Mandatory
ECM.04.02	System	Provide ability to configure a time -based alarm/reminder capability for follow -up tracking of functions within a workflow (e.g., non -receipt of the bank information within a definable number of business days)	Mandatory
ECM.04.03	System	Provide the capabil ity to define checklists as part of workflow tasks to help guide users through each process.	Mandatory
ECM.04.04	System	Provide ability to configure the system to handle conditional routing of a work object based on defined business purposes.	Mandatory
ECM.04.05	System	Provide the ability to configure workflow roles, rules, and routing for each document type.	Mandatory

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Label	Responsible	Requirement Statement	Priority
ECM.04.06	System	Ensure that the workflow system will work in concert with the LOB to provide date-effective processing (e.g., future effective date processing).	Mandatory
ECM.04.07	System	Provide ability to configure e-mail notifications to recipients other than system users, as well as recipients outside of TCRS and provide the ability to subscribe to events.	Mandatory
ECM.04.08	System	Provide graphical flow diagrams to visualize the configuration of any workflow. Allow business analysts to modify a workflow through interacting with the flow diagrams.	Mandatory
ECM.04.09	System	Provide the ability to configure multiple (re-usable) levels within a workflow or route to ensure consistency of similar processing even when that processing is done as part of different workflow routes	Mandatory
ECM.04.10	System	Provide ability to configure notifications to a supervisor if a work item is returned for correction a specified (configurable) number of times.	Mandatory
ECM.04.11	System	Provide the capability to send workflow notifications to users that are easily noticeable and integrated into their worklists.	Mandatory
ECM.04.12	System	Provide ability to configure rules to prioritize workflow tasks based on the type of document and/or other attributes of the task.	Mandatory
ECM.04.13	System	Provide the capability to incorporate random sampling into workflow processes, configurable by process and task. For example, being able to define that a specified, (configurable) percentage of the instances of a given task are sent to an approver for additional review.	Mandatory
ECM.04.14	System	Provide ability to configure the system to automatically generate reminders or ticklers, both in correspondence to members who have not responded to requests for	Mandatory

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		additional information and to staff who may need to provide personal follow -up on incomplete tasks	
ECM.04.15	System	Provide ability to configure work process maps with conditional routing. For example, the level of approval for signing a refund authorization may vary depending on the size of the refund	Mandatory
ECM.04.16	System	Provide ability to configure rules for routing documents to appropriate users by document type.	Mandatory
ECM.04.17	System	Ability to configure the system to handle conditional routing of a work object based on the state of any work item attribute	Mandatory
ECM.04.18	System	Configurable to ensure that no user can approve their own work within a workflow process.	Mandatory
ECM.04.19	System	Provide ability to configure workflow step status attributes (e.g., review, pending, complete, approve etc.).	Mandatory
ECM.04.20	System	Ability to configure the system to suspend the processing of a work object because TCRS is awaiting information from an external entity (member, employer, third party, etc.) or from an internal entity (users, audit, reviewer, etc.) and resume, without requiring manual intervention, the processing of that work object once the information has been received	Mandatory
ECM.04.21	System	Ability to support work process suspension capability such that, for example, the processing of a request for direct deposit can be suspended while awaiting the receipt of bank confirmation of the account number and routing information	Mandatory
ECM.04.22	System	Provide ability to configure alerts or notifications for users (through email, dashboard, or other means) of upcoming due dates and past due dates for both internal tasks and tasks to be completed by external parties .	Mandatory

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ECM.04.23	System	Provide ability to configure the system to automatically assign files to the specialists based on a table with a list of those specialists	Mandatory
ECM.04.24	System	Provide ability to configure the system to fully automate rote tasks such as the acknowledgement of receipt of information or other member communication	Mandatory
ECM.04.25	System	Provide ability to configure the system to manage workflow tasks using a combination of passive and active workflow models. Staff would select work from a common pool for some tasks (passive workflow), while with other tasks, staff would be assigned work directly (active workflow).	Mandatory
ECM.04.26	System	Provide ability to “turn on” and “turn off” the audit/review step of various workflow business processes based on TCRS defined parameters (e.g., by user, by business process)	Mandatory
ECM.04.27	System	Provide ability to configure thresholds for review or approval. For example, auditing records processed by new staff members.	Mandatory
ECM.04.28	System	Provide ability to configure a timeline for each workflow including tasks such as when items are due, when reminders need to be sent, the frequency and number of additional reminders, and when internal escalations are required.	Mandatory
ECM.04.29	System	Provide ability to configure deadline monitoring capabilities to trigger the start of a workflow task or the next step in a workflow.	Mandatory
ECM.04.30	System	Provide ability to configure the fax of a document trigger a workflow.	Mandatory
ECM.04.31	System	Allow an authorized user to initiate workflow processes manually based on the receipt of a phone-call or walk-in.	Mandatory

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Label	Responsible	Requirement Statement	Priority
ECM.04.32	System	Provide ability to configure scan of a document trigger a workflow.	Mandatory
ECM.04.33	System	Provide ability to configure communication to be triggered by business events, user requests, or scheduled times.	Mandatory
ECM.04.34	System	Provide ability to configure a member's web submission of a document trigger a workflow.	Mandatory
ECM.04.35	System	Provide ability to assign a work object to either a work queue or to a specific user.	Mandatory
ECM.04.36	System	Provide the ability to configure the system to assign, change values of, and query against the value of any work object attribute.	Mandatory
ECM.04.37	System	Ability to assign and prioritize a work object based on business processing logic such that the processing of that work object takes precedence over other work objects within a work process; the default priority of all work objects should be the same and work objects of the same priority should be processed on a first - in/first -out basis	Mandatory
ECM.04.38	System	Provide audit trail and step and response details to track manually initiated work as well as that accomplished "within" the workflow system .	Mandatory
ECM.04.39	System	"Route back" to the original worker a work object that is sent back by a reviewer so that the original worker can make the needed correction/changes; upon completion the item should "route forward" to the same reviewer.	Mandatory
ECM.04.40	System	Ability to recognize if an account/folder needs special processing in another work area and allow the manual, "on-the-fly" definition of an alternative routing of the work object	Mandatory
ECM.04.41	System	Display the status (not-started, in-process, pending more information, completed, etc.) of all workflow processes.	Mandatory

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ECM.04.42	System	Provide the capability to re -assign all the workflow tasks from a given user systematically (e.g., as part of an account deactivation workflow process).	Mandatory
ECM.04.43	System	Provide the capability for the workflow tool to integrate with user email calendars to populate reminders, notify when a user is out-of-office, etc.	Mandatory
ECM.04.44	System	Provide the capability to define configurable rules for routing documents scanned into the ECM to appropriate users by document type.	Mandatory
ECM.04.45	System	Provide the ability to configure any work step/work process to modify the contents of “status indicators” within the database record (e.g., LOB member record) associated with the work object (e.g., associated member).	Mandatory
ECM.04.46	System	Provide the capability to systematically initiate or continue workflow processes via various definable triggers (e.g., through imaging documents into the ECM system, via web form submission through the self-service portals, via batch jobs, etc.).	Mandatory
ECM.04.47	System	Provide a means to trigger, and process work outside of the proposed workflow system .	Mandatory
ECM.04.48	System	Provide for a workflow activity log of all activity and tasks through the workflow, to include at a minimum : <ul style="list-style-type: none"> • Task ID • Process ID • Event ID • Result Cod • Task Name • User Assigned • Date & Time Assigned • Date & Time Completed • Documents Used/ Processed • Duration task has been in work queue • Wait period remaining (if applicable) until next step of workflow 	Mandatory

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Label	Responsible	Requirement Statement	Priority
		<ul style="list-style-type: none"> Workflow assignment history <p>The workflow activity log must be accessible through the system to let users view the history and review the activities within any given workflow.</p>	
ECM.04.49	System	Include an integrated electronic workflow tool for defined business processes and system maintenance (e.g., changing a process flow, updating rate or parameter tables, adding a user role, etc.) as required.	Mandatory
ECM.04.50	System	Show the status of all work items in the system by workflow processes and any sub-processes (what activity/step it is in, who's working on it, when it was completed, etc.)	Mandatory
ECM.04.51	System	Provide the capability to automatically report/notify on "lost" workflow items (e.g., workflows that experience unhandled errors during system processing steps).	Mandatory
ECM.04.52	System	Provide work process measurement and reporting capabilities, including but not limited to individual work item status and location, average/maximum/minimum queue time, queue lengths, performance metrics, and process bottleneck identification, quality, reworks	Mandatory
ECM.04.53	System	Provide multiple reports for users and management – both at an individual work item level and at the aggregate for current status, month-to-date status, year-to-date status, and particular date ranges, such as all suspended work items, which member of staff suspended then, when they were suspended, and reason if available; all work items in process (identified by role or member number or name) throughout the system; user-oriented work throughput information such as work items processed by each user and the average/maximum/minimum queue time and other performance metrics;	Mandatory

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ECM.04.54	System	The solution shall provide out-of-box reporting capability to create customizable reports.	Mandatory
ECM.04.55	System	Report on how much “lapsed time” a work object was in every work step/work process to ascertain how long it took to perform various processing on an account (e.g., establish “normal” processing time from start to finish)	Mandatory
ECM.04.56	System	Report on all work processed through the system during a user-specified period, identifying the work items by type, member ID, and staff member; reworked items	Mandatory
ECM.04.57	System	Allow an authorized user to monitor and be notified of staff’s assigned work and progress.	Mandatory
ECM.04.58	System	Allow an authorized user to monitor work processes via the workflow management system.	Mandatory
ECM.04.59	System	Enable an authorized user to view the workflow activity log to view the history and review the activities on any given workflow.	Mandatory
ECM.04.60	System	Ability to “leave” a work process in order to access another process without exiting/stopping the first process (i.e., multi-tasking)	Mandatory
ECM.04.61	System	Provide ability for a user to sort and select new work by multiple criteria such as first-in, first out, or priority of work item	Mandatory
ECM.04.62	System	Ability to send a transaction to a reviewer for approval and/or audit.	Mandatory
ECM.04.63	System	Provide ability to cancel a work item.	Mandatory
ECM.04.64	System	Provide ability to create work-items manually.	Mandatory
ECM.04.65	System	Allow users to link electronic documents (images, spreadsheets, etc.) to a workflow.	Mandatory
ECM.04.66	System	Provide the capability to allow a user to manually submit a workflow task for review/audit.	Mandatory

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ECM.04.6	System	Enable an authorized user to reassign a workflow task.	Mandatory
ECM.0468	System	Provide the capability to search outstanding workflows based on configurable attributes (e.g., process name, user assigned, time elapsed, etc.)	Mandatory
ECM.0469	System	Provide the capability to manually suspend and resume workflows. When suspending a workflow, a user may select the workflow to auto -resume after a configurable number of days.	Mandatory
ECM.04.7	System	Allow a user to release a task to a queue (so other team members can work on it).	Mandatory
ECM.04.7	System	Provide the capability for an authorized user to start a workflow process manually.	Mandatory
ECM.04.7	System	Provide the capability for business supervisors to manage the automated assignment of workflow processes and tasks (in a push model) for their team based on different parameters (e.g., setting the system to assign a pre-defined number or percentage of incoming tasks to each user, etc.) The assignment parameters should be configurable by process.	Mandatory
ECM.04.7	System	The system will provide the capability to create worklists containing all current workflow tasks belonging to a user. The worklists should be configurable by business users.	Mandatory

Content Authoring & Generation

Label	Responsible	Requirement Statement	Priority
ECM.05.01	System	Provide content security features that ensure that content is protected from unauthorized access, modification, or distribution	Mandatory
ECM.05.02	System	Provide ability for authorized user to create documents.	Mandatory
ECM.05.03	System	Allow authorized user to edit generated document.	Mandatory

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Label	Responsible	Requirement Statement	Priority
ECM.05.04	System	Enable authors to specify if the template is applicable for which channels (e.g., email, text, print)	Mandatory
ECM.05.05	System	Enable document author to check and correct for accessibility issues.	Mandatory
ECM.05.06	System	Support a variety of document types including Microsoft Word for forms and letters with the ability to export and change the information prior to printing and committing the documents to the system.	Mandatory
ECM.05.07	System	Provide a business user-friendly development environment for creating and editing correspondence templates.	Mandatory
ECM.05.08	System	<p>Establish (rules and procedures) relationships among individual pieces of correspondence/requests for information.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Certain correspondence such as the "Notice of Retirement Letter" which gives a final chance for a retiree to modify their retirement options is to be permanently archived • Letter from a participant requesting information on retirement options and expected benefits • Correspondence to/ from the participant from/ to TCRS requesting additional/clarification of information pertaining to the participant's credited service and/or contributions • Return of the requested information/clarification from the participant to TCRS • Correspondence from TCRS to the participant setting forth retirement options and expected benefits under each option • Letter from the participant to TCRS with accompanying application, which selects a particular option 	Mandatory
ECM.05.09	System	Integrate a Correspondence Management System, from which the system will be capable of generating, storing and assembling correspondence from a library of pre-approved and custom-made correspondence. Correspondence	Mandatory

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Label	Responsible	Requirement Statement	Priority
		includes any communications intended for stakeholders including forms, letters, packages and emails.	
ECM.05.10	System	The system will support the generation of reports and correspondence based on the following triggers: <ul style="list-style-type: none"> • Business Events • User Prompts • Batch Jobs 	Mandatory
ECM.05.11	System	Provide a clear audit trail of changes made to documents, including user and system-initiated changes.	Mandatory
ECM.05.12	System	Provide the capability to include a barcode with customizable information (e.g., Process ID, Member ID, etc.) on reports and correspondence.	Mandatory
ECM.05.13	System	Generate a document based on selected template and application data.	Mandatory
ECM.05.14	System	Provide the capability to include conditional text and to populate data bookmarks with data from the PAS database within correspondence templates.	Mandatory
ECM.05.15	System	Support multilingual documents for document authoring and the ability to specify the language for content.	Mandatory
ECM.05.16	System	Provide the capability to produce correspondence in varying page sizes (e.g., letter, legal, etc.).	Mandatory
ECM.05.17	System	Track and manage multiple versions of content.	Mandatory
ECM.05.18	System	Integrate with popular content authoring tools, such as Microsoft Word or Google Docs, to enable seamless content creation and storage.	Mandatory
ECM.05.19	System	Track and manage multiple variants of the same content based on the selected channel	Mandatory
ECM.05.20	System	Track and manage multiple variants of the same content based on different languages.	Mandatory

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Distribution

Label	Responsible	Requirement Statement	Priority
ECM.06.01	System	Identify those accounts where no response was received from a follow-up correspondence after a TCRS-defined period	Mandatory
ECM.06.02	System	Track the distribution, turn-around, and processing of each document.	Mandatory
ECM.06.03	System	Track follow-up activity and turnaround time associated with correspondence/requests for information	Mandatory
ECM.06.04	System	Provide mobile access features that enable users to access and interact with content from mobile devices, such as smartphones or tablets, to ensure that content is available on-the-go.	Mandatory
ECM.06.05	System	Provide analytics and reporting features that allow administrators to track and analyze content delivery metrics, such as user engagement, content views, or content sharing, to gain insights into user behavior and to improve content delivery strategies.	Desired
ECM.06.06	System	Provide the capability to send email notifications to participants registered on the self-service portals.	Mandatory

Use

Label	Responsible	Requirement Statement	Priority
ECM.07.01	System	Provide the ability to add unlimited annotations to documents.	Mandatory
ECM.07.02	System	Provide the ability to view both the original “clean” version of an image and its various annotated versions.	Mandatory
ECM.07.03	System	Provide the ability to track annotations added to images via versioning.	Mandatory
ECM.07.04	System	Filter content according to user-specified criteria presented as facets of the object.	Mandatory

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ECM.07.05	System	Provide exact match, partial match, fuzzy, synonym, phonic, Boolean, wild card, and proximity searches to find stored documents	Mandatory
ECM.07.06	System	Provide the capability to specify partial matches and allow designation of "wild card" fields or characters.	Mandatory
ECM.07.07	System	Provide a robust and flexible range of search functions that operate on any combination of metadata of every level of aggregation (record, file, series, folder, box, etc.) and on the contents of the records through user -defined parameters.	Mandatory
ECM.07.08	System	The system will provide the capability for users to search on annotations, comments and redactions that are associated with a document, folder, or group of documents.	Mandatory
ECM.07.09	System	Provide the capability to retrieve documents from the repository using document and/or folder attributes and/or combinations of attributes as search criteria.	Mandatory
ECM.07.10	System	Search for keywords that may be found in any metadata field or the document's content.	Mandatory
ECM.07.11	System	Further define search results; refine or narrow searches to a subset of the results.	Mandatory
ECM.07.12	System	Capture documents directly from authoring application.	Mandatory
ECM.07.13	System	Import electronic objects by drag and drop.	Mandatory
ECM.07.14	System	Import photos from digital cameras or mobile phones.	Mandatory
ECM.07.15	System	Open documents in the repository as view -only.	Mandatory

Records Management

Label	Responsible	Requirement Statement	Priority
ECM.08.01	System	Provide configured organization -defined file plans/classification scheme based on business functions and activities.	Mandatory

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ECM.08.02	System	Enable users to manually declare objects as records to distinguish and manage them differently from other information content.	Mandatory
ECM.08.03	System	Enable authorized users to configure criteria or triggers to automatically declare objects as records.	Mandatory
ECM.08.04	System	Enable users to edit the object's metadata prior to filing it as a record.	Mandatory
ECM.08.05	System	Support file plans with minimum of three level hierarchy for categories/series, folders, and records/documents.	Mandatory
ECM.08.06	System	Support alpha -numeric record series codes/structures.	Mandatory
ECM.08.07	System	Enable a user to relocate a record series or folder and all objects under them, to another location in the file plan.	Mandatory
ECM.08.08	System	The solution shall retain a history of where a document existed prior to reorganization or relocation.	Mandatory
ECM.08.09	System	Enable an authorized user to mark a series as inactive and prevent any new folders or records from being created for that series and sub -series.	Mandatory
ECM.08.10	System	Support open and closed volumes/folders.	Mandatory
ECM.08.1	System	Automatically close a volume/folder on fulfillment of specified criteria to be defined at configuration, including (a) by annual cut -off date; (b) passage of time since a specified event (e.g., last addition of record to the volume/folder)	Mandatory
ECM.08.2	System	Support manual cutoff of folders and volumes	Mandatory
ECM.08.3	System	Support case files with parent and child records associated.	Mandatory
ECM.08.4	System	Allow the use of barcode technology for check-out/check -in, location tracking.	Mandatory
ECM.08.5	System	Enable tracking of physical records by the provision of request and check -out/check -in facilities that reflect the current location or user of the item.	Mandatory

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ECM.08.6	System	Allow defined life cycle stages (e.g., creation, review, published, superseded, etc.) and support automatic progression through the stages according to configurable criteria as well as manual life cycle stage changes.	Mandatory
ECM.08.7	System	If a document contains links to other documents, those links must remain valid regardless of changes to the documents involved, including changes to the content or to the physical or logical storage locations of the documents.	Mandatory
ECM.08.8	System	Maintain a relationship between the physical and electronic object.	Mandatory
ECM.08.9	System	Maintain a relationship between the original record and copies that are annotated or redacted, or store annotations and redactions in a separate layer so the original record remains intact.	Mandatory
ECM.0820	System	Maintain a relationship between the original object (e.g., Word document) and its renditions (e.g., PDF or paper).	Mandatory
ECM.08.21	System	Each copy or rendition will have its own metadata.	Mandatory
ECM.08.22	System	Allow a user to mark a record as superseded. Automatically mark a record as superseded based on configurable trigger conditions.	Mandatory
ECM.08.23	System	Allow users to capture emails (text and attachments) as a single record as well as individual but linked records.	Mandatory
ECM.08.24	System	Provide the capability to apply a record retention schedule as defined by TCRS, and automatically archive or dispose of imaged documents according to the schedule. Note: Need to include or callout disposition authorities and retention periods based on the file plan of the document category	Mandatory

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Glossary

Term	Definition
Activity (step, task)	<p>A description of a piece of work that forms one logical step within a process. An activity may be a manual activity, which does not support computer automation, or a workflow (automated) activity. A workflow activity requires human and/or machine resources(s) to support process execution; where human resource is required an activity is allocated to a workflow participant.</p>
Activity Instance	<p>The representation of an activity within a (single) enactment of a process, i.e., within a process instance. (See also general entry on Instance).</p> <ul style="list-style-type: none"> • An activity instance is created and managed by a workflow management system when required within the enactment of process, in accordance with the process definition. • Each activity instance represents a single invocation of an activity, relates to exactly one process instance and uses the process instance data associated with the process instance. Several activity instances may be associated with one process instance, where parallel activities exist within the process, but one activity instance cannot be associated with more than one process instance. • Each activity instance is normally capable of independent control and audit and exhibits internal state.
Activity State	<p>A representation of the internal conditions defining the status of an activity instance at a particular point in time. Most workflow management systems maintain such status information as part of their workflow control data. The WfMC Reference Model identifies a number of common states which an activity instance may take:</p> <ul style="list-style-type: none"> • Inactive - The activity instance has been created but may not yet been activated; no work item exists for that activity. • Active - One or more work items have been created and assigned for processing. • Suspended - The activity instance is quiescent; no further work items are started until it is resumed. (Note that some activities may not be suspend-able.) • Completed - The process instance has achieved its completion conditions and any post-completion system activities such as audit logging are in progress.

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Administrator	A workflow system user who has special privileges allowing various system set-up, control and management functions to be performed. In some systems these tasks may be shared between several administrators, each taking responsibility for separate areas of administration.
API Gateway	API gateways like Kong, Apigee, and AWS API Gateway provide a centralized entry point for managing and securing APIs. They often include features like rate limiting, caching, and request/response transformation.
API Management	API management is the set of people, processes and technology that enables an organization to publish APIs safely and securely, either internally or externally. Common components include an API gateway, developer portal, and administrative UI with reporting and analytics capabilities. Some API management solutions include monetization capabilities.
Application Data	Data that is application specific and not accessible by the workflow management system.
Architecture Design Description (ADD)	The Architecture Design Description (ADD) is a critical document in the field of software and systems engineering. It is used to provide a detailed and comprehensive description of the architectural design of a system, software application, or component. The ADD serves as a bridge between high-level design decisions and the actual implementation of the system. It helps stakeholders understand the architecture, its components, and how they interact with each other.
Architecture Principle	Define the underlying general rules and guidelines for the use and deployment of all IT resources and assets across the enterprise.
Audit Data	A historical record of the progress of a process instance from start to completion or termination. Such data normally incorporates information on the state transitions of the process instance
Audit Deficiency Rate (Compliance)	Audit deficiency rate measures the percentage of audit findings that are classified as deficiencies. The MSP should track audit deficiency rates and take corrective actions where necessary to ensure compliance with relevant regulations and standards.

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Automated Activity	An activity which is capable of computer automation using a workflow management system to manage the activity during execution of the business process of which it forms a part.
Automated Clearing House (ACH)	Automated Clearing House (ACH) is an electronic funds transfer system that enables the automated processing and settlement of financial transactions between banks and financial institutions. It facilitates the secure and efficient movement of funds between accounts, allowing for various types of payments such as direct deposits, bill payments, payroll transactions, and business-to-business transactions.
Business Continuity Plan (BCP)	A Business Continuity Plan (BCP) is a comprehensive document that outlines how an organization will maintain essential functions and operations during and after a significant disruption or disaster. The primary goal of a BCP is to ensure that the organization can continue its critical functions, deliver essential services, and minimize downtime in the face of unforeseen events such as natural disasters, cyberattacks, equipment failures, or other emergencies.
Business impact Analysis (BIA)	A business impact analysis (BIA) is the process of determining the criticality of business activities and associated resource requirements to ensure operational resilience and continuity of operations during and after a business disruption. The BIA quantifies the impacts of disruptions on service delivery, risks to service delivery, and recovery time objectives (RTOs) and recovery point objectives (RPOs). These recovery requirements are then used to develop strategies, solutions, and plans.
Business Process	A set of one or more linked procedures or activities which collectively realise a business objective or policy goal, normally within the context of an organisational structure defining functional roles and relationships.
Business to Business (B2B)	Business-to-business (B2B) refers to a type of commerce or transactional relationship between two or more businesses or organizations. In a B2B context, one business sells products, services, or solutions to another business, rather than directly to individual consumers (as in business-to-consumer or B2C transactions).
Change Failure Rate	Change failure rate measures the percentage of changes that result in incidents or outages. The MSP should track change failure rate to

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	identify areas for improvement and optimize the change management process.
Change Management Compliance Rate	Change management compliance rate measures the percentage of changes that are compliant with the client's change management policies and procedures. The MSP should track change management compliance rates and take corrective actions where necessary to minimize the risk of non-compliance.
Client Application	A client application is an application which interacts with a workflow engine, requesting facilities and services from the engine
Cloud Services	Cloud Services refers to technology that allows users to access and use shared data and computing services via the Internet or a Virtual Private Network. It gives users access to resources without having to build infrastructure to support these resources within their own environments or networks. Federal records can reside in a cloud environment hosted by a 3rd party service provider.
Code quality	This metric measures the quality of the code itself. It includes measures such as code maintainability, readability, complexity, and conformity to coding standards.
Commercial-off-the-shelf (COTS)	Commercial-off-the-shelf (COTS) refers to software, hardware, or other products that are readily available for purchase from commercial vendors or suppliers. These products are designed and manufactured for the general market and are not custom-built for a specific organization or project. COTS solutions are contrasted with custom or bespoke solutions that are developed in-house or by third-party contractors to meet specific, tailored requirements.
Computer Telephony Integration (CTI)	The intelligent linking of computers with switches, enabling coordinated voice and data transfers to the desktop.
Constraint	A condition (typically pertaining to activity/work selection and/or completion) which must be met during work processing; failure to meet a constraint may causes an exception condition or other defined procedure.
Continuous Deployment (CD)	Process that takes validated Features from a staging environment and deploys them into the production environment, where they are readied for release.

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Continuous Integration (CI) Process of taking features from the Program Backlog and developing, testing, integrating, and validating them in a staging environment where they are ready for deployment and release.

Controlled Vocabulary A defined list of explicitly allowed terms used to index, categorize, tag, sort, and retrieve content through browsing and searching; Defined policies control over who adds terms to the vocabulary (e.g., Librarian). ANSI standard provides guidelines for the construction, format, and management of monolingual controlled vocabularies. Primary purpose is to achieve consistency in the description of content objects and to facilitate retrieval

Data Architecture DMBOK describes Data Architecture as an integrated collection of master design documents at different levels of abstraction, including the standards that govern how data is collected, stored, arranged, used, and removed. It is also classified by descriptions of all the containers and paths that data takes through the organization's systems.

Data Archival The long-term storage of data that is no longer actively used or needed for day-to-day operations but must be retained for potential future access. It involves migrating data that has exceeded its operational use from primary storage systems to dedicated archival systems or media designed for infrequent access. The goal of data archiving is to optimize storage efficiency and costs, while ensuring data permanence and availability for historical reference, audits, or regulatory compliance.

Data Breach Incident Rate The data breach incident rate measures the frequency of data breaches or unauthorized access incidents. The MSP should track the data breach incident rate and take corrective actions where necessary to minimize the risk of non-compliance and protect the client's data.

Data classification Data classification is a critical process in information security and data management that involves categorizing data based on its sensitivity, importance, and the level of protection it requires. The purpose of data classification is to ensure that data is handled, stored, and protected in accordance with its value and risk to the organization. By classifying data, organizations can establish clear policies and procedures for data access, storage, sharing, and disposal, which helps mitigate security risks and compliance challenges.

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Data Cleansing The mechanisms, processes, and methods employed to validate or correct data with respect to predefined business rules, allowed values, ranges, etc.
Source: DAMADMBOK.

Data Dictionary A catalogue of the solution’s data structure including the database, tables, fields, etc. Also includes mapping as necessary for data migration from the current to future data model.

Data Element A basic unit of information having a meaning and that may have subcategories (data items) of distinct units and values.

Data Entity An encapsulation of data that is recognized by a business domain expert as a thing. Logical data entities can be tied to applications, repositories, and services and may be structured according to implementation considerations.

The data entities in a package/package services environment can be classified as master data, reference data, transactional data, content data, and historical data. Applications that operate on the data entities include transactional applications, information management applications, and business warehouse applications.

Data Governance DMBOK describes Data Governance (DG) as the exercise of authority and control (planning, monitoring, and enforcement) over the management of data assets.

Data Loss Prevention (DLP) Describes a set of technologies and inspection techniques used to classify information content contained within an object —such as a file, email, packet, application, or data store —while at rest (in storage), in use (during an operation) or in transit (across a network). DLP tools are also can dynamically apply a policy —such as log, report, classify, relocate, tag, and encrypt —and/or apply enterprise data rights management protections.

Data Management Book of Knowledge (DMBOK) Presents a comprehensive view of the challenges, complexities, and value of effective data management.
<https://www.dama.org/>

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Data Management Maturity Model (DMM)	<p>The DMM Program provides the best practices roadmap and services to help organizations build, improve, and measure their enterprise data management function and staff. The program centers around the Data Management Maturity (DMM) model, a comprehensive framework of data management practices in six key categories that helps organizations benchmark their capabilities, identify strengths and gaps, and leverage their data assets to improve business performance.</p> <p>https://cmmiinstitute.com/data-management-maturity</p>
Data Modeling	<p>DMBOK describes Data modeling as the process of discovering, analyzing, and scoping the data requirements, and then representing and communicating these data requirements in a precise form called the data model. This process is iterative and may include a conceptual, logical and physical model.</p>
Data Owners	<p>Authorize access to information in accordance with the classification of the information and the need for access to it. Data Owners also monitor and ensure compliance with all applicable laws, security policies and procedures affecting the information. They create, manipulate, and report on data from within a business program perspective. They also sign-off on data requests, etc.</p>
Data Retention	<p>DMM describes data retention as: Ensure the data maintenance will satisfy organizational and regulatory requirements for historical data availability, and the legal and regulatory requirements for data archiving and retention of data are met.</p>
Data Steward	<p>Data Stewards manage data assets on behalf of others and in the best interests of the organization. Data Stewards represent the interests of all stakeholders and must take an enterprise perspective to ensure data is of high quality and can be used effectively. Data Stewards are designated by the Business Owners. Data Stewards are assigned to each subject area.</p> <ul style="list-style-type: none"> • Ensures the day-to-day and project-by-project, data governance policies and initiatives are adhered to. • Influence decisions to ensure that data is managed in ways that support the overall goals of the organization. • Usually responsible for the business glossary content. • Responsible for evaluating and determining the appropriate confidentiality level for data based on the organization's classification scheme.

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- Define the confidentiality and regulatory categories within the Metadata repository.
- Accountable for controlling and ensuring the quality of Reference Data.
- May create and manage core metadata; document rules and standards; manage data quality issues; and execute operational data governance activities.

Data Store A data store, also known as a data repository or data storage, refers to a centralized location or system where data is stored, organized, and managed. It serves as a reliable and structured storage medium for various types of data, enabling efficient data access, retrieval, and manipulation.

Data Warehouse A data warehouse is a centralized repository of integrated data from one or more disparate sources. It stores current and historical data in one single place in an organized, structured way that is optimized for reporting, visualization, analytics, and data mining. The key functions of a data warehouse include data cleansing, data integration from different sources, data transformation and enrichment, as well as data organization and storage.

Data workaround rate This metric measures the frequency with which data is altered or “curated” to fit within the bounds or processing needs of a system, even though it may not be accurate to do so.

De-identification De-identification is the process used to prevent someone's personal identity from being revealed. Typically, this refers to masking PII data.

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Deadline	<p>A time-based scheduling constraint which requires that a certain activity (or work item) be completed by a certain time (the "deadline").</p> <ul style="list-style-type: none"> • Activity scheduling by a workflow management system will attempt to meet deadline constraints set against particular activities. • The deadline may be expressed as an attribute of the process definition or within workflow relevant data. • Escalation procedures may be invoked if deadlines are not meant.
Defect density	This metric measures the number of defects found per unit of code. It can be used to identify areas of the code that require further testing or improvement.
Deployment Frequency	Deployment frequency measures the number of deployments per unit of time. The MSP should track deployment frequency to ensure that updates and changes are delivered quickly and efficiently.
Development & Operations (DevOps)	The goal of DevOps is to help bring together developers who write application software and operations who run the software in production. Also, to build and maintain the infrastructure where it runs. DevOps replaces the old approach of development teams writing applications then throwing them over the wall to an operations team who deploys and manages the software with minimal visibility into how it was developed. In a DevOps environment, developers and operations teams work side by side throughout the entire process of developing, deploying, and managing applications.
Device Compatibility	Mobile-friendly websites and applications should be compatible with various mobile devices, operating systems, and browsers. Compatibility testing across different devices and screen sizes is crucial to ensure a consistent experience for all users.
Digital Forensics	The use of specialized, investigative techniques and technologies to determine whether illegal or otherwise inappropriate events have occurred on computer systems and provide legally defensible information about the sequence of those events.
Digital Media (Audio)	Digital Media (Audio) encompass formats used to encode recorded sound as machine readable files by converting acoustic sound waves into digital signals that meet the definition of Federal records. Digital audio formats are generally composed of both a wrapper format, usually the common name associated with the file extension, and an encoding

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method or codec. These records must also be in the correct file formats according to NARA's transfer guidance.

Digital Media (Photo)	Digital Media (Photo) include still photographs of natural, real-world scenes or subjects produced by digital cameras, and scanned images of photographic prints, slides, and negatives that meet the definition of Federal records. These records must also be in the correct file formats according to NARA's transfer guidance.
Digital Media (Video)	Digital Media (Video) refers to digital moving images consist of bitmap digital images or "frames" displayed in rapid succession at a constant rate, giving the appearance of movement. Includes both video digitized from analogue sources and born digital video that meet the definition of Federal records. These records must also be in the correct file formats according to NARA's transfer guidance.
Disaster Recovery Test Frequency	Measures how frequently the organization undergoes a tabletop exercise simulating a disaster recovery scenario.
Document Imaging	The process of capturing, storing, and retrieving documents regardless of original format, using micrographics and/or electronic imaging (scanning, OCR, ICR, etc.). (ISO 12651-1)
Electronic imaging	A technique for inputting, recording, processing, storing, transferring, and using images. (ISO 12651-1)
Electronic Messages	Electronic Messages refers to email messages, instant messages, chat messages, text messages, and voicemail messages that meet the definition of Federal records.
Email Record	Email correspondence with a customer during business is also considered to be a WCB record and shall be retained as part of the customer file.
Enterprise Content Management (ECM)	Enterprise Content Management (ECM) refers to the strategies, tools, and processes used by organizations to capture, manage, store, preserve, and deliver content and documents related to their business operations. ECM systems are designed to facilitate efficient document management, content collaboration, and information governance across an enterprise.

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Escalation	A procedure (automated or manual) which is invoked if a particular constraint or condition is not met.
ETL(Extract, Transform, Load)	Tools like Apache NiFi, Talend, and Apache Beam are used for data integration, data transformation, and loading data from various sources into data warehouses, data lakes, or other destinations.
Event	An occurrence of a particular condition (which may be internal or external to the workflow system) which causes the workflow management software to take one or more actions. For example, the arrival of a particular type of email message may cause the workflow system to start an instance of a specific process definition.
Extensible Markup Language (XML)	XML is a widely used markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. XML is designed to store and transport data, making it suitable for a wide range of applications and industries.
Extract Transform and Load (ETL)	Extract, Transform, Load (ETL) is a process commonly used in data integration and data warehousing. It involves the extraction of data from source systems, the transformation of that data into a format suitable for analysis or reporting, and the loading of the transformed data into a target system, often a data warehouse. ETL is a crucial part of the data pipeline in organizations, allowing them to collect, clean, and prepare data for analysis, reporting, and business intelligence purposes.
Field Duplication Rate	A measure of DevOps tool usage efficiency by determining how many custom data fields are created and used where standard fields already exist.
File Share	File sharing tools allow you to transfer files, distribute them and give access to them. Shared files can be various kinds: software, books, videos, documents, etc. These tools avoid transferring everything via email and saturating inboxes with heavy files. Examples: Box, Titan, Microsoft.
First Call Resolution (FCR)	FCR measures the percentage of support calls that are resolved on the first call. A higher FCR indicates a more efficient and effective support process.

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Forms Management	The centralized establishment of standards for forms and their application. This includes management techniques for the creation, analysis, design and revision of all official forms. Forms management assures better quality forms through controls on their design and production, greater efficiency in gathering and processing of information, and the economical and efficient distribution of forms.
GraphQL	GraphQL is an alternative to RESTful APIs that allows clients to request only the data they need. It provides a more flexible and efficient way to integrate and query data from different sources.
gRPC	gRPC is an open-source, high-performance remote procedure call (RPC) framework developed by Google. It is designed for building efficient and scalable communication systems between applications and services, particularly in a microservices architecture.
Hybrid Cloud	Hybrid cloud is a cloud computing environment that combines elements of both public cloud and private cloud services, allowing data and applications to be shared between them. In a hybrid cloud setup, an organization typically maintains some of its computing resources and applications in a private cloud, while utilizing public cloud services for others. The two cloud environments are typically connected and can work together seamlessly.
Hypertext Transfer Protocol Secure (HTTPS)	It is a secure version of the standard HTTP protocol used for transmitting data over the internet. HTTPS is designed to provide secure communication by encrypting the data exchanged between a user's web browser and a website's server.
Imaging	Imaging allows organizations to capture paper-based information and convert it to electronic images that are stored in a computer electronically.
Incident Closure Rate	Incident closure rate measures the percentage of incidents or outages that are resolved and closed within a specified time frame. The MSP should aim for a high incident closure rate to ensure timely resolution and minimize the impact on the client.
Information Lifecycle	The life cycle of information management encompasses the following: planning; the collection, creation, receipt, and capture of information; its organization, use and dissemination; its maintenance, protection and preservation; its disposition; and its evaluation.

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Information Sharing Agreement	An Information Sharing Agreement (ISA) is a formal, legally binding document that outlines the terms and conditions under which organizations or entities agree to share specific types of information with one another. ISAs are commonly used in various contexts, including business partnerships, government agencies, research collaborations, and data-sharing initiatives. The primary purpose of an ISA is to define the rights, responsibilities, and restrictions associated with the sharing of information to ensure data privacy, security, and compliance with relevant laws and regulations.
Instance (as in Process or Activity Instance)	The representation of a single enactment of a process, or activity within a process, including its associated data. Each instance represents a separate thread of execution [1] of the process or activity, which may be controlled independently and will have its own internal state and externally visible identity, which may be used as a handle, for example, to record or retrieve audit data relating to the individual enactment.
Instrumentation	Refers to the process of adding code or tools to monitor, measure, and collect data about the application's behavior, performance, and usage. This collected data is valuable for various purposes, including troubleshooting issues, optimizing performance, and gaining insights into how users interact with the software. Instrumentation can be applied to various parts of an application, such as code, infrastructure, and user interfaces.
Interactive Voice Response (IVR)	Interactive Voice Response (IVR) is a technology that allows computer systems to interact with humans through voice and DTMF (dual-tone multi-frequency) tones via the telephone keypad. IVR systems are widely used in various industries and applications to automate interactions, provide information, and route calls to the appropriate destination.
Interface Catalog	The purpose of an Interface Catalog is to scope and document the interfaces between applications to enable the overall dependencies between applications to be scoped as early as possible. This mapping enables: <ul style="list-style-type: none"> • Understand the degree of interaction between applications, identifying dependencies. • Understand the number and types of interfaces between applications • Understand the degree of duplication of interfaces between applications

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- Identify potential interface simplification when considering the target Application Portfolio

Interface Control Document (ICD) An Interface Control Document (ICD) is a formal document used in engineering and technical projects to define and describe the interfaces between different system components, subsystems, or entities. These interfaces can encompass hardware, software, data, or communication protocols. The primary purpose of an ICD is to ensure that different parts of a complex system can interact seamlessly and that all stakeholders have a clear understanding of how these interactions should occur.

Interface Testing Interface testing aims at verifying whether the components interface correctly to provide the correct exchange of data and control information. Usually, the test cases are generated from the interface specification. A specific objective of interface testing is to simulate the use of APIs by end-user applications. This involves the generation of parameters of the API calls, the setting of external environment conditions, and the definition of internal data that affect the API.

Invoked Applications An invoked application is a workflow application that is invoked by the workflow management system to automate an activity, fully or in part, or to support a workflow participant in processing a work item.

Iteration A workflow activity cycle involving the repetitive execution of one (or more) workflow activity(s) until a condition is met.

JavaScript Object Notation (JSON) JavaScript Object Notation, commonly known as JSON, is a lightweight data-interchange format that is easy for humans to read and write and easy for machines to parse and generate. JSON is often used for data transmission between a server and a web application or between different parts of an application.

Learnability Learnability refers to the ease with which users can learn to use a software interface or system. It measures how quickly and efficiently users can understand and become proficient in utilizing the features and functionalities of the software.

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Lightweight Directory Access Protocol (LDAP)

The Lightweight Directory Access Protocol is an open, vendor-neutral, industry standard application protocol for accessing and maintaining distributed directory information services over an Internet Protocol network.

Managed File Transfer (MFT)

A technology that provides the secure transfer of data in an efficient and a reliable manner. Unlike traditional file transfer tools, such as FTP and scripting, MFT core functionalities include the ability to secure files in transit and at rest and reporting and auditing of file activity. What also differentiates MFT from other forms of infrastructure and integration technologies is its unique focus on managing the transfer of large file sizes and volume.

Manual Activity

An activity within a business process which is not capable of automation and hence lies outside the scope of a workflow management system. Such activities may be included within a process definition, for example to support modelling of the process, but do not form part of a resulting workflow.

Master Data Management

Master data management (MDM) is a comprehensive method for enabling an enterprise to link all of its critical data to one file, called a master file, that provides a common point of reference. MDM streamlines data sharing across users and departments to ensure consistency in the data used throughout the organization. This master file contains the essential information, such as member information, department data, vendors, or accounts, that runs the business. MDM solutions centralize the management of this master data to improve data quality, achieve better data governance, and reduce costs related to data inconsistencies across systems and processes.

Mean Time Between Failures (MTBF)

MTBF measures the average time between system failures or incidents. A higher MTBF indicates greater system reliability, which is critical for services that require high availability.

Mean Time to Detect (MTTD) (Incident)

MTTD measures the average time it takes to detect an incident or outage. A shorter MTTD is better, as it enables the MSP to respond quickly and minimize the impact on the client.

Mean Time to Repair (MTTR)

Mean Time to Repair (MTTR): MTTR measures the average time taken to repair or restore a service after an incident or outage. This metric is

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critical for services that require high availability, as it measures the time taken to restore service in the event of an outage.

Mean Time to Respond (MTTR) (Incident)	MTTR measures the average time it takes to respond to an incident or outage. A shorter MTTR is better, as it enables the MSP to resolve the issue quickly and minimize the impact on the client.
Mean Update Delay	A measure of how up to date the data within the DevOps tools is kept, and whether there is any gap between reported metrics and actual data.
Metadata Management	Provides a top-down approach to architecting, planning, populating, and managing the metadata repository to fully describe the organization's data assets.
Microservices	Microservices architecture involves breaking down a monolithic application into smaller, loosely coupled services that can be developed, deployed, and scaled independently. Microservices communicate with each other through APIs and often use lightweight protocols like HTTP/REST or gRPC for communication.
Mobile-friendly	Mobile-friendly refers to a design or functionality that is specifically tailored and optimized for mobile devices such as smartphones and tablets. A mobile-friendly website or application ensures that users can easily access and interact with the content, features, and functionality on smaller screens and touch-based interfaces commonly found on mobile devices.
MSP	Managed Service Provider
Multi-factor Authentication (MFA)	Multi-factor Authentication (MFA), also known as Two-Factor Authentication (2FA) or Two-Step Verification, is a security process in which a user is required to provide two or more different authentication factors to verify their identity and gain access to a system, application, or account. MFA enhances security by adding an extra layer of protection beyond traditional username and password authentication.
NACHA	NACHA, formerly known as the National Automated Clearing House Association, is a nonprofit organization that develops and maintains rules and standards for the ACH (Automated Clearing House) Network, which is a highly reliable and efficient electronic funds transfer system used in the United States.

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NIST Standards	NIST standards in the context of integration practices refers to the NIST Special Publication 800-53, often abbreviated as NIST SP 800-53 or simply SP 800-53, is a document published by the National Institute of Standards and Technology (NIST) in the United States. It provides a comprehensive set of security controls and guidelines for federal information systems and organizations, with a focus on information security and cybersecurity. The document is officially titled "Security and Privacy Controls for Federal Information Systems and Organizations."
OAuth and OpenID Connect	These authentication and authorization protocols are commonly used for securing API access and enabling single sign-on (SSO) between applications. OAuth is often used for delegated authorization, while OpenID Connect provides identity layer on top of OAuth.
On-Prem	"On-prem" is a shortened form of "on-premises," and it refers to computing resources, software, or infrastructure that is physically located and managed within an organization's own facilities or data centers, rather than being hosted or managed in a cloud-based environment or at a third-party data center.
Open API	The OpenAPI Specification (OAS), formerly known as Swagger, is an open standard for describing and documenting RESTful APIs. It provides a standardized way to describe the structure, functionality, and interactions of APIs, making it easier for developers to understand, consume, and interact with these APIs.
Organizational Model	A model which represents organisational entities and their relationships; it may also incorporate a variety of attributes associated with the entities. Such a model may be realised in a directory or other form of database.
Organizational Role	A group of participants exhibiting a specific set of attributes, qualifications and/or skills.
Parallel Routing	A segment of a process instance under enactment by a workflow management system, where two or more activity instances are executing in parallel within the workflow, giving rise to multiple threads of control.

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Pension Administration System (PAS) The software used to administer pension plans.

Personal Health Information “Personal health information” means, with respect to an individual, whether living or deceased:

- (i) information with respect to the physical or mental health of the individual;
- (ii) information with respect to any health service provided to the individual;
- (iii) information with respect to the donation by the individual of any body part or any bodily substance of the individual or information derived from the testing or examination of a body part or bodily substance of the individual;
- (iv) information that is collected:
 - A. in the course of providing health services to the individual; or
 - B. incidentally to the provision of health services to the individual; or
- (v) registration information.

Personally Identifiable Information (PII) Personally identifiable information (PII) refers to any data that could potentially identify a specific individual. It can include direct identifiers like names, identification numbers, and contact information. PII also encompasses indirect personal information that could be used to deduce a person's identity, such as date and place of birth, mother's maiden name, or biometrics. Stringent security controls are necessary when handling PII to comply with privacy regulations and avoid identity theft. Redacting, encrypting, or replacing PII with substitutes can help de-identify or mask data when storing or transferring sensitive personal information.

Plan of Action and Milestones (POAM) Is a critical document used in the field of cybersecurity and information security management. It is typically associated with compliance frameworks and regulations, such as the Federal Information Security Management Act (FISMA) in the United States. The primary purpose of a POAM is to outline specific corrective actions and timelines for addressing identified security weaknesses, vulnerabilities, or deficiencies within an organization's information systems.

Policy Violation Rate (Compliance) Policy violation rate measures the frequency of policy violations within the MSP's organization or the client's organization. The MSP should track

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policy violation rates and take corrective actions where necessary to minimize the risk of non-compliance.

Post-Condition	A logical expression which may be evaluated by a workflow engine to decide whether a process instance or activity within a process instance is completed.
Pre-Condition	A logical expression which may be evaluated by a workflow engine to decide whether a process instance or activity within a process instance may be started.
Process	A formalised view of a business process, represented as a co-ordinated (parallel and/or serial) set of process activities that are connected in order to achieve a common goal.
Process Definition	The representation of a business process in a form which supports automated manipulation, such as modelling, or enactment by a workflow management system. The process definition consists of a network of activities and their relationships, criteria to indicate the start and termination of the process, and information about the individual activities, such as participants, associated IT applications and data, etc.
Process Execution	The time period during which the process is operational, with process instances being created and managed.
Process Instance	<p>The representation of a single enactment of a process. * A process instance is created, managed and (eventually) terminated by a workflow management system, in accordance with the process definition.</p> <ul style="list-style-type: none"> • Each process instance represents one individual enactment of the process, using its own process instance data, and which is (normally) capable of independent control and audit as it progresses towards completion or termination. It represents the unit of work with respect to a business process which passes through a workflow management system (for example, the processing of one insurance claim, or the production of one engineering design). • Each process instance exhibits internal state, which represents its progress towards completion and its status with respect to its constituent activities. (See Process State) <p>(Some business processes may never "complete" within a defined timescale in the accepted sense of the word, but achieve a protracted, persistent dormant state, which may require the process instance to be placed in an archive state, for example to support legal requirements on the maintenance of process data.)</p>

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Process Role	A mechanism that associates participants to a collection of workflow activity(s).
Process State	<p>A representation of the internal conditions defining the status of a process instance at a particular point in time. Most workflow management systems maintain such status information as part of their workflow control data.</p> <p>The WfMC Reference Model identifies a number of common states which a process instance may take:</p> <ul style="list-style-type: none"> • Initiated - The process instance has been created but may not yet be running. • Running - The process instance has started execution and one or more of its activities may be started. • Active - One or more activities are started and activity instances exist. (Further sub-states may be supported by particular implementations to record more detailed information about active activities.) • Suspended - the process instance is quiescent; no further activities are started until it is resumed. • Complete - the process instance has achieved its completion conditions and any post-completion system activities such as audit logging are in progress. • Terminated - the execution of the process has been stopped (abnormally) due to error or user request. • Archived - the process instance has been placed in an indefinite archive state (but may be retrieved for process resumption - typically supported only for long-lived processes).
Record Series	The record series is the lowest level of classification included in an ORS. It consists of a grouping of records which are functionally similar, and which share a common retention period.
Records Management (RM)	ISO standard 15489:2001 defines Records Management (RM) as the field of management responsible for the efficient and systematic control of the creation, receipt, maintenance, use, and disposition of records, including the processes for capturing and maintaining evidence of and information about business activities and transactions in the form of records.
Records Schedule	An official policy document that incorporates a classification system with a retention schedule and arranges records into logical groupings (generally referred to as records series) based on business functions.

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Recovery Point Objective (RPO)	RPO defines the acceptable amount of data loss that an organization can tolerate after a disaster. It indicates the maximum time interval between the most recent backup and the point of failure. In other words, it represents the amount of data that can be lost during recovery.
Recovery Time Objective (RTO)	RTO represents the targeted duration within which systems, applications, or services should be recovered after a disaster. It defines the maximum tolerable downtime, indicating how quickly the recovery process should be completed.
Reference Data Management	Refers to the set of processes, governance, and technology solutions involved in managing critical shared master data domains such as customers, products, suppliers, employees or chart of accounts. RDM aims to ensure the quality, accuracy, governance and timely availability of this common reference data to support business processes and analytics. It establishes golden sources of truth for key data elements, mapping and traceability mechanisms, stewardship responsibilities, change control procedures and workflows to distribute updates across systems. The objectives are to increase productivity through data standardization, minimize errors and costs from duplications, and enable a single integrated view of information across an organization.
Resolution Time	Resolution time measures the time taken by the MSP to resolve a client's issue or request. The SLA typically specifies a maximum time limit for resolution, which can vary depending on the severity of the issue.
Response Time	Response time measures the time taken by the managed service provider (MSP) to respond to a client's request for support. The response time SLA typically specifies a maximum time limit for the MSP to respond to a request, such as 15 minutes or 1 hour.
Responsive Design	The application should automatically adjust its layout, content, and interface elements based on the screen size and orientation of the mobile device. This ensures that the content is displayed appropriately and remains readable and usable.
RESTful	RESTful, short for Representational State Transfer, is an architectural style for designing networked applications. It is not a protocol or a standard but a set of constraints and principles that define how web services should be designed and structured.

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Retention Period	Retention periods represent the minimum amount of time that your agency will keep the records classified within each bucket. Setting appropriate retention periods can be difficult. You must consider business, legal, and administrative needs as well as any historical or reference use your agency may have for the records.
Retention Schedule	After such identification has occurred the RM will develop a records retention schedule (RRS), archiving and destruction of information.
Risk Assessment Results (Compliance)	Risk assessments are a process for identifying and evaluating risks to the MSP and the client. The MSP should conduct regular risk assessments and track the results to identify areas of non-compliance and prioritize corrective actions.
Robotic process automation (RPA)	Robotic process automation (RPA) is the term used for software tools that partially or fully automate human activities that are manual, rule-based, and repetitive. They work by replicating the actions of an actual human interacting with one or more software applications to perform tasks such as data entry, process standard transactions, or respond to simple customer service queries. Indeed, the “chatbot” that has started to become ubiquitous on websites is almost always a robotic process automation tool, not a human. It can handle the typical standard queries like “where is X on the website”, “how do I reset my password”, and the like.
Root Cause Analysis (Incident)	Root cause analysis is a process for identifying the underlying cause of an incident or outage. The MSP should perform root cause analysis for all incidents and outages to identify the root cause and prevent similar incidents from occurring in the future.
Security Assertion Markup Language (SAML)	SAML is an XML-based open standard for exchanging authentication and authorization data between parties, particularly in web-based applications. SAML enables Single Sign-On (SSO) and allows different systems to make assertions about the identity of users and their privileges. It is commonly used in scenarios where users need to access multiple applications or services with a single login.
Security Information and Event Management (SIEM)	It refers to a comprehensive set of technologies and processes used to monitor, collect, analyze, and manage security-related information in an organization's IT environment. SIEM systems provide a centralized

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platform for detecting and responding to security incidents, helping organizations protect their digital assets and sensitive data.

Sequential Routing A segment of a process instance under enactment by a workflow management system, in which several activities are executed in sequence under a single thread of execution. (No -split or -join conditions occur during sequential routing.)

Service Mesh Service mesh technologies like Istio and Linkerd focus on handling communication between microservices within a cluster. They provide features like load balancing, traffic routing, and security at the network level.

Shared Drives Shared Drives, also known as network drives, refer to managed shared servers which provide electronic storage space for authorized users to house Federal records in supported file formats. Shared Drives can be managed on premises or in the cloud. Examples include SharePoint, OneDrive, and Google Drive.

The use of shared drives poses recordkeeping challenges because agencies may store content that includes Federal records and non-record materials.

Simple Network Management Protocol (SNMP) Simple Network Management Protocol (SNMP) is a widely used network protocol for managing and monitoring network devices and systems. SNMP is an application-layer protocol that allows network administrators to collect information from network devices, monitor network performance, and configure remote devices. It is particularly valuable for managing and troubleshooting complex network environments.

Single Sign-On (SSO) Single Sign-On (SSO) is an authentication mechanism that enables users to access multiple applications or services with a single set of login credentials (such as a username and password). Instead of requiring users to remember and enter separate usernames and passwords for each application, SSO allows them to log in once, and then they are granted access to multiple applications without the need to reauthenticate for each one.

Social Media Social Media refers to messages generated through a social media application that meet the definition of Federal records. Examples of

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	social media applications include Facebook, Twitter, Slack, Pinterest, Google Plus, and Skype, among others.
Software Configuration Management (SCM)	Software Configuration Management is the discipline of managing and controlling the evolution of software systems throughout their lifecycle. It involves the systematic management of software configuration items (SCIs), which are the components that make up the software, including source code, documentation, libraries, and other related artifacts. SCM aims to ensure that software systems are developed, maintained, and delivered in a controlled and predictable manner.
State Transition	A movement from one internal state (of a Process or Activity Instance) to another within a workflow, reflecting a change in the status of the workflow, for example initiating a particular activity. The state transition may be in response to an external event, a user API call, a routing decision taken by the workflow engine, etc.
Structured Data	Structured data refers to data that is stored in defined fields. Categories for structured data include database formats, spreadsheets, statistical data that is the result of quantitative research and analysis, and scientific data collected by instrumentation tools during the scientific process.
Sub Process	A process that is enacted or called from another (initiating) process (or sub process), and which forms part of the overall (initiating) process. Multiple levels of sub process may be supported.
System Security Plan (SSP)	A System Security Plan (SSP) is a comprehensive document that outlines the security controls, policies, and procedures for a computer system, network, or information technology (IT) system. It is a crucial component of an organization's overall cybersecurity strategy and is often required for compliance with various regulatory frameworks and standards, such as the Federal Information Security Modernization Act (FISMA) in the United States or the General Data Protection Regulation (GDPR) in the European Union.
Tagging	In a general sense, tagging refers to the act of applying managed metadata to an item.
Taxonomy	A taxonomy is a formal classification system. A taxonomy groups the words, labels, and terms that describe something, and then arranges the groups into a hierarchy. All these taxonomies are structured

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hierarchies of information; formal classification systems that help people handle information.

Technical Debt Measurement	Assess and track the level of technical debt in the software product. Technical debt represents design or implementation compromises made to expedite development, which can result in increased effort and time required for future changes. Monitor metrics such as code complexity, code duplication, and adherence to coding standards.
Test Coverage	Test coverage measures the percentage of code that is covered by automated tests. The MSP should track test coverage to ensure code quality and reduce the risk of incidents or outages.
Threat Detection Time	Threat detection time measures the time it takes to detect security threats or incidents. The MSP should track threat detection time to ensure quick incident response and minimize the impact of security incidents.
Transition Condition	A logical expression which may be evaluated by a workflow engine to decide the sequence of activity execution within a process.
Uptime	Uptime measures the amount of time that the service is available to the client. It is usually expressed as a percentage of the total time, such as 99.9% uptime. High uptime is critical for services that require continuous availability, such as web hosting or cloud services.
User Experience (UX)	<p>User Experience (UX) refers to the overall experience and satisfaction that a user has while interacting with a product, system, or service. It encompasses every aspect of the user's interaction, including their perceptions, emotions, behaviors, and responses.</p> <p>A good user experience is characterized by a design that is intuitive, efficient, enjoyable, and meets the user's needs and goals. It involves considering the user's context, preferences, and capabilities to create a seamless and meaningful interaction. UX design focuses on enhancing usability, accessibility, and pleasure in the user's journey.</p>
User Personalization	User personalization refers to the practice of tailoring and customizing a user's experience, content, and interactions based on their specific preferences, characteristics, behavior, and context. It involves delivering personalized and relevant content, recommendations, features, and

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functionalities to individual users, with the aim of enhancing their engagement, satisfaction, and overall user experience.

Vulnerability Management

Vulnerability management measures the effectiveness of the MSP's vulnerability management program in identifying, assessing, and remediating vulnerabilities. The MSP should track the number of vulnerabilities identified, the time taken to remediate them, and the success rate of remediation efforts.

WAPI

WAPI is an abbreviation for Workflow APIs and Interchange Formats, published by the Workflow Management Coalition, and incorporating specifications to enable interoperability between different components of workflow management systems and applications.

Web Accessibility

Web accessibility refers to the inclusive practice of designing and developing websites and web content in a way that ensures equal access and usability for people with disabilities. It involves creating digital environments that can be perceived, understood, navigated, and interacted with by a diverse range of users, including those with visual, auditory, physical, cognitive, or neurological impairments.

The goal of web accessibility is to remove barriers and provide equal opportunities for individuals with disabilities to access and engage with web-based information, services, and functionalities. It promotes inclusivity, independence, and equal participation, aligning with the principles of universal design.

Web Content Accessibility Guidelines (WCAG)

Web Content Accessibility Guidelines (WCAG) is a set of internationally recognized guidelines developed by the World Wide Web Consortium (W3C) to ensure web content is accessible to a wide range of users, including those with disabilities. WCAG provides a framework for designing, developing, and evaluating accessible web content and user interfaces.

Websites

Websites refers to

- (1) web content records, which represent information presented on a website, and
- (2) website administrative records, which provide evidence of the management and operations of the website.

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Examples of website records include the following: web page content, dynamic content, scripts, list of URLs referenced by hyperlinks, website design records, etc.

Work Item (Work Object, Work Queue Item)

The representation of the work to be processed (by a workflow participant) in the context of an activity within a process instance. * An activity typically generates one or more work items which together constitute the task to be undertaken by the user (a workflow participant) within this activity

In certain cases, an activity may be completely handled by an invoked application which can operate without a workflow participant, in which case there may be no work item assignment.

- The work item(s) are normally presented to the user via a work list, which maintains details of the work items allocated to a user, and a worklist handler, which interacts with the worklist on the behalf of the user.
- The control and progression of work items rests with the worklist handler and the user, rather than the workflow engine, which is notified of work item status (e.g., completion) via the worklist handler interface. (The WfMC WAPI interface includes standard API calls for this purpose.)
- Tools or applications may be invoked to support the processing of a work item, or it may be processed independently by a workflow participant, with the workflow management system merely notified of the completion of work items.

Work Item Pool

The representation of all work items accessible from a particular workflow engine

Workflow Application

A general term for a software program that interacts with a workflow enactment service, handling part of the processing required to support a particular activity (or activities).

Workflow Control Data

Data that is managed by the Workflow Management System and/or a Workflow Engine. Such data is internal to the workflow management system and is not normally accessible to applications

Workflow Definition

That part of the process definition which comprises the automatable activities.

Workflow Domain

A workflow management service that consists of one or more workflow engines which are managed as a homogeneous unit, operating to a common administrative model.

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Workflow Enactment Service	A software service that may consist of one or more workflow engines in order to create, manage and execute particular workflow instances. Applications may interface to this service via the workflow application programming interface (part of WAPI).
Workflow Engine	A software service or "engine" that provides the run time execution environment for a process instance.
Workflow Interoperability	The ability for two or more Workflow Engines to communicate and work together to co-ordinate work.
Workflow Management System (WMS)	A system that defines, creates and manages the execution of workflows through the use of software, running on one or more workflow engines, which is able to interpret the process definition, interact with workflow participants and, where required, invoke the use of IT tools and applications
Workflow Monitoring	The ability to track and report on workflow events during workflow execution.
Workflow Participant	A resource which performs the work represented by a workflow activity instance. This work is normally manifested as one or more work items assigned to the workflow participant via the worklist.
Workflow Relevant Data	Data that is used by a Workflow Management System to determine the state transitions of a workflow instance, for example within pre- and post-conditions, transition conditions or workflow participant assignment.
Worklist (Work Queue)	<p>A list of work items associated with a given workflow participant (or in some cases with a group of workflow participants who may share a common worklist). The worklist forms part of the interface between a workflow engine and the worklist handler.</p> <ul style="list-style-type: none"> • Generally, a worklist handler will request work items from a workflow engine to create such a list. This is sometimes done via a query mechanism. • In some workflow management systems work items may be placed in the worklist by a workflow engine for subsequently access and actioning by the worklist handler.

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Worklist Handler

A software component that manages the interaction between the user (or group of users) and the worklist maintained by a workflow engine. It enables work items to be passed from the workflow management system to users and notifications of completion or other work status conditions to be passed between the user and the workflow management system. *A worklist handler may be vendor supplied as a component of the workflow management software or may be developed as a standalone custom application. A worklist handler may communicate with several workflow systems, consolidating user work items into a single list of tasks for presentation to the user. This principle may be extended to include other external information sources such as mail in-tray items. Possible functions that may be performed by the worklist handler include:

- Selecting a work item
- Reassigning a work item
- Notifying completion of a work item
- Invocation of a tool or client application as part of the work item processing
- The WfMC WAPI interface includes standard API calls for worklist handler communication with a workflow engine